



ISSN 0971-8834

RNI-JK-ENG-1994-2673

# JK-Practitioner

International Journal of Current Medical Science & Practice

January-June 2023

Volume 28: Number 1-2

www.jkpractitioner.com

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TITLE	JK-PRACTITIONER
PLACE OF PUBLICATION	SRINAGAR
PERIODICITY OF PUBLICATION	QUARTERLY
PUBLISHER'S NAME	DR. G. M. MALIK
WHETHER CITIZEN OF INDIA	YES
ADDRESS	JHEM MARKET, BATMALOO
EDITOR'S NAME	DR. G.M. MALIK
WHETHER CITIZEN OF INDIA	YES
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JK-Practitioner  
ISSN 0971-8834

Volume 28, Number (1-2)  
RNI-JK-ENG-1994-2673

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The **JK-PRACTITIONER**- Frequency Quarterly, one volume per year beginning in January. Other issues in April, July and October. **Correspondence regarding Editorial matters** should be addressed to the Chief Editor, G M Malik, PO BOX No.884,GPO, Srinagar, Kashmir (INDIA). **Annual Subscription rates:-Personal Rs.1500/- Institutional Rs.2000/-, Reduced Rs.1200/-Institutional rate** applies to Libraries, Schools, Hospitals, Clinics, Commercial and Private institutions and organisations. **Reduced rate** is available for medical students only. **Rates outside India** US \$100/-Gulf countries SR 100/- .All other countries US \$100 or equivalent. **Concessional Rate for personal subscription** is available for a three year term at Rs.4000/-. Outside India US \$ 200/- Gulf Countries SR 250/-Postal Charges within the country are Rs.100/-extra for a oneyear subscription. **Single current issue Rs.600/-**. **Prices are subject to change. Change of Address:-** The publisher must be notified 60 days in advance. **Volume Index** appears in October issue. **Indexing/Abstracting Services:-** The journal is currently abstracted and indexed in **EMBASE/Excerpta Medica** database, **IndMED**, **Pubmed (Medline)** and listed in **Ulrich's Periodicals Directory (USA)**, **INSDOC (INDIA)**. And **Index Academicus (IA)** **Scopus**, **SCI**. **Copyright information:-** When the manuscript is accepted for publication the authors agree to automatic transfer of the copyright to the publisher that the manuscript will not be published elsewhere in any language without the consent of the copyright holder. Old issues of the journal can be purchased at 15 % discount subject to availability. **INFORMATION FOR AUTHORS SUBMITTING MANUSCRIPTS:-** Manuscripts are to be submitted on a CD in **MS Word** with two hardcopies\*. The articles undergo the standard review process. Please allow 9-12 weeks before information regarding acceptability, resubmission or rejection is conveyed to the authors. Once the article is cleared for publication the authors will have to bear the publication cost.

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SCO 3-4, Chowk Gurudwara Dukhniwaran Sahib,  
Sirhind Road, Patiala-147001 (Punjab) India  
0175-2357981, 98146-32807  
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## Original Article

Prevalence and antimicrobial resistance pattern of *Acinetobacter baumannii* Complex: An under-estimated bacteria roaring to be considered

Kumar H, Mir RF, Kaur N, Bala R, Chauhan J, Chauhan S

## Abstract:

**Introduction:** *Acinetobacter baumannii* complex have been known to cause hospital acquired infection along with community-acquired infection. Moreover with inherited (intrinsic) or acquired anti-microbial resistance, it becomes hard for the physician to treat the patient.

**Aim:** To know the prevalence and anti-microbial resistance pattern of *A. baumannii* complex in various clinical samples.

**Material and Methods:** A total of 4123 various clinical specimens received from OPD and IPD of various specialties were processed during a period of 1 year (May, 2022 to April, 2023).

**Results:** Out of 4123 samples, 44.96% samples showed growth among which 6.74% were from OPD and 93.28% were from IPD. A total of 183 strains of *A. baumannii* complex were isolated and the total prevalence was 4.44%. The isolated strains of *A. baumannii* complex showed increased resistance to fluoroquinolones and cephalosporins. The most effective antibiotic was colistin followed by Minocycline. Among all *A. baumannii* complex, 53.55% were MDR, 27.32% were XDR while 1.64% were PDR.

**Conclusion:** *A. baumannii* complex cause hospital acquired as well as community acquired infections. It is therefore advised to establish high-quality recommendations for the "rational use of antibiotics" that must be properly followed and implemented.

JK-Practitioner2023;28(1-2):01-06

## INTRODUCTION

Nonfermenting gram-negative bacteria (NFGNB) are a varied taxonomically group of aerobic, nonsporing bacteria that either do not use glucose as a source of energy or use it oxidatively. [1] About 15% of all bacterial isolates from a clinical microbiology laboratory are known to be NFGNB. *Pseudomonas* species, *Acinetobacter* species, *Burkholderia* species, *Stenotrophomonas maltophilia* etc. are among the diverse types of bacteria that make up non-fermentative gram-negative bacteria (NFGNB).

The *Acinetobacter baumannii* named after scientist Paul Baumann was used to be thought of being a low-virulence commensal bacteria. It has nonetheless established itself as a powerful pathogen, and the majority of infections linked to healthcare have affected very sick patients in the ICU.[2] In recent years, *A. baumannii* infections have afflicted patients with co-morbid conditions outside of the ICU, in trauma patients following natural catastrophes, and even in community-dwelling patients. It is responsible for several diseases, including meningitis, pneumonia, urinary tract infections, bacteremia, wound infections, and pneumonia.[3]

In four major classes of antimicrobials—fluoroquinolones (50-73% non-susceptible), aminoglycosides (19-31% non-susceptible),  $\beta$ -lactams (39-66% non-susceptible), and carbapenems (9-39% non-susceptible)—an analysis of susceptibility data for *Acinetobacter baumannii* Complex between 1995 and 2004 revealed an increase in the percentage of resistance to all antimicrobial agents.[4] *A. baumannii* infections that were multidrug resistant (MDR) were traditionally treated with carbapenems, but recent usage of these drugs has increased the prevalence of carbapenem resistance. Although previously avoided due to systemic toxicities (nephrotoxicity and neurotoxicity), polymyxins are now commonly utilised as the antibiotic of choice for MDR *A.*

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Mobile: +91-9467806959

## Indexed

EMBASE, SCOPUS, IndMED, ESBCO, Google Scholar besides other national and International Databases

## Cite This Article as

Kumar H, Mir RF, Kaur N, Chauhan J, Chauhan S, Prevalence and antimicrobial resistance pattern of *Acinetobacter baumannii* Complex: An under-estimated bacteria roaring to be considered..JK Pract2023;28(1-2):01-06

Full length article available at [jkpractitioner.com](http://jkpractitioner.com) one month after publication

## Keywords

Nonfermenting gram-negative bacteria, Multi-drug resistant, Colistin resistant.

*baumannii* infections. However, colistin-resistant strains have been reported in many parts of the world.[5]

Therefore in view of the above, this cross-sectional study was planned to know about the prevalence of *A. baumannii* complex and their antibiotic resistance pattern at a tertiary care institute.

### MATERIAL AND METHODS

A cross-sectional study was conducted (May, 2022 to April, 2023) on clinical samples received from Out-patient department (OPD) and in-patient department (IPD) of various specialties in the Department of Microbiology, MMIMSR, Mullana. The Ethical clearance was taken from institutional ethical committee.

Pus samples included Swabs taken from the wound, ear discharge and pus secretions. Blood and Body fluids included all the sterile fluids from the body while respiratory samples included sputum, endotracheal secretions and Broncho-alveolar lavage. Urine samples were not included in the study. Only *A. baumannii* complex was further included in the study while other bacterial isolates were excluded from the study.

#### Sample Processing:

Pus sample and Respiratory samples: All the samples were subjected to the gram staining followed by culture on Blood agar and MacConkey agar (HiMedia, India).

Blood and body fluids: For Blood culture pair of blood was taken from two different peripheral veins and inoculated into two blood culture bottles. In case of other sterile fluids around 3-5 mL was inoculated in blood culture bottles and these bottles were incubated in automated blood culture system (BD BACTEC FX40). For blood culture, blood culture bottles were incubated for 5 days while for other sterile body fluids were incubated for 48 hours before declaring them negative. The flagged positive blood culture bottles were processed by subculturing on Blood agar and MacConkey agar (HiMedia, India), and pure bacterial isolates were subjected to species identification and antibiotic susceptibility testing.

Note: Only blood cultures with both bottles identified as positive were judged to be positive. The blood culture bottles that only had one bottle flagged positive or that had not been flagged positive for up to five days were regarded as contaminated and negative, respectively.

Bacterial Identification and Antibiotic sensitivity testing:

Identification of all bacterial isolates was performed by putting GN I.D and GP I.D card in Vitek-2 Compact (Biomeurix). Antibiotic sensitivity testing for *A. baumannii* complex was performed by using N406 AST card in Vitek-2 Compact (Biomeurix) as per manufacturer standard operating procedures. Results of antibiotic sensitivity testing was evaluated using CLSI 2022 guidelines. [6]

Colistin Antibiotic sensitivity testing:

The Colistin MIC was evaluated on uncoated 96-well polystyrene microtitre plates using the standard BMD method (MIC range: 0.25-16 mg/L) and by CLSI standards.[6] *A. baumannii* has colistin MICs that fall between the EUCAST MIC breakpoints of >2 mg/L for resistance and 2 mg/L for susceptibility.[7] *Proteus mirabilis* (colistin MIC >16 mg/L) was used as Colistin-resistant quality-control strain for each run.

Identification of Multi-drug resistant, Extensively drug resistant and Pan drug resistant isolates of *A. baumannii* complex: As suggested by US Centers for Disease Control and Prevention (CDC) and the European Centre for Disease Prevention and Control (ECDC), isolates that are resistant to at least one antibiotic from three or more antimicrobial group will be considered as multidrug-resistant (MDR), isolates those are resistant to at least one antibacterial agent in all categories except two or fewer will be considered as Extensively drug-resistant (XDR). Pan drug resistance (PDR) will be those isolates which will be resistant to all antibiotics tested with all agents in all antimicrobial categories listed in the Clinical and Laboratory Standards Institute (CLSI) guidelines.[6,8]

#### Quality Control:

*Acinetobacter baumannii* (ATCC 19606), *Escherichia coli* (ATCC 25922), *Staphylococcus aureus* (ATCC 25923) strains were used as reference strain for quality control in culture and antimicrobial susceptibility assays.

### RESULTS

Among total of 4123 samples, 1606 were pus samples, 1630 were blood and body fluids while 887 were respiratory samples. Out of 4123 samples, 44.96% were culture positive while 55.04% samples showed no growth. (Table 1 and Table 2) Among Pus samples, *Escherichia coli* was (27.63%) the most predominant bacteria followed by *Staphylococcus aureus* (22.69%). In Blood and body fluids, *Escherichia coli* (30.33%) was the most predominant bacteria followed by *Klebsiella pneumoniae* (24.43%). Among Respiratory samples, *Klebsiella pneumoniae* (32.31%) was the most predominant bacteria followed by *Pseudomonas aeruginosa* (32.06%). (Table-3) Due to less number, isolates of *Enterococcus* spp, *Stenotrophomonas maltophilia* and *Burkholderia cepacia* were excluded from the study. The overall prevalence of *A. baumannii* complex was 4.44%. The prevalence of *Acinetobacter baumannii* Complex in pus samples was 4.42%, in blood and body fluids was 3.19% while in respiratory samples was 6.76%. Isolates of *A. baumannii* complex were found highly resistant to Fluoroquinolones and 3<sup>rd</sup> and 4<sup>th</sup> generation cephalosporins. The most effective antibiotic against *A. baumannii* complex was Colistin and Minocycline. (Table 4) Among 183 isolates of *A. baumannii* complex, 53.55% were MDR, 27.32% were XDR and 1.64% were PDR. (Table 5)

## DISCUSSION

The current high risk posed by antibiotic-resistant pathogenic bacteria makes treating patients in hospitals a significant issue.[9] The abbreviation "ESKAPE" (*Enterococcus faecium*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, and *Enterobacter cloacae*) refers to the most prevalent MDR pathogens.[2]

In current study, a total of 4123 samples were taken in which 55.04% were sterile or showed no growth and 44.96% showed growth. The positivity rate in IPD was 93.28% as compared to OPD i.e., 6.74%. In another study conducted by Abebe M *et al* (2019), the positivity rate was 46.78% which is concordance with our study.[10]

According to a systematic analysis of the clinical and economic impact of antibiotic resistance, ESKAPE bacteria are associated with the highest risk of mortality, resulting in higher health-care costs.[11]

In our study, *Enterococcus* spp. was not included due to less sample size. In pus samples, the most prevalent organism was *Escherichia coli* (27.63%) followed by *Staphylococcus aureus* (22.63%) and *Pseudomonas aeruginosa* (20.96%). Another study conducted by Roy S *et al* (2017) showed most prevalent organism as *Staphylococcus aureus* (42.21%) followed by *Klebsiella* species (15.86%) and *Pseudomonas* species (15.28%).[12] Among Blood and body fluids, most common isolated organism was *Escherichia coli* (30.33%) followed by *Klebsiella pneumoniae* (24.43%) and *Pseudomonas aeruginosa* (14.32%). In another study conducted by Shume T *et al* (2022) the most prevalent organism was *Klebsiella pneumoniae* (26.5%) and *Escherichia coli* (20.6%).[13]

Among respiratory samples, most commonly isolated organism was *Klebsiella pneumoniae* (32.31%) followed by *Pseudomonas aeruginosa* (32.31%) and *Escherichia coli* (16.79%). In another study by Singh S *et al* (2020), reported *Pseudomonas* species was the commonest isolate (31%), followed by *Klebsiella pneumoniae* (21.3%).

*Acinetobacter baumannii* is an opportunistic gram-negative coccobacillus that exhibits exceptional survival under varied environmental circumstances and inherent resistance to commonly recommended antibiotics. [14] *A. baumannii* isolates predominately develop in healthcare facilities and are closely associated with nosocomial infections, especially in patients receiving critical care and in immunocompromised people. [15] The most frequent clinical symptoms include meningitis, urinary tract infections (UTI), central line-associated bloodstream infections (BSI), ventilator-associated pneumonia (VAP), and pneumonia. [16] Unfortunately, the absence of effective treatments has resulted in a high crude death rate for infections arising in sterile locations, which can range from 40% to 80%. [17]

The prevalence of *A. baumannii* complex was 4.44% among total samples. The prevalence of *A. baumannii*

complex in pus samples was 4.42%, in blood and body fluids was 3.19% while in respiratory samples was 6.76%. In another study conducted by Sharma RK *et al* (2017) the overall prevalence of *Acinetobacter baumannii* was 6.42% and maximum number of *Acinetobacter baumannii* were isolated from the endotracheal secretions followed by pus samples.[3]

The World Health Organisation (WHO) declared carbapenem-resistant *A. baumannii* to be a critical priority in 2017 and stated that new antibiotics are urgently required to treat it.[18] Clinical isolates of *A. baumannii* throughout the 1970s were susceptible to widely used antibiotics such as ampicillin, gentamicin, chloramphenicol, and nalidixic acid. However, it became a severe nosocomial infection in the late 1970s, primarily due to the introduction of broad-spectrum antibiotics in hospitals.[19] Also, the intrinsic (inherent) or acquired resistance with the help of various mechanisms in *A. baumannii* complex make situation more drastic.[20]

In current study, among *A. baumannii* complex maximum resistance was reported to Fluoroquinolones and Cephalosporins (3<sup>rd</sup> & 4<sup>th</sup> generation). However increased resistance was seen in Gentamicin and Piperacillin-tazobactam. The strains of *A. baumannii* complex was most susceptible to Colistin followed by Minocycline and Meropenem. In another study conducted by Kaur N *et al* (2021) higher resistance was seen to Fluoroquinolones and Cephalosporins (3<sup>rd</sup> & 4<sup>th</sup> generation).[21] In another study conducted by Chauhan S *et al* (2022) the maximum strains of *A. baumannii* complex were multi-drug resistant.[22]

Today, the majority of first-line antibiotics are no longer effective. When treating multidrug-resistant (MDR) *A. baumannii*, tigecycline, and colistin are the only antibiotics still effective against it. However, colistin-resistant strains have been reported in many parts of the world.[23]

In current study, 3.64% strains of *A. baumannii* complex were resistant to colistin. In another study conducted by Chauhan S *et al* (2022), total number of colistin resistant *Acinetobacter baumannii* were 6.36%.

Multidrug-resistant Gram-negative bacteria are known to cause substantial morbidity and death. *Acinetobacter* spp. which is multidrug-resistant has been identified as one of the most difficult illnesses linked with healthcare to manage and treat. The primary targets of this organism are patients hospitalized in the burn unit, intensive care unit, and wards with central intravenous catheters and respiratory devices.[2,24] In current study, 53.55% of *A. baumannii* complex isolates were MDR, 27.32% were XDR while 1.64% were PDR which is in concordance with study conducted by Chauhan S *et al* (2022) which showed 30.99% isolates as MDR.

**CONCLUSION**

The overall prevalence of *A. baumannii* complex was 4.44%. The prevalence in pus samples, blood and body fluids while in respiratory samples was 4.92%, 3.19% and 6.76% respectively. Isolates of *A. baumannii* complex were found highly resistant to fluoroquinolones and 3<sup>rd</sup> and 4<sup>th</sup> generation cephalosporins. The most effective against *A. baumannii* complex was colistin and minocycline. Among the isolates of *A. baumannii* complex MDR, XDR and PDR were found to be 53.55%, 27.32% and 1.64% respectively. This study has revealed that

maximum isolated strains of *A. baumannii* complex are multi-drug resistant and only a few antibiotics are effective for treating the infections caused by this pathogen.

**LIMITATION**

In this study there was lack of additional clinical information and risk factors. Also it was not possible for the molecular characterization of antibiotic resistant determinants and multifactorial phenotypes related to pathogenesis such as biofilm formation which would suggest the ability of this pathogen to persist and survive in the hospital settings.

**Table 1: Sample-wise distribution**

S.No	Type of Specimen	Number of specimen (n=4123)
1.	Pus	1606
2.	Blood and Body fluids	1630
3.	Respiratory samples	887

**Table 2: Culture positivity rate in OPD and IPD among various clinical samples**

Total no. of samples	Culture Positive (n=1854)		No growth/Sterile (n=2269)	
4123	OPD	IPD	OPD	IPD
	125 (6.74%)	1729 (93.28%)	321 (14.15%)	1948 (85.85%)

**Table 3: Distribution of isolates among various clinical samples**

Type of sample (n=1854)	<i>Escherichia coli</i>	<i>Klebsiella pneumoniae</i>	<i>Pseudomonas aeruginosa</i>	<i>Acinetobacter baumannii</i> Complex	<i>Staphylococcus aureus</i>	<i>Enterobacter cloacae</i>
Pus (n= 749)	207 (27.63%)	121 (16.15%)	157 (20.96%)	71 (9.47%)	170 (22.69%)	23 (3.07%)
Blood and Body fluids (n=712)	216 (30.33%)	174 (24.43%)	102 (14.32%)	52 (7.30%)	94 (13.20%)	74 (10.39%)
Respiratory samples (n= 393)	66 (16.79%)	127 (32.31%)	126 (32.06 %)	60 (15.27%)	12 (3.05%)	02 (0.50%)

**Table-4: Sample-wise antibiotic resistance pattern of *Acinetobacter baumannii* Complex**

Antibiotic	Pus Samples (n=71)	Body and Body Fluids (n=52)	Respiratory Samples (n=60)	Total Resistance rate (n=183)
Ciprofloxacin	64 (90.14%)	46 (88.46%)	51 (85%)	87.97%
Levofloxacin	62 (87.33%)	44 (84.61%)	49 (81.67%)	84.69%
Gentamicin	60 (84.50%)	41 (78.84%)	48 (80 %)	81.42%
Amikacin	55 (77.46%)	40 (76.92%)	43 (71.66%)	75.40%
Cefepime	61 (85.91%)	45 (86.53%)	49 (81.66%)	84.69%



<b>Ceftazidime</b>	64 (85.91%)	47 (90.38%)	53 (88.33%)	89.62%
<b>Pipercillin tazobactam</b>	61 (85.91%)	43 (82.69%)	42 (70%)	79.78%
<b>Co-trimoxazole</b>	54 (76.05%)	39 (75 %)	41 (68.33%)	73.22%
<b>Minocycline</b>	28 (39.43%)	21 (40.38%)	20 (33.33%)	37.70%
<b>Imipenem</b>	54 (76.05%)	41(78.84%)	41 (68.33%)	74.31%
<b>Meropenem</b>	51 (71.83%)	40 (76.92 %)	40 (66.66%)	71.58%
<b>Colistin</b>	02 (1.41%)	01 (1.92%)	0 (0%)	1.64%

**Table 5: Distribution of MDR, XDR and PDR *Acinetobacter baumannii* Complex in various clinical samples**

Type of Sample	Non-MDR	MDR	XDR	PDR
<b>Pus (n=66)</b>	10 (15.15%)	35 (53.03%)	19 (28.79%)	02 (3.03%)
<b>Blood and Body fluids (n=36)</b>	08 (22.22%)	19 (52.78%)	09 (25%)	00
<b>Respiratory samples (80)</b>	13 (16.25 %)	44 (55%)	22 (27.5%)	01 (1.25%)
<b>Total no. of <i>Acinetobacter baumannii</i> Complex (n=183)</b>	31 (16.94%)	98 (53.55%)	50 (27.32%)	03 (1.64%)

**REFERENCES**

- Malini A, Deepa E, Gokul B, Prasad S. Nonfermenting gram-negative bacilli infections in a tertiary care hospital in kolar, karnataka. J Lab Physicians. 2009 Jul;1(2):62-6.2. Vázquez-López R, Solano-Gálvez SG, Juárez Vignon-Whaley JJ, Abello Vaamonde JA, Padró Alonzo LA, Rivera Reséndiz A, et al. *Acinetobacter baumannii* Resistance: A Real Challenge for Clinicians. Antibiotics. 2020 Apr 23;9(4):205.
- Sharma RK, Mamoria VP. A Prospective Study on Prevalence and Antibiotic Susceptibility Pattern of *Acinetobacter baumannii* in Clinical Samples obtained from Patients admitted in Various Wards and Intensive Care Units. J Mahatma Gandhi Univ Med Sci Technol. 2017 Dec;2(3):122-7.
- Gaynes R, Edwards JR; National Nosocomial Infections Surveillance System. Overview of nosocomial infections caused by gram-negative bacilli. Clin Infect Dis. 2005 Sep 15;41(6):848-54.
- Cai Y, Chai D, Wang R, Liang B, Bai N. Colistin resistance of *Acinetobacter baumannii*: clinical reports, mechanisms and antimicrobial strategies. J Antimicrob Chemother. 2012 Jul;67(7):1607-15.
- Clinical Laboratory Standard Institute. Performance Standards for Antimicrobial Disk Susceptibility Testing. 32nd ed. Vol. 42. Pennsylvania, USA: CLSI supplement M100; 2022.
- The European Committee on Antimicrobial Susceptibility Testing. Breakpoint tables for interpretation of MICs and zone diameters. Version 10.0, 2020. <http://www.eucast.org>.
- Magiorakos AP, Srinivasan A, Carey RB, Carmeli Y, Falagas ME, Giske CG, et al. Multidrug-resistant, extensively drug-resistant and pandrug-resistant bacteria: an international expert proposal for interim standard definitions for acquired resistance. Clin Microbiol Infect. 2012 Mar;18(3):268-81.
- Gonzalez-Villoria AM, Valverde-Garduno V. Antibiotic-Resistant *Acinetobacter baumannii* Increasing Success Remains a Challenge as a Nosocomial Pathogen. J Pathog. 2016;2016:7318075..
- Abebe M, Tadesse S, Meseret G, Derbie A. Type of bacterial isolates and antimicrobial resistance profile from different clinical samples at a Referral Hospital, Northwest Ethiopia: five years data analysis. BMC Res Notes. 2019 Sep 11;12(1):568..
- Mulani MS, Kamble EE, Kumkar SN, Tawre MS, Pardesi KR. Emerging Strategies to Combat ESKAPE Pathogens in the Era of Antimicrobial Resistance: A Review. Front Microbiol. 2019 Apr 1;10:539.
- Roy S and Dhar D. Isolation, Characterization and Antibiotic Sensitivity Pattern of Different Bacteria in Pus Sample. J Pure Appl Microbiol. 2017;11(2):885-889.

13. Shume T, Tesfa T, Mekonnen S, Asmerom H, Tebeje F, Weldegebreal F. Aerobic Bacterial Profile and Their Antibiotic Susceptibility Patterns of Sterile Body Fluids Among Patients at Hiwot Fana Specialized University Hospital, Harar, Eastern Ethiopia. *Infect Drug Resist.* 2022 Feb 22;15:581-593..
14. Peleg AY, Seifert H, Paterson DL. *Acinetobacter baumannii*: emergence of a successful pathogen. *Clin Microbiol Rev.* 2008 Jul;21(3):538-82
15. Antunes LC, Visca P, Towner KJ. *Acinetobacter baumannii*: evolution of a global pathogen. *Pathog Dis.* 2014 Aug;71(3):292-301
16. Inchai J, Pothirat C, Bumroongkit C, Limsukon A, Khositsakulchai W, Liwsrisakun C. Prognostic factors associated with mortality of drug-resistant *Acinetobacter baumannii* ventilator-associated pneumonia. *J Intensive Care.* 2015 Mar 2;3:9.
17. Ma C, McClean S. Mapping Global Prevalence of *Acinetobacter baumannii* and Recent Vaccine Development to Tackle It. *Vaccines (Basel).* 2021 Jun 1;9(6):570
18. Tacconelli E, Carrara E, Savoldi A, Harbarth S, Mendelson M, Monnet DL, et al. WHO Pathogens Priority List Working Group. Discovery, research, and development of new antibiotics: the WHO priority list of antibiotic-resistant bacteria and tuberculosis. *Lancet Infect Dis.* 2018 Mar;18(3):318-327
19. Towner KJ. *Acinetobacter*: an old friend, but a new enemy. *J Hosp Infect.* 2009 Dec;73(4):355-63
20. Kumar N, Kumar H. Intrinsic Resistance: A Significant Characteristic in Evaluating Antibiotic Sensitivity Pattern [Letter]. *Infect Drug Resist.* 2022 Apr 5;15:1515-1516.
21. Kaur N, Kumar H, Bala R, Garg R, Chauhan J, Chauhan S, et al. Prevalence of Extended Spectrum Beta-lactamase and Carbapenemase Producers in Gram Negative Bacteria causing Blood Stream Infection in Intensive Care Unit Patients. *J Clin Diagn Res.* 2021;15(11);DC04-07
22. Chauhan S., Kaur N., Saini AK., Aman S., Chauhan J., Kumar H. Colistin Resistant Gram-Negative Bacteria Isolated from Various Clinical Samples in North Indian Tertiary Care Center. *Int J Pharm Qual Assur.* 2022 Sep 1;13(03):15–23.
23. Carbapenem resistance and mortality in patients with *Acinetobacter baumannii* infection: systematic review and meta-analysis. *Clin Microbiol Infect.* 2014 May;20(5):416-23
24. Sharma M, Singhal L, Gautam V, Ray P. Distribution of carbapenemase genes in clinical isolates of *Acinetobacter baumannii* & a comparison of MALDI-TOF mass spectrometry-based detection of carbapenemase production with other phenotypic methods. *Indian J Med Res.* 2020 Jun;151(6):585-591

## Original Article

## Laparoscopic Ventral Mesh Rectopexy In Rectal Prolapse : A Two Year Study

Irfan Nazir Mir, Arshid Iqbal Qadri, Rauf A Wani, Fazl Q Parray, Manzoor Ahmad, Aijaz A Malik, Mubashir A Shah, Irshad Ahmad Kumar

**Abstract:**

**Background and Purpose:** An autonomic nerve-sparing rectopexy technique was first documented by D'Hoore *et al* in 2004. This procedure is a comparably novel method adopted rapidly and reported good outcomes and postoperative function. The objective of the study was anatomical correction of prolapse and evaluation of functional outcomes.

**Material and Methods:** The present study was conducted in the department of General and Minimal Access Surgery in a tertiary care hospital. This was a prospective cohort study of patients presenting with a complete rectal prolapse over a period of 2 years from May 2019 to April 2021.

**Results:** The mean age of patient in our study was 42.21 years, with range of age varying from 29-60 years of age. Most of our patients 25/35 were in the age group of between 41-50 years. Out of a total 28 (80%) were females and most female patients were middle aged, multiparous, with history of vaginal delivery. The mean BMI of patients in our study was 28.2. Most patients 16(45.71%) in our study had a grade V prolapse, followed by grade IV prolapse. The mean operative time in our study was 106.2 minutes. The mean estimated blood loss in our study was 24.71 ml, and the mean hospital stay in our patients was 3.43 days. Most of our patients were discharged between 3-4 days. 12 patients (34.28%) patients in our study developed minor complications postoperatively. There were no major complications and no mortality was recorded. Recurrence was noted in two patients.

**Conclusion:** The management of rectal prolapse is correction of physical abnormality and the functional outcome. We found laparoscopic ventral mesh rectopexy apt at both the fronts. However, larger study with longer follow up is needed to validate our findings.

JK-Practitioner2023;28(1-2):07-12

**INTRODUCTION**

It is considered that a sliding hernia via a pelvic fascial defect or rectal intussusception causes rectal prolapse. Laxity of the pelvic floor, a weak sphincter complex, a redundant recto sigmoid colon, a deep Douglas' pouch, pudendal neuropathy, and a loose rectal fixation may all contribute to Rectal Prolapse. Currently, a pelvic floor problem is thought to be the most probable cause. [1-2] Up to >90% of patients with rectal prolapse are women over the age of 50 who have given birth vaginally. Male Rectal Prolapse patients are often younger (20-40 years old) and the incidence declines with age. Psychiatric individuals and the elderly inhabitants of nursing homes also have a higher frequency of rectal prolapse. [1]

Surgical techniques include either a perineal or abdominal approach, [1] and while Rectal Prolapse is fundamentally a benign illness, surgical care should be customized to balance the risk of perioperative invasiveness against the possible improvement in quality of life. [3] The majority of surgeons favor abdominal treatments because they are more successful and have lower recurrence rates, especially in elderly patients also. [4] However, general anesthesia, which is required for abdominal procedures, may raise some risks for elderly individuals with rectal prolapse. Less intrusive and possibly helpful are perineal techniques. Berman originally described laparoscopic rectopexy in 1992 [5]; since then, it has developed as an effective therapy for rectal

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**Indexed**

EMBASE, SCOPUS, IndMED, ESBCO, Google Scholar besides other national and International Databases

**Cite This Article as**

Mir IN, Qadri AI, Wani RA, Parray FQ, Ahmad M, Malik AA, Shah MA, Kumar IA. Laparoscopic Ventral Mesh Rectopexy In Rectal Prolapse : A Two Year Study. JK Pract2023;28(1-2):07-12

Full length article available at [jkpractitioner.com](http://jkpractitioner.com) one month after publication

**Keywords**

Mesh Rectopexy, Rectal prolapse, Nerve sparing rectopexy

prolapse.[3] Modern laparoscopy and general anesthesia have made the abdominal approach more acceptable to elderly individuals. [4] Laparoscopic Rectal Prolapse procedures are presently accessible for the abdominal approach, despite the fact that traditional open operations have been conducted. [6] According to studies, laparoscopic surgery provides benefits over open surgery, such as reduced discomfort, a shorter hospital stay, and a quicker recovery. [7]

A strategy for autonomic nerve-sparing rectopexy was initially published by D'Hoore et al in 2004, [8] based on the notion of rectovaginopexy outlined by Silvis et al in 1998. [9] In this operation, the dissection is purely ventral from the rectovaginal space to the pelvic floor; there is no lateral or dorsal mobilization. Mesh sutured to the anterior aspect of the rectum connects the rectum to the sacrum. Ventral dissection and mesh placement provide several benefits. [10]

- i) A supra-anal rectocele may be rectified;
- ii) The rectovaginal septum is strengthened, preventing anterior recto-rectal intussusception, which may be an underlying mechanism leading to complete rectal prolapse; and
- iii) A colpopexy is done. The autonomic nerves are preserved by avoiding any lateral or posterior mobilization. This is a relatively innovative technique that has been quickly embraced, and several prospective studies have demonstrated positive results and postoperative function. [2] In addition, 4% of mesh-related complications have been documented. [11]

## MATERIAL AND METHODS

The present study was carried out in The Department of General and Minimal Access Surgery at the Sher-i-Kashmir Institute of Medical Sciences (SKIMS), Soura as a project handled by the principal author. This was a prospective cohort analysis of individuals who presented with a full rectal prolapse between May 2019 and April 2021. Regarding functional issues, individuals in this cohort had a variety of symptoms, including mass per rectum, obstructed defecation, faecal incontinence, urgency, leakage, urinary complaints, and pelvic discomfort.

Prior to surgery, all patients gave their informed consent after receiving a thorough explanation of the procedure's advantages and potential risks. Only individuals with verified Complete Rectal Prolapse on clinical examination and defecography were included in the research. From May 2019 to April 2021, Laparoscopic Ventral Mesh Rectopexy was performed on all 35 patients diagnosed with Complete Rectal Prolapse. The study's primary purpose was the anatomical repair of prolapse, while its secondary objective was the assessment of functional outcomes. Pre-operative evaluation

On first presentation, a thorough history and physical examination were completed on all patients. All patients were clinically assessed in both the supine and squatting positions. If prolapse was not apparent

in the supine position, the patient was instructed to "bear down" in a squatting posture. To determine colon redundancy, a barium enema was performed on all patients. A flexible sigmoidoscopy was done the same day, if required. In female patients, a comprehensive obstetric history was obtained, including the number of pregnancies, labor complications, birthweight of the infant, and obstetric injuries, in order to conduct additional tests, if required, and determine a definitive justification for surgery. Selected individuals with a clinical diagnosis of internal or external prolapse underwent defecating proctograms, a dynamic magnetic resonance imaging (MRI) proctogram, and lower gastrointestinal endoscopy. This research assessed functional results before and after surgery as its outcome measure.

We evaluated faecal incontinence using the faecal incontinence severity index (FISI) and constipation using the Wexner scoring system. Incontinent patients had a FISI score of 8 or higher, whereas constipation was characterized as a Wexner score of 5 or higher. Using a disease-specific personal questionnaire, an objective evaluation of patient satisfaction after the surgery was performed.

### Inclusion Criteria

- Adult patients (age >18 years)
- Medically fit patient
- Full thickness rectal prolapse

### Exclusion criteria

- Patient not fit for general anesthesia
- Triple compartment syndrome
- Recurrence after surgery

### Follow-up and post-surgical evaluation

Three, six, and twelve months postoperatively, anorectal function was evaluated using the FISI and Wexner constipation scores. The patient was clinically assessed at 3 and 6 months. After 12 months and beyond, a telephone interview utilizing a personal questionnaire was conducted as a follow-up.

### Statistical examination

A biomedical statistician was responsible for the statistical analysis. The Mann-Whitney U-test was employed to analyze unpaired data, while the Wilcoxon signed rank test was used to analyze paired data (two-sided p-test).

## AIMS AND OBJECTIVES

1. To know the hospital based incidence and demography of patients with rectal prolapse.
2. Laparoscopic ventral mesh rectopexy (VMR) in the management of rectal prolapse vis a vis Safety, Ease of the procedure, Intraoperative, Hospital stay and Complications postoperatively.
3. Rate of recurrence at a mean follow up of 6 months.
4. Patient satisfaction on follow up based on scores and detailed questionnaire.

## RESULTS

This was a prospective cohort study of patients presenting with a complete rectal prolapse over a period of 2 years from May 2019 to April 2021. In

terms of the functional disorders, patients in this cohort presented with a combination of symptoms like mass per rectum, obstructive defecation, fecal incontinence, urgency, leakage, urinary complaints, and pelvic pain. 35 patients with rectal prolapse, after proper evaluation were subjected to surgery, the analytical results obtained are shown in table 1.

**Table 1: Various parameters**

Period of study	2 years
No. of patients	35
Mean age (in years)	42.21
Gender distribution (M/F)	7/28
Mean BMI	28.2
Mean operative time (in minutes)	106.2
Mean estimated bleed (in ML)	24.71
Mean hospital stay (in days)	3.43
Follow up (in months)	6month (minimum)
No. of recurrences	2

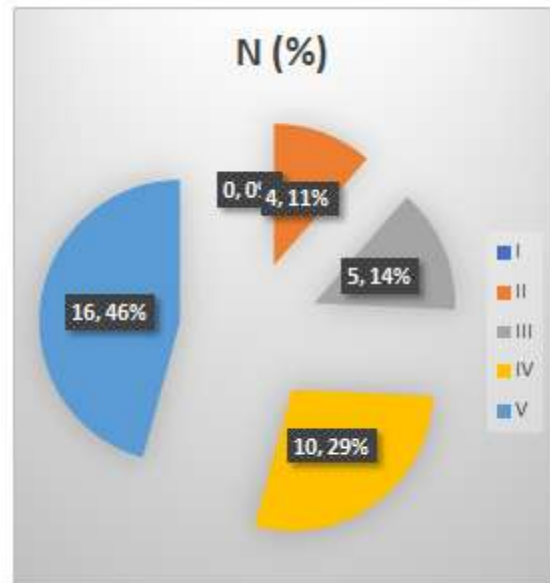
The mean age of patient in our study was 42.21 years, with range of age varying from 29-60 years of age. Most of our patients 25/35 were in the age group of between 41-50 years. Most of the patients in our study were female. Out of a total of 35 patients, 28 (80%) were female, whereas 7 (20%) were male. Most female patients were middle aged, multiparous, with history of vaginal delivery in most of them. The mean BMI of patients in our study was 28.2, with BMI ranging from 21 to 34. (table-1)

We distributed our patients on the basis of different grades of prolapse, as per the Oxford prolapse grading system. Most patients 16(45.71%) in our study had a grade V prolapsed, followed by grade IV prolapsed.

**Table 2: Previous pelvic surgical history**

Type of surgery	Females	Males
Tubal Ligation (open)	7 (25%)	NA
Hysterectomy (Open)	5 (17.85%)	NA
Ovarian cystectomy	2 (7.14%)	NA
No pelvic surgery	14 (50%)	7(100%)
Total	28 (100%)	7 (100%)

Fourteen females in our study group had undergone pelvic surgeries previously. 7 (25%) had undergone tubal ligation surgery (open), 5 (17.85%) had undergone hysterectomy (open) while as 2 (7.14%) had undergone ovarian cystectomy (laparoscopic). whereas the other 14 females in the study group and all the male patients had no history of any previous pelvic surgery. (Table-2)



**Figure1: Pie chart depicting grade of prolapse**

The mean operative time in our study was 106.2 minutes. The range of operative time was between 62 minutes to 166 minutes. In the initial cases we noted that the operative time was higher but as we went on doing more and more cases, the operative time decreased significantly. The mean estimated blood loss in our study was 24.71 ml, with a range of between 7-152 ml. Most patients had bleeding approximately between 10-40 ml. The mean hospital stay in our patients was 3.43 days, with a minimum stay of 2 days and a maximum stay of 8 days. Most of our patients were discharged between 3-4 days. (Table-1) 12 patients (34.28%) patients in our study developed minor complications postoperatively, 1 patient (2.85%) developed wound infection (port site), 2 patients developed upper respiratory infection (hospital acquired), 4 patients developed acute constipation postoperatively, whereas 5 patients (14%) developed urinary tract infection. There were no major complications and no mortality was recorded. No mesh related complication like mesh erosion, infection or perforation was reported. Recurrence was noted in two patients. In one patient recurrence occurred at six months of surgery and in another patient at eight months postoperatively. Both patients were found to be having redundant sigmoid colon. These patients were subsequently planned for sigmoid resection.

## DISCUSSION

Surgery for rectal prolapse has three objectives: first, the repair of the physical defect; second, the restoration of bowel function; and third, the avoidance of future functional issues. For the treatment of rectal prolapse, many abdominal and perineal treatments have been reported, with perineal techniques now reserved for high-risk patients who cannot tolerate extensive abdominal surgery. [12] Nonetheless, the risk of long-term recurrences and chronic incontinence is greater than with abdominal surgeries. Abdominal technique is now regarded as the standard



of therapy and is used whenever possible. [13] Rectopexy with sutures or mesh, colonic resection, or a combination resection-rectopexy approach are abdominal surgeries. In the past, these procedures were performed using an open approach; more recently, less invasive techniques have been used. In a randomized, controlled research, laparoscopic rectopexy was shown to be associated with decreased postoperative discomfort, faster recovery, and a shorter hospital stay. In addition, there were considerably fewer surgical problems compared to open procedures. [14] Laparoscopic surgery is now regarded as the standard method and is usually advised for all situations. Recurrence rates for abdominal surgeries including sigmoid resection with or without rectopexy range from 2% to 5%. This method also includes the danger of anastomotic leakage and incontinence after bowel resection, especially in older patients. [15]

In the past, mesh rectopexy entailed circumferential mobilization of the rectum up to the pelvic floor, with mesh implanted ventrally or posteriorly. Full rectal mobilization has been related with autonomic nerve injury and decreased recto sigmoid motility, both of which result in the onset of or a worsening of constipation. [16]

In 2004, D'Hoore et al. referred to "nerve-sparing ventral rectopexy" as a treatment for rectal prolapse. The distinctive feature of laparoscopic ventral rectopexy is that only the front rectum is mobilized, keeping the autonomic innervation intact. [5] This procedure has acquired universal support and is considered by many to be the "gold standard" for the treatment of pelvic organ prolapse. [17] The combined advantages of laparoscopic technique and ventral rectopexy have made the treatment safe and successful, with minimum postoperative functional impairment.

We conducted a prospective study in our institution from May 2019 to April 2021, to study the demographic factors, risk factors associated with rectal prolapse as well as to establish the feasibility and effectiveness of laparoscopic ventral mesh rectopexy in the management of rectal prolapse. Our study comprised of a total of 35 patients, 80% of our patients were middle aged females (mean age 42.21 years), almost all the female patients were multiparous. Our study included 20% male patients, we observed that the male patients in our study were comparatively younger as compared to female patients. Most patients (almost 75%) had grade IV/V prolapse (oxford grading), signifying that most of the patients report late to hospital for treatment.

There was a high female preponderance and most patients in our study were female, middle aged and multiparous, which implies these factors as high risk for the development of rectal prolapse. these findings were similar to those reported by Garley AD et al [4] and Rickert A et al [18]

Similarly, Garley AD et al [4] reported that the male patients with rectal prolapse tend to be younger age group as compared to female patients, our findings are also similar in this regard.

Laparoscopic ventral mesh rectopexy was done in all patients, there were no conversion to open surgery.

The mean operative time in our study was 106.20 minutes, the estimated mean blood loss was 24.7 ml. Similar findings were reported by Siproudhis et al. [19]

The mean hospital stay post operatively in our study was 3.43 days with a range of 2-8 days, similar stay rates in laparoscopic ventral mesh rectopexy were reported by Graf et al. [20]

Laparoscopic techniques have not made any significant difference on recurrence rates which continue to range from 0% to 10% in a follow up of 8-30 months. [21] Several studies have found a recurrence incidence of around 5% after LMVR. Most recurrences happen during the first two to three years. [5,17] Recurrence risks are comparable to those reported for other abdominal surgeries (2% to 9%). 92 In the current study, 5.71 percent (2/35) of patients had recurrence, which is consistent with earlier research.

Compared to posterior rectal dissection, ventral mesh rectopexy has been demonstrated to be related with a decreased prevalence of new-onset constipation and a higher improvement in pre-existing constipation. Three randomized studies have shown that avoiding lateral and posterior dissection improves constipation. [22,23] In addition, studies that included faecal incontinence data demonstrated an improvement in symptoms after the LMVR. It has also been noted that the rate of new-onset faecal incontinence following LMVR is minimal. [5] The findings indicate that most problems with LMVR are minimal. Our functional outcomes closely resemble those of previous investigations. Pre-existing constipation improved in 80% of cases while as 11.42% (4/35) patient developed new onset constipation.

Previously, rectopexy surgery was thought to cause kinking of redundant sigmoid colon over the fixed rectum, resulting in worsening of preexisting or new onset constipation. [24] For this reason, resection-rectopexy was advocated for patients with redundant sigmoid. Nevertheless, D'Hoore et al. [5] demonstrated that the denervation of the rectum caused by its circumferential mobilization was responsible for the majority of post-rectopexy functional issues. Similarly, redundant sigmoid was found in 19 of 35 patients in the current study; nevertheless, the majority of patients had better constipation scores in the follow-up, and no new cases of constipation were recorded.

The mesh-related problems were initially of concern to us, and they were also mentioned to the patients. Yet, the technique was confirmed to be safe in the current study. No mesh-related complication: Infections, erosions, or perforation was observed. Coating the mesh with peritoneum inhibited adherence of the small intestine. In this research, patients were not examined for postoperative dyspareunia or sexual dysfunction.

Consensus is increasing that rectal prolapse is a component of multi-compartment pelvic floor dysfunction. [25] Thirty-five percent of prolapse cases are accompanied by urine incontinence, and fifteen percent of patients complain of severe genital prolapse. [26] Fixing the posterior vaginal fornix to the mesh's lowest portion offers extra support for the pelvic floor during ventral mesh rectopexy. This results in the repair of an existing or prospective genital prolapse by suspending

the middle compartment. [5] A posterior rectopexy, in contrast, just reinforces the posterior compartment. Large rectoceles may be repaired by distal attachment of the mesh to the pelvic floor. It also results in a shallow, suspended Douglas pouch, immediately rectifying any related enterocele or sigmoidocele. It indicates that sparing the rectal autonomic nerves improves the result of surgery for constipation. Our results reveal a significant improvement in faecal incontinence ratings over the follow-up period.

Laparoscopic ventral rectopexy seems to be a safe and successful surgical treatment for full-thickness rectal prolapse, particularly in Indian patients with a sigmoid colon that is large and redundant. Nevertheless, given the small sample size and short follow-up period, this must be confirmed in a bigger research with a longer follow-up period. For proof of level I, prospective randomized studies are necessary.

## CONCLUSION

To conclude, we observed that rectal prolapse is prevalent mostly in middle aged, multiparous females, and that the laparoscopic ventral mesh rectopexy is safe, feasible and easy to perform with low complication and recurrence rates. One noteworthy point is that the management of rectal prolapse is not only the correction of physical abnormality but the functional outcome is very important part. The ideal procedure has to address both issues. We found laparoscopic ventral mesh rectopexy apt at both the fronts. However, larger study with longer follow up is needed to validate our findings.

## REFERENCES

- Garely AD, Krieger BR, Ky AJ. Rectal prolapse. In: Cameron JL, Cameron AM (editors): Current surgical therapy. Elsevier Saunders: Philadelphia; 2014, pp. 190-194.
- Rickert A, Kienle P. Laparoscopic surgery for rectal prolapse and pelvic floor disorders. *World J Gastrointest Endosc* 2015;7:1045-1054.
- Murphy PB, Wanis K, Schlachta CM, Alkhamesi NA. Systematic review on recent advances in the surgical management of rectal prolapse. *Minerva Chir* 2017;72:71-80.
- Yasukwa D, Hori T, Machimoto T, et al. Outcome of a modified laparoscopic suture rectopexy for rectal prolapse with the use of a single or double suture: A case series of 15 patients. *Am J Case Rep* 2017;18:599-604.
- Berman IR. Sutureless laparoscopic rectopexy for procidentia. Technique and implications. *Dis Colon Rectum* 1992;35:689-693.
- Tou S, Brown SR, Malik AI, Nelson RL. Surgery for complete rectal prolapse in adults. *Cochrane Database Syst Rev* 2008;CD001758.
- Purkayastha S, Tekkis P, Athanasiou T, et al. A comparison of open vs. laparoscopic abdominal adaptation to distension in patients with overt rectal prolapse. *Br J Surg* 1998;85:1527-32.
- Graf W, Stefansson T, Arvidsson D, Pahlman L. Laparoscopic suture rectopexy. *Dis Colon Rectum* 1995;38:211-2.
- rectopexy for full-thickness rectal prolapse: a meta-analysis. *Dis Colon Rectum* 2005;48:1930-1940.
8. D'Hoore A, Cadoni R, Penninckx F. Long-term outcome of laparoscopic ventral rectopexy for total rectal prolapse. *Br J Surg* 2004;91:1500-1505.
9. Silvis R, Gooszen HG, Kahraman T, et al. Novel approach to combined defaecation and micturition disorders with rectovaginoscopy. *Br J Surg* 1998;85:813-817.
10. Van Geluwe B, Wolthuis A, D'Hoore A. Laparoscopy for pelvic floor disorders. *Best Pract Res Clin Gastroenterol* 2014;28:69-80.
11. Roig JV, Buch E, Alós R et al.: Ano-rectal function in patients with complete rectal prolapse: differences between continent and incontinent individuals. *Rev Esp Enferm Dig.*,2008, 90:794-805.
12. Melton GB, Kwaan MR. Rectal prolapse. *Surg Clin North Am* 2013; 93: 187-198 [PMID: 23177071 DOI: 10.1016/j.suc.2012.09.010]
13. Tou S, Brown SR, Nelson RL. Surgery for complete (full-thickness) rectal prolapse in adults. *Cochrane Database Syst Rev* 2015;CD001758.
14. Slawik S, Soulsby R, Carter H, Payne H, Dixon AR. Laparoscopic ventral rectopexy, posterior colporrhaphy and vaginal sacrocolpopexy for the treatment of recto-genital prolapse and mechanical outlet obstruction. *Colorectal Dis* 2008; 10: 138-143 [PMID: 17498206 DOI: 10.1111/j.1463-1318.2007.01259.x]
15. Fleming FJ, Kim MJ, Gunzler D, Messing S, Monson JR, Speranza JR. It's the procedure not the patient: the operative approach is independently associated with an increased risk of complications after rectal prolapse repair. *Colorectal Dis* 2012; 14: 362-368 [PMID: 21692964 DOI: 10.1111/j.1463-1318.2011.02616.x]
16. Bachoo P, Brazzelli M, Grant A. Surgery for complete rectal prolapse in adults. *Cochrane Database Syst Rev* 2000; (2): CD001758 [PMID: 10796817]
17. Formijne Jonkers HA, Poirier N, Draaisma WA, Broeders IA, Consten EC. Laparoscopic ventral rectopexy for rectal prolapse and symptomatic rectocele: an analysis of 245 consecutive patients. *Colorectal Dis* 2013; 15: 695-699 [PMID: 23406289 DOI: 10.1111/codi.12113]
18. van Iersel JJ, Consten EC. Ventral mesh rectopexy for rectal prolapse: level-I evidence. *Lancet Gastroenterol Hepatol* 2016;1:264- 265.
19. Siproudhis L, Bellissant E, Juguet F, Mendler MH, Allain H, Bretagne JF, et al. Rectal
21. Madiba TE, Baig MK, Wexner SD. Surgical management of rectal prolapse. *Arch Surg* 2005;140:63-73.
22. Mollen RM, Kuijpers JH, van Hoek F. Effects of rectal mobilization and lateral ligaments division on

- colonic and anorectal function. *Dis Colon Rectum* 2000; 43: 1283-1287 [PMID: 11005498]
23. Selvaggi F, Scotto di Carlo E, Silvestri A, festa L, Peigari V. Surgical treatment of rectal prolapse: a randomised study. *Br J Surg* 1993; 80 Suppl: S89
24. O'Brien DP. Rectal prolapse. *Clin Colon Rectal Surg* 2007; 20: 125-132 [PMID: 20011387 DOI: 10.1055/s-2007-977491]
25. Samaranayake CB, Luo C, Plank AW, Merrie AE, Plank LD, Bissett IP. Systematic review on ventral rectopexy for rectal prolapse and intussusception. *Colorectal Dis* 2010; 12: 504-512 [PMID: 19438880 DOI: 10.1111/j.1463-1318.2009.01934.x]
26. Brown RA, Ellis CN. Ventral mesh rectopexy: procedure of choice for the surgical treatment of pelvic organ prolapse? *Dis Colon Rectum* 2014; 57: 1442-1445 [PMID: 25380012 DOI: 10.1097/DCR.0000000000000247]

**Original Article****A cross sectional study of compliance and adherence of topical antiglaucoma medications in rural population of Kashmir**

Snober Yousuf, Arsalan-un-nisa, Aaliya Rasool, Tufela Shafi

**Abstract:**

**Background :** Glaucoma is a chronic, progressive disease and a leading cause of treatable, non-reversible blindness in India. Medical intervention directed towards halting the progression of disease, remains one of the mainstays of treatment for glaucoma. Hence, increased compliance with anti glaucoma medication attains utmost importance , as non-compliance can lead to further progression of the disease and ultimately vision loss.

**Materials and Methods:** This cross sectional study was carried out at the Department of Ophthalmology, Government Medical College, Srinagar from January -December 2022 on patients undergoing treatment for glaucoma by means of intraocular pressure lowering medications. Patients were categorized as compliant or non compliant based on their adherence to the stipulated medication protocol. A customised questionnaire with pertinent information on number of medications, duration of treatment, patient's view on disease, reasons for non-compliance, technique of drug administration, presence of caregivers as well as state of the disease as measured by visual field changes over time were documented. All data was tabulated and interpreted using SPSS software.

**Results:** A total of 240 patients were included in this study. The average age of patients was 60.5 years , with a male to female ratio of 1.6 :1. 86.7% of the patients had bilateral disease and the largest chunk of patients was undergoing treatment from the past 1- 3 years ( 75.8%). A total of 5% of the patients gave a positive family history for the disease. Compliance rates to medication were found to be as follows : Total Non Compliance- 20%, Partial Non Compliance-58% , Full Compliance- 22%. Additionally, 52% of the patients were found to be employing an incorrect method of drug administration. Financial difficulties and unavailability of the drugs at their places of residence were found to be the leading causes of non-compliance. Lack of caregivers was also associated with a higher rate of non-compliance.

**Discussion:** As the worlds population ages, glaucoma is becoming an increasingly important cause of blindness. Medical management remains the most widely used technique to mitigate the vision crippling changes that engulf a glaucomatous eye. Subsequently, strict adherence to anti-glaucoma medication protocol, as formulated by the treating physician, remains a simple yet an indispensable tool to halt the progression of this disease and salvage the remaining vision. Our study highlights an alarming 58% rate of partial non-compliance and a 20% rate of total non compliance, which is much more than studies conducted in other parts of the world. The unique feature of this study is highlighting financial reasons and unavailability of drugs in remote areas as the leading causes of non-compliance. Awareness regarding the importance of anti-glaucoma medication, demonstration of correct techniques of drug administration, proper availability of drugs and a positive attitude of family members/ caregivers can be essential factors to increase drug compliance in glaucoma patients and decrease the burden of ocular complications.

**JK-Practitioner2023;28(1-2):13-16****INTRODUCTION**

Glaucoma, a chronic, progressive and most often asymptomatic disease is the second leading cause of blindness worldwide but the leading

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**Indexed**

EMBASE ,SCOPUS, IndMED, ESBCO, Google Scholar besides other national and International Databases

**Cite This Article as**

Yousuf S, Arsalan-un-Nisa, Rasool Aliya, Shafi Tufela. A cross sectional study of compliance and adherence of topical antiglaucoma medications in rural population of Kashmir. JK Pract 2023;28(1-2):13-16

Full length article available at [jkpractitioner.com](http://jkpractitioner.com) one month after publication

**Keywords**

Compliance, Adherence, Anti glaucoma medications, Quality of life

cause of preventable blindness in multiple racial groups. In India, it is the leading cause of treatable non-reversible blindness. Risk factors for glaucoma, such as older age and higher intraocular pressure (IOP), are neither specific nor sensitive enough for mass screening.[1] Primary open angle glaucoma known as sneak thief of sight, is estimated to affect almost 7 million people in India. Due to lack of symptoms in early stages of disease, patients often report late to healthcare professionals with extensive damage to optic nerve.

Glaucoma treatment requires lifelong therapy to maintain quality of life. So adherence and persistence with chronic therapies is crucial to prevent disease progression in glaucoma. Patients report high rates of adherence which are not supported by pharmacy claims analysis.[2] Given the asymptomatic nature of glaucoma and the lifelong therapeutic regimen without apparent subjective improvement, glaucoma patients are at risk of non-compliance with their treatment .[3] Recently clinicians have substituted the less judgmental word “adherence” instead of compliance in glaucoma therapy. The former term implies that patients have some control over how they use their medications and that they will use them willingly, either because they have an understanding of their disease or because they simply believe that the treatment is appropriate. For instance, patients with type A personalities may be more likely to adhere to a medical regimen if they believe it is important to prevent glaucoma from damaging their vision. The purpose of this study was to assess compliance and adherence to topical antiglaucoma medications with a self reporting method and to know barriers for lack of adherence.

## METHODS

This cross-sectional study included individuals with the diagnosis of primary or secondary glaucoma as well as those categorized as “glaucoma suspects” who were undergoing treatment with intraocular pressure (IOP) lowering medication. All subjects had been examined at Government Medical College, Srinagar between January 2022 and December 2022. This study was approved by ethical committee of GMC, Srinagar. This study utilised a standardized questionnaire and direct observation by study personnel among glaucoma patients aged 40 years and above, belonging predominantly to rural areas of Kashmir. 240 consecutive glaucoma patients on medical therapy following up at the glaucoma clinic for at least 6 months were recruited. The questions included number of medications, duration of treatment, patients view on disease, reasons for non compliance to treatment and disease stability as measured by visual field changes over time by treating glaucoma specialist's observation. Factors such as presence of caregiver and number of medications with their effect on compliance were studied . The method of drug administration was observed by study personnel among patients or care-

givers. Patients who were on medications for less than six months were excluded from the study. Verbal consent was taken from each of the 240 patients participating in the survey. The collected data was cleaned, edited, and coded in MS Excel and analysed using SPSS (Statistical Package for Social Scientist; version 20, IBM USA). Descriptive statistics in the form of frequencies and percentages were then calculated.

In this study, ‘non-compliance’ stands for missing any of the medication doses in the last week (both partial and total noncompliance). ‘Partial compliance’ was defined as those missing at least one time of medication per week and (or) the inability to accurately describe the medication regimen. ‘Total non-compliance’ was defined as not taking any prescribed glaucoma medication for one week. ‘Full compliance’ meant patient's total adherence to regimen and not missing any medication for the last one week. In addition to this, improper drug administration technique was also noted, whether the patient touched the drug dispensing container right up to the tip to the eye or if any of the medication drops missed the eye.

In this study, mean defect in best eye on visual field was considered mild [better than 6 Decibel (dB)], moderate (6 to 12 dB) and severe (worse than 12 dB). The doctor's perception of disease stability was categorised as stable or unstable/progressing .A patient was defined as being stable if he had stable optic disc findings on subsequent disc photographs, no visual field progression, and IOP maintained in the target range. The disease was termed unstable/progressing if the patient had progression of disc findings (progressive cupping of optic disc, broadening or deepening of retinal nerve fibre layer defects or disc haemorrhage) with progression of glaucomatous field defects in visual field associated with IOP higher than the target pressure.

## RESULTS

A total of 240 patients were interviewed. The average age of the participants was 60.5 years, ranging from 30 to 90 years. 90% of the participants were over the age of 50 years and 62.5% of them were males. All the participants were illiterate and belonged to socioeconomic class III or IV of Kuppuswamy scale. 86.7% of cases had bilateral involvement of glaucoma in their eyes. Most of the patients were on treatment duration of 5 years or less (n=240) and 10% had a family history of glaucoma (Table 1).

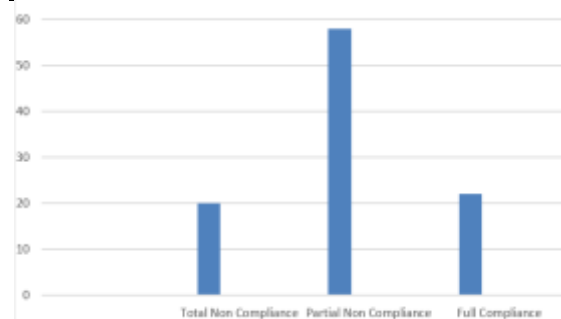
125 patients (52%) were observed to conduct improper drop administration technique. 76 patients (60.8%) touched the drug dispensing vehicle with the eye while instilling the medication and 49 patients (39%) missed the eye. Around 58% of the interviewed patients mentioned missing at least some form of the prescribed medication in the past 1 week with 20% patients having total non compliance (Figure 1). The most cited reason for noncompliance was drug shortage due to high cost followed by unavailability



of drugs in the rural areas (Table 2). Non compliance was higher in patients who did not have a caregiver at home.

**Table. 1 Sociodemographic characteristics of participants**

Sociodemographic Data	Number (%)
<b>Age</b>	
30-40 Years	16 (6.66%)
41-50 Years	54 (22.50%)
51-60 Years	72 (30.00%)
61-70 Years	42 (17.50%)
71-80 Years	32 (13.30%)
≥81 Years	24 (10.00%)
<b>Sex</b>	
Male	175 (73%)
Female	65 (27%)
<b>Socioeconomic Class</b>	
III	190 (79.20%)
IV	50 (20.80%)
<b>Laterality</b>	
Bilateral	208 (86.70%)
Unilateral	32 (13.30%)
<b>Duration of Treatment</b>	
6 months -1 year	18 (7.50%)
1-2 Years	97 (40.40%)
2-3 Years	85 (35.40%)
4-5 Years	40 (16.70%)



**Figure1 Level of compliance to anti glaucoma medications (n =240)**

**Table. 3 Reasons for non compliance**

Reasons	Number of patients (%)
Cost of drugs	64 (45.7%)
Unavailability of drugs at native place	28 (20%)
Ran out of drops	24 (17%)
Discomfort	15 (10.7%)
Forgetfulness	09 (6.4%)

## DISCUSSION

Glaucoma is becoming an increasingly important cause of blindness, as the world's population ages. In India alone, 11.2 million people aged 40 years and above are affected with glaucoma and 1.2 million are blind due to glaucoma. Lack of glaucoma awareness and late presentation adds hugely to the burden of this disease. The only treatment modality available is lowering of the intraocular pressure with medical or surgical management which halts the progression of disease but the damage to the optic nerve is irreversible. In such circumstances, the need for increasing compliance of antiglaucoma medications has become imperative to manage this condition, because non-compliance to antiglaucoma therapy has long been recognised as an important limiting factor in the medical management of glaucoma.[6] Patients with glaucoma having lower rates of compliance are presumed to be at greater risk of developing visual loss.[7]

This cross-sectional descriptive study was done to evaluate factors affecting compliance to antiglaucoma medications among a sample population belonging predominantly to rural areas of Jammu and Kashmir. In our study, around 58% of the interviewed patients reported partial non-compliance and 20% reported total non compliance with their antiglaucoma medications. Earlier studies done in India have shown a high percentage of non-compliance among patients with glaucoma, which still holds true. However, in other developed and developing countries of Asia, the non-compliance rates have been found to be varied: Israel (29%), Hong Kong (63.4%), Taiwan (75.8%), Saudi Arabia (19.4%) and Pakistan (65.5%).[8-12]

In our study, cost of the drugs was a major cause of non-compliance in 45.7% patients, which is contradictory to earlier studies done in India, where forgetfulness was the major cause of noncompliance. The reason for that can be attributed to the fact that this study was done only on rural population belonging to low socioeconomic status. Another reason was unavailability of drugs at their respective places (20% patients) and the patients having to wait for their scheduled visit to the tertiary hospital to procure the drug and subsequent missing of doses. So, the patients should be given an option of surgical treatment even in the early course of disease to reduce the financial burden and preserve vision. Improper drop administration technique was seen in 52% patients especially in older people who did not have a caregiver at home. Health professionals should demonstrate the proper technique to the patient as well as to the caregiver, whenever available. We need to focus on patient education and community awareness on glaucoma in our country.[13] Due to a high level of non compliance, as seen in our study, there is a need to pay more attention to anti glaucoma medication adherence in patients attending glaucoma clinics. Making patients and their family members aware about the disease and its sequelae, creating a

strong family support system and establishing a healthy doctor patient relationship can help to

## REFERENCES

1. Alan Robin, Davinder S Grover. Compliance and adherence in glaucoma management. *Indian J Ophthalmol.* 2011;59:93-6.
2. Gail F Schwartz *et al.* Adherence and Persistence with Glaucoma Therapy. *Surv Ophthalmol.* 2008;53:57-68.
3. Cătălina Zaharia *et al.* Adherence to Therapy in Glaucoma Treatment—A Review, *J Pers Med.* 2022;12(4):514.
4. George Shafranov. Glaucoma Therapy: Compliance, Adherence, Persistence, and Alliance. *Glaucoma Today.* 2006;07:40-42.
5. Sharon Kingman. Glaucoma is second leading cause of blindness globally. *Bull World Health Organ.* 2004;82(11):887-8.
6. Rudd P. In search of the gold standard for compliance measurement. *Arch Intern Med.* 1979;139:627–8.
7. Kass MA. Compliance and prognosis in glaucoma. *Arch Ophthalmol.* 1985;103:504.
8. Castel OC, Keinan-Boker L, Geyer O, Milman U, Karkabi K. Factors associated with adherence to increase compliance and maintain the quality of life of these patients.
9. Pong JCF, Lai JSM, Tham CCY, Lam DSC. Compliance with topical antiglaucoma medications. *HKJ Ophthalmol.* 2003;9:12.
10. Hwang DK, Liu CJ, Pu CY, Chou YJ, Chou P. Persistence of topical glaucoma medication: A nationwide population-based cohort study in Taiwan. *JAMA Ophthalmol.* 2014;132:1446–52.
11. Essam OA, Mousa ABA, Humaid ASS, Suliman AHSS, Wairimu GP, Ahmed M. Compliance of glaucoma patients to ocular hypotensive medications among the Saudi population. *J Ocular Pharmacol Ther.* 2016;32:50-4.
12. Ahmad I, Khan BS, Rehman M. Causes of noncompliance in patients with open angle glaucoma. *Ophthalmol Update.* 2015;13:7-9.
13. Ketaki Rajurkar, Suneeta Dubey, Parmatma Prasad Gupta, Denny John, Lokesh Chauhan. Compliance to topical anti-glaucoma medications among patients at a tertiary hospital in North India. *Journal of current ophthalmology.* 2018;30:125-9.

**Original Article****Impact of Detak Mobile Application in Early Detection of Acute Coronary Syndrome in the Covid-19 Pandemic in Blitar Regency Indonesia**

Novita Ana Anggraini, Faridah Mohd Said, Nur Syazana Umar, Rahmania Ambarika, Sandeep Poddar

**Abstract:**

**Introduction:** The Covid pandemic has had an impact on reducing the number of emergency room visits in cases of acute coronary syndrome (ACS). This will have a negative impact when the decrease in the number of emergency room visits by ACS patients results in delays in treatment. Online education through applications can be a solution to increasing knowledge without having to violate health protocols due to crowds during the Covid-19 pandemic. This study aims to determine the effect of the DETAK mobile application on the early detection of ACS during the Covid-19 pandemic.

**Methods:** This study will use a quantitative research design with a quasi-experimental pretest and posttest with a control group. This study applied a quantitative research design. A total of 252 respondents who met the inclusion criteria were randomly divided into control and intervention groups. The intervention group was given education through the DETAK application, and the control group was given conventional education about ACS. Before the intervention was given, a pre-test was conducted in both groups and after the intervention, a post-test was performed on both.

**Results:** The results of the study showed that there was an increase in the ability to detect ACS early in the control group ( $p=0.025$ ) and the intervention group ( $p < 0.001$ ). Results from the bivariate analysis showed that there were differences in the ability of early detection between the intervention and control groups ( $p < 0.001$ ).

**Conclusions:** There was an effect of using the DETAK mobile application on increasing knowledge of risk factors and symptoms of ACS which has an impact on increasing the ability to detect early symptoms of ACS during the Covid-19 pandemic.

**JK-Practitioner 2023;28(1-2):17-24**

**INTRODUCTION**

In 2020, the coronavirus caused a large number of people in Indonesia to get pneumonia. This had a big effect on health services. The main focus of health services during a pandemic is treating patients with Covid-19. The ease of transmission of the coronavirus has resulted in restrictions on activities and a reduction in non-urgent cases in health services. Furthermore, the Covid-19 epidemic has placed a lot of strain on already overburdened healthcare systems, raising questions about their ability to handle the demands of intensive care treatments [1]. Every attempt has been made to provide as many patients as possible with the opportunity to be admitted and treated in hospitals. The usual clinical practice has been entirely altered, and all non-urgent treatments have been cancelled. Acute coronary syndrome (ACS) management has grown more difficult and less common as a result of underestimating screening and elective therapies for coronary artery disease (CAD) in the setting of a stressed healthcare system. Despite this, ACS continues to be a leading cause of morbidity and mortality globally, accounting for more than 1 million hospital admissions each year in the US, while ischemic heart disease is to blame for almost 1.8 million deaths yearly in Europe, or 20% of all fatalities [2]. The prevalence of heart disease in Indonesia, which is diagnosed by a doctor in a population of all ages

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**Indexed**

EMBASE, SCOPUS, IndMED, ESBCO, Google Scholar besides other national and International Databases

**Cite This Article as**

Anggraini NA, Said FM, Ambarika R, Poddar S. Impact of Detak Mobile Application in Early Detection of Acute Coronary Syndrome in the Covid-19 Pandemic in Blitar Regency Indonesia. JK Pract 2023;28(1-2):17-24

Full length article available at [jkpractitioner.com](http://jkpractitioner.com) one month after publication

**Keywords**

Education, early detection, acute coronary syndrome, mobile application.

is 2 million cases. According to the doctor's diagnosis, the urban areas (1.6%) are higher than the rural areas (1.3%) [3]. The Covid pandemic has also had an impact on reducing the number of emergency room visits in cases of acute coronary syndrome (ACS). This will have a negative impact when the decrease in the number of emergency room visits by ACS patients results in delays in treatment [1,4]. Time is an important factor in the treatment of ACS. Prehospital delay will reduce the prognosis and increase the complications of ACS [5]. This condition may increase the ACS mortality rate during the Covid-19 pandemic. Restricting the number of hospital visits in non-Covid-19 patients can have an impact on delays in treatment for ACS which can have an impact on increasing mortality due to ACS [2,4].

Increased ACS mortality during the Covid pandemic can be avoided by providing proper education about the early detection of ACS. Improving the ability to detect ACS can increase the accuracy of seeking help so that prehospital delays can be prevented [6,7]. ACS patients can make the right decision when they should immediately come to IDG for treatment. This will reduce the negative impact caused by limiting the number of hospital visits for ACS patients [5]. Education related to improving the early detection of ACS can be done through an online application to minimize physical contact [8,9].

Online education through applications can be a solution to increasing knowledge without having to violate health protocols due to crowds. Moreover, a survey from the Indonesia Internet Service Provider Association (APJII) shows Indonesia as the largest internet user in Asia-Pacific. This condition shows the potential for using education through mobile applications to increase the ability for early detection of ACS [8,10]. Thus, this study aims to determine the effect of the DETAK mobile application on the early detection of ACS during the Covid-19 pandemic.

## METHOD

This study applied a quantitative research design with a quasi-experimental pre- and post-test with the control group. The population of this study was the community with a high risk of ACS in Blitar with 4282 cases of cardiovascular disease. The samples obtained in Blitar regency with 22 public health centre sub-districts, are Bakung, Binangun, Doko, Gandusari, Garum, Kademangan, Kanigoro, Kesamben, Nglegok, Panggungrejo, Ponggok, Sanankulon, Selorejo, and Selopuro. From the 22 sub-districts, the 4 with the highest ACS incidence rate, are Srengat, Wonodadi, Kademangan, and Selorejo. The sampling technique used in this study was a probability sampling technique. This technique is used to determine samples from wide population such as residents of a regency/city, province, and state. From 22 Blitar sub-districts were chosen 4 sub-districts with the highest incidence of cardiovascular disease, the 4 areas were Srengat, Wonodadi,

Kademangan, and Selorejo. Furthermore, in each sub-district, a health center was selected in the area with the highest incidence of heart disease. The samples in this study have been calculated using G\*power. The researcher decided to use a large effect size suggested by Cohen  $d$  (0,8) with  $\alpha=0,05$ ,  $\beta=0,95$ . The total number of respondents in this study was 252 with 126 in each group.

Inclusion criteria for this study were age >45 years; obesity; smoking; history of hypertension, diabetes mellitus, hyperlipidemia, hypercholesterol and, CVD; family history of cardiovascular disease, hypertension, diabetes mellitus, hyperlipidemia; patients who were willing to be respondents. Exclusion criteria from this study were a community with no high risk for ACS, and patients who were not willing to be respondents.

The instrument for this study was a checklist sheet that was divided into 3 sections, sociodemographic data, clinical factors, and early detection skills. This questionnaire was modified from several works of literature (socio demographic profile was adopted from Ferwana (2013)[11], clinical factors instrument was adopted from Ralapanawa et al., (2019)[12], early detection instrument was adopted from Collet et al., (2021)[13]. Some of the questions asked in the sections on early detection skills were about recognising, measuring, understanding, and mentioning ACS symptoms.

The mobile application used in this study was DETAK. DETAK is a mobile-based application developed by researchers with attention to literature studies related to information needs to increase knowledge and early detection abilities of ACS patients. This application has knowledge and practice features. In the knowledge menu, respondents were asked to fill out the questionnaire in the application, which includes age, sex, knowledge of coronary artery disease, and signs and symptoms of coronary artery disease that they have experienced. Whereas the practice menu contains coronary artery disease management taken recommendations based on the results of early detection measurements using the application.

The data collection process was carried out from March to June 2022. The data used in quantitative research were primary and secondary. Primary data were obtained from interviews conducted directly with respondents, and then the researcher filled out observation sheets according to the data submitted by respondents. Secondary data was obtained from reports or health documents from the Blitar Public Health Centre and other data that supported the research, such as supporting documents and an overview of the research site.

In this study, the people who took part were evaluated based on their condition before they were put in either the DETAK application group or the control



**Figure 1. DETAK application from registration until detection ACS**

group. After that, respondents were given information on the early detection of ACS through the DETAK application for the intervention group. For the control group, conventional health promotion will be provided using leaflets periodically to increase the ability of early detection of ACS. For the intervention group, the researcher use DETAK based on android mobile application. The respondent follow the instruction in figure 1 of DETAK application from registration until detection ACS.

After a month of intervention, the researcher conducted a post-test to measure the ability of respondents to achieve early detection in preventing ACS. To evaluate the ability of early detection of ACS in both groups was carried out by giving questionnaires about the ability to recognize the signs of ACS symptoms being felt, the ability to recognize risk factors for ACS, and the ability to make quick decisions after feeling ACS symptoms. The scores of the pre-test and post-test early detection results will be analyzed using a bivariate test to see differences in early detection abilities in each group and compare the differences between groups.

A Chi-Square test was carried out to describe the sociodemographic data (Age, BMI, Gender, Education, Marital status, Health Insurance, Employment Status) and the clinical factor of ACS. The bivariate analysis was carried out using the Wilcoxon test to analyze the effect of the DETAK app for early detection of ACS in the control and intervention groups. Mann-Whitney test was carried out to analyze the difference in the early detection of ACS after receiving DETAK in the control and intervention groups.

#### **Ethical Approval**

This research got approval from the Health Research Ethic Committee of the Institute Health of Science STRADA with number 3102/KEPK/VI/2022 dated June 29, 2022.

#### **RESULT**

The data in table 1 show that the respondents experience hypertension in both the control group (68.7%) and the intervention group (72.2%). Most of them had no history of diabetes mellitus in both groups with the percentages being 70.6% and 69.8% for the control and intervention groups, respectively. However, the clinical factors of hyperlipidemia indicated most of them did not have it (79.4%) in the control group while most of them in the intervention group had it (69.8%). Meanwhile, when viewed from the aspect of smoking history, both groups showed the same results as most of them had a smoking history in the control group (68.3%) and the intervention group (73.8%). Other clinical factors suggested that most of the respondents had an overweight BMI. The number of respondents who had an overweight BMI was 37.3% in the control group and 38.1% in the intervention group. Most of the respondents participating in the study had an ACS history, with 59.5% in the control group and 65.1% in the intervention group. Meanwhile, the results of the analysis indicated that all clinical factor variables had a p-value > 0.05, suggesting that the control and intervention groups are homogeneous.

The results of the research shown in the table above indicate that the ages of most respondents are in the range of 45-59 years old in both the control group (50%) and intervention group (54%). Most of them are female, with 54.8% in the control group and 57.9% in the intervention group. Respondents in this research have a good education, and most of them finished their high school education (SMA). When viewed from other aspects such as marital status, most of both the control group (92.9%) and the intervention group (92.1%) were married. Most of the respondents participating in this research had BPJS health insurance, both in the control group (85.7%) and the intervention group (92.1%). Most of them also worked in the control group (54%), as did 47.6% of



those in the intervention group.

**Table 1:** Characteristics of Respondents

Variables		Groups			
		Control		Intervention	
		F	%	f	%
Hypertension	Yes	86	68.3	91	72.2
	No	40	31.7	35	27.8
	<b>Total</b>	<b>126</b>	<b>100</b>	<b>126</b>	<b>100</b>
Diabetes mellitus	Yes	37	29.4	38	30.2
	No	89	70.6	88	69.8
	<b>Total</b>	<b>126</b>	<b>100</b>	<b>126</b>	<b>100</b>
Hyperlipidemia	Yes	26	20.6	88	69.8
	No	100	79.4	38	30.2
	<b>Total</b>	<b>126</b>	<b>100</b>	<b>126</b>	<b>100</b>
Current smoker	Yes	40	31.7	33	26.2
	No	86	68.3	93	73.8
	<b>Total</b>	<b>126</b>	<b>100</b>	<b>126</b>	<b>100</b>
Obesity/BMI	<18.5 : underweight	20	15.9	20	15.9
	18.5-24.9 : normal weight	27	21.4	32	25.4
	25.0-29.9 : overweight	47	37.3	48	38.1
	30.0-34.9 : obesity class I	32	25.4	26	20.6
	35.0-39.9 : obesity class II	0	0	0	0
	>40 : obesity class III	0	0	0	0
	<b>Total</b>	<b>126</b>	<b>100</b>	<b>126</b>	<b>100</b>
History ACS	Yes	75	59.5	82	65.1
	No	51	40.5	44	34.9
	<b>Total</b>	<b>126</b>	<b>100</b>	<b>126</b>	<b>100</b>
Age	<45 years old	22	17.5	23	18.3
	45-59 years old	63	50.0	68	54.0
	60-75 years old	41	32.5	35	27.8
	>75 years old	0	0	0	0
	<b>Total</b>	<b>126</b>	<b>100</b>	<b>126</b>	<b>100</b>
Gender	Male	57	45.2	53	42.1
	Female	69	54.8	73	57.9
	<b>Total</b>	<b>126</b>	<b>100</b>	<b>126</b>	<b>100</b>
Education	Elementary school	33	26.2	30	23.8
	Junior high school	27	21.4	35	27.8
	Senior high school	44	34.9	42	33.3
	Bachelor's	22	17.5	19	15.1
	<b>Total</b>	<b>126</b>	<b>100</b>	<b>126</b>	<b>100</b>
Marital status	Single	9	7.1	10	7.9
	Married	117	92.9	116	92.1
	<b>Total</b>	<b>126</b>	<b>100</b>	<b>126</b>	<b>100</b>
Health insurance	Non BPJS	18	14.3	10	7.9
	BPJS	108	85.7	116	92.1
	<b>Total</b>	<b>126</b>	<b>100</b>	<b>126</b>	<b>100</b>
Employment status	Employed	68	54.0	60	47.6
	Unemployed	42	33.3	50	39.7
	Retired/Sickness disability	16	12.7	16	12.7
	<b>Total</b>	<b>126</b>	<b>100</b>	<b>126</b>	<b>100</b>

\*Chi Square Test

The data in Table 2 shows an increase in the ability to detect ACS early in the control group with a p-value 0,025 and a p-value < 0,001 in the intervention group. A negative rank indicated a decrease in post-test scores as there was only 1 respondent in the intervention group and 4 respondents in the control

group. Positive rank represents an increase in post-test scores, where an increase in post-test scores in the intervention group was higher (66 respondents) than that of the control group (13 respondents). Tie scores neither increased nor decreased where the control group showed a higher tie score (109 respondents)

**Table 2:** Result of the Impact of Pre and Post DETAK

Groups			N	Mean Rank	Sum of Ranks	Median	Interquartile Range	p
Control	Early detection of ACS	Negative Ranks	4	8.50	34.00	8.00	1	0.025*
		Positive Ranks	13	9.15	119.00			
		Ties	109					
		<b>Total</b>	<b>126</b>					
Intervention	Early detection of ACS	Negative Ranks	1	28.50	28.50	10.00	2	0.000*
		Positive Ranks	66	34.08	2249.50			
		Ties	59					
		<b>Total</b>	<b>126</b>					

\*Wilcoxon Test

**Table 3:** The difference between early detection and preventing treatment of ACS

Group		N	Mean Rank	Sum of Ranks	Median	Interquartile Range	P
Early detection of ACS	Control	126	103.37	13025.00	1.5000	1.00	0.000
	Intervention	126	149.63	18853.00			
	<b>Total</b>	<b>252</b>					

compared with the intervention group (59 respondents). This proved that the DETAK application can be used effectively for the early detection of ACS independently.

The results of the research shown in the table above indicated that there was a significant difference between the control and intervention groups in the respondent's ability to early detect with p-value < 0,001. This showed that the use of the DETAK application had an effect on improving the ability for early detection of ACS. The weakness of this study was not carrying out an analysis of the confounding factors so that it has the potential to trigger bias in the research results. This can be used to improve future research to include countering factors in the analysis to minimize bias.

## DISCUSSION

DETAk is an android-based mobile application that was developed to help people in the community understand ACS comprehensively. It provides health information about ACS, assessing ACS risk factors based on the results of the literature and expert opinion, as well as ACS management. This indicated that the DETAK application can be used effectively for the early detection of ACS in an independent manner.. The DETAK app makes it easy to gain ACS-related knowledge in a fun way. Audio-visual media provides a fun learning experience so that understanding related to ACS symptom signs becomes better [8]. This is in line with research showing the effectiveness of using mobile

applications to improve the early detection of ACS symptoms. The DETAK application is very easy to access and learn from combining audio-visual elements through educational videos and infographics that make it easier for respondents to understand the symptoms and risk factors of ACS. Attractive virtual media will provide a pleasant stimulus and learning experience that will increase understanding [14]. Increased knowledge about the risk factors and symptoms of ACS will increase patient self-efficacy [15,16]. Patients can recognize any ACS symptoms that may appear during an attack. This condition will reduce stress due to increased problem-solving skills due to sufficient knowledge in recognizing the symptoms of ACS that they feel [17,18]. With the DETAK app, patients will know and be able to assess the symptoms of ACS they are feeling, so they can prevent prehospital delays due to prolonged early detection [19].

Differences in how educational materials about ACS were given to the control and intervention groups affected how early ACS could be found. The conventional method given to the control group places patients more passively in seeking information, so their level of understanding will be less than optimal and highly dependent on health workers [8,9]. The conventional method will also limit material repetition because there are no audio-visual media that they can access independently. This condition will make learning motivation decrease because patients will feel they do not have a great need to learn or

motivation because of their passive role in learning [9].

In the intervention group, on the other hand, patients worked together to find the information they needed. This condition will make them more motivated to learn new knowledge so that their level of understanding will be more optimal [8]). The flexible Detak application makes it very easy for patients to choose their study material and time. The use of the DETAK application also greatly facilitates the process of repeating material according to what they need. Coupled with interactive and interesting learning media, the learning experience will be more enjoyable [9,20,21]. This condition increases the level of understanding of ACS symptoms in the intervention group, which will increase the ability to detect ACS early.

Even so, 113 out of 126 people in the control group and 60 out of 126 people in the intervention group did not notice an improvement in their ability to spot early ACS. One of the inhibiting factors for the early determination of ACS is age. There are more than 30% of respondents over 60 years old. This causes a less optimal level of understanding of ACS symptoms due to decreased cognitive ability. In addition, elderly respondents have difficulty using the application. This difficulty will limit their access to the material they need so that their understanding of the signs and symptoms of ACS is less than optimal [5,6].

The Covid-19 pandemic has limited everyone's activities, including non-urgent routine health check-ups to minimize prevention. This makes patients who have risk factors that are not optimally controlled so that there is a potential for ACS attacks to occur [1,2,4]. Because of the COVID-19 epidemic, there were fewer medical/educational consultations, therefore home visits and club activities were cancelled. [22,23] The DETAK application provides information about risk factors and actions that must be taken to prevent an ACS attack. Knowing the risk factors you have, will increase your awareness of ACS. Someone who has a high ACS risk factor will tend to be careful and sensitive about the symptoms they feel [8,17]. This condition will increase the speed of early detection of ACS so that decisions to seek help from health services can be made quickly and accurately in a pandemic [1,2,4,24]. Reducing prehospital delay due to the increased ability to detect early ACS will reduce complications and improve the prognosis of ACS [6,25]. This shows that the DETAK application can improve early detection in ACS patients by increasing knowledge of the risk factors and symptoms of the disease.

## CONCLUSION

There was an effect of using the DETAK mobile application on increasing knowledge about risk factors and symptoms of ACS which has an impact on increasing the ability to detect early symptoms of ACS during the Covid-19 pandemic with p-value < 0,001.

## ACKNOWLEDGEMENT

The authors would like to thank all respondents and the team who participated in this research and are also thankful to the Institute Health of Science STRADA & Lincoln University College for academic support.

## REFERENCES

1. Mafham MM, Spata E, Goldacre R, Gair D, Curnow P, Bray M, et al. COVID-19 pandemic and admission rates for and management of acute coronary syndromes in England. *The Lancet* [Internet]. 2020;396(10248):381–9. [https://doi.org/10.1016/S0140-6736\(20\)31356-8](https://doi.org/10.1016/S0140-6736(20)31356-8)
2. Schiavone M, Gobbi C, Biondi-Zoccai G, D'Ascenzo F, Palazzuoli A, Gasperetti A, et al. Acute coronary syndromes and Covid-19: exploring the uncertainties. *J Clin Med*. 2020;9(6):1683. <https://doi.org/10.3390/jcm9061683>
3. Kemenkes RI. Profil Kesehatan Indonesia 2020. Kementrian Kesehatan Republik Indonesia. 2021;139.
4. Ashraf S, Ilyas S, Alraies MC. Acute coronary syndrome in the time of the COVID-19 pandemic. *Eur Heart J* [Internet]. 2020 Jun 7;41(22):2089–91. <https://doi.org/10.1093/eurheartj/ehaa454>
5. Arrebola-Moreno M, Petrova D, Garcia-Retamero R, Rivera-López R, Jordan-Martínez L, Arrebola JP, et al. Psychological and cognitive factors related to prehospital delay in acute coronary syndrome: A systematic review. *Int J Nurs Stud*. 2020 Aug 1;108:103613. <https://doi.org/10.1016/j.ijnurstu.2020.103613>
6. Garrido D, Petrova D, Catena A, Ramírez-Hernández JA, Garcia-Retamero R. Recognizing a Heart Attack: Patients' Knowledge of Cardiovascular Risk Factors and Its Relation to Prehospital Decision Delay in Acute Coronary Syndrome. *Front Psychol*. 2020 Aug 25;11:2056. <https://doi.org/10.3389/fpsyg.2020.02056>
7. Khaled MFI, Adhikary DK, Islam MM, Alam MM, Rahman MW, Chowdhury MSIT, et al. Factors Responsible for Prehospital Delay in Patients with Acute Coronary Syndrome in Bangladesh. *Medicina (B Aires)*. 2022;58(9):1206. <https://doi.org/10.3390/medicina58091206>
8. Dwairej L, Ahmad M. Hypertension and mobile application for self-care, self-efficacy and related knowledge. *Health Educ Res*. 2022;37(3):199–212.

9. Zahid T, Alyafi R, Bantan N, Alzahrani R, Elfirt E. Comparison of effectiveness of mobile app versus conventional educational lectures on oral hygiene knowledge and behavior of high school students in Saudi Arabia. *Patient Prefer Adherence*. 2020;14:1901. <https://doi.org/10.1093/her/cyac012>
10. Crandall K, Shake M. A mobile application for improving functional performance and health education in older adults: A pilot study. *Aging Sci*. 2016;4(151):2. <http://dx.doi.org/10.4172/2329-8847.1000151>
11. Ferwana M. Socio-demographic and racial differences in acute coronary syndrome: Comparison between Saudi and South Asian patients. *Journal of Family Medicine and Primary Care*. 2013 Jan;2(1):64. <https://doi.org/10.4103%2F2249-4863.109950>
12. Ralapanawa U, Kumarasiri PV, Jayawickreme KP, Kumarihamy P, Wijeratne Y, Ekanayake M, Dissanayake C. Epidemiology and risk factors of patients with types of acute coronary syndrome presenting to a tertiary care hospital in Sri Lanka. *BMC cardiovascular disorders*. 2019 Dec;19(1):1-9. <https://doi.org/10.1186/s12872-019-1217-x>
13. Collet, J. P., Thiele, H., Barbato, E., Bauersachs, J., Dendale, P., Edvardsen, T., Gale, C. P., Jobs, A., Lambrinou, E., Mehilli, J., Merkely, B., Roffi, M., Sibbing, D., Kastrati, A., Mamas, M. A., Aboyans, V., Angiolillo, D. J., Bueno, H., Bugiardini, R., ... Siontis, G. C. M. (2021). 2020 ESC Guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation. In *European Heart Journal* (Vol. 42, Issue 14, pp. 1289–1367). Oxford University Press. <https://doi.org/10.1093/eurheartj/ehaa575>
14. Rufaindah E, Patemah P. Application of “Stunting Prevention” Android-Based Applications to Mother Knowledge and Nutritional Status of Toddlers Ages 0-36 Months. *Jurnal Kebidanan*. 2021;11(1):41–6. <https://doi.org/10.31983/jkb.v11i1.6462>
15. Demisse L, Alemayehu B, Addissie A, Azazh A, Gary R. Knowledge, Attitudes and Beliefs About Acute Coronary Syndrome Among Patients Diagnosed With Acute Coronary Syndrome, Addis Ababa, Ethiopia. 2022 [cited 2022 Jun 21]; <https://doi.org/10.21203/rs.3.rs-1435311/v1>
16. Dijkhuis TE, Bloem F, Kusters LAJ, Roos SM, Gordijn SJ, Holvast F, et al. Investigating the current knowledge and needs concerning a follow-up for long-term cardiovascular risks in Dutch women with a preeclampsia history: a qualitative study. *BMC Pregnancy Childbirth*. 2020;20(1):1–10. <https://doi.org/10.1186/s12884-020-03179-1>
17. Demisse L, Alemayehu B, Addissie A, Azazh A, Gary R. Knowledge, Attitudes and Beliefs About Acute Coronary Syndrome Among Patients Diagnosed With Acute Coronary Syndrome, Addis Ababa, Ethiopia. 2022 [cited 2022 Jun 22]; <https://doi.org/10.21203/rs.3.rs-1435311/v1>
18. Mirzaei S, Steffen A, Vuckovic K, Ryan C, Bronas UG, Zegre-Hemsey J, et al. The association between symptom onset characteristics and prehospital delay in women and men with acute coronary syndrome. *European Journal of Cardiovascular Nursing*. 2020;19(2):142–54. <https://doi.org/10.1177/1474515119871734>
19. Arrebola-Moreno M, Petrova D, Garrido D, Ramírez-Hernández JA, Catena A, Garcia-Retamero R. Psychosocial markers of pre-hospital decision delay and psychological distress in acute coronary syndrome patients. *Br J Health Psychol*. 2020;25(2):305–23. <https://doi.org/10.1111/bjhp.12408>
20. Hoschar S, Albarqouni L, Ladwig KH. A systematic review of educational interventions aiming to reduce prehospital delay in patients with acute coronary syndrome. *Open Heart*. 2020;7(1):e001175. <http://dx.doi.org/10.1136/openhrt-2019-001175>
21. Yusriani Y, Septiyanti S. The Impact of Community Health Education Media in the Industrialization Era on the Diet of High Risk Pregnant Women. *Journal of Nonformal Education*. 2021;7(2):259–67. <http://dx.doi.org/10.15294/jne.v7i2.31793>
22. Lolo WA, Citraningtyas G, Mpila DA, Wijaya H, Poddar S. Quality of Life of Hypertensive Patients Undergoing Chronic Disease Management Program during the COVID-19 Pandemic. *Kesmas: Jurnal Kesehatan Masyarakat Nasional (National Public Health Journal)*. 2022 Nov 30;17(4):264-9. <http://dx.doi.org/10.21109/kesmas.v17i4.6224>
23. Sen S. SARS-CoV-2 and Environment: Transmission and Green Combat. *International Journal of Advancement in Life Sciences Research*. 2022 Apr 27;5(2):1-5. <https://doi.org/10.31632/ijalsr.2022.v05i02.001>
24. Sahu KK, Kumar R. Current perspective on pandemic of COVID-19 in the United States. *J Family Med Prim Care [Internet]*. 2020 Apr

- 30;9(4):1784–91.  
<https://pubmed.ncbi.nlm.nih.gov/32670917>
25. Michalski P, Kasprzak M, Siedlaczek M, Kubica A. The impact of knowledge and effectiveness of educational intervention on readiness for hospital discharge and adherence to therapeutic recommendations in patients with acute coronary syndrome. *Medical Research Journal*. 2020;5(2):72–8. <https://doi.org/10.5603/MRJ.a2020.0023>



**Original Article****Stunting Care Application (SCATION) and Its Effect in Early Detection of Stunting in Toddlers in Langkat District**

Ingka Kristina Pangaribuan, Faridah Mohd Said, Salbiah Binti Abdul Rahim, Hafizah Che Hassan, Sandeep Poddar

**Abstract:**

**Introduction:** According to WHO data from 2020, 144 million children around the world had stunted growth in 2021. Based on the results of the Indonesian Nutrition Status Study (SSGI), Ministry of Health, the prevalence of stunting among children under five is 24.4% in 2021. Poor nutrition during pregnancy and the early years of childhood has the terrible side effect of stunting. Children that are stunted may never reach their full height potential, and their brains may never fully mature cognitively.

**Methods:** This study is quantitative in nature, with an analytic approach and a quasi-experimental design with a pre-post test design by using scation (*stunting care application*). The population in this study were parents who had children aged 0–5 months, with a total sample of 212 mothers.

**Result:** The median value of knowledge is 55.0 and 50.0 for skills after being given an intervention by scation (*stunting care application*), while the median value for the control group is 45.0 for knowledge and 45.0 for skills. The increase in knowledge was 5.0 in the intervention group (scation) and 2.0 in the control group, and there was an increase in the same skills in both groups, namely 5.0 with a p-value of 0.004 for knowledge and 0.007 for skills.

**Conclusion:** There is an effect of the SCATION application on increasing mothers' knowledge and skills in the early detection of stunting in toddlers

**JK-Practitioner2023;28(1-2):25-34**

**INTRODUCTION**

Inadequate nutrient intake is a long-term malnutrition issue that results in stunting. As a result, the individual may have trouble reaching their full potential in terms of physical and mental development. Poor nutrition during pregnancy and the early years of childhood has the terrible side effect of stunting. Children that are stunted may never reach their full height potential, and their brains may never fully mature cognitively.[1,2]

A child is said to be stunted if his height and body length are minus 2 from the Multicentre Growth Reference Study standard or the median standard deviation of the WHO child growth standard. In addition, the Indonesian Ministry of Health stated that stunting is a child under five with a z-score less than -2SD/standard deviation (stunted) and less than -3SD (severely stunted).[3,4]

Government efforts to reduce the prevalence of stunting include the Sustainable Development Goals (SDGs). The second goal of the SDGs is to end hunger and achieve food security. Adopting better nutrition and sustainable agriculture. Second Objective of Part A of The SDGs include ending hunger, achieving food security and balanced diets, and tackling child stunting. This situation continues in his RPJMN (National Medium) 2020-2024 in Indonesia. [5]A policy that addresses one of the problems associated with stunting (term development planning). Accelerate the reduction of stunting by increasing the effectiveness of specific meticulous measures nutritional intervention.

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**Indexed**

EMBASE, SCOPUS, IndMED, ESBCO, Google Scholar besides other national and International Databases

**Cite This Article as**

Pangaribuan IK, Said FM, Rahim SA, Hasan HC, Poddar S, Stunting Care Application (SCATION) and Its Effect in Early Detection of Stunting in Toddlers in Langkat District..JK Pract2023;28(1-2):25-34

Full length article available at [jkpractitioner.com](http://jkpractitioner.com) one month after publication

**Keywords**

Stunting Care Application (Scation), Knowledge, Skill, Stunting

One means of intervention to reduce stunting is formation. Stunted areas, including stunted villages. Stunt Locus Village Rural areas within stunted area districts designated as Focus on integrated stunting interventions by multiple sectors, i.e. OPD (regional appropriate organizations), NGOs (non-governmental organizations) and communities, Host a stunting convergence conference to discuss ways to integrate multiple disciplines in a focused effort to reduce stunting and reduce the incidence of stunting. Although there were some Indonesian government efforts to reduce the prevalence of stunting Indonesia's prevalence remains at 14%, below target for 2024. [6,7]

According to World Health Organization statistics from 2020, 144 million children worldwide had stunting in 2021. Of these children, 55% live in Asia, where its prevalence is higher than that of childhood obesity and wasting. Stunting affected 32.6 percent of children under the age of five globally in 2000. According to data from UNICEF, WHO, and the World Bank Group, the rate of stunting has been progressively reducing and is expected to reach 22% in 2020.[3]

Children under the age of five who are stunted are distributed as follows: 27% of all stunted children live in low-income countries, 65% of all stunted children reside in lower-middle-income countries, 8% of all stunted children reside in upper-middle-income countries, and 1% of all stunted children reside in high-income countries.[ Based on the results of the SSGI 2021, the national ]stunting rate decreased by 1.6 percent per year,] from 27.7 percent in 2019 to 24.4 percent in 2021.[

Stunting in Langkat is 18.23%; it has decreased, but it is not in line with the government's target of 10%. Thus, Indonesia is not able to achieve Millennium Development Goal 4 (reduce child mortality). [9] Based on the preliminary survey, mothers in the Langkat area only bring their children to healthcare centres until they are 1 year old. One reason is that healthcare facilities are so far away, mothers work, and several mothers had picked them up but did not come. So it is necessary to carry out an innovation to create parental independence in the early detection of stunting, and this sanitation application is very effective and relevant to resolving problems in Langkat district. Technology continues to develop at an exponential speed, online platforms are also increasing. The use of technology is used to increase knowledge that can prevent a disease and promote positive behavior change to achieve MDGs4. Government of Indonesia has introduced and implemented M-Health, E-Health such as Hello Doctor for provision of health information and health services, Prima Ku for growth of children and friends of pregnant women to monitor the development of pregnant women. However, limited application on

child health especially in controlling stunting. I chose a health-based application because, based on data from the Ministry of Communication and Information, in 2021, 89% of the Indonesian population will use smartphones, and now health information is already based on digital technology. Therefore, it is call for research stunting care application (SCATION) and it effect for early detection of stunting in toddlers in Langkat Health District

## **MATERIALS AND METHODS**

### **Samples**

The sample in this research is parents who had children under five in the Langkat Health Center Work Area, which is 212 mothers. The matching approach technique will be used to select the sampling technique for respondents, which will be either cluster sampling or probability sampling. With inclusion criteria, parents with children under the age of five who are willing to be respondents, parents with smartphones; with exclusion criteria, toddlers with growth and development disorders, and parents who do not live with the child.

### **Research Design**

This study used a quasi-experimental design because it is a study that provides an intervention with a pre-post-test with a control group design to evaluate the role of the stunting care application (SCATION) versus conventional methods on early detection of stunting in toddlers. This study uses a quasi-experimental design because it has an intervention group and a control group, and there are external variables that cannot be controlled by the researcher.[10]

Stunting care application (SCATION) is an android application that can be used to prevent stunting. In this SCATION application, discussions can be held between the general public, pregnant women, and health workers regarding health information about stunting and there is an alarm in the form of a reminder when parents should bring their children to monitor growth and development to health care facilities. In this SCATION application there are (normal sizes of baby's head and chest circumference, normal height and weight) so that if they are not appropriate, they can be detected immediately, so making the SCATION application is one of the best solutions we have to reduce stunting rates in Indonesia.

### **Data Collected**

Looking for secondary data from health center the number of mothers who have toddlers, the researcher asked the consent of all respondents, after obtaining the necessary approvals and approvals, data collection

begins, Respondents filled out the Knowledge questionnaire and performed skills according to the checklist sheet. Researchers measured the knowledge and skills of mothers before the intervention in the control group and the intervention group. Researchers intervened in the intervention group; researchers conducted post-intervention measurements on respondents from both groups at the next visit (about the eighth week after the intervention); The data collected are sociodemographic factors: mother and child, mother's knowledge and skills, Researchers carry out data processing and analysis. The data information that will be requested at the time of registration can be seen in the figure 1.

Furthermore, the data written by the respondent can be used for health workers in Langkat district, next in this application there are several features that are very useful in early detection of stunting. There are features that help mothers in early detection of stunting and how to prevent it in the education feature. Furthermore, the scation application will help the mother to remind the schedule for measuring the height and weight contained in the picture, the application user mother can click which will later appear on the mother's cellphone.

Then the results of measurements of height per age and weight per age will appear, and conclusions will

emerge that can be used as a guide for mothers to consult with pediatric specialists if needed. (Figure 3) In the educational feature, mothers will get some information about stunting, assessment of toddler development, how to measure height and weight and the provision of complementary feeding (MP-ASI) that is appropriate for the child's age, as shown below in figure 4.

The Scation application is also equipped with Q and A (Question and Answer) features where in this feature mothers of toddlers can directly ask questions about the health of toddlers which will be answered immediately by the admin (health workers).

#### **Ethical Approval:**

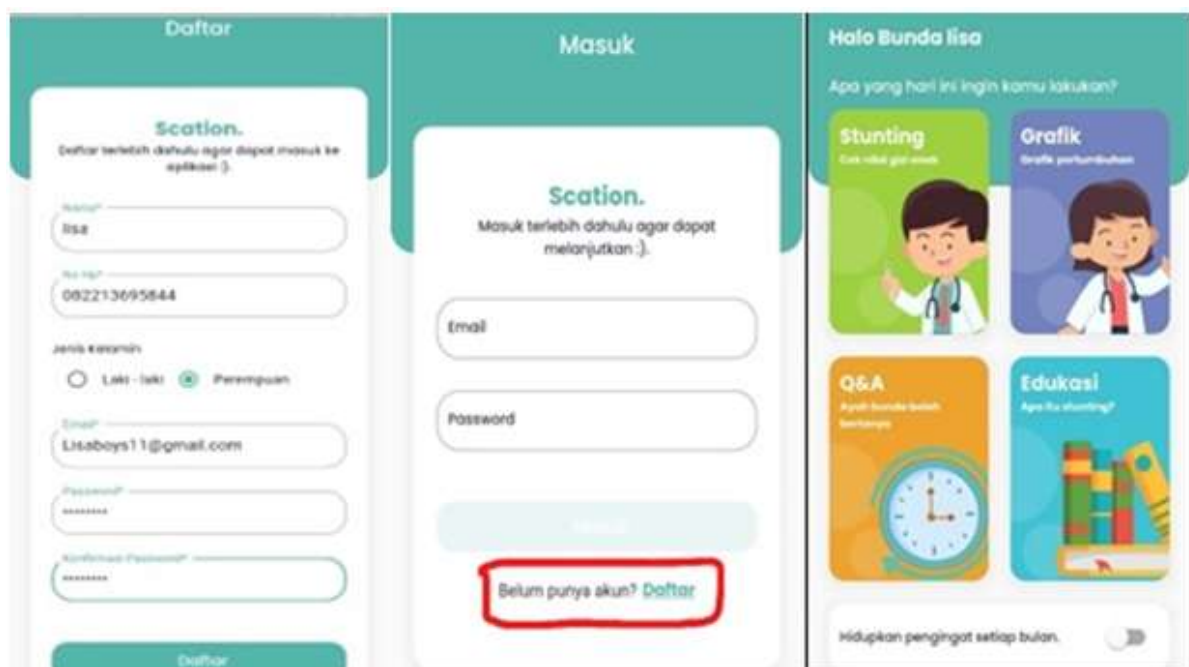
This research get ethical approval from Sekolah Tinggi ILMU Kesehatan (STIKes) Mitra Husada Medan with No 780/KEP-MHM/X/2022 dated 22<sup>nd</sup> October 2022.

#### **RESULT**

##### **Respondent Rate**

The number of respondents in this study is as many as 212 samples, where all respondents are willing to be the research sample, so that it can be concluded that the respondent rate in this study is 100%.

##### **Analysis Univariate Demographic**



**Figure 1. Login for application**

The screenshot shows a mobile application interface for child identity registration. The top bar is teal with a back arrow and the text 'List Anak'. Below the bar, there's a teal box with a white minus sign and the text 'riska' and 'Perempuan'. To the left of this box is an illustration of a person standing next to a box with a sad face. Below the illustration is the text 'Data anak keong statuskan ke tarikh dahulu.' and a red arrow pointing to a green circular button with a white plus sign. To the right of the teal box is a 'Cek Hasil' button. Below this is a form for a child named 'riska' with fields for 'Formulir Status Anak' and a 'Lanjutkan' button.

Figure 2. Identity of child



Figure 3. Result for growth development of child



Figure 4. (Question and Answer)

## Profile

## Mother Demographic

Table 1 Frequency Distribution of Mother Demographic in Langkat Regency by Using Scation (Stunting Care Application) in 2022

Characteristic	Group		Total
	Intervention (SCATION) (n = 106)	Control Book KIA (n = 106)	
<b>1. Age</b>			
a. < 20	3 (2.8%)	6 (5.7%)	9 (4.24%)
b. 20 - 35	98 (92.5%)	96 (90.6%)	194 (91.5%)
c. > 35	5 (4.7%)	4 (3.8 %)	9 (4.24 %)
<b>2. Education</b>			
a. Junior High School	17 (16.0 %)	3 (2.8 %)	20 (9.43%)
b. Senior High School	67 (63.2 %)	89 (84.0 %)	156 (73.6 %)
c. College	22 ( 20.8 %)	14 (13.2 %)	36 (16.9 %)
<b>3. Job</b>			
a. Housewife	72 (67.9 %)	75 (70.8 %)	147 (69.3 %)
b. Working Mother	34 (32.1 %)	31 (29.2 %)	65 (30.7 %)
<b>4. Parity</b>			
a. 1-2	47 (44.3 %)	70 (66 %)	117 (55.2 %)
b. 3-4	59 (55.7 %)	36 (34 %)	95 (44.8 %)

The majority of parents in the intervention and control groups were aged 20–35 years, as many as 194 (91.5%). Based on their education level, the majority of respondents' education level is high school, as many as 156 (73.6%). According to occupation characteristics, the majority of respondents in both groups of housewives were 147 (69.3%), and the majority of respondents in both groups had 1-2 children as many as 117 (55.2%). Majority of toddlers

aged 1 <2 years are 74 toddlers (33%), based on gender the majority are male as many as 122 people (54.5%), based on body weight the majority of toddlers have normal weight as many as 176 people (78.6%), and based on height the majority of toddlers have normal height as many as 129 people (57.6%) Both research groups have a score for maternal knowledge before and after the intervention using

scation (stunting care application). From the table significant difference ( $p < 0.005$ ) which means that the two groups can be compared (comparable). The comparison of posttest knowledge scores was seen in the intervention group, where the median score was 55.0 with a range of 30–77.50, and in the control group, where the median score was 50 with a range of 30–75. This difference was statistically significant ( $p = 0.004$ ).

#### Toddler Demographic

**Table 2 Frequency Distribution of Toddler Demographic in Langkat District by using Scation (Stunting Care Application) in 2022**

No	Characteristics	Frequency	%
<b>Age</b>			
1	0<1 year	27	12.1
2	1<2 year	74	33
3	2<3 year	77	34.3
4	3<4 year	33	14.7
5	4<5 year	13	5.9
<b>Gender</b>			
1	Female	102	45.5
2	Male	122	54.5
<b>Weight</b>			
1	More Nutrition	23	10.2
2	Normal	176	78.6
3	Malnutrition	25	11.2
<b>Height</b>			
1	Normal	129	57.6
2	Stunting	95	42.4
<b>Total</b>		<b>224</b>	<b>100</b>

#### Bivariate Analysis

**Table 3 Comparison of Knowledge and skills Scores of Mothers for Early Detecting Stunting in Toddlers in the Intervention Group using Scation and the Control Group**

In the Intervention Group Using Suction and the Control Group			
Item	Group		Score P*
	Intervention (n = 106)	Control (n = 106 )	
Knowledge Score			
a. Pretest			
Mean	47.78	45.74	0.174
Median	50.0	45.0	
Range	20 - 75	30 - 75	
b. Posttest			
Mean			0.004
Median	53.73	49.33	
Range	55.0	50.0	
	30 – 77.50	30 - 75	



**Skill Score****a. Pretest**

Mean (SD)	47.22	45.19	0.295
Median	45.0	45.0	
Range	10 – 80	10 – 75	

**b. Posttest**

Mean (SD)	53.16	48.63	
Median	50.0	50.0	
Range	20 – 80	30 – 75	0.007

**DISCUSSION**

Based on the results of the study, the majority of respondents were aged 21-35 years. Where at this time respondents were considered mature for women in terms of emotions, personality and social so that they had the opportunity to access information about stunting. Based on the respondent's occupation, the majority of housewives have less knowledge about stunting. Based on education, the majority of mothers completed school up to high school. Based on (11) states that education greatly affects one's knowledge. Knowledge has a close relationship with education, where with higher education, a person will broaden his knowledge. Low education does not guarantee that a mother does not have sufficient knowledge about the nutrition of her family. The existence of high curiosity can influence mothers in getting information about the right food for children. Increased knowledge is not absolutely obtained from formal education alone, but can be obtained through non-formal education (12)

This research is in line with the (13) on Growth Monitoring Applications to Increase Mother's Self-Monitoring of stunting where the statistical test results with Man Whitney analysis showed a p value of 0.007, which means that there was a significant difference between the independent practice of the control group and the intervention group during the posttest so that it can be concluded that the use of growth monitoring applications has a good effect on mothers' independent practices in monitoring stunting. This research is in accordance with (14) research which states that parental knowledge is closely related to parenting styles for the growth and development of toddlers.

The activity of providing the SCATION application (Stunting Care Application) showed very good results in increasing mother's knowledge to detect early stunting in toddlers where the comparison of posttest knowledge scores was seen in the intervention group from the median score of 55.0 with a range of 30-77.50 and the median control group had a score of 50 with a range of 30-75. This difference was statistically

significant ( $p = 0.004$ ) which could be concluded that there was an effect of changing mother's knowledge after using the Scation application.

This research is in line with another study (15), which states that one of the most widely accessed media by mothers is mobile phones, so efforts to increase knowledge through android-based mobile applications are quite effective in providing knowledge and preventing stunting in toddlers. Globally, the increasing use of mobile phone applications is no longer just for the use of sending messages but for downloading health-related applications such as those about pregnancy, nutrition, and diet.

Giving the Scation application to mothers has proven that there is an increase in the mother's knowledge in the early detection of stunting in toddlers, where mothers who have used the Scation application will routinely fill out measurements of children's height and weight to determine the nutritional status of toddlers, coupled with an alarm (reminder) every month that will be accepted by the mother so that she does not forget to fill in the measurements of the child's height and weight based on age. The pretest knowledge between the control and intervention groups showed a p value = 0.174, which means that the two groups had homogeneous knowledge / there was no difference in knowledge between the two groups at first. After being given the Stunting Care Application (Scation), the results obtained a significant difference with a p value = 0.004. It shows that the Scation application is proven to increase the knowledge of respondents.

According to research (16), a person's level of knowledge is closely related to the level of formal education; the higher a person's formal education, the easier it is for that person to understand health-related matters. Knowledge, or cognitive ability, is a very important domain in shaping one's actions. Some researchers (17) also stated that based on the results of research on the ability of mothers' knowledge about balanced nutrition before being given the Ayo Dedis android application, the majority of mothers had sufficient abilities, and after being given the Ayo

Dedis android application, the majority of mothers' knowledge increased to good, so it can be concluded that there is an influence on the Ayo Dedis application based on android to increase mothers' knowledge with a p value of 0.004.

According to (18) mentions knowledge is an individual who knows what to do and how to do it. Knowledge is one aspect of behavior that shows a person's ability to understand and use abilities by thinking about everything he has learned. Parents who do not know about stunting cause them to be disinterested and reluctant to prevent stunting early detection. This research is also in accordance with the research of (19) Adopt a learning style, smartphone portability and concept expression with interactive illustrations and global reach has made application-based learning (app) an effective medium. Educational mobile apps can increase one's knowledge. The author believes that educational applications can have a significant impact knowledge. This study supports research (10), which states that mothers' skills in stimulating growth and development in toddlers have an influence, with a difference in the average skills of respondents in the practise of stimulating growth and development of toddlers before and after attending a class for mothers of toddlers with a p value of 0.001. The use of the m-health application can increase knowledge and skills in the area of pregnancy and child health. M-health applications can be used as a means for health promotion. In the m-health application, there is health information that can be used by users as a source of information about the health information used. As a result, users of the m-health application will gain more knowledge. (11)

Based on the results of the study, the mother's skill score in the intervention group, posttest observations in the intervention group were higher than the control group. It can be seen from the median score of 50 with a range of 20-80 while the median score in the control group is 50 with a range of 30-75. This difference is statistically significant ( $p = 0.007$ ) it can be concluded that there is an effect of mother's skills on early detection of stunting in toddlers. this study also supported by research by Susilawati & Dhamayanti, 2017(20).

The results of the research using the scation application can be seen that there is a decrease in children who experience stunting and children who experience malnutrition, based on these results it can be seen that the scation application can assist parents in monitoring the growth of children so that they can

overcome or prevent stunting in toddlers. The scation application has features that are easy for parents to understand so that it is easy for mothers to enter data on the child's height and weight according to the child's age. The scation application provides information about stunting such as the causes, impacts, and how to overcome stunting so as to provide information to parents for early detection of stunting in toddlers in Langkat district.

To achieve optimal results, the activity of providing information must pay attention to the media to be used. Media is a means or effort to display messages or information to be conveyed, both through print, electronic and outdoor media, so that target knowledge can increase and ultimately change behavior in a positive direction towards health (21). The use of media will help clarify the information conveyed. So that the information conveyed can be clearer and easier to understand in accordance with the objectives to be achieved.

Mobile devices, smartphones and tablets Computers have influenced many fields including the health sector. Progress mobile technologies such as smartphones and tablets personal computer (PC) has provided major impact on the treatment system health. Mobile technology offers innovative approach to solving problems complex health. Many applications current mobile health (mHealth app) available in market. This app is designed for facilitating various issues and problems health, and intended for use outside the clinic (22).

The following research is a study conducted (23) regarding the use of android applications in diagnosing and monitoring stunting cases early. This study is also a study conducted by (24) with a smartphone to increase parental compliance in providing growth and development stimulation to their children using the rimender system. Prevention of growth and development disorders in toddlers can be detected early by doing stimulation is one way that can be used to monitor and monitor growth and development abnormalities in children. Where there is a role for the application of Mother Cares (MOCA) to increase parental compliance in stimulating children's growth and development with an increase in compliance of 2.2 times in the intervention group compared to the control group. The author makes a prototype in this study based on an expert system in the form of a Stunting Care Application (SCATION) with the use of technology. The SCATION application is an application that can be downloaded via an android smartphone that can be used to help

detect stunting in toddlers early and is useful for parents to monitor their child's growth regularly independently. With the SCATION application, it is hoped that it will increase the knowledge and skills of parents in monitoring children's growth because the advantages of this application are that it is attractive, easy to use, and uses a reminder system.

#### LIMITATIONS OF THE STUDY

In this study, the authors face limitations that affect the research conditions, while the limitations of the study include At the time of the research the internet network was not strong, at the time of conducting the research there were results of children experiencing stunting and malnutrition, the researchers did not conduct in-depth research regarding the causes of the case to the toddler.

#### SUGGESTION

Parents are expected to pay attention to the growth of children according to the right age and pay attention to the development of children. Because during the research the parents paid less attention to the child's growth, they only focused on the condition of the child being healthy or sick without looking at the child's growth and development. From this research need socialize the use of the Stunting Care (SCATION) application to parents of toddlers as an effort to increase knowledge and skills in early detection of stunting in toddlers so that treatment and prevention can be carried out.

#### CONCLUSION

There is an effect of stunting care (SCATION) application on early detection of stunting incidence in children under five in Langkat Regency, where there are:

1. The majority of parents in the intervention and control groups were aged 20–35 years, as many as 194 (91.5%). Based on their education level, the majority of respondents' education level is high school, as many as 156 (73.6%). According to occupation characteristics, the majority of respondents in both groups of housewives were 147 (69.3%), and the majority of respondents in both groups had 1-2 children as many as 117 (55.2%).
2. The majority of toddlers aged 1-2 years are 74 (33.3%); the majority are male, as many as 122 (55%); the majority of toddlers have normal weight, as many as 176 (78.5%); and the majority of toddlers have normal height, as many as 129 (57.5%).
3. There was an increase in mother's knowledge in the intervention group compared to the control group, with a comparison of posttest knowledge

scores showing in the intervention group a median score of 55.0 with a range of 30-77.50 and in the control group a median score of 50 with a range of 30-75. This difference was statistically significant ( $p = 0.004$ ).

4. There was an increase in maternal skills in the intervention group compared to the control group: the intervention group's median score was 50 with a range of 20-80, while the control group's median score was 50 with a range of 30-75. This difference was statistically significant ( $p = 0.007$ ). the effect of a mother's skills on early detection of stunting in toddlers.

#### REFERENCES

1. UNICEF. Levels and trends in child malnutrition: Key findings of the 2019 edition. April 2019. Available at: <https://www.unicef.org/reports/joint-child-malnutrition-estimates-levels-and-trends-child-malnutrition-2019>
2. United Nations-World Health Organization-The World Bank Group. UNICEF-WHO-The World Bank: Joint child malnutrition estimates - Levels and trends. Report. 2019; p.1-15.
3. WHO. Levels and trends in child malnutrition: Key findings of the 2020 Edition of the Joint Child Malnutrition Estimates. Geneva WHO. 2020;24(2):1–16.
4. Kemenkes RI. Profil Kes Indo 2019. Kementrian Kesehatan Republik Indonesia. 2020. 487 p. Available at: <https://pusdatin.kemkes.go.id/resources/download/pusdatin/profil-kesehatan-indonesia/Profil-Kesehatan-indonesia-2019.pdf>
5. Tobing ML, Pane M, Harianja E, Badar SH, Supriyatna N, Mulyono S, et al. Tnp2K 2017. PREPOTIF J Kesehat Masy. 2021;13(1):238–44. Available from: [http://www.tnp2k.go.id/images/uploads/downloads/Binder\\_Volume1.pdf](http://www.tnp2k.go.id/images/uploads/downloads/Binder_Volume1.pdf)
6. Ali PB. Evaluasi Program Percepatan Pencegahan Stunting: Pelaksanaan dan Capaian. 2020;(November):1–26. Available at: [https://stunting.go.id/sdm\\_downloads/evaluasi-program-percepatan-pencegahan-stunting-pelaksanaan-dan-capaian/](https://stunting.go.id/sdm_downloads/evaluasi-program-percepatan-pencegahan-stunting-pelaksanaan-dan-capaian/)
7. Rakotomanana H, Gates GE, Hildebrand D, Stoecker BJ. Determinants of stunting in children under 5 years in Madagascar. Maternal & child nutrition. 2017 Oct;13(4):e12409. <https://doi.org/10.1111/mcn.12409>

8. Kemenkes. Hasil Survei Status Gizi Indonesia (SSGI) 2022. Kemenkes. 2023;1–7.
9. Dinas Kesehatan Provinsi Sumatera Utara. Profil Kesehatan Provinsi Sumatera Utara Tahun 2020. Dinas Kesehat Provinsi Sumatera Utara [Internet]. 2020;1–422. Available from: <http://dinkes.sumutprov.go.id/unduh>
10. Notoadmodjo S. Promosi Kesehatan & Prilaku Kesehatan. Jakarta: EGC. 2012.
11. Indrayani D, Legiati T, Hidayanti D. Kelas Ibu Balita Meningkatkan Pengetahuan dan Keterampilan Ibu dalam Stimulasi Tumbuh Kembang. *Jurnal Kesehatan Prima*. 2019 Aug 9;13(2):115-21.  
<https://doi.org/10.32807/jkp.v13i2.240>
12. De Onis M, Branca F. Childhood stunting: a global perspective. *Maternal & child nutrition*. 2016 May;12:12-26.  
<https://doi.org/10.1111/mcn.12231>
13. Rokhaidah H. Aplikasi Pemantau Pertumbuhan Meningkatkan Pemantauan Mandiri Ibu terhadap Stunting. *Dunia Keperawatan J Keperawatan dan Kesehat*. 2021; 9(1) 55-63  
<https://doi.org/10.20527/dk.v9i1.8257>
14. Pangaribuan IK, Simanullang E, Poddar S. The analyze toddler growth and development according to family's economic status in Village Limau Manis, Districts Tanjung Morawa. *Enfermeria clinica*. 2020 Jun 1;30:92-5.  
<https://doi.org/10.1016/j.enfcli.2019.11.029>
15. Indriani AA, Ratnawati R, Wanita F. Aplikasi Reminder Pengontrolan Perawatan Gigi Berbasis Android. *Inspiration: Jurnal Teknologi Informasi Dan Komunikasi*. 2019 Jun 15;9(1):59-68.  
<https://doi.org/10.35585/inspir.v9i1.2490>
16. Akombi BJ, Agho KE, Hall JJ, Merom D, Astell-Burt T, Renzaho AMN. Stunting and severe stunting among children under-5 years in Nigeria: A multilevel analysis. *BMC Pediatr* 2017;17(1):1–16. Available from: <http://dx.doi.org/10.1186/s12887-016-0770-z>
17. Sekarwati L. Pengaruh Aplikasi Berbasis Android Ayo Dedis Untuk Peningkatan Pengetahuan Gizi Seimbang Terhadap Stunting Pada Ibu Hamil. *Media Husada Journal of Nursing Science*. 2022 Jul 28;3(2):132-42.  
<https://doi.org/10.33475/mhjns.v3i2.86>
18. Ramdhani A, Handayani H, Setiawan A. Hubungan Pengetahuan Ibu Dengan Kejadian Stunting. *Semnas Lppm*. 2020;ISBN: 978-:28–35.
19. Bhatheja S, Fuster V, Chamaria S, et al. Developing a Mobile Application for Global Cardiovascular Education. *J Am Coll Cardiol*. 2018 Nov, 72 (20) 2518–2527.  
<https://doi.org/10.1016/j.jacc.2018.08.2183>
20. Susilawati S, Dhamayanti M, Rusmil K. “Sahabat Ibu Balita”: Aplikasi Untuk Meningkatkan Pengetahuan Dan Keterampilan Ibu Tentang Pertumbuhan Dan Perkembangan Anak. *Jurnal Kesehatan Al-Irsyad*. 2017 Mar 29:74-85.  
<http://jka.universitalirsyad.ac.id/index.php/jka/article/view/75>
21. Salsabila AA, Lala H, Suharno B. Pengaruh Edukasi Kesehatan Phbs Di Sekolah Terhadap Peningkatan Pengetahuan Siswa Kelas 3 Sd. *Jurnal Informasi Kesehatan Indonesia (JIKI)*. 2022 Dec 27;8(2):157-65.  
<https://doi.org/10.31290/jiki.v8i2.3355>
22. Jusoh S. A Survey on Trend, Opportunities and Challenges of mHealth Apps. *Int. J. Interact. Mob. Technol*. 2017 Nov 27;11(6):73-85.  
<https://doi.org/10.3991/ijim.v11i6.7265>
23. Syaroni W, Munir Z. Pemanfaatan aplikasi android dalam mendiagnosa dan memonitoring kasus stunting lebih dini. *Jurnal Teknik Elektro Dan Komputer*. 2020 Dec 31;9(3):189-96.  
<https://doi.org/10.35793/jtek.v9i3.30377>
24. Eka Falentina Tarigan. Midwifery and Complementary Care Peranan Aplikasi Mother Cares (MOCA) terhadap Kepatuhan Orang Tua. 2022;01(01):1–12.  
<https://doi.org/10.33859/mcc.v1i1>

**Original Article****Understanding the perception of medical students regarding the newly introduced competency based medical education (CBME) and identifying the challenges which hamper its proper implementation**

Mehwish Majeed, Zuryat Ashraf, Sami Manzoor, Saima Bashir

**Abstract:**

**Background:** Current medical education system is based on knowledge acquisition, but a successful health professional should not only be knowledgeable but at the same time skillful. Students have very good theory knowledge but they are incapable of applying this knowledge practically in the right direction. MCI (Medical council of India) conducted a review of the existing curriculum for medical undergraduates and introduced CBME (competency based medical education). In spite of putting tremendous efforts, there are some factors responsible for poor student participation and attendance. The aim of this work was to assess the student's perspective regarding CBME and its various components.

**Material and Methods:** Total number of 180 students were included in the study. A questionnaire analyzing the knowledge, perception and attitude of students towards CBME was prepared. The questionnaire was handed over to the students, who filled the questionnaire themselves and appropriate responses were then analyzed.

**Results and Conclusion:** Most students agreed that change in traditional system of medical education is a must (75%). The most needed changes incorporated in the old curriculum have many advantages and are an improvement on the older version of 1997. The ultimate recipients of CBME are the students going to be future doctors, so understanding their perception regarding this paramount change is very necessary.

JK-Practitioner2023;28(1-2):35-41

**INTRODUCTION**

Medical education in India dates back many decades but unfortunately there have been no timely required major changes in revamping, delivering and assessing this paramount educational forum. We still are clinging to the traditional methods set out by UK, although they themselves adapted to the changing trends required to suit the changing health care needs. Now we seem to be waking up to the fact that there is a need for change from knowledge-based education to skill-based education. There has also been a tremendous increase in the number of medical colleges in India which has warranted an upgradation in the traditional methods of medical education. Current medical education system is based on knowledge acquisition, but a successful health professional should not only be knowledgeable but at the same time skillful. The current education system is not providing students with the required skills for them to be called competent. Students have very good theory knowledge but they are incapable of applying this knowledge practically in the right direction to handle a situation in the right manner. Medical professionals confront new challenges everyday which can be faced boldly only when they are appropriately trained to be competent. Students with good amount of knowledge fail to deliver practical skills like empathy, communication, professionalism and ethics. So, they should be trained efficiently to communicate with patients and their relatives in a very respectful manner which includes values, beliefs, privacy and confidentiality.

With the aim to improve the health care system, MCI (Medical council of India) responsible for maintaining and establishing the standards of medical education conducted a review of the existing

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**Indexed**

EMBASE, SCOPUS, IndMED, ESBCO, Google Scholar besides other national and International Databases

**Cite This Article as**

Majeed M, Ashraf Z, Manzoor S, Bashir S. Understanding the perception of medical students regarding the newly introduced competency based medical education and identifying the challenges which hamper its proper implementation. JK Pract 2023;28(1-2):35-41

Full length article available at [jkpractitioner.com](http://jkpractitioner.com) one month after publication

**Keywords**

Competency, AETCOM, CBME, Traditional system, Medical students, Foundation course.

curriculum for medical undergraduates and introduced CBME (competency based medical education) to be implemented across the country from 2019. Competence means the attainment of enough knowledge, decision making skills, attitude to perform required actions and skillful tasks to a desired level of proficiency. [1, 2] CBME ensures that the graduates attain observable abilities in a time independent and learner centered manner.[3] In time independent manner, each student gets an opportunity to learn at his or her own pace. CBME provides platform which is learner centric, so that student gains competencies in knowledge, attitude, communication, skills and ethics. [4,5] There are around 2949 competencies enlisted in CBME curriculum. Alignment and integration between different disciplines is one of the paramount strategies for implementing this new curriculum. [6,-8] The elements in new curriculum are foundation course (FC), early clinical exposure (ECE), attitudes, ethics and communication (AETCOM), elective postings (EP), alignment and integration, clinical clerkship etc. CBME also includes maintenance of log books and feedback sessions. [9-11]

CBME directs faculty members to change their method of teaching. Teaching should be more practical and conceptual. Countrywide faculty training programs are being conducted for successful implementation of CBME. [12,13] In traditional method teaching was confined to classrooms and practical laboratories, while CBME stresses on skill acquisition and assessments in work place which involves direct observation. [14,15]

CBME is a well thought out approach for shifting the paradigm of medical education from traditional to the current method of teaching, however there are various challenging in the way of implementing this program successfully. Its success depends on various factors like proper planning, proper infrastructure, supportive management, availability of resources and timely supervision to ensure the proper implementation of the program. [16-18]

As far as our scenario is concerned, in spite of putting tremendous efforts for implementation of CBME, there are some factors responsible for poor student participation and attendance. This prompted us to conduct this study with the aim to assess the student's perspective regarding current pattern of medical education, its advantages, their understanding about competencies and to find out the roadblocks responsible for poor student participation so that medical education system could be made more practical and appropriate to cater the public health care needs.

#### MATERIAL AND METHODS:

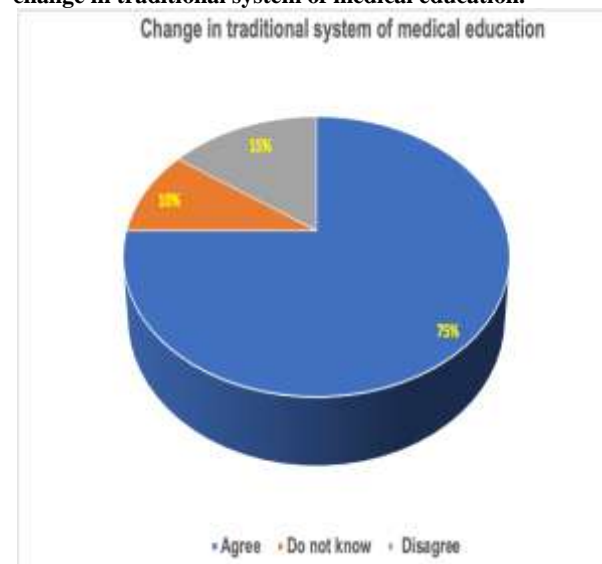
This observational study was conducted from 1<sup>st</sup> october to 1<sup>st</sup> november 2021 among 1<sup>st</sup> year MBBS students of 2020-2021 batch after obtaining clearance from Institutional Ethical Committee. Total number of 180 students were included in the study. A

questionnaire analyzing the knowledge, perception and attitude of students towards CBME was prepared. Proper informed consent was taken from the respondents. The questionnaire was handed over to the students, who filled the questionnaire themselves and appropriate responses were then analyzed. Out of 180 students, we received response from 150 students whose responses were finally included in the study. Options of questions were framed on a 3-point Likert's scale. Our questionnaire was prepared based on earlier studies. The identity of the respondents was kept confidential.

#### RESULTS

As shown in Table 1, total 16 questions were included in the questionnaire for which responses were put as agree, don't know and disagree. As is evident from the table most of the students agreed that change in traditional system of medical education is a must (75%). Students were of the thought that they should have early exposure to simulation and research laboratories (90%) and that there is a need to inculcate skill based learning from 1<sup>st</sup> year MBBS (90%). When asked about basic skills that should be included most of them said that communication, first aid, life support skills should be included from 1<sup>st</sup> year. When asked about foundation course all of them (100%) agreed that basic life support training should be incorporated early in the curriculum. Also, most of them agreed that stress management, time management, language and communication skills should be included. About (AETCOM), only 60% agreed that it should be included. To our surprise only (35%) agreed that SDL should be incorporated in the curriculum. Almost similar response was seen for SGD as well.

**Figure 1. Showing perception of students towards change in traditional system of medical education.**



We also noted down several comments provided by medical students about CBME as shown in the comments box.

#### DISCUSSION

This observational study was conducted in Government Medical College, Srinagar from 1<sup>st</sup>



Table no. 1: Showing perception of students about CBME curriculum.

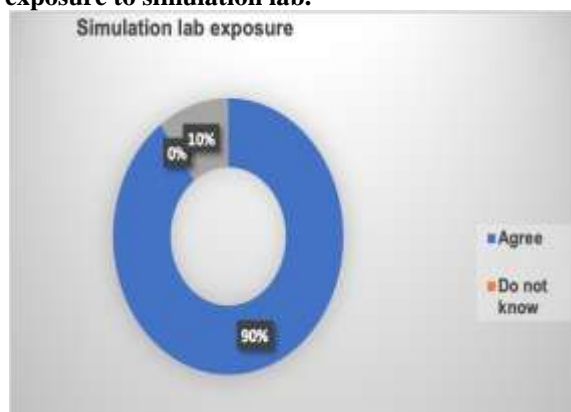
	Components	Agree	Don't know	Disagree
1.	Is there a need for change in traditional system of medical education.	113(75%)	15(10%)	22(15%)
2.	Do you think division of a broader topic into multiple small competencies has simplified teaching and improved learning.	105(70%)	23(15%)	22(15%)
3.	Should students have exposure to simulation/ research laboratories from 1 <sup>st</sup> year MBBS.	135(90%)	0(0%)	15(10%)
4.	Is there a need to inculcate skill based learning from 1 <sup>st</sup> year of MBBS.	135(90%)	5(3.3%)	10(6.6%)
5.	Do you think the following basic skills are necessary to be included in your curriculum from 1 <sup>st</sup> year			
	a) Communication skills	143(95%)	0(0%)	7(5%)
	b) First aid skills	143(95%)	0(0%)	7(5%)
	c) Life support skills	143(95%)	0(0%)	7(5%)
	d) Radiological skills	128(85%)	0(0%)	22(15%)
	e) Surgical skills like suturing, giving injections.	128(85%)	0(0%)	22(15%)
6.	Is early clinical exposure necessary from 1 <sup>st</sup> year MBBS.	98 (65%)	7(5%)	45(30%)
7.	Do you think the following components of Foundation Course (FC) should be incorporated in the curriculum.			
	a) Basic life support training	150(100%)	0(0%)	0(0%)
	b) Field/ health center visits	120(80%)	10(7%)	20(13%)
	c) Time management	143(95%)	3(2%)	4(3%)
	d) Stress management	150(100%)	0(0%)	0(0%)
	e) Language and communication skills	120(80%)	10(7%)	20(13%)
	f) Professionalism and ethics			
	g) Biomedical waste management	75(50%)	5(3%)	70(47%)
	h) IT/ computer skills	60(40%)	20(13%)	70(47%)
		60(40%)	10(7%)	80(53%)
8.	Is it necessary to incorporate ethics and communication (AETCOM) in students from 1 <sup>st</sup> year.	90(60%)	15(10%)	45(30%)
9.	Should the topics be taught keeping alignment and integration in mind.	143(95%)	7(5%)	0(0%)
10.	Do you think skill based learning is more beneficial than theory classes.	123(85%)	8(5%)	19(10%)
11.	Do you think skill based learning can help to build a healthy doctor patient relationship.	113(75%)	30(20%)	7(5%)
12.	Should sports activities be included in the curriculum.	143(95%)	7(5%)	0(0%)
13.	Do you think self-directed learning (SDL) is beneficial.	53(35%)	23(15%)	74(50%)
14.	Do you think small group discussions (SGD) are of any benefit.	60(40%)	23(15%)	67(45%)
15.	Do you think demonstrate, observe, assist and perform (DOAP) has an edge over educational video in imparting clinical skills.	120(80%)	15(10%)	15(10%)
16.	Do you think alignment and integration results in repetitions of the same topic.	90(60%)	5(3%)	55(37%)

*Comments provided by medical students about CBME.*

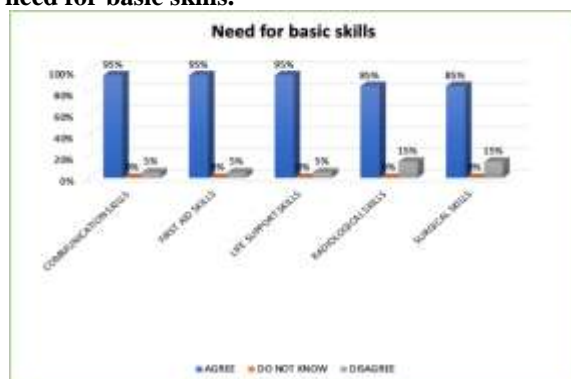
1. Proper implementation of CBME is lacking. Regulatory authorities need to work on it.
2. Division of a topic into various competencies has made syllabus elongated and tiring rather than elucidate and germane.
3. Students are of the view that teachers seem to be racing to complete the syllabus rather than focusing on delivering it at a pace understandable to the students.
4. AETCOM sessions are boring and unimportant.
5. In SDL most of the students are not confident enough to delineate the topic properly, which makes the session dull for the whole class.
6. SGDs get converted into interrogative viva rather than an interactive session.
7. Feedback taken from the students are not taken into account and thus not put into effect, so students think that these sessions are futile.

October to 1<sup>st</sup> November 2021 among 1<sup>st</sup> year MBBS students of 2020-2021 batch after obtaining clearance from Institutional Ethical Committee. Total 180 second phase MBBS students were included in our study. We conducted this study with the aim to know the perception of MBBS students about the newly incorporated Community Based Medical Education (CBME) curriculum.

**Figure 2. Showing perception of students towards exposure to simulation lab.**



**Figure 3. Showing perception of students towards need for basic skills.**



Various components were included in the questionnaire and feedback was taken from each student. Our questionnaire was prepared based on earlier studies. CBME is a new concept for the students and various new elements have been added to it to revamp the old traditional way of teaching. Educationists across the globe agree that there is a need of shift from teacher centric to student centric teaching. [19] As shown in table no 1, most of the students (75%) agreed that there is a need for change in traditional method of teaching. Similar results were obtained in a study done by Adarsha et al. [20] Majority students welcomed the practice of dividing a bigger topic into multiple small competencies (70%). According to them it has simplified teaching and improved learning. In CBME competencies relevant to the priority health care needs of the people are included. [21] MBBS students are now taught various clinical skills like giving I.V injections, I.V infusions etc. which they were not taught before. Even (90%) students agreed that skill-based learning should be included from 1<sup>st</sup> year. Around (95%) of students were of the notion that communication skills should be introduced from the beginning of the curriculum. So far medical students have been learning to communicate with patients by watching or copying their seniors without getting any formal training to acquire good communication skills. This no doubt is a very good initiative to introduce this paramount skill from the beginning of the course. Same results (responses) were seen for first aid, life support, radiological and surgical skills. Many students (65%) were of the opinion that early clinical exposure should be incorporated from the 1<sup>st</sup> year itself as it acclimatizes the students with the hospital environment and gives them an opportunity to interact with the patients. This introduces compassion and professionalism in students. Most of the students in our study welcomed the introduction of many

components of the foundation course. Medical students experience extreme psychological stress due to several examinations. [22-24] (100%) students agreed that basic life support training and stress management should be included in their course. Some students were of the notion that sessions on stress management should be conducted throughout the course. Many suggested (80%) that field visits in the beginning will be very useful in understanding the functioning of health care system. Although computer technology is immensely used in every aspect of education but sessions to foster the same were not much welcomed by the students (40%). The reason for the same can be that they have already acquired basic computer skills in their schools and auxiliary skills for the same can be self-learned. There was an overall average response for AETCOM sessions. Only 60% agreed that they are beneficial and should be incorporated in the curriculum. Some pilot studies have been done which explained the role of training for communication skills. [25, 26] There was a strong positive response (95%) for teaching while keeping making it simple and easily understandable. There were negative reviews about AETCOM, SDL and SGDs. They also said that feedback taken from them are not taken into consideration and thus not used to revamp this newly introduced program.

### CONCLUSION

There are three subjects on which the knowledge of medical profession in general is woefully weak: they are manners, morals and medicine – *Gerald. Lieberman*.

The must needed changes incorporated in the old curriculum have many advantages and are an improvement on the older version of 1997. The ultimate recipients of CBME are the students going to be future doctors, so understanding their perception regarding this paramount change is very necessary. Hence our study focused on understanding the student's perspective about various components of this new curriculum. Most of the students agreed that the major changes incorporated in the new curriculum

integration of topics into consideration. It is recommended by the new curriculum that at least 80% of the topics should be temporally aligned. [27] In our study 60% students opined that alignment and integration leads to repetition of the same topic. To our surprise taking about SDL and SGD most of the students 50%, 45% respectively did not admire these two modes of teaching and learning. Many said that these were time consuming and not properly followed. We think students need to be properly familiarized to perceive these two modules of learning positively. Majority students 80% welcomed the introduction of DOAP as a means of imparting clinical skills.

We also noted down some comments from students regarding CBME. Most of them said that CBME is not being properly implemented as of now. Regulatory authorities need to make sure that proper sensitization has taken place among students and teachers need to be appropriately trained for proper implementation of the same. They said teachers seem to rush through the topics for completion rather than

were need of the hour but when asked about few components like SDL, AETCOM, SGDs, computer skills etc. the response was not welcoming. Old medical curriculum was stressing more on instructive lectures which needed to be changed if we wanted a better health care outcome. Medical education should be framed and conducted in a way so that the new doctors are clinically more competent rather than just having mugged up knowledge.

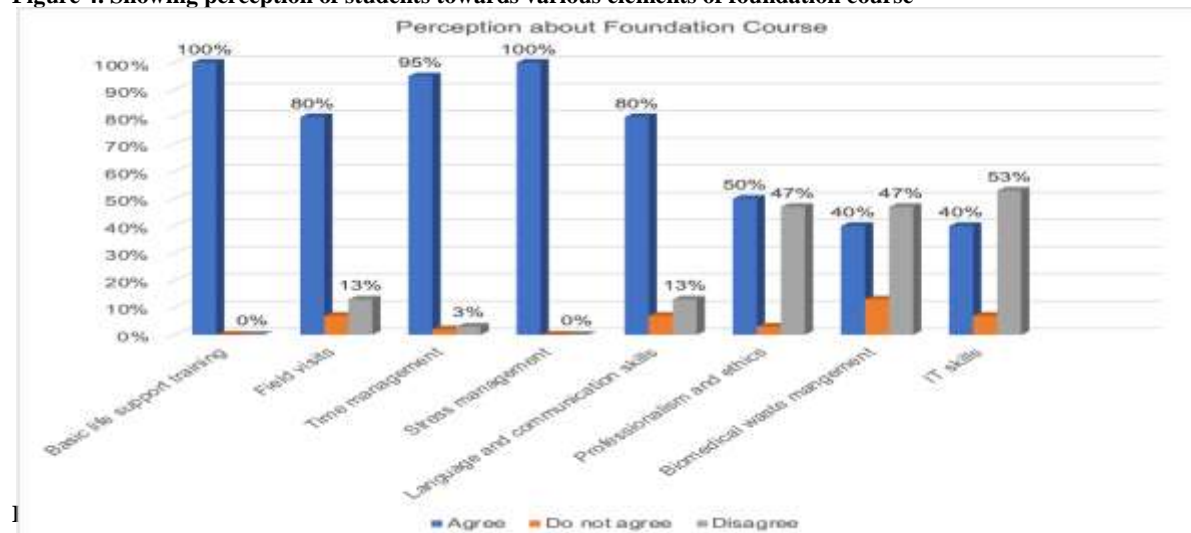
### LIMITATIONS

1. Only responses to questions in questionnaire were noted down and we did not dig deep to get detailed perspective of the student.
2. Since this curriculum is still in its infancy some students were not fully aware about CBME and it was clearly evident from the poor responses we received from them.

### CONFLICT OF INTEREST

There is no conflict of interest among authors.

**Figure 4. Showing perception of students towards various elements of foundation course**



# AETCOM sessions

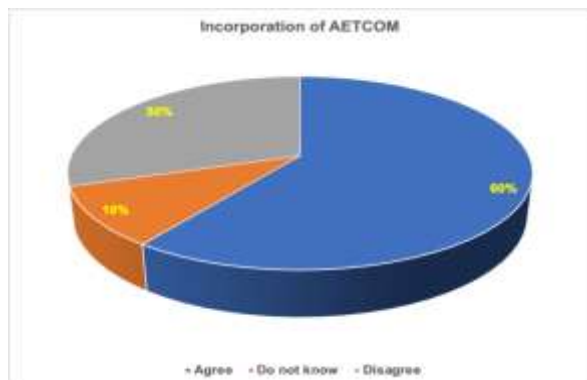
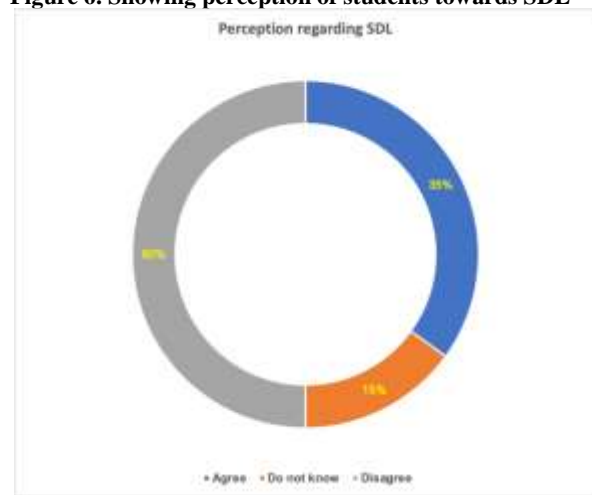


Figure 6. Showing perception of students towards SDL



## REFERENCES

1. WHO. Sexual and reproductive health-Core competencies in primary health care. Geneva: WHO Publication; 2011.<http://www.who.int/publications/2011/9789241501002>.
2. Chacko TV. Moving toward competency-based education: Challenges and the way forward. *Arch Med Health Sci* 2014;2:247-53.
3. Frank JR, Snell LS, Cate OT, Holmboe ES, Carraccio C, Swing SR, et al. Competency based medical education: Theory to practice. *Med Teach* 2010; 32: 638-45.
4. Carraccio C, Wolfsthal SD, Englander R, et al. Shifting paradigms: from Flexner to competencies. *Acad Med*. 2002;77(5):361–7.
5. Medical Council of India. Curriculum Implementation Support Program of the Competency Based Undergraduate Medical Education Curriculum. New Delhi. Medical Council of India; 2019.
6. Medical Council of India, Competency based Undergraduate curriculum for the Indian Medical Graduate. Vol. 1. New Delhi, Medical Council of India; 2018.
7. Medical Council of India, Competency based Undergraduate curriculum for the Indian Medical Graduate. Vol. 2. New Delhi, Medical Council of India; 2018.
8. Medical Council of India, Competency based Undergraduate curriculum for the Indian Medical Graduate. Vol. 3. New Delhi, Medical Council of India; 2018.
9. Medical Council of India. Early Clinical Exposure for the Undergraduate Medical Education Training Program; 2019:1-43.
10. Medical Council of India. Attitude, Ethics and Communication (AETCOM). Competencies for the Indian Medical Graduate. New Delhi: Medical Council of India; 2018.[https://www.mciindia.org/CMS/wp-content/uploads/2020/01/AETCOM\\_book.pdf](https://www.mciindia.org/CMS/wp-content/uploads/2020/01/AETCOM_book.pdf).
11. Medical Council of India. Alignment and Integration Module for Undergraduate Medical Education Program. New Delhi, Medical Council of India; 2019:1-34.
12. Hawkins RE, Welcher CM, Holboe ES, Krik LM, Norcini JJ, Simons KB et al. Implementation of competency based medical education: are we addressing the concerns and challenges? *Medical education in review* 2015;49(11):1086-1102.
13. Modi JN, Gupta P, Singh T. Competency-based medical education, entrustment and assessment. *Indian Pediatr* 2015;52:413-20.
14. Boursicot K, Etheridge L, Setna Z, Sturrock A, Ker J, Smee S et al. Performance in assessment: Consensus statement and recommendations from the Ottawa conference. *Med Teach* 2011;33:370-83.
15. Weinberger SE, Pereira AG, Lobst WF et al. Alliance for Academic Internal Medicine Education Redesign Task Force II. Competency-based education and training in internal medicine. *Ann Intern Med* 2010;153(11):751–6
16. World Health Organization. Sexual and reproductive health core competencies in primary care: attitudes, knowledge, ethics, human rights, leadership, management, teamwork, community work, education, counselling, clinical settings, service, provision. World Health Organization 2011.
17. Epstein RM, Hundert EM. Defining and assessing professional competence. *JAMA* 2002;287(2):226-35.
18. Fraser SW, Greenhalgh T. Coping with complexity: educating for capability. *BMJ* 2001;323(7316):799-803.
19. Competency-Based Medical Education: The Wave of the Future Nicolette Caccia, Amy Nakajima, Nancy Kent, J Obstet Gynaecol Can 2015;37(4):349–353.
20. V. Adarsha. “Competency Based Medical Education: Empowering Students Of Today To Become Competent Physicians Of Tomorrow.” *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)* 2019;18(9):20-25.

21. Bhutani N, Arora D. Competency based medical education in India: a brief review. *Int J Rec Innov Med Clin Res* 2020; 2 (2): 64-70.
23. Dyrbye LN, Thomas MR, Shanafelt TD. Systematic review of depression, anxiety, and other indicators of psychological distress among U.S. and Canadian medical students. *Acad Med* 2006;81:354-73.
24. Yusoff MS, Rahman A. Stress management for medical students: A systematic review. In: *Social Sciences and Cultural Studies-Issues of Language, Public Opinion, Education and Welfare*. Vol.1. London, Intech Open Limited 2012; 477-97.
25. Komattil R, Hande SH, Mohammed CA, Subramaniam B. Evaluation of a personal and
22. Dyrbye LN, Thomas MR, Shanafelt TD. Medical student distress: causes, consequences, and proposed solutions. *Mayo Clin Proc* 2005;80:1613-22.
23. Dyrbye LN, Thomas MR, Shanafelt TD. professional development module in an undergraduate medical curriculum in India. *Korean J Med Educ* 2016;28:117-21.
26. Naineni K, Rao GVR, Saie U. Addressing the challenges of training in communication skills in medicine in India. *J Res Med Educ Ethics* 2016;6:10-14.
27. Basheer A. Competency-based medical education in India: Are we ready? *J Curr Res Sci Med* 2019;5:1-3



**Original Article****Role of Tranexamic Acid (Topical and Intravenous) on blood loss in uncomplicated laparoscopic cholecystectomy- Prospective Study**

Surbhi Abrol, Inakshi Chrungoo, RK Chrungoo, Nandita Mehta , K.S Mehta, H.S Bali

**Abstract:**

**Background and Purpose:** Despite advances in surgical technique, excess bleeding remains a major complication associated with surgery and contributes to poor clinical outcomes. A haemostatic agent with broad applicability and minimal adverse effects such as TXA is attractive as a way to control pathologic haemorrhage. Data for its use in L.C is limited. A study to review the use of TXA in controlling bleeding in uncomplicated L.C, measured in terms of drain output, preoperative and postoperative hemoglobin and hematocrit and hospital stay related to bleeding.

**Materials and Method:** Patients were randomly divided into 4 groups of 25 patients each by Group A : receiving 10 ml I/v TXA, 30 min prior to surgery and 10ml Topical NS ,Group B : receiving I.v dose of 10ml of NS, 30 min prior to surgery and 10ml TXA topically, Group C: receiving 10 ml i.v TXA, 30 min prior to surgery and 10ml of topical TXA intraoperatively, Group D : receiving 10 ml i.v NS, 30min. prior to surgery and 10ml topical NS intraoperatively.

**Results:** The drain output and the hospital stay of the patients has significantly reduced. Group C ( $34.8 \pm 25.87$ ) as compared to other TXA groups. Whereas in group- D: drain output was found to be significantly higher ( $81.08 \pm 31.61$ ) and the hospital stay of the patient prolonged for a day as well. Thus use of TXA in uncomplicated L.C is recommended.

**Conclusion:** We concluded from our study that the groups where TXA was used in either intravenous or topical or in both the forms.

JK-Practitioner2023;28(1-2):42-46

**INTRODUCTION**

"Blood saving is better than blood transfusion". Despite advances in surgical technique, excess bleeding remains a major complication associated with surgery and contributes to poor clinical outcomes. Surgical variables are prime determinants of the risk of intraoperative and perioperative bleeding[1]

Knowing what to use for what level of bleeding is key to surgical success. [2] Endoscopic surgeons must be trained to recognise, avoid and, if necessary, manage bleeding complications. Over the last decade, novel techniques have been developed to make haemostasis in minimal access surgery as efficient and reliable as in open surgery.[3]

In the beginning of the 1950s it was found that the amino acid lysine inhibits activation of plasminogen, but the effect was too weak to be used in the treatment of fibrinolytic hemorrhagic conditions. Systematic investigations in 1953 by a group in Japan led by Shosuke Okamoto showed that several mercapto and aminocarbonic acids had an antiplasminic effect. The incentive of their industrious work was to reduce the thousands of maternal deaths each year from postpartum haemorrhage. They found that epsilon-aminocaproic acid (Epsilon Amino Caproic Acid), a synthetic derivative of the lysine, had a strong inhibiting effect on plasminogen. [4] but due to its GI side effects and large dose requirement ,search for a more potent antiplasminic substance started. At the research department of the pharmaceutical plant Kabi, Stockholm discovered that only the trans form was antifibrinolytic (trans-4-aminomethyl-cyclohexanecarboxylic acid), and thus trans-AMCHA or tranexamic acid was born. [5,6]

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**Indexed**

EMBASE ,SCOPUS, IndMED ,ESBCO, Google Scholar besides other national and International Databases

**Cite This Article as**

Abrol Surbhi, Chrungoo I, Chrungoo RK, Mehta Nandita, Bali HS, Role of Tranexamic Acid (Topical and Intravenous) on blood loss in uncomplicated laparoscopic cholecystectomy- Prospective Study. JK Pract2023;28(1-2):42-46

Full length article available at [jkpractitioner.com](http://jkpractitioner.com) one month after publication

**Keywords**

Blood loss, laparoscopic cholecystectomy, tranexamic acid



TXA is a synthetic derivative of lysine that inhibits fibrinolysis by blocking the lysine binding sites on plasminogen. Onset of action is 5-15 minutes, duration of action is 3 hours, binds 3% primarily to Plasminogen and has a half-life of 2-11 hours. Excretion is via urine (>95% as unchanged drug) [7]. Existing literature has focused most exclusively on the biliary complications of this procedure, but other complications such as significant haemorrhage during laparoscopic cholecystectomy have not been documented. [8]

Since the prevalence of gallstones in adult population is high in Jammu and Kashmir. [9] The study shall be undertaken in the patients undergoing laparoscopic cholecystectomy.

Encouraged by these studies we therefore sought to review the use of Tranexamic Acid (TXA) in controlling bleeding in uncomplicated laparoscopic cholecystectomy.

## MATERIAL AND METHODS

- **SOURCE OF DATA:** The study will be conducted on patients admitted in Department of Surgery, ACHARYA SHRI CHANDER COLLEGE OF MEDICAL SCIENCES AND HOSPITAL, SIDHRA JAMMU (ASCOMS) for elective laparoscopic cholecystectomy (L.C).
- **SAMPLE SIZE:** 100 adult patients of either sex in age group of 19 years to 80 years, posted for laparoscopic cholecystectomy.
- **STUDY UNIT:** All patients with USG documented cholelithiasis.
- **STUDY DESIGN-** Hospital based computer generated randomized, double-blind, placebo-controlled trial
- **STUDY PERIOD:** The study was done on patients from 1<sup>st</sup> November 2019 for a period of one year.
- **STUDY SETTING-** Patients will be randomly divided into four groups of 25 patients each by computer generated randomization.
  1. Group A : receiving 10 ml (1g) intravenous Tranexamic acid, 30 min prior to surgery and 10ml Topical NS
  2. Group B : receiving Intravenous dose of 10ml of NS, 30 min prior to surgery and 10ml (1g) Tranexamic acid topically
  3. Group C: receiving 10 ml (1g) intravenous Tranexamic acid, 30 min prior to surgery and 10ml (1g) of topical Tranexamic acid intraoperatively.
  4. Group D : receiving 10 ml intravenous of Normal saline (NS), 30min. prior to surgery and 10ml topical NS intraoperatively.

After the patient's eligibility had been confirmed and the consent procedures completed, we randomly allocated patients to the intervention or placebo group by assigning them the sequentially numbered

envelope. Patients, all members of surgical team, nursing staff and the anaesthetist were unaware of allocation. Surgeon and data collectors were blinded. A nurse who was not involved in the study or in the care of patients, opened the sealed envelope in a room away from the operating theatre and prepared the treatment. The bottle with the decided dose of tranexamic acid and syringe were labelled with patient's randomization number. Bottles and syringe containing Tranexamic acid were indistinguishable from those containing placebo (as Tranexamic acid is colorless substance). At the end of each surgery, the envelope was resealed and kept in patient's folder and seal was opened and checked after the patient is discharged.

The results were reported as adjusted odds ratios (AORs) and 95% confidence intervals (CIs). *P* values < .05 were considered to indicate statistically significant results. SPSS software (version 21.0; SPSS) was used for the data analysis.

The data obtained will be statistically analyzed in terms of:

- Drain output on POD1
- Preoperative and Postoperative hemoglobin and hematocrit.
- Hospital stay related to bleeding.

## INCLUSION CRITERIA

All patients with USG documented cholelithiasis of either sex in age group of 17 years to 80 years, posted for laparoscopic cholecystectomy.

## EXCLUSION CRITERIA

- Patients with acute cholecystitis or acute calculous pancreatitis.
- Patients with bleeding disorders, clotting abnormalities, or those on anticoagulants.
- Patients with Portal hypertension and cirrhosis
- Patients with Renal Impairment.
- Pregnant females.
- Patients with history of Thromboembolism.
- Patients with intra-operative and post-operative bile spillage.
- Patients who had bleeding due to trocar injury to major blood vessels.
- Suspected allergy to Tranexamic acid.
- Any other bleeding mishaps per-operatively, for example-sinus and other bed bleed controlled by various other methods such as spongistorm packing.

## DISCUSSION-

Cholecystectomy is the commonest operation of the biliary tract and the second most common operative procedure performed today Karam J, Roslyn JR.(1997).

Laparoscopic cholecystectomy is now considered as the "gold standard" treatment for symptomatic gallstone disease [10]

Although the utility of topical thrombin products is undeniable, questions remain regarding the risks

associated with each formulation[1] Various pharmacological adjuncts have been developed which when applied either systemically or topically, can promote haemostasis. Tranexamic acid is one of them which exerts its antifibrinolytic effect by blocking lysine-binding locus of plasminogen and plasmin molecules, thereby preventing the binding of plasminogen and plasmin to the fibrin substrate.[11]

Hence, our experience regarding the role of tranexamic acid in preventing blood loss in uncomplicated laparoscopic cholecystectomy has been discussed, taking into account the various parameters.

Different dosage regimens exist for adults. Most often an initial IV bolus of 1 g or 10-15 mg/kg body weight with/without repetition after 6 h or continuous infusions over 8 h is administered. Increased rates of thromboembolic events were not noted.[12]

However, the majority of the patients in our study were females that is 61%, which is comparable with the findings of (13) on laparoscopic cholecystectomy in 1973, in which the percentage of female patients was 72.6%.

The mean hemoglobin of the patient preoperatively in each group were Group A ( $12.16 \pm 1.60$ ), Group B ( $11.85 \pm 1.70$ ), Group C ( $11.32 \pm 1.43$ ), Group D ( $12.17 \pm 1.84$ ).

The mean post-operative haemoglobin decreased by 1 g/dl in control group. Whereas there were insignificant loss of blood in other 2 groups where tranexamic acid was given topical or intravenous or through both routes.

When pre and post-operative haematocrit were compared in all the four groups, the findings were consistent as with the hemoglobin loss, i.e. in Group A (Tranexamic acid was given intravenous) and Group D (where PLACEBO given I/v and topical), a drop of 1% haematocrit were observed.

These observations were consistent with Gohel, et al. (2007) and Pandove, et al. (2017)[8,14] both concluded that patients in the control group bled more as compared to the patients who received tranexamic acid in their papers which studied the efficacy of Tranexamic acid in decreasing blood loss in caesarean section and uncomplicated laparoscopic cholecystectomy. Pandove PK, et al. (2017)[8] concluded that the use of tranexamic acid decreased the intraoperative and postoperative bleeding in laparoscopic cholecystectomy, but it was not statistically significant. This may be due to minimal blood loss in the laparoscopic procedures. There is no active role of tranexamic acid in limiting blood loss in elective laparoscopic cholecystectomy.

In our study the mean change in preop and post op hemoglobin and haematocrit value when compared with Group C and Group D were found significant i.e. the blood loss and drop in haematocrit was statistically significant, a group where both intravenous and topical Tranexamic acid was given

and group where intravenous and topical placebo was given. The blood loss was less in group C.

There was no significant alteration in mean pulse of the patients in the groups where Tranexamic acid was given but there were surely significant intraoperative and postoperative heart rate changes in case of placebo group (group D) when compared to other 3 groups in which Tranexamic acid was given either intravenous, topical or both.

A 14 F suction drain was kept in all the patient who underwent laparoscopic cholecystectomy and output was assessed over a period of 24 hours and drain were taken out accordingly. Only 10 patients had their drain removed after 24 hrs. Amongst them only one patient had their drain removed on 3<sup>rd</sup> POD, rest other 9 patients had their drain removal on 2<sup>nd</sup> POD.

The drain output was assessed and measured by emptying the contents of the suction drain in the measuring cylinder in 1<sup>st</sup> 24 hours, the mean output in group A ( $41.6 \pm 19.40$ ), Group B ( $44.4 \pm 22.23$ ), Group C ( $34.8 \pm 25.87$ ), Group D ( $81.08 \pm 31.61$ ). It was also found that out of 10 patients whose drain was removed on 2<sup>nd</sup> and 3<sup>rd</sup> POD, 9 patients belonged to group D (control group) indicating increase in hospital stay of the patients who did not receive Tranexamic acid. Which is significant when compared to other 3 groups.

The mean hospital stay of the patients in our study in Group A was 2.12 days, Group B was 2.24 days, Group C - 2.2 days and Group D - 2.76 days. When all the 4 groups were compared, the comparison between group A and D, were found significant i.e. the hospital stay increased in patients who belonged to Group-D.

Similar findings were found in study conducted by Pandove, et al. (2017)[8] where the mean days of hospitalisation for Tranexamic acid group were 2.4 days which was less as compared to placebo group i.e. 2.63 days.

In another the study conducted by Choi, et al. (2009)[15] (on the effect of Tranexamic acid on blood loss during orthognathic surgery (bimaxillary osteotomy) the hospitalisation days between Tranexamic acid group and placebo had no significant difference.

## CONCLUSION

1. The dose of Tranexamic acid used in our study both intravenous and topically was 1gram and none of the cases were given any dose postoperatively.
2. When preoperative and post-operative hemoglobin of the patients were compared in all the 4 groups, it was found that there was no statistically significant dip in hemoglobin when the placebo group was compared to Tranexamic acid group.
3. Likewise, there was no statistically significant drop in post-operative hematocrit when compared to preoperative hematocrit when all the groups were compared and assessed.

4. Mean Drain output when measured over 24 hours in each group came out to be significantly increased in group D patients where intravenous and topical normal saline was given .
5. Group A in which intravenous Tranexamic acid was given showed lesser mean drain output i.e., 41.6 ml when compared to group B- where only topical Tranexamic acid was given i.e., 44.4 ml.
6. Group C in which both I/V and topical Tranexamic acid was given, mean drain output was 34.8 lowest when compared to all the other 3 groups.
7. The mean hospital stays of patients in Group A – 2.12 days , Group-B -2.24 days , Group C- 2.2days , and Group D- 2.76 days.
8. In 90% patients drain was removed on 1<sup>st</sup> post-operative day belonging from all the 4 groups.
9. It was also found that out of 10 patients (10%) whose drain was removed on 2<sup>nd</sup> and 3<sup>rd</sup> POD, 9 (9%) patients belonged to group D(control group) indicating increase in hospital stay of the patients who did not receive Tranexamic acid.
10. When all the 4 groups were compared, the comparison between group A and D, Group B and D and group C and D were found significant. The hospital stay was prolonged by a day in patients who were given placebo.

We conclude from our study that the groups where tranexamic acid was used in either intravenous or topical or in both the forms. The drain output and the hospital stay of the patients has significantly reduced. Amongst the three groups where Tranexamic acid was given : Group C i.e where Tranexamic acid was given both intravenously and topically the drain output was lesser than other two Tranexamic acid groups. Whereas in the placebo group : intravenous normal saline and topical normal saline was given the drain output was found to be significantly higher and the hospital stay of the patient prolonged for a day as well.

Though, similar previous study did not report significant effect of Tranexamic acid on drain output in laparoscopic cholecystectomy. But various urological , neurosurgical and trauma trials reported the use of Tranexamic acid helpful in bleeding control.

Being an economical and widely used drug with low side effect profile. We do recommend use of Tranexamic acid both intravenous and topically in uncomplicated laparoscopic cholecystectomy.

## REFERENCES

1. Boucher, B.A. and Traub, O. (2009), Achieving Hemostasis in the Surgical Field. *Pharmacotherapy: The Journal of Human Pharmacology and Drug Therapy*, 29: 2S-7S. <https://doi.org/10.1592/phco.29.pt2.2S>
2. Sileshi B, Achneck HE & Lawson JH. Management of Surgical Hemostasis: Topical Agents. *Vascular*. 2008 Mar-Apr;16 Suppl 1:S22-8
3. Harrell G, Kercher K, Heniford B: Energy sources in laparoscopy. *Semin Laparosc Surg* 2004; 11: 201-209
4. Tengborn L, Blombäck M, Berntorp E. Tranexamic acid--an old drug still going strong and making a revival. *Thromb Res*. 2015;135(2):231-242. doi:10.1016/j.thromres.2014.11.012
5. Okamoto S, Sato S, Takada Y, Okamoto U. An active stereo isomer (trans-form) of AMCHA and its fibrinolytic (antiplasminic) action *in vitro* and *in vivo*. *Keio J Med* 1964; 13: 177-85
6. Melander B, Gliniecki G, Granstrand B, Hanshoff G. Biochemistry and toxicology of amikapron; the antifibrinolytically active isomer of AMCHA. (A comparative study with epsilon-aminocaproic acid). *Acta Pharmacol Toxicol* (Copenh) 1965;22(4):340-352. [PubMed] [Google Scholar]
7. Rappold JF & Pusateri AE. Tranexamic Acid in Control Resuscitation. *Transfusion*(2013), 53: 96S-99S.
8. Pandove PK, Singla RL, Mittal P, Mahajan N, Kumar A. Role of Tranexamic Acid on Blood Loss in Laparoscopic Cholecystectomy. *Niger J Surg*. 2017 Jul-Dec;23(2):111-114. doi: 10.4103/njs.NJS\_53\_16. PMID: 29089735; PMCID: PMC5649425
9. Khuroo MS, Mahajan R, Zargar SA, Javid G, Sapru S. Prevalence of biliary tract disease in India: a sonographic study in adult population in Kashmir. *Gut*. 1989 Feb;30(2):201-5. doi: 10.1136/gut.30.2.201. PMID: 2649414; PMCID: PMC1378302.
10. Hardy JF, Desroches J. Natural and synthetic antifibrinolytics in cardiac surgery. *Can J Anaesth*. 1992 Apr;39(4):353-65. doi: 10.1007/BF03009046. PMID: 1373346.
11. Eriksson O, Kjellman H, Pilbrant Å , Margareta Schannong Pharmacokinetics of Tranexamic Acid after Intravenous Administration to Normal Volunteers *Eur J Clin Pharmacol* (1974); 7: 375
12. Waskowski J, Schefold JC, Stueber F. Prophylaktische Anwendung von Tranexamsäure in der nichtkardialen Chirurgie : Update 2017 [Prophylactic use of tranexamic acid in noncardiac surgery : Update 2017]. *Med Klin Intensivmed Notfmed*. 2019;114(7):642-649. doi:10.1007/s00063-018-0402-5
13. Kambouris AA, Carpenter WS, Allaben RD. Cholecystectomy without drainage. *Surg Gynecol Obstet* 1973;137:613-7.
14. Gohel Mayur, Patel Purvi, Gupta Ashoo, Desai Pankaj, Efficacy of tranexamic acid in decreasing blood loss during and after cesarean section: A randomized case controlled prospective study, *J Obstet Gynecol India* Vol. 57, No. 3 : May/June 2007 ; 227-230
15. Choi WS, Irwin MG, Samman N. The effect of tranexamic acid on blood loss during

orthognathic surgery: a randomized controlled trial. J Oral Maxillofac Surg. 2009 Jan;67(1):125-33. doi: 10.1016/j.joms.2008.08.015. PMID: 19070758.

**Original Article****A study on Anthropometric Factors and Breast Cancer Risk**

Jahangeer Aslam Makhdoomi, Misba Hamid Baba, Riffat Anjum Fatima, Sumera Saba

**Abstract:**

**Background and Purpose:** Breast cancer is the most common cancer in women worldwide, which poses a health concern throughout the world. Therefore it necessitates ruling out the factors that increase the risk of breast cancer. Body mass index an index of adiposity is considered to be one of the risk factors for the development of breast cancers in postmenopausal women. Waist to hip ratio which corresponds to the central obesity is another factor associated with an increased risk of breast cancer in both pre and postmenopausal women. This study aims to examine the relationship between obesity and breast cancer.

**Materials and Methods:** This study was conducted between January 2017 and December 2019 in a tertiary care hospital. 150 patients who qualified our set criterion of all the diagnosed clinical stages of breast cancer, aged between 24 to 80 years. All the patients were subjected to nine anthropomorphic body measurements i.e. height, weight, chest circumference, waist circumference, thigh girth, arm span, BMI, abdomen, and thigh skinfold thickness. These factors were compared with Histopathological examination values using a t-test. The analysis was done using the data editor of SPSS V20. The p-value <0.05 was considered significant.

**Results:** On comparing the selected anthropometric factors six out of nine selected factors risk i.e. height, weight, chest circumference, waist circumference, thigh girth, arm span, BMI, abdomen, and thigh skinfold thickness showed a significant relationship between the factor and the breast cancer risk. The p-value ( $p < 0.05$ ) was quite significant which clearly shows that there is a direct relationship between adiposity and breast cancer. The remaining three factors i.e. height, arm span, and thigh skinfold thickness were found to be insignificant in comparison with HPE ( $p > 0.05$ ).

**Conclusions:** We observed that weight, adiposity, and chest circumference increase the risk of breast cancer in women. We also observed that higher waist and chest circumference were associated with an increased risk of premenopausal and postmenopausal breast cancer with increased luminal types and triple-negative breast tumors in our subset of the population.

**JK-Practitioner2023;28(1-2):47-54**

**INTRODUCTION**

The breast or mammary gland is a distinguishing feature of class Mammalia. From puberty to death, the breast is subjected to constant physical and physiological alterations that are related to menses, pregnancy, gestation, and menopause. The impact of breast disease in societies assumes greater importance as the incidence of breast cancer continues to increase steadily. One of every two women will consult her physician for breast disease; approximately one of every four women will undergo breast biopsy, and one of every nine American women will develop some variant of breast cancer.[1] Carcinoma of the breast is the most common site-specific cancer in women and is the leading cause of death from cancer for females 40 to 44 years of age. Breast cancer is a major health problem for women throughout the world. In 2020, there were 2.3 million women diagnosed with breast cancer and 685 000 deaths globally. As of the end of 2020, there were 7.8 million women alive who were diagnosed with breast cancer in the past 5 years; making it the world's most prevalent.[2] Worldwide breast cancer is the

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**Indexed**

EMBASE ,SCOPUS, IndMED ,ESBCO, Google Scholar besides other national and International Databases

**Cite This Article as**

Makhdoomi JA, Baba MH, Fatima RA, Saba S. A study on Anthropometric Factors and Breast Cancer Risk. JK Pract2023;28(1-2):47-54

Full length article available at [jkpractitioner.com](http://jkpractitioner.com) one month after publication

**Keywords**

Obesity, Body Mass Index, Breast Cancer, Waist circumference

most frequently diagnosed cancer and the leading cause of cancer death among females, accounting for 23% of the total cancer cases and 14% of the cancer deaths although there is five-fold variation in incidence between high incidence areas such as the United States and Western Europe, and low incidence areas such as Africa and Asia.[3] Since 1990, the death rate from breast cancer has decreased in the United States by 24%, and similar reductions have been observed in other countries.[4,5] The adoption of screening mammography, and the use of adjuvant therapy, have contributed approximately equally to this improvement. Although breast cancer has traditionally been less common in no developing nations, its incidence in these areas is increasing. Body size is one of the few breast cancer risk factors that can be modified throughout life and therefore should be considered in research on breast cancer prevention. The contrasting effects of body size on premenopausal breast cancer compared with postmenopausal breast cancer and the lack of strong association between body mass and postmenopausal breast cancer in some cohort studies have led to a view that obesity has some influence on breast cancer risk. These conclusions are based on analyses that consider relative weight at one point in time as an adequate measure of lifelong weight patterns and their metabolic consequences.[5] Recent research suggests that, compared to body mass indices, adult weight gain and increased central body fat may be more specific markers of the metabolic consequences of obesity and therefore may predict health outcomes more consistent with an increased risk of postmenopausal breast cancer. The timing of weight gain also appears to influence breast cancer risk; increased relative weight and weight gain after menopause have been associated with the largest increases in relative risks. Overall levels of adiposity, increased central fat deposition, and weight gain is associated with alterations in ovarian hormone and glucose metabolism and in growth factors that may promote breast cancer cell growth. Data on lifelong weight changes and the location of fat depots may more precisely identify women with high-risk patterns of sex steroid and glucose metabolism. Similarly, research is needed to determine if weight gain during periods of hormone change, such as menarche, pregnancy, and menopause, have different biologic effects, perhaps because of differences in the location of fat deposition during these periods. Research is also needed on whether there are critical times relative to breast cancer promotion when excessive weight gain should be avoided. Data are lacking on the influence of weight gain on breast cancer risk or prognosis. Relatively consistent findings on the relationships between body size and shape and breast cancer risk have been emerging in recent years. Adult height is predictive of breast cancer risk, even in populations with no evidence of energy or nutrient deficiency. A complex relationship with adiposity has

been observed. The dominant pattern is increased risk with increasing adiposity except in younger, premenopausal women from countries with high breast cancer rates, in whom an inverse association is noted. When adult weight is evaluated as a dynamic measurement rather than a constant one, excess weight in the years preceding breast cancer diagnosis seems especially critical, consistent with the substantial evidence that adiposity at the time of breast cancer diagnosis is associated with an increased probability of recurrence and a decreased survival time.[6,7] Epidemiological evidence implicating anthropometric risk factors in breast cancer etiology is accumulating. For premenopausal women, breast cancer risk increases with increasing height but decreases with higher weight or body mass index, and no association with increased central adiposity exists. For postmenopausal women, an increased risk of breast cancer is found with increasing levels of all the anthropometric variables including height, weight, body mass index, waist-hip ratio, waist circumference, and weight gain. Weight loss appears to decrease risk, particularly if it occurs later in life. Breast size may be a risk factor for breast cancer; however, the current evidence is inconclusive. A study from Nigeria showed that waist to hip ratio (WHR) is a significant predictor of breast cancer risk in Nigerian women and measures to sustain increased physical activity and ensure healthy dietary practices were recommended to reduce the burden of obesity in the population.[6–11] Breast Cancer is a major killer disease in females globally and in developing regions, where the early cancer detection facilities remain unavailable. A study in Kashmir conducted on the analysis of breast cancer in Kashmiri women has shown that Breast Cancer is the second most common cancer in the valley after esophageal cancer.<sup>[12]</sup> In another study from the same region it was found that the majority of patients with breast cancer were married, postmenopausal, came from rural settings and the commonest tumor at presentation was T2 followed by T3.[12] Besides in India too breast cancer is the second most common cancer among women however the first being Cervical cancer. Although various studies have focussed on obesity and the association with breast carcinoma very few studies have been conducted on breast cancer and its link with various anthropometric measures. Since breast cancer remains one of the most common cancers in the Kashmir valley and as people are getting more aware of the disease we intend to find an association between this malignancy and various anthropometric parameters through this research.

## MATERIALS AND METHODS

This study was conducted between January 2017 and December 2019 in a tertiary care hospital. 150 patients who qualified our set criterion of all the diagnosed clinical stages of breast cancer, aged between 24 to 80 years were enrolled. Only patients



who gave consent were enrolled while patients with deformity and reluctance were excluded. A complete history and examination with risk factor assessment, baseline investigations complete blood count, liver function tests, kidney function tests, chest X-rays, and electrocardiogram were evaluated in all the patients. In addition, Performance Status (The Eastern Cooperative Oncology Group -ECOG) was incorporated. Risk factor assessment such as smoking (duration, type, pack-years), alcohol consumption, socioeconomic status (Kupposwamy scale), marital status, place of residence, age at pregnancy, menarche, menopause, history of benign proliferative lesion, any first degree relative with a history of breast cancer, history of cancer in ovary/endometrium, radiation to the chest was also reported in patients. All the patients were subjected to nine anthropomorphic body measurements i.e. height, weight, BMI, arm span, chest circumference, waist circumference, abdomen and thigh skinfold thickness, and waist to hip circumference.

### Measured Anthropometric Parameters

#### 1. Height

Height or standing height is the maximum distance from the floor to the highest point on the head when the subject is facing directly ahead. Shoes were taken off, feet together and arms by the sides. Heels, buttocks, and upper back were in contact with the wall when the measurement was made.

#### 2. Weight

#### 3. Chest Circumference

The subject was made to stand or sit while the chest circumference measurement was taken at the level just at the nipples.

#### 4. Abdominal circumference/Girth

The girth was taken at the narrowest waist level or if it was not apparent at the midpoint between the lowest rib and the top of the hip bone (Iliac crest).

#### 5. Thigh girth

The subject was standing erect with their weight evenly distributed on both feet and legs slightly parted. The circumference measured was taken at the level of mid-point on the lateral surface of the thigh, midway between trochanterion and tibial laterale.

#### 6. Arm Span

With the subject facing away from the wall with her back and buttocks touching the wall the arms were stretched out horizontally. Measurement was taken from one farthestmost fingertip to other.

#### 7. BMI

The body mass index (BMI), calculated as  $\text{weight(kg)/height(m)}^2$ , or  $\text{weight (lbs)/height(inches)}^2$

x 703, was used to classify weight status and risk of disease.

#### 8. Abdominal and

#### 9. Thigh Skinfold Thickness

The mark was made 5cm adjacent to the umbilicus to the right side. The vertical pinch was made at the marked site and the calipers were placed just below the pinch and the measurement was taken.

With the subject sitting and the knee bent at right angles, the measurement was taken at the midpoint of the anterior surface of the thigh midway between the patella and inguinal fold.

### Statistical Analysis

All the continuous variables were reported in terms of Mean  $\pm$  S.D, and the categorical variables in terms of frequency and percentages. The student's independent t-test was used to analyze the data. All the results were discussed on a 5% level of significance i.e., a p-value  $< 0.05$  was considered significant. The data was analyzed with the help of the statistical software SPSS V 20.

### RESULTS

The mean age of the patients was 44.53years (Fig 1). The highest number of cases was found in the urban population than in rural areas. The major complaints by the patients were through the lump in the Breasts and the frequency was 145 followed by the Discharge nipple (Fig 2). Stage III A was predominant, followed by III C, IIA, and II B stages with 20%, 18.7%, 17.3%, and 16.7 % respectively (Fig 3). 140 patients were having Infiltrating Duct Cell followed by Duct CA in Situ followed by other types (Fig 4). Left-sided laterality dominated the right-sided one, left side (n=83) followed by the right side (n=66) (Fig 5). Majority of the patients were ER/PR+ (n=65), followed by TNBC (n=34), HER+ (n=22) and ER+ (n=13) respectively (Fig 6). The mean height of the patients was  $153 \pm 5.43$ cm (Fig 7). The mean weight of the patients was  $61.53 \pm 11.3$ kg (Fig 8). Mean BMI was 26.23 with class I obesity in 63 patients followed by class II obesity in 30 patients (Fig 9). The mean ARMS SPAN, of the patients, was  $157.5 \pm 7$  (Fig 10). The mean Chest Circumference of patients was  $97.24 \pm 10.6$ cm (Fig 11). The mean abdomen circumference was  $98.39 \pm 12.26$ cm (Fig 12). The mean abdominal skinfold thickness was  $23.45 \pm 7$ cm (Fig 13). Mean thigh skinfold thickness was  $24.58 \pm 9.12$ cm (Fig 14). 98cm Mean thigh girth was  $44.05 \pm 4.31$ cm (Fig 15)

Paired t-test was performed to find the association between the various physical parameters and the incidence of breast cancer. There were no significant differences in HPE of the patients when compared with Height ( $P=0.435$ ). A significant difference was found ( $p=0.000$ ) in comparing weight with HPE. A significant difference was found ( $p=0.00$ ) in comparing HPE with CHEST

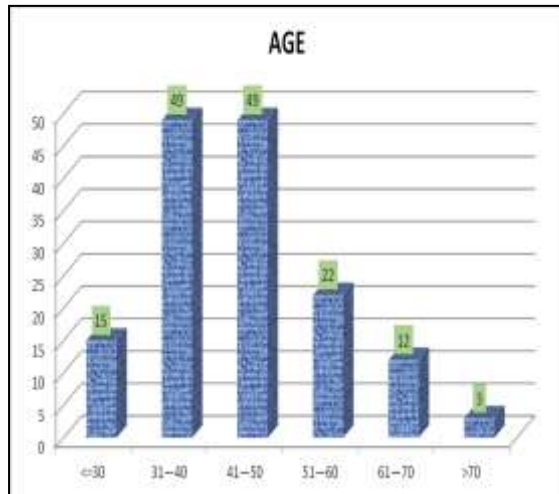


Fig 1 Mean age of 150 patients

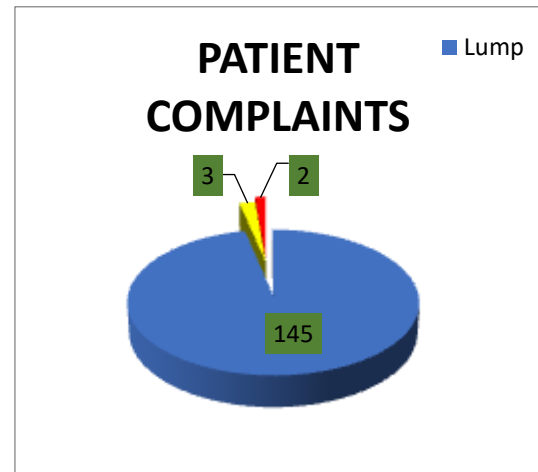


Fig 2 Main patient complaints at the time of diagnosis

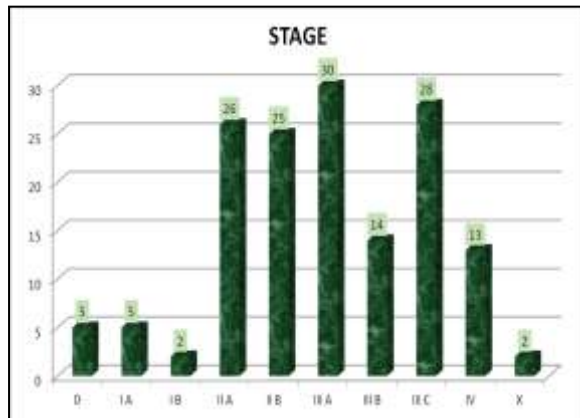


Fig 3 Stage-wise distribution of the patients

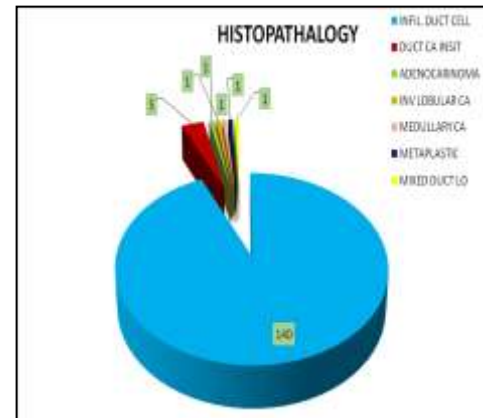


Fig 4 Histopathology of the patients

Circumference. A significant difference was found ( $p=0.00$ ) in comparing HPE with Abdomen Circumference. A significant difference was found in comparing HPE with Thigh girth ( $p=0.00$ ) and abdominal skinfold thickness ( $p=0.046$ ). A

#### DISCUSSION

Obesity has become a crucial public health problem worldwide, especially for breast cancer development and survival. Most studies have shown that body mass index which reflects general obesity is associated with a decrease in the risk of developing breast cancer before menopause and an increase after menopause in most of the studies, while waist to hip ratio which reflects central obesity is associated with an increased risk of both pre and postmenopausal breast cancer. Results are variable with differences in metabolic risk and definitions of obesity according to ethnicity. Findings suggest that anthropometric factors may have different associations with breast cancer risk in Kashmiri women than in Western women. Our study

significant difference was found ( $p=0.022$ ) in comparing HPE with BMI. No significant association was found when HPE was compared with arm span ( $p=0.990$ ), and thigh skin thickness ( $p=0.566$ )

showed that weight, chest circumference, abdominal and thigh girth, BMI, and abdominal skin thickness are a few important anthropometric factors that were associated with increased breast cancer risk in our set of samples. Many studies have evaluated various anthropometric factors and found that either these factors were positively affecting or showed a negative correlation of these physical parameters with the breast cancer risk. Tehard B and Clavel-Chapelon F et al did a cohort study with several anthropometric measurements and breast cancer risk.[13] A slight increase in risk with increasing height was found. Weight, BMI, thorax and waist circumferences, and WHR were negatively related to breast cancer risk

**LAB**

Category	Percentage
ER/PR+	65
TNBC	34
HER+	22
CCR+	13
T+	10
PR+	4
PR/HER	3
N/A	1

### HEIGHT

HEIGHT	Frequency
<= 145.00	12
146.00 ---	42
151.00 ---	56
156.00 ---	27
161.00 +	13

## WEIGHT

Weight Category	Count
<= 40	6
41 - 50	25
51 - 60	41
61 - 70	54
71 - 80	18
81+	6

**BMI**

BMI Category	Number of Students
<16.05	8
underweight	34
16.05-21.9	17
normal weight	63
21.0-24.9	30
overweight	0
25.0-29.9	0
obese class I	0
>30.0	0
obese class II	0

ARM SPAN	Frequency
<= 135.00	1
135.01 - 145.00	12
145.01 - 155.00	47
155.01 - 165.00	59
165.01 +	31

among premenopausal women. The relationships became non-significant after additional adjustment for BMI. An increased risk of premenopausal breast cancer with an android body shape ( $WHR > 0.87$ ) might be confined to obese women. Among postmenopausal women, all anthropometric measurements of corpulence were positively

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risk.[14] Suleyman S, Gokmen U et al did a retrospective and explorative analysis of the 3767 female BC patients from a single center. All patients'

BMI at the time of initial diagnosis and tumor demographics were recorded. Their data indicated that

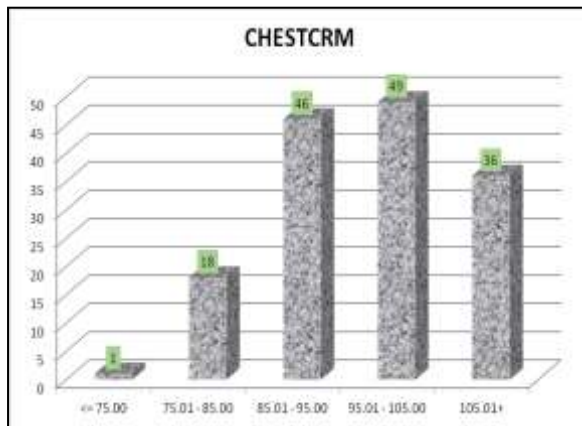


Fig 11 Measured Chest girth

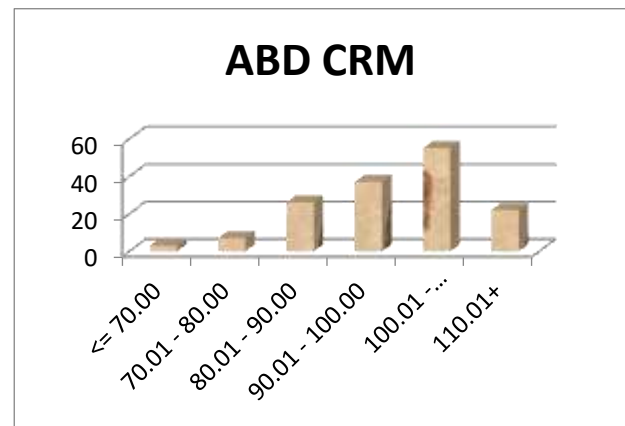


Fig 12 Measured Waist girth

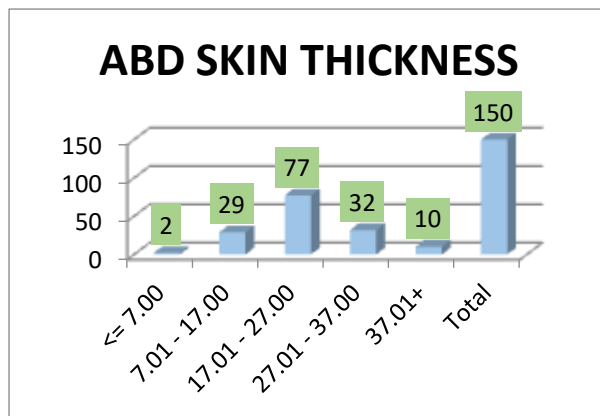


Fig 13 Measured abdominal skin thickness

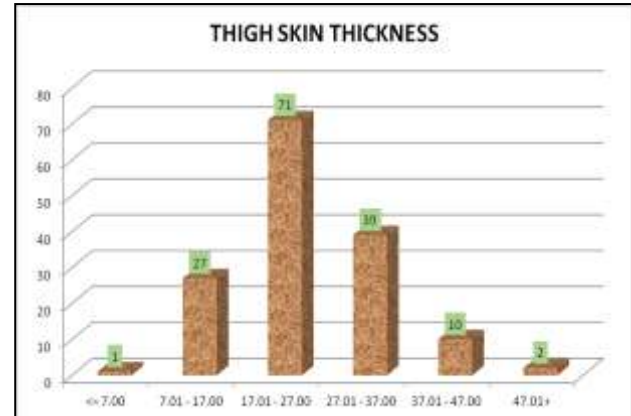


Fig 14 Measured thigh skin thickness

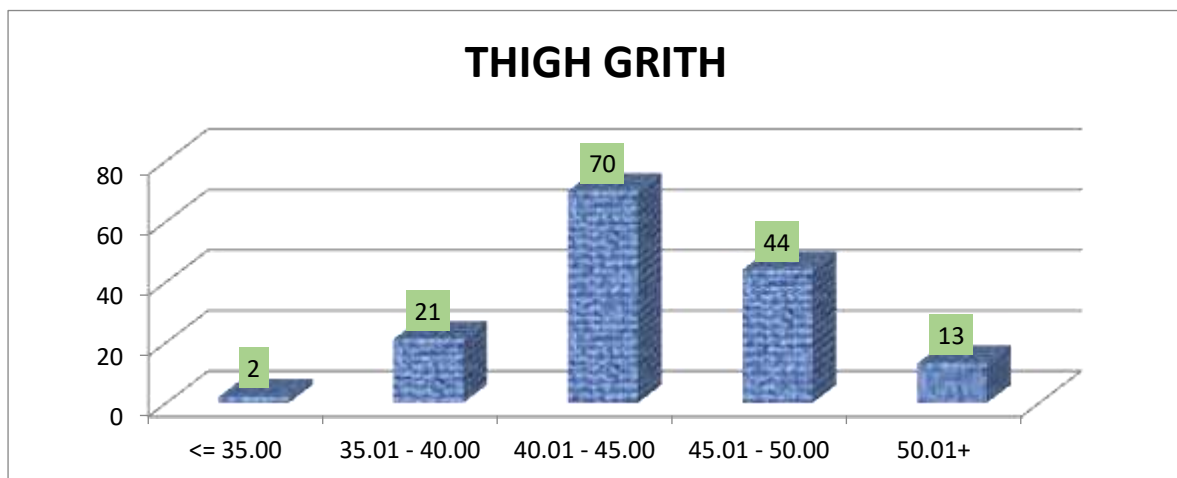


Fig 15 Measured thigh girth

BMI was an independent factor in patients with BC, with an association indicating a decreased incidence for luminal-like subtype and increased incidence for triple-negative subtype among premenopausal patients. However, this significance was not found in postmenopausal patients.[15] Samira EZ, Nahid G, Fatemah HS et al studied the relationship between body size and body shape and with risk of breast cancer. Their study revealed that the risk of breast cancer increased with increased hip circumference. In addition, the results indicated that body shape might be a useful predictor in determining the risk of breast cancer.[15] Amina A, Gabriela T, et al studied the association between anthropometry, body shape evolution across a lifetime, and the risk of breast cancer using a multi-center population-based case-control study in Mexico. Analysis of body shape evolution throughout life showed a strong and significant increase in the risk of breast cancer among women with increasing silhouette size over time compared to women with no or limited increase. Their findings suggested that anthropometric factors had different associations with breast cancer risk in Hispanic women than in Caucasian women. This study also showed the importance of considering the evolution of body shape throughout life.[4,16,17]

Our study adds to the literature on weight, adiposity, chest circumference, and risk of breast cancer in Kashmiri women in the Asian subcontinent. We observed that higher abdomen circumference and chest circumference were associated with an increased risk of premenopausal and postmenopausal breast cancer with increased luminal types and triple-negative breast tumors in our subset of the population. This in addition to dietary habits may contribute further to the risk of breast cancer.

Future studies of breast cancer should include more accurate measurements of various parameters of anthropometry and incorporate inflammatory markers and focus on the role of nutrition. Evaluation of an individual woman's risk of breast cancer has become much more important because this risk can now be modified. Until recently, risk has been primarily based on the evaluation of family and reproductive history and history of benign breast disease. New information on risk based on genotype, detailed histologic characteristics of benign breast disease, and hormone levels now allows a much more powerful prediction of risk for an individual woman.

## CONCLUSIONS

We observed that weight, adiposity, and chest circumference increase the risk of breast cancer in women. We also observed that higher waist and chest circumference were associated with an increased risk of premenopausal and postmenopausal breast cancer with increased luminal types and triple-negative breast tumors in our subset of the population.

Available evidence provides a basis for strategies that can reduce the risk of breast cancer, although some of these represent complex decision-making. Attainable

objectives can make an important impact on individual risk of cancer. However, even the collective implementation of all lifestyle strategies will not reduce population rates of breast cancer to the very low levels of traditional agrarian societies because the magnitude of the necessary changes is unrealistic or undesirable. Thus, a role will exist for hormonal and other chemopreventive interventions that may be appropriate for women at particularly high risk and, potentially, for wide segments of the population because few women can be considered to have very low risk. Together, the modification of nutritional and lifestyle risk factors and the judicious use of chemopreventive agents can have an impact on the incidence of this important disease.

Obesity has reached a level where it has to be considered a concern due to negative health complications it is associated with, such as increased cancer rates. Our study revealed that women with breast cancer present with typical body silhouette and visceral obesity, along with altered body proportions. Simple anthropometric characteristics such as height, weight, body mass index, waist and chest circumference, and skin fold thicknesses may be valuable tools for the assessment of the population to disclose subjects at greater risk of developing breast cancer.

Avoiding weight gain during adult life can importantly reduce the risk of breast cancer, as well as cardiovascular disease, and many other conditions. Individual women can reduce weight gain by exercising regularly and moderately restraining caloric intake, which is facilitated by the overall quality of diet. Healthcare providers play an important role in counseling patients throughout adult life about the importance of weight control. However, the incorporation of greater physical activity into daily life will be difficult for many persons. Physicians can assess dietary habits and provide guidance and policies influencing diet in many ways. Providing the best current information on the diet is an important role.

## CONFLICTS OF INTEREST

None

## Ethics

As the study did not involve any invasive procedure or any departure from the routine standard evaluation and treatment, no significant ethical considerations arose. Patients were enrolled only after informed consent. The study was undertaken only after clearance by the 'Institutional Ethical Committee' that looks into routine ethical aspects of studies at our institution.

## Funding

Nil

## REFERENCES

1. Street W. Breast Cancer Facts & Figures 2019-2020. :44.

2. Parkin DM, Bray FI, Devesa SS. Cancer burden in the year 2000. The global picture. *European Journal of Cancer*. 2001;37:4–66.
3. Jemal A, Bray F, Center MM, Ferlay J, Ward E, Forman D. Global cancer statistics. *CA Cancer J Clin*. 2011;1:69–90.
4. Ballard-Barbash R. Anthropometry and breast cancer. Body size-a moving target. *Cancer*. 1994;74:1090–100.
5. Ballard-Barbash R, Birt DF, Kestin M, King IB. Perspectives on Integrating Experimental and Epidemiologic Research on Diet, Anthropometry and Breast Cancer. *The Journal of Nutrition*. 1997;127:936S-939S.
6. Okobia MN, Bunker CH, Zmuda JM, Osime U, Ezeome ER, Anyanwu SNC, et al. Anthropometry and breast cancer risk in Nigerian women. *Breast J*. 2006;462–6.
7. Huang N si, Quan C lian, Mo M, Chen J jian, Yang B long, Huang X yan, et al. A prospective study of breast anthropomorphic measurements, volume and ptosis in 605 Asian patients with breast cancer or benign breast disease. Santanelli F, editor. *PLoS ONE*. 2017;12:e0172122.
8. Clinton SK. Diet, Anthropometry and Breast Cancer: Integration of Experimental and Epidemiologic Approaches. *The Journal of Nutrition*. 1997;127:916S-920S.
9. Friedenreich CM. Review of anthropometric factors and breast cancer risk. *European Journal of Cancer Prevention*. 2001;10:15–32.
10. Tehard B, Clavel-Chapelon F. Several anthropometric measurements and breast cancer risk: results of the E3N cohort study. *Int J Obes (Lond)*. 2006;30:156–63.
11. Huang Z, Willett WC, Colditz GA, Hunter DJ, Manson JE, Rosner B, et al. Waist circumference, waist:hip ratio, and risk of breast cancer in the Nurses' Health Study. *Am J Epidemiol*. 1999;150:1316–24.
12. Wani SQ, Khan T, Wani SY, Koka AH, Arshad S, Rafiq L, et al. Clinicoepidemiological analysis of female breast cancer patients in Kashmir. *J Cancer Res Ther*. 2012;8:389–93.
13. Tehard B, Lahmann PH, Riboli E, Clavel-Chapelon F. Anthropometry, breast cancer and menopausal status: use of repeated measurements over 10 years of follow-up-results of the French E3N women's cohort study. *Int J Cancer*. 2004;111:264–9.
14. Warren R, Thompson D, Frate C del, Cordell M, Highnam R, Tromans C, et al. A comparison of some anthropometric parameters between an Italian and a UK population: "proof of principle" of a European project using MammoGrid. *Clinical Radiology*. 2007;62:1052–60.
15. Ebrahimzadeh Zagami S, Golmakani N, Homaei Shandiz F, Saki A. Evaluating the Relationship between Body Size and Body Shape with the Risk of Breast Cancer. *Oman Med J*. 2013;28:389–94.
16. Pacholczak R, Klimek-Piotrowska W, Kuszmierz P. Associations of anthropometric measures on breast cancer risk in pre- and postmenopausal women—a case-control study. *J Physiol Anthropol*. 2016;35:7-17.
17. Cm F. Review of anthropometric factors and breast cancer risk. *European journal of cancer prevention: the official journal of the European Cancer Prevention Organisation (ECP)* [Internet]. 2001 [cited 2022 Jun 11];10. Available from: <https://pubmed.ncbi.nlm.nih.gov/11263588/>



**Review Article****Functional Circuit Class Therapy in Type 2 Diabetes: Impact on Cardiac Autonomic Function, Fatigue, and Cognition: A Literature Review**

Sunita Kumari, Moattar Raza Rizvi

**Abstract:**

Type 2 diabetes mellitus (T2DM) poses a significant global health concern, affecting millions of individuals worldwide and leading to various physical and psychological complications. The escalating prevalence of T2DM is driven by factors such as urbanization, sedentary lifestyles, and rising obesity rates. Recent studies emphasize the positive impact of exercise in managing and preventing this metabolic disorder. In particular, Functional Circuit Class Therapy, a novel group-based exercise regimen, holds great promise for individuals with T2DM. However, there remains a paucity of literature investigating its effects on cardiac autonomic function, fatigue measures, and cognition in this specific population. Through a meticulous narrative review of 45 relevant articles, we aim to shed light on the potential benefits of exercise and Functional Circuit Class Therapy, offering innovative insights that may revolutionize diabetes care and enhance overall well-being. Key words: Type 2 diabetes, exercise, Functional Circuit Class Therapy, cardiac autonomic function, fatigue measures, cognition. This comprehensive review emphasizes the significant impact of Type 2 Diabetes Mellitus (T2DM) on global health and also discusses the potential benefits of exercise in its management. The introduction of Functional Circuit Class Therapy presents a promising approach for individuals with T2DM, warranting further investigation. By understanding the outcomes of exercise on cardiac autonomic function, fatigue, and cognition, this study paves the way for tailored diabetes care strategies and improved overall well-being. The significance of this research lies in its contribution to combatting the T2DM epidemic and empowering individuals to lead healthier lives.

**JK-Practitioner2023;28(1-2):55-63****INTRODUCTION**

As stated by International Diabetes Foundation in 2006, as nearly 246 million individuals worldwide were affected by type 2 diabetes, and it is intended to increase to 380 million by 2025, which is a total of 7.1% of the adult population [Silink, M]. However, more recent data from the Centers for Disease Control and Prevention (CDC) in the United States show that more than 37 million Americans have diabetes, and approximately 90-95% of them have type 2 diabetes [Silink, M][Sun, H]. More of children, teenagers and young adults are developing it now which was often developed in individuals aged above 45 years. [Silink, M].

It imposes a greater effect of public health with a Type 2 diabetes is a serious public health concern with a substantial impact on human life and overall money spent on health. The cause of increase in the rising of cases of diabetes both globally and in western Europe is drastic economic development and urbanization. Both genders are equally affected with the incidence peak at around 55 years of age. It is estimated that globally 7079 individuals per 100000 will have type 2 diabetes by 2030. Lower income group pose greater chance of developing the disease.[Khan, M. A. B].

Long-lasting manifestations and symptoms of diabetes mellitus can affect both physical and mental health, many of which are crippling. The most prevalent kind of diabetes, type 2, is essentially a combination of issues with insulin release and action, either of which may predominate. Chronic hyperglycemia and microvascular pathology

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**Indexed**

EMBASE, SCOPUS, IndMED, ESBCO, Google Scholar besides other national and International Databases

**Cite This Article as**

Yousuf S, Arsalan-un-Nisa, Rasool Aliya, Shafi Tufela. A cross sectional study of compliance and adherence of topical antiglaucoma medications in rural population of Kashmir..JK Pract2023;28(1-2):55-63

Full length article available at [jkpractitioner.com](http://jkpractitioner.com) one month after publication

**Keywords**

Type 2 Diabetes Mellitus, exercise, Functional Circuit Class Therapy, cardiac autonomic function, fatigue, cognition, lifestyle, well-being.

unique to diabetes that causes different types of neuropathies and nephropathies are characteristics of diabetes. The liver overproduces glucose. Because of inadequate insulin secretion caused by impaired islet beta cell function, peripheral tissues utilize glucose insufficiently. (Clemente-Suárez).

Due to increase in rate of obesity, physical inactivity, dietary changes The incidence and prevalence of type 2 diabetes (T2DM) have indeed increased significantly due to factors such and ageing the prevalence and incidence of type 2 diabetes is increasing drastically [Ong, K. L]. Type 2 diabetes affects various organs involved in its onset, including the pancreas, liver, skeletal muscle, kidneys, brain, small intestine, heart, and adipose tissue [Gandhi, A]. Over 37 million Americans have diabetes and around 90-95% will have type to diabetes as per the reports of the Centers for Disease Control and Prevention (CDC) [Wilson, J.].

Diabetic autonomic neuropathy is a significant consequence of diabetes that is often overlooked. It is associated with other microangiopathic comorbidities and can lead to various complications such as silent myocardial ischemia, arrhythmias and sudden death. One specific manifestation of diabetic autonomic neuropathy is cardiovascular autonomic neuropathy (CAN), which is characterized by impaired autonomic regulation [Agashe, S]. A study conducted by Alberto et al. in 2014 evaluated the relationship between resting heart rate and cardiac autonomic neuropathy in 387 individuals with diabetes. The study found a correlation between elevated resting heart rate and an increased likelihood of having cardiac autonomic neuropathy. This highlights the significance of this relationship in predicting the development of this condition [Verrotti, A]. Other research supports the link between cardiac autonomic neuropathy and cardiovascular events in persons with diabetes. A meta-analysis including 87 studies confirmed the increase in resting heart rate by 10 bpm which is 1.15 for cardiovascular disease [Spallone, V]. Autonomic nervous system (ANS) imbalance, manifested as cardiac autonomic neuropathy, can be an important predictor of cardiometabolic episodes in the diabetic population [Vinik, A. I.]. It is important to recognize and diagnose cardiac autonomic neuropathy in individuals with diabetes to effectively manage and prevent complications. Autonomic dysfunction can lead to altered exercise tolerance, decrease heart rate and blood pressure response, and increases in cardiac output during workout [Karayannis, G]. Early detection and appropriate management strategies are crucial in improving outcomes for individuals with DAN.

Fatigue is a significant clinical manifestation of diabetes, particularly in individuals with Type 2 Diabetes Mellitus (T2DM), and has been connected to both depression and diabetes distress (Park H). It is a subjective experience characterized by a declining ability to perform physical or mental tasks, influenced

by a range of physiological, psychological, and lifestyle factors. These factors include fluctuations in glucose control, diabetes symptoms, emotional distress related to the condition, depression, physical inactivity, and Body Mass Index (BMI) (Hidayat, B. F). Despite its prevalence in the diabetic population, fatigue remains an underexplored aspect of the disease. Lifestyle factors, such as lack of exercise and higher BMI, contribute to the weariness experienced by individuals with T2DM (Telford, 2007). Furthermore, the diagnosis of diabetes can trigger feelings of depression, which may also contribute to feelings of fatigue (Rustad, J. K). Understanding the multifactorial nature of fatigue in diabetes is crucial for addressing its influence on patients' quality of life and overall health.

Diabetes is associated with chronic brain problems, which can manifest as impaired cognitive performance and abnormalities on brain imaging. Studies suggested that persons with T1DM and T2DM both may have experiences of cognitive and are at increased risk of developing vascular dementia, Alzheimer's disease and dementia [Zilliox, L. A] [Dove, A] [Varghese, S. M]. Glycemic control, or the management of blood glucose levels, may have an impact on the extent of cognitive dysfunction in individuals with type 2 diabetes. Research suggests that better glycemic control may help mitigate cognitive impairment in this population [Munshi, M. N.]. It is important to recognize and address cognitive impairment in individuals with diabetes as it can significantly impact their daily functioning and quality of life. Healthcare professionals should be aware of the association between diabetes and cognitive problems and adapt treatment strategies accordingly [Zilliox, L. A] [Hopkins, R].

Exercise is a fundamental strategy for glycemic control in individuals with diabetes. It has several beneficial effects which includes increased sensitivity to insulin in tissues, improved lipid profile, reducing blood pressure, and even improving psychological well-being by alleviating symptoms of depression [Syeda, U. A] [Gulve, E. A]. The effectiveness of exercise in glycemic control can vary depending on the type of exercise. It has been reported that aerobic training is more effective than strength training in correcting glycemic control. These activities includes jogging, cycling, walking or swimming [Gulve, E. A]. Aerobic exercise has well-documented benefits in improving glucose control and retarding the progression of comorbidities associated with diabetes, such as cardiovascular disease [Gulve, E. A]. Various studies have shown the positive effect of exercise on glycemic control in individuals with diabetes. For example, a systematic review found that aerobic exercise markedly improved glycemic control in patients with type 2 diabetes mellitus [Kurniawati, Y]. Another study conducted on adults with type 1 diabetes found that physical activity, including both aerobic and resistance training, was associated with

betterment in glycemic control [Reddy, R.,]. A randomized control trial was done focusing on the individual and combined effect of both resistance and aerobic training, the result showed that there was no additional benefit of combining these type of training compared to single mode of training [Sigal, R. J]. The intensity and duration of exercise has influence on glycemic control. On comparing with continuous training high intensity interval training was found to be more effective in regulating glucose in general population [Grace, A]. However, it is essential for individuals with diabetes to consult with their healthcare providers to determine the most appropriate exercise regimen based on their specific needs and health conditions.

Embracing the power of exercise to transform the landscape of Type 2 Diabetes management and prevention is a groundbreaking approach supported by recent studies. Introducing the concept of Functional Circuit Class Therapy, a tailor-made exercise regimen designed for group engagement, represents a novel and exciting prospect for individuals with diabetes. Although extensively studied in diverse populations like stroke survivors and those with cerebral palsy, its untapped potential in Type 2 Diabetes mellitus individuals calls for further exploration. With a pioneering spirit, our current study endeavors to uncover the profound impact of Functional Circuit Class Therapy on cardiac autonomic function, fatigue measures, and cognitive well-being. This innovative investigation holds the promise of reshaping how we approach diabetes care, heralding a new era of holistic and empowering interventions.

### **Methodology**

In pursuit of a robust and comprehensive research foundation, a meticulous methodology was employed. The initial step involved identifying pertinent literature from reputable databases like Google Scholar, PubMed, and PEDro. Using strategically chosen keywords, like "Type 2 diabetes," "cardiovascular fitness," "diabetic encephalopathy," and "fatigue," ensured the inclusion of relevant studies. Additionally, cross-referencing enabled the retrieval of additional valuable resources. A total of 32 articles were meticulously reviewed, ensuring that only full-text articles were considered for analysis. A narrative review approach was then adopted, allowing

for a cohesive and insightful synthesis of the findings. Through this rigorous methodology, our study seeks to build upon the existing knowledge and provide novel awareness about the impact of Functional Circuit Class Therapy on cardiac autonomic function, fatigue measures, and cognition in persons with Type 2 Diabetes Mellitus.

### **Conclusion:**

Type 2 diabetes is a global health concern, with a rising prevalence predicted in the coming years. The disease is associated with several complications, including cognitive impairment, fatigue, and autonomic dysfunction, which can significantly affect the quality of life of patients. However, exercise emerges as a valuable intervention in managing diabetes and its complications. Studies have demonstrated the positive impact of exercise on glycemic control in patients with type 2 diabetes. Aerobic physical exercise has been shown to improve glycemic control significantly. Exercise has also been found to improve metabolic outcomes, including insulin sensitivity and glucose metabolism. Resistance exercise has been found to benefit insulin sensitivity in those with type 2 diabetes. High-intensity interval training has been shown to be more effective in regulating glucose than continuous training at moderate intensity. Functional circuit class therapy is a tailored exercise program that has been studied in various populations, including stroke survivors and cerebral palsy patients. However, there is a paucity of literature on the effect of circuit class therapy on individuals with type 2 diabetes. A recent study aimed to examine the effect of functional circuit class therapy on cardiac autonomic function, fatigue measures, and cognition in individuals with type 2 diabetes. The study found that circuit training is beneficial in physical function and glucose metabolism in type 2 diabetic patients. Public awareness and education about diabetes remain crucial. It is essential to understand the importance of exercise in managing diabetes and its complications. Exercise can help improve glycemic control, metabolic outcomes, and physical function in individuals with type 2 diabetes. Understanding these aspects can pave the way for effective prevention and management strategies, offering hope for improved outcomes in diabetes care

**Epidemiology of Type 2 diabetes**

<b>Source</b>	<b>Aim</b>	<b>Findings</b>
Magliano, D. J., 2022	To provide global diabetes prevalence estimates	The IDF Diabetes Atlas reports that approximately 10.5% of adults worldwide are living with diabetes, with projections indicating a rise of 643 million by 2030 and 783 million by 2045.
Ong, K. L. 2023	To provide global diabetes prevalence estimates	The global prevalence of diabetes was 8.4% and 529 million people were having diabetes throughout the world in 2021. It is projected that 783 million people will be affected by 2050.
Sun. H et al, 2022	To provide global diabetes prevalence estimates	It was reported that the global prevalence of diabetes was 10.5%, and the number of adults living with diabetes was 537 million in 2021 and by 2045, the number of adults living with diabetes is projected to rise to 783 million.
Pradeepa, R and Mohan V 2021	To discuss the burden of diabetes in India	The study suggested that the prevalence of diabetes in India is more and increasing, mainly due to the increasing rate of obesity and physical inactivity. The prevalence of diabetes in India was 8.8%, and the number of adults living with diabetes was 87 million in 2021.
Centres for Disease Control and Prevention (CDC. (2017).	To provide diabetes prevalence estimates in the United States	Data published in 2019 showed 37.3 million people suffering from diabetes in America which is equal to 11.3% of the US population. Only 28.7 million cases are diagnosed with diabetes, while 8.5 million people were undiagnosed.
Kayyali, R. et al, 2019	To establish the awareness amongst individuals about the symptoms, risk and lifestyle issues related to type 2 diabetes.	The study found that there is a need for increased public awareness and education about the symptoms, risk factors, and lifestyle choices related to Type 2 diabetes.
Gruss, S. M et al. 2019	To search for the evidence for the prevention of type 2 diabete	The study thoroughly analysed various translation studies, current research for the prevention of type 2 diabetes and educating people about the importance of changing lifestyle as prevention strategies.
Khan, M. A. B et al. 2020	To examine the global burden and forecasted trends of Type 2 diabetes	Type 2 diabetes has become topic of great concern as it has marked impact on human life and economic burden on an individual. The increase in number is of great concern in lower income countries.
Alberti, K. G, et al 2007	To present global diabetes statistics	The majority of adults with diabetes reside in low- and middle-income countries.

**Diabetes and cognitive impairment**

Study	Aim	Findings
Dove, A et al. 2021	To analyse the effect of diabetes on cognition and its progression to dementia	Diabetes is related to an accelerated progression of cognitive deterioration, including incident cognitive impairment and dementia.
Varghese, S. M. et al 2022	To compare the prevalence of cognitive decline in diabetic individual and the general population	It was found that cognitive impairment is higher in individuals with diabetes compared to the general population.
Hopkins, R. et al, 2016	To discuss the management of cognitive decline in adults with diabetes	The individual with diabetes often experience difficulty in performing certain task due to cognitive decline. Lifestyle modification, glycemic control and medication can be used as management strategies for the same.
Luchsinger, J et al., 2007	To review epidemiologic studies of the link between diabetes and cognitive impairment	Diabetes is associated with cognitive impairment, including executive function, working memory, psychomotor and attentional functions. Diabetes treatment may alter the trajectory to cognitive impairment, and interventions that prevent diabetes could prevent cognitive impairment.
Alkethiri, K et al, 2021	To investigate the connection between type 2 diabetes and cognitive functions	Type 2 diabetes is linked to impairment of cognitive functions, with executive function, attention/concentration, visual memory, and verbal memory.
Zilliox, L. A et al., 2016	To find out the evidence suggesting that diabetes leads to cognitive decline and eventually to dementia	Type 1 and 2 diabetes individual showed cognitive decline leading to dementia in both human as well as animal.

**Diabetes and fatigue**

Author/Study	Aim	Findings
Bi, Y., Zhang et al., 2021	To identify and prevent fatigue in patients with type 2 diabetes	There is strong evidence suggesting the relation between type 2 diabetes (T2DM) and fatigue.
Singh, R et al., 2016	To evaluate the connection between quality of life, functional status and fatigue in type 2 diabetes	Fatigue is prevalent in patients with type 2 diabetes and is associated with lower quality of life. The contributing factors are both physiological(disease and its complication) as well psychological. (depression and anxiety)
Goedendorp, M. M et al., 2014	To examine the impact, prevalence, and potential determinants of chronic fatigue in type 1 diabetes	Though the fatigue cannot be explained only by hyperglycemia or glucose variability but is prevalent in type 1 diabetic individuals.
Jain, A et al., 2015	To study the prevalence of depression and fatigue in type 2 diabetes mellitus in industry workers	Fatigue and depression are more prevalent in diabetes patients compared to nondiabetic participants.
Widyanthari, D. M et al., 2020	To explore the possible connections between diabetes and fatigue	Blood glucose fluctuation is often thought of as a cause of fatigue in diabetes, but there may be other factors involved, such as inflammatory markers. Other related factors that can contribute to fatigue in diabetes include obesity and comorbidities associated with complications.

**Diabetes and autonomic function**

Author/Study	Aim	Findings
American Diabetes Association. (2023).	To provide guidelines for diagnosing and treating diabetes	Autonomic neuropathy is common complication in diabetes, which increases the chance of exercise-induced injury or adverse events through decreased autonomic control.
Autonomic control of energy balance and glucose homeostasis [Hyun, U., & Sohn]	To discuss the function of the autonomic nervous system (ANS) in energy balance and glucose homeostasis	Energy balance and glucose homeostasis are majorly regulated by ANS. Sympathetic nervous system increases thermogenesis and hepatic gluconeogenesis, while parasympathetic nervous system promotes insulin secretion.

**Diabetes and circuit class therapy**

Study	Aim	Findings
Park, S. Y., & Lee et al., 2015	To assess the effects of circuit training on physical function and glucose metabolism in type 2 diabetes	Circuit training improved the physical function index and glucose metabolism in type 2 diabetic patients.
Arazi, H et al.,2020	To investigate the efficacy of circuit resistance training on insulin resistance, serum glucose and physical health in type 2 diabetic elderly males.	Study showed the positive effect of circuit resistance training on serum glucose, insulin resistance, and health-related physical fitness in elderly men with type 2 diabetes.
Gretebeck, K. A. et al., 2019	Aim of the study was to compare the effects of functional circuit training on mobility performance in older individuals with type 2 diabetes	Functional circuit training improved mobility in type 2 diabetic older adult.
Verrotti, A.] et al., 2019	To review the complications of diabetic autonomic neuropathy	There is significant increment in morbidity and mortality in individuals with type 2 diabetes as it affects the autonomic nervous system wherein it leads to autonomic neuropathy which can affect any circuit/tract of the autonomic nervous system.
Bönhof, G. J. et al., 2019	To review the clinical sequels of diabetic neuropathy and its association with autonomic dysfunction	Neuropathic pain, foot ulcers and autonomic dysfunctions are major clinical symptoms following diabetes leads to significant morbidity and mortality.

**Exercise and diabetes**

Study	Aim	Findings
Reddy, R et al., 2019	To investigate whether there is any effects on glycemic control of resistance exercise and aerobic exercises in adults with type 1 diabetes	Both type of exercises can improve glycemic control in adults with type 1 diabetes.
Kirwan, J. P. et al., 2017	Whether the exercise can be used as management strategy in type 2 diabetes	Both aerobic and resistance training has positive impact on glucose regulation whether implemented individually or in combination.High-intensity interval training may also be effective.
Kurniawati, Y et al., 2019	To review the effectiveness of physical exercise on glycemic control in individuals with type 2 diabetes	Aerobic physical exercise is effective in improving glycemic control in individuals with type 2 diabetes.



Sigal, R. J. et al., 2007	To investigate the efficiency of resistance training, aerobic training, or both on glycemic control in individuals with type 2 diabetes	Combining the type of exercise may not be very effective when compared to individual protocol hence it can be concluded that if implemented individually both aerobic and resistance training can be effective for glycemic control.
Grace, A. et al. 2017	To investigate the effects of different aerobic exercise training intensities on glycemic control in individuals with type 2 diabetes	The study highlighted the effectiveness of high-intensity interval training over continuous training to improve glycemic control in individuals with type 2 diabetes.

## REFERENCES

- Agashe, S., & Petak, S. (2018). Cardiac autonomic neuropathy in diabetes mellitus. *Methodist DeBakey cardiovascular journal*, 14(4), 251.
- Alberti, K. G. M. M., Zimmet, P., & Shaw, J. (2007). International Diabetes Federation: a consensus on Type 2 diabetes prevention. *Diabetic Medicine*, 24(5), 451-463.
- Alkethiri, K., Almtoudi, T., bin Jurays, A., Abanumay, F., Aldammas, M., AlKhodheer, M., ... & Bashir, S. (2021). The relationship between type 2 diabetes mellitus with cognitive functions. *Heliyon*, 7(3).
- American Diabetes Association. (2023). Standards of care in diabetes—2023 abridged for primary care providers. *Clinical Diabetes*, 41(1), 4-31.
- Arazi, H., Gholizadeh, R., Sohbatazadeh, A., & Eghbali, E. (2020). The impact of circuit resistance training on serum glucose, insulin resistance and health related physical fitness in elderly men with type 2 diabetes. *Baltic Journal of Health and Physical Activity*, 12(3), 6.
- Bi, Y., Zhang, L., Li, X., Kan, Y., Li, S., Zou, Y., ... & Zhang, Y. (2021). Contributing factors of fatigue in patients with type 2 diabetes: A systematic review. *Psychoneuroendocrinology*, 130, 105280.
- Bjornstad, P., Chao, L. C., Cree-Green, M., Dart, A. B., King, M., Looker, H. C., ... & Nelson, R. G. (2023). Youth-onset type 2 diabetes mellitus: an urgent challenge. *Nature Reviews Nephrology*, 19(3), 168-184.
- Bönhof, G. J., Herder, C., Strom, A., Papanas, N., Roden, M., & Ziegler, D. (2019). Emerging biomarkers, tools, and treatments for diabetic polyneuropathy. *Endocrine reviews*, 40(1), 153-192.
- Centers for Disease Control and Prevention (CDC). (2017). National Diabetes Statistics Report, 2017-Estimates of Diabetes and Its Burden in the United States Background.
- Clemente-Suárez, V. J., Martín-Rodríguez, A., Redondo-Flórez, L., López-Mora, C., Yáñez-Sepúlveda, R., & Tornero-Aguilera, J. F. (2023). New Insights and Potential Therapeutic Interventions in Metabolic Diseases. *International Journal of Molecular Sciences*, 24(13), 10672.
- Dove, A., Shang, Y., Xu, W., Grande, G., Laukka, E. J., Fratiglioni, L., & Marzegli, A. (2021). The impact of diabetes on cognitive impairment and its progression to dementia. *Alzheimer's & Dementia*, 17(11), 1769-1778.
- Gandhi, A., Tang, R., Seo, Y., & Bhargava, A. (2022). Organ-Specific Glucose Uptake: Does Sex Matter?. *Cells*, 11(14), 2217.
- Goedendorp, M. M., Tack, C. J., Steggink, E., Bloor, L., Bazelmans, E., & Knoop, H. (2014). Chronic fatigue in type 1 diabetes: highly prevalent but not explained by hyperglycemia or glucose variability. *Diabetes care*, 37(1), 73-80.
- Goran, M. I., Ball, G. D., & Cruz, M. L. (2003). Obesity and risk of type 2 diabetes and cardiovascular disease in children and adolescents. *The Journal of Clinical Endocrinology & Metabolism*, 88(4), 1417-1427.
- Grace, A., Chan, E., Giallauria, F., Graham, P. L., & Smart, N. A. (2017). Clinical outcomes and glycaemic responses to different aerobic exercise training intensities in type II diabetes: a systematic review and meta-analysis. *Cardiovascular diabetology*, 16, 1-10.
- Gretebeck, K. A., Blum, C. S., Moore, T., Brown, R., Galecki, A., Strasburg, D., ... & Alexander, N. B. (2019). Functional exercise improves mobility performance in older adults with type 2 diabetes: a randomized controlled trial. *Journal of Physical Activity and Health*, 16(6), 461-469.
- Gruss, S. M., Nhim, K., Gregg, E., Bell, M., Luman, E., & Albright, A. (2019). Public health approaches to type 2 diabetes prevention: the US National Diabetes Prevention Program and beyond. *Current diabetes reports*, 19, 1-11.
- Gulve, E. A. (2008). Exercise and glycemic control in diabetes: benefits, challenges, and adjustments to pharmacotherapy. *Physical Therapy*, 88(11), 1297-1321.
- Hidayat, B. F., Sukartini, T., & Kusumaningrum, T. (2020). A systematic review of fatigue in type 2 diabetes. *Jurnal Ners*, 15(2), 513-517.
- Hopkins, R., Shaver, K., & Weinstock, R. S. (2016). Management of adults with diabetes and cognitive problems. *Diabetes Spectrum*, 29(4), 224-237.
- Hyun, U., & Sohn, J. W. (2022). Autonomic control of energy balance and glucose homeostasis. *Experimental & Molecular Medicine*, 54(4), 370-376.
- Jain, A., Sharma, R., Choudhary, P. K., Yadav, N., Jain, G., & Maanju, M. (2015). Study of fatigue, depression, and associated factors in type 2 diabetes mellitus in industrial workers. *Industrial Psychiatry Journal*, 24(2), 179.

23. Karayannis, G., Giamouzis, G., Cokkinos, D. V., Skoularigis, J., & Triposkiadis, F. (2012). Diabetic cardiovascular autonomic neuropathy: clinical implications. *Expert review of cardiovascular therapy*, 10(6), 747-765.
24. Kayyali, R., Slater, N., Sahi, A., Mepani, D., Lalji, K., & Abdallah, A. (2019). Type 2 Diabetes: how informed are the general public? A cross-sectional study investigating disease awareness and barriers to communicating knowledge in high-risk populations in London. *BMC Public Health*, 19(1), 1-11.
25. Khan, M. A. B., Hashim, M. J., King, J. K., Govender, R. D., Mustafa, H., & Al Kaabi, J. (2020). Epidemiology of type 2 diabetes—global burden of disease and forecasted trends. *Journal of epidemiology and global health*, 10(1), 107.
26. Kirwan, J. P., Sacks, J., & Nieuwoudt, S. (2017). The essential role of exercise in the management of type 2 diabetes. *Cleveland Clinic journal of medicine*, 84(7 Suppl 1), S15.
27. Kurniawati, Y., Baridah, H. I. A., Kusumawati, M. D., & Wabul, I. (2019). Effectiveness of physical exercise on the glycemic control of type 2 diabetes mellitus patients: a systematic review.
28. Luchsinger, J., & Florez, H. (2007). Diabetes mellitus and cognitive impairment. *Psychiatric Disorders and Diabetes Mellitus*, 41-52.
29. Magliano, D. J., Boyko, E. J., & Atlas, I. D. (2021). What is diabetes?. In *IDF DIABETES ATLAS* [Internet]. 10th edition. International Diabetes Federation.
30. Munshi, M. N. (2017). Cognitive dysfunction in older adults with diabetes: what a clinician needs to know. *Diabetes Care*, 40(4), 461-467.
31. Ong, K. L., Stafford, L. K., McLaughlin, S. A., Boyko, E. J., Vollset, S. E., Smith, A. E., ... & Brauer, M. (2023). Global, regional, and national burden of diabetes from 1990 to 2021, with projections of prevalence to 2050: a systematic analysis for the Global Burden of Disease Study 2021. *The Lancet*.
32. Park, H., Park, C., Quinn, L., & Fritsch, C. (2015). Glucose control and fatigue in type 2 diabetes: the mediating roles of diabetes symptoms and distress. *Journal of advanced nursing*, 71(7), 1650-1660.
33. Park, S. Y., & Lee, I. H. (2015). Effects on training and detraining on physical function, control of diabetes and anthropometrics in type 2 diabetes; a randomized controlled trial. *Physiotherapy theory and practice*, 31(2), 83-88.
34. Pradeepa, R., & Mohan, V. (2021). Epidemiology of type 2 diabetes in India. *Indian journal of ophthalmology*, 69(11), 2932.
35. Reddy, R., Wittenberg, A., Castle, J. R., El Youssef, J., Winters-Stone, K., Gillingham, M., & Jacobs, P. G. (2019). Effect of aerobic and resistance exercise on glycemic control in adults with type 1 diabetes. *Canadian journal of diabetes*, 43(6), 406-414.
36. Rustad, J. K., Musselman, D. L., & Nemeroff, C. B. (2011). The relationship of depression and diabetes: pathophysiological and treatment implications. *Psychoneuroendocrinology*, 36(9), 1276-1286.
37. Shin YL, Yoo H, Hong JY, Kim J, Lee KN, Kim YH. Glucose Control in Korean Patients with Type 2 Diabetes Mellitus according to Body Mass Index. *Journal of Obesity & Metabolic Syndrome*. 2023 Mar 3;32(1):55.
38. Sigal, R. J., Alberga, A. S., Goldfield, G. S., Prud'homme, D., Hadjiyannakis, S., Gougeon, R., ... & Kenny, G. P. (2014). Effects of aerobic training, resistance training, or both on percentage body fat and cardiometabolic risk markers in obese adolescents: the healthy eating aerobic and resistance training in youth randomized clinical trial. *JAMA pediatrics*, 168(11), 1006-1014.
39. Sigal, R. J., Kenny, G. P., Boulé, N. G., Wells, G. A., Prud'homme, D., Fortier, M., ... & Jaffey, J. (2007). Effects of aerobic training, resistance training, or both on glycemic control in type 2 diabetes: a randomized trial. *Annals of internal medicine*, 147(6), 357-369.
40. Silink, M. Mobilising The Resources To Address The Diabetes Epidemic. *Diabetes in Asia Study Group (DASG) acknowledges the generous support of*, 1.
41. Singh, R., Teel, C., Sabus, C., McGinnis, P., & Kluding, P. (2016). Fatigue in type 2 diabetes: impact on quality of life and predictors. *PloS one*, 11(11), e0165652.
42. Spallone, V. (2019). Update on the impact, diagnosis and management of cardiovascular autonomic neuropathy in diabetes: what is defined, what is new, and what is unmet. *Diabetes & metabolism journal*, 43(1), 3-30.
43. Sun, H., Saeedi, P., Karuranga, S., Pinkepank, M., Ogurtsova, K., Duncan, B. B., ... & Magliano, D. J. (2022). *IDF Diabetes Atlas: Global, regional and country-level diabetes prevalence estimates for 2021 and projections for 2045*. *Diabetes research and clinical practice*, 183, 109119.
44. Syeda, U. A., Battillo, D., Visaria, A., & Malin, S. K. (2023). The importance of exercise for glycemic control in type 2 diabetes. *American Journal of Medicine Open*, 9, 100031.
45. Varghese, S. M., Joy, N., John, A. M., George, G., Chandy, G. M., & Benjamin, A. I. (2022). Sweet Memories or Not? A Comparative Study on Cognitive Impairment in Diabetes Mellitus. *Frontiers in Public Health*, 10, 822062.
46. Verrotti, A., Prezioso, G., Scattoni, R., & Chiarelli, F. (2014). Autonomic neuropathy in diabetes mellitus. *Frontiers in endocrinology*, 5, 205.
47. Vinik, A. I., Casellini, C., Parson, H. K., Colberg, S. R., & Nevoret, M. L. (2018). Cardiac autonomic neuropathy in diabetes: a predictor of cardiometabolic events. *Frontiers in neuroscience*, 12, 591.
48. Widyantari, D. M., Jawi, I. M., Antari, G. A. A., & Widyantini, D. N. (2020). Fatigue among diabetic patients: A descriptive study. *Enfermería Clínica*, 30, 131-134.

49. Wilson, J. (2023). The Impact of County Level Characteristics on Type 2 Diabetes Related ED Utilization.
50. Zilliox, L. A., Chadrasekaran, K., Kwan, J. Y., & Russell, J. W. (2016). Diabetes and cognitive impairment. *Current diabetes reports*, 16, 1-11.

**Case Report****Interventional diagnosis loculated pleural effusion due to tuberculosis in children: case report**

Dimas Bayu Firdaus, Finny Fitry Yani, Oea Khairsyaf

**Abstract:**

**Introduction:** Tuberculosis (TB) remains a significant health concern for children worldwide, with approximately one million cases reported in 2020. Extrapulmonary tuberculosis occurs in about 20% of tuberculosis cases in children. Childhood pleural tuberculosis is a frequent manifestation of TB in pediatric patients. Numerous studies have outlined the clinical features of pleural TB in children. However, accurately diagnosing childhood pleural TB continues to be a difficult task.

**Case:** A 13-year-old girl with clinical symptoms of TB, but still not proven bacteriologically. A minimally invasive diagnostic search is carried out to determine the therapy given. VATS results showed a loculated pleural cavity and a caseous mass was found on the posterolateral left lung.

**Discussion:** The diagnosis of pleural TB is based on the presence of tuberculosis bacilli in the pleural fluid, pleural biopsy, and pleural granulomas on histopathological examination. Pediatric TB is difficult to diagnose because it can be confirmed by culture in only 20% to 40% of cases (compared to 90% of adult cases). Thoracoscopy is a safe, simple, and accurate tool to assist in the diagnosis of pleural disease.

**Conclusion:**

Diagnosing pleural effusion can be challenging due to the presence of tuberculosis, which often necessitates less invasive methods like bronchoscopy and thoracoscopy as the preferred means of diagnosis, helping to eliminate other potential causes.

**JK-Practitioner2023;28(1-2):64-68****INTRODUCTION**

Tuberculosis (TB) remains a significant health concern for children worldwide, with approximately one million cases reported in 2020.[1]Children and adolescents younger than 15 years represent about 12% of incident cases but this group accounts for 16% of the estimated 1,4 million deaths from TB in 2019. The relatively high mortality rate in these children creates an urgent need for better case detection in this group[2] Diagnosis can be challenging due to nonspecific signs and symptoms, and difficulty in obtaining adequate samples.[3]

Extrapulmonary tuberculosis occurs in about 20% of tuberculosis cases in children. Childhood pleural tuberculosis is a frequent manifestation of TB in pediatric patients. Numerous studies have outlined the clinical features of pleural TB in children. Studies conducted in developing countries have found that pleural tuberculosis to be the most common type of extrapulmonary tuberculosis among children and adolescents. Several reports have summarized the clinical characteristics of childhood pleural TB however, accurately diagnosing childhood pleural TB continues to be a difficult task. [4,5]

The diagnostic and treatment approaches for tuberculosis (TB) in children differ depending on factors such as the doctor's expertise, the healthcare setting, and the child's age.[5] Thoracoscopy is an effective and secure method for identifying pleural TB in children, but its applicability is limited due to its invasive procedure.[6] Here we report the diagnosis course of loculated pleural effusion due to tuberculosis in children.

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**Indexed**

EMBASE ,SCOPUS, IndMED, ESBCO, Google Scholar besides other national and International Databases

**Cite This Article as**

Firdaus DB, Yani FF, Khairsyaf O, Interventional diagnosis loculated pleural effusion due to tuberculosis in children: case report. JK Pract2023;28 (1-2):64-68

Full length article available at [jkpractitioner.com](http://jkpractitioner.com) one month after publication

**Keywords**

Pleural effusion, tuberculosis, thorascopic

## CASE

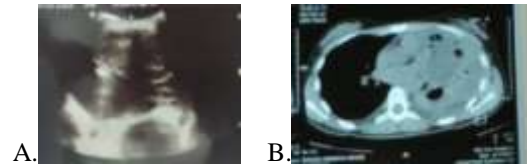
A 13-year-old girl with a cough for more than 2 weeks accompanied by shortness of breath, and a history of recurrent fever was referred from the previous hospital because there was no clinical improvement after treatment. Tuberculosis contact history is unknown. The patient has been vaccinated with BCG. Physical examination of the thorax revealed dullness to percussion and absent breath sounds at the bottom of the right hemithorax. No palpable lymph node enlargement was found in this patient.

Laboratory examinations showed an increase in the erythrocyte sedimentation rate (36mm/hour), there were no significant abnormalities in other laboratories. Tuberculin test and Sputum Rapid Molecular Test were performed on this patient with negative results. A chest X-ray shows a pleural effusion and is confirmed by a chest ultrasound that shows a separated (loculated) pleural effusion. A *Chest CT scan* was performed on a patient with left lower lobe atelectasis with pleural effusion.

**Table 1. Laboratory Test**

	Result
Hb	10,1 g/dl
Leukocytes	7,7 $10^3/\text{mm}^3$
Platelets	714 $10^3/\text{mm}^3$
Diff Count	
-Basophils	0 %
-Eosinophils	3 %
-Band Neutrophils	1 %
-Segmented Neutrophils	61 %
-Lymphocytes	30 %
-Monocytes	5 %
Absolute Lymphocytes Count	2,3 $10^3/\text{mm}^3$
Erythrocyte Sedimentation Rate	36 mm/H
LDH	197 U/L
Total Protein	7,1 g/dl
Albumins	3,3 g/dl
Globulins	3,8 g/dl
Blood Glucous	107 mg/dl

Thoracentesis was performed on this patient and seropurulent pleural fluid was obtained, then the procedure was followed by the insertion of a chest tube. The pleural fluid analysis described an acute exudate process (based on Light's criteria), no bacterial growth was found on culture examination, the impression of chronic inflammation of an acute exacerbation was obtained based on cytology results, Adenosine Deaminase (ADA) examination was performed with a result of 37 U/L. During the observation that the total fluid drained was 520cc, clinical improvement was found in the patient, but the evaluation chest X-ray did not show any significant improvement.



**Figure 1. Thoracic Ultrasound (A), and Thoracic CT-Scan (B)**

Further investigations were carried out on the patient to determine the cause of the persistent atelectasis. Bronchoscopy showed narrowing of segment B5 of the left lung, with good mucosa. The examination was continued with Video-Assisted Thoracoscopy Surgery (VATS) which found a loculated pleural cavity and a caseous mass was found on the posterolateral left lung. The results of the caseous tissue biopsy in the patient showed a large caseous area with an appearance of a mycobacterium infection otherwise the result of the MTB culture is negative. Following a comprehensive evaluation, the patient was prescribed anti-tuberculosis medications. As the patient exhibited clinical and radiological improvements after two months of treatment, the administration of anti-tuberculosis drugs was continued until the ninth month.

**Table 2. Pleural fluid examination**

	Result
Total Liquid	520 Ml
Rivalta	Positive
Albumin	3 g/dl
LDH	643 u/l
Glucose	76,5 Mg/dl
Total Cell	625 /mm <sup>3</sup>
PMN	60% %
MN	40% %
Impression	Exudative acute process
Cytology	Acute exacerbation of chronic inflammation
Culture	No Growth
ADA	37 U/l

## DISCUSSION

This case described, a 13-year-old girl presented with pleural effusion, and tuberculosis was suspected as the underlying cause. Pleural tuberculosis is more commonly observed in children aged over 5 years compared to those under 5, and it is frequently seen during adolescence. Studies have reported a median age of 13 years for the occurrence of pleural tuberculosis in pediatric patients.[7] Early signs and symptoms include acute fever with nonproductive cough and unilateral chest pain.[8]. This is under the patient, who has similar symptoms, so the patient is suspected of having TB.

The results of the Mantoux examination and the patient's rapid molecular sputum test were negative. Diagnosing tuberculosis in pediatric cases is challenging as culture confirmation is possible only in 20% to 40% of cases, in contrast to the higher rate of 90% in adults. Consequently, numerous cases of pediatric TB remain undiagnosed, and clinical

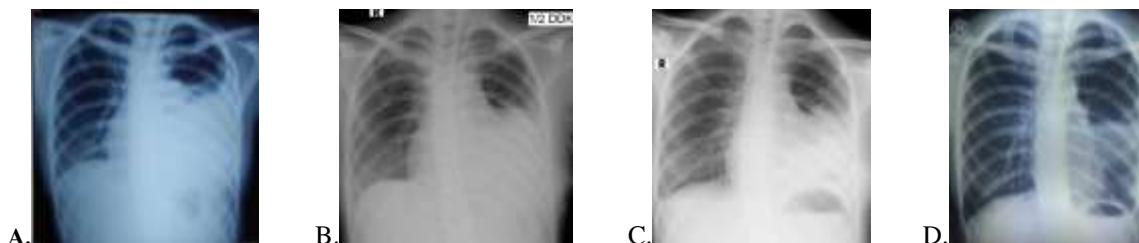


diagnosis is often relied upon. This delay in diagnosis significantly impacts the timely identification and treatment of TB in children. Moreover, the accuracy of diagnosis plays a crucial role in the successful management of TB in pediatric patients.[9]

The patient's chest X-ray showed a pleural effusion with a right paracardial infiltrate. Confirmation of the

Pleural LDH can serve as a useful biomarker for diagnosing empyema.[12]

Pleural effusion is a frequent complication of pneumonia in children. When the pleural Adenosine Deaminase (ADA) level exceeds 40 U/L, pleural tuberculosis (TB) is typically considered as a potential cause. ADA is an enzyme that plays a role in



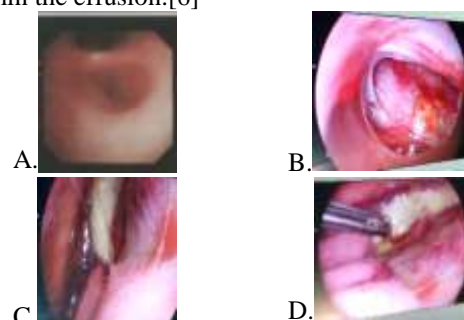
**Figure 2. Serial chest X-ray; Initial chest X-ray (A), Chest X-ray after chest tube insertion (B), X-ray evaluation 3 days after chest tube insertion(C), and X-ray after the intensive phase of anti-tuberculosis drugs (D)**

presence of fluid in the pleural space in the patient was performed by Thoracic Ultrasound with the impression of a loculated pleural effusion and a CT-Scan of the thorax which gave the impression of a pleural effusion with atelectasis. Pleural effusion is significantly more common on ultrasound than on chest X-rays. This is consistent with previous studies that have shown ultrasound to be superior to chest X-ray for pleural effusions, and for differentiating consolidation from pleural effusions.[10]

The study by Charlotte et al mentioned that chest ultrasound could be useful for detecting findings related to pulmonary TB and for treatment follow-up in children.[11] Ultrasound has a higher inter-operator concordance of interpretation than chest X-ray in 0.5 cm consolidation, pleural effusion, or enlarged mediastinal lymph nodes. Ultrasonography has the advantage of being relatively easy to perform as a bedside examination, quick to perform, and can be performed directly by the clinician.[10]

Pleural effusion is a frequent occurrence in children diagnosed with pulmonary tuberculosis, with approximately 30% of confirmed pulmonary TB cases experiencing this complication, particularly among older children. This aligns with previous findings reporting pleural effusion in 2-38% of pediatric TB cases, occurring more commonly in older children. Pleural effusion can arise as an immune response to *Mycobacterium tuberculosis* or as a result of the spread of adjacent pulmonary TB.[11] A thoracic tube was placed on the patient, with a total production of 520cc seropurulent fluid. The results of the pleural fluid analysis gave the impression of an exudative acute process with LDH levels reaching 643 U/L. The levels of pleural lactate dehydrogenase (LDH) as a biomarker can fluctuate during the progression of pleural inflammation. The initial level of pleural LDH is believed to mirror the serum LDH level due to filtration into the pleural space. On the other hand, elevated LDH levels are presumed to have a cellular origin rather than being derived from filtration.

converting adenosine to inosine and is involved in the differentiation of lymphoid cells. Increased ADA activity is associated with enhanced cellular immunity. The presence of elevated ADA in pleural fluid indicates the activation of T cells and monocytes within the effusion.[6]



**Figure 3. Bronchoscopy (A), septa and tissue on VATS (B&C), Sampling (D)**

In this case, the patient's ADA result was not available or did not indicate a value below 40 U/L. Certain risk factors were associated with negative pleural ADA results in children with pleural tuberculosis, such as the absence of chest pain and higher levels of pleural total protein, pleural LDH, and blood urea nitrogen. The usual presentation of tuberculous pleural effusion involves a predominance of lymphocytes. However, in up to 10% of tuberculous effusions, a neutrophil dominant pattern may be observed, which corresponds to lower levels of pleural ADA activity.<sup>6</sup> The diagnosis of pleural TB is based on the presence of tuberculous bacilli in the pleural fluid, pleural biopsy, and pleural granulomas on histopathological examination. Conventional methods such as direct pleural fluid examination, pleural fluid culture, and pleural biopsy have been proven to establish pleural TB.[8] Pleural tuberculosis often presents with a very low bacilli count in the pleural fluid, which contributes to negative results in smear staining and mycobacterial cultures. Positive smear staining is observed in less than 20% of cases, while culture positivity for *Mycobacterium tuberculosis* ranges



from 18% to 38%. Polymerase chain reaction (PCR) testing shows positive results in approximately 14.3% of cases. In the pediatric population, these ratios are even lower, indicating greater difficulty in diagnosing pleural TB in children.[7] After the insertion of segment B5 of the left lung, with good mucosa. Atelectasis typically resolves on its own without intervention. However, persistent and recurrent atelectasis serves as an important indication for diagnostic flexible bronchoscopy. Depending on the findings during the endoscopic examination, additional procedures may be performed, including suctioning, extraction of foreign bodies, sampling of various materials, and other specialized procedures tailored to the specific situation.[13]

The examination was followed by Video-assisted thoracoscopy surgery (VATS) which found a loculated pleural cavity and found a caseous mass on the posterolateral left lung. Thoracoscopy is a reliable, straightforward, and precise method for aiding in the diagnosis of pleural diseases. In the case of pleural tuberculosis, the combined sensitivity of histology and culture when using rigid thoracoscopy is nearly 100%. A study conducted by Maoshui et al. demonstrated that this technique has an 80% sensitivity rate and serves as a sensitive diagnostic approach for identifying pleural TB in children residing in countries with a high burden of TB. The study also reported various complications, with only one child requiring additional treatment for pneumothorax.[9]

The results of the caseous tissue biopsy in the patient showed a large caseous area with an appearance of a mycobacterium infection. Histological examination can provide valuable supporting evidence for diagnosing tuberculosis. The accuracy of the histological assessment relies on obtaining a sufficient tissue sample. Various techniques for tissue sampling have been assessed in children to aid in the diagnosis of TB, including endobronchial ultrasound-guided transbronchial needle aspiration, ultrasound-guided biopsy, and CT-guided biopsy.[9]

Parapneumonia effusion and empyema are usually progressively worse and then divided into three stages namely, exudative, fibrinopurulent, and organizational. The thick, fibrous fibrin organized in the pleural cavity limits lung expansion in the third or organizational stage.[14] Pleural fibrosis, or fibrothorax is an important complication of pleural TB, causing impaired lung function, chronic chest pain, and dyspnea. Pleural tuberculosis sometimes remains undiagnosed until severe pleural fibrosis occurs. Late diagnosis is an important risk factor for pleural fibrosis.[7]

## CONCLUSION

The difficulty of establishing the diagnosis of pleural effusion due to tuberculosis makes minimally invasive procedures such as bronchoscopy and thoracoscopy a modality of choice in establishing the

the chest tube, the patient experienced clinical improvement, but the *follow-up* chest X-ray did not show significant improvement. Further investigations were carried out on the patient to determine the cause of the atelectasis. Bronchoscopy showed narrowing of diagnosis and ruling out other possible diagnoses. This case report demonstrates that thoracoscopy can demonstrate a loculated pleural effusion.

## REFERENCES

1. World Health Organization. Global Tuberculosis Report 2021. Geneva; 2021.
2. World Health Organization. WHO Consolidated Guidelines on Tuberculosis. Module 2: Screening – Systematic Screening for Tuberculosis Disease. Geneva; 2021.
3. Kanabus A. TB in Children - Getting, diagnosing & treating TB - TBFacts [Internet]. Global Health Education. 2020 [cited 2021 Nov 21]. p. p.1-7. Available from: <https://tbfacts.org/tb-children/>
4. Vieira JL, Foschiera L, Ferreira ICS, Chakr VCBG. Performance of the quantification of adenosine deaminase and determination of the lactate dehydrogenase/adenosine deaminase ratio for the diagnosis of pleural tuberculosis in children and adolescents. *J Bras Pneumo*. 2021;47(2):1–6.
5. Ramos S, Gaio R, Ferreira F, Leal JP, Martins S, Santos JV, et al. Tuberculosis in children from diagnosis to decision to treat. *Revista Portuguesa de Pneumologia (English Edition)*. 2017 Nov 1;23(6):317–22.
6. Han XF, Han C, Jin F, Wang JL, Wang MS. Factors associated with negative pleural adenosine deaminase results in the diagnosis of childhood pleural tuberculosis. *BMC Infectious Diseases*. 2021;21(1):1–7.
7. Bayhan GI, Sayir F, Tanir G, Tuncer O. Pediatric tuberculosis. *International Journal of Mycobacteriology*. 2018 Jul 1;7(3):261–4.
8. Kementrian Kesehatan Republik Indonesia. Pedoman Nasional Pelayanan Kedokteran Tatalaksana Tuberkulosis. 1st ed. Burhan E, Soeroto AY, Isbaniah F, editors. Jakarta: Kementerian Kesehatan RI; 2020. p. 92-118.
9. Wang M, Han C, He Y. Diagnostic role of medical thoracoscopy in childhood pleural tuberculosis. *Scientific Reports*. 2019;9(1):1–6.
10. Heuvelings CC, Bélar S, Andronikou S, Lederman H, Moodley H, Grobusch MP, et al. Chest ultrasound compared to chest X-ray for pediatric pulmonary tuberculosis. *Pediatric Pulmonology*. 2019;54(12):1914–20.
11. Heuvelings CC, Bélar S, Andronikou S, Jamieson-Luff N, Grobusch MP, Zar HJ. Chest ultrasound findings in children with suspected pulmonary tuberculosis. *Pediatric Pulmonology*. 2019;54(4):463–70.
12. Wu Y-H, Wang J-L, Wang M-S. Factors Associated With the Presence of Tuberculous

Empyema in Children With Pleural Tuberculosis.  
Frontiers in Pediatrics. 2021;9(October):1–6.  
13. Barglik R, Grabowski A, Korlacki W,  
Pasierbek M, Modrzyk A. Pleural empyema in

children – Benefits of primary thoracoscopic  
treatment. Wideochirurgia I Inne Techniki  
Maloinwazyjne. 2021;16(1):264–72.

