

## **Drain or not to drain in Elective Gastrointestinal Surgery -A Prospective Cross Sectional Study**

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### **Abstract-**

#### **Introduction-**

Drains, its usage and needs have always been a topic of debate. There are many in the surgical profession like John yates who believed that the concept of prophylactic intra-peritoneal drainage is not necessary and should be changed with changing times. Furthermore they have also openly opined their views but there are also those who wish continue to remain silent on this issue and continue to utilize drain as a safety valve or as a preventive measure due to their consciences rather than any scientific backing for the same. Regrettably the concept of prophylactic drainage has not been scientifically studied in great detail. So the importance of overall use of the prophylactic drain in abdominal surgeries remains a topic of further study. Despite this , surgeon's still employ prophylactic drain application in abdominal surgeries on regular basis thus adhering to the values of Tait. . Hence there continues to remain a dispute regarding the usage of drains. Therefore, the objective of this study was to focus the usefulness of the prophylactic drainage of peritoneum after abdominal surgeries.

**Methods-**All the abdominal surgery cases of both sexes admitted in surgical ward through OPD or via emergency basis requiring elective abdominal surgeries for various abdominal pathologies were evaluated with detailed history. This is prospective cross sectional study.

**Result-** There is evidence of level 1a that drains do not reduce complications after hepatobiliary surgery, colorectal surgeries with primary anastomosis and appendectomy for any stage of appendicitis. Drains were indirectly responsible for increasing the morbidity and post-operative recovery period.

**Discussion-** Practice of prophylactic drain placement in abdominal surgeries was associated with higher morbidity and mortality.

**Conclusion-** Many elective GI operations can be performed safely without prophylactic drainage. Drains should be omitted after hepatobiliary surgery, colorectal surgeries with primary anastomosis and appendectomy (recommendation grade A). Furthermore, there should be studies carried out to understand the role of drains.

**Key words**– Drains, Non- Drain group, Gastrointestinal surgery , Drain site complications

## **Background –**

What is a Surgical Drain?

The Oxford English dictionary defines a drain as “a channel by which surplus liquid is drained or gradually carried off”(1). While this statement can be applied to a surgical drain, however what the second half of the definition that is offered by online encyclopedia is far away from the truth. Wikipedia in year 2007 stated that “application of surgical drains helps in faster wound healing and prevents further infection”. Regrettably this statement has been ingrained in the minds of many surgeons (2).

In the field of surgery, the usage of drains has always been an important component, though the field has expanded into multiple super and sub-specialties, it continues to remain an important modality(3). Initial surgeons came out with different variants of it though rudimentary but it formed the base on which the current models are based. As many times fear precedes over logic in such decisions. No one will question the need for drainage of unwanted collections, nobody can directly say yes or no to precautionary drain usage and hence we are left with quote of Tait(4) –Whenever there is doubt, the drain is to be put. This illogically logic statement that is still whispered today, but the query will be removed one day. Surgeon's are using prophylactic drainage on daily basis after abdominal procedures after its advantages were shown by Sims(5). But this theory was rejected by many in the surgical society. Doctors who prefer to use drains argue that drainage of the peritoneum can detect early problems at a fast rate thus providing an early option in helping improve lives while people who were not in favour say that drainage of the peritoneum is not possible as mentioned by. Hence it is of no use. As quoted by John yates in his paper published in the year 1881 for which he received Senn medal accurately described the issue of peritoneal drainage, the problem that persist even today(6). He concluded that it is not possible to drain the peritoneal cavity completely as it is physiologically and mechanically against the body mechanics to allow the peritoneum to be completely drained. Hence there continues to remain a dispute regarding the usage of drains. Therefore, the objective of this study was to focus the usefulness of the prophylactic drainage of peritoneum after abdominal surgeries.

## **MATERIALS AND METHODS**

The present study was undertaken in the department of surgery, Jawaharlal Nehru Medical College, Wardha in collaboration with Datta Meghe Medical College Hingana, Nagpur, Datta Meghe Institute of medical science (DMIMS), Sawangi, Meghe, Wardha, Maharashtra India.

**Source Of Data:-** Department Of Surgery AVBRH

### **Method Of Collection Of Data:-**

All the elective abdominal cases of both sexes admitted in surgical ward through out door patient(OPD) or in emergency requiring elective abdominal surgeries for various abdominal pathologies will be evaluated with detailed history, examination, pathology, surgical procedure underwent, postoperative course, various complications, duration of hospital stay and follow up to 1month will be documented.

They will receive similar postoperative antibacterial protocol and other treatment (nil per orally, Iv fluids, analgesics). These cases were grouped into no- drain and drain group.

**Type of Study:** Prospective Observational Study

**Sample Size** :90

**Duration Of Study** : September 2018 To October 2020

### **Inclusion Criteria** :

All The Operated Cases for Various Intra-Abdominal Diseases On Elective Basis Were Included.

### **Exclusion Criteria** :

1. Medical diseases &/or medications which could interfere with the immune competency of the patient like diabetes mellitus or steroid use.
2. Patients<6yrs of Age
3. Patients Underwent Abdominal Surgeries (Elective) That Died Within 48hrs After Surgery.
4. Emergency abdominal surgeries

## **STATISTICAL ANALYSIS**

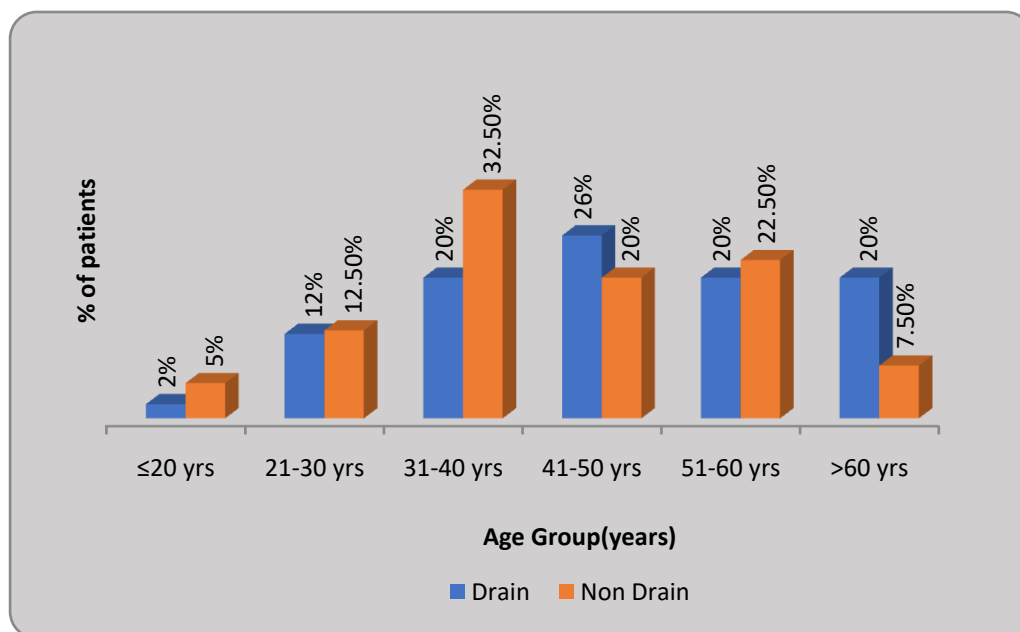
Processing of the collected data was done using SPSS 16.0. An expository statistical process was done, the frequency, percentage, mean, and standard deviation were calculated for evaluation of co-relation between the parameters, t-test, variance . Outcome was evaluated in 95% confidence interval and  $p < 0.05$  significance level.

## **Results & Observation tables-**

**Table 1: Age distribution of patients**

Age Group(yrs)	Drain	Non Drain	Total	$\chi^2$ -value
≤20 yrs	1(2%)	2(5%)	3(3.33%)	4.77 p=0.44,NS
21-30 yrs	6(12%)	5(12.50%)	11(12.22%)	
31-40 yrs	10(20%)	13(32.50%)	23(25.56%)	
41-50 yrs	13(26%)	8(20%)	21(23.33%)	
51-60 yrs	10(20%)	9(22.50%)	19(21.11%)	
>60 yrs	10(20%)	3(7.50%)	13(14.44%)	
Total	50(100%)	40(100%)	90(100%)	
Mean±SD	47.10±13.44	42.85±14.22	45.21±13.88	
Range	16-68	11-74	11-74	

In the present study of 90 patients, it was observed that the mean age of presentation was 45.21±13.88 (11-74 years), the youngest patient being 11 years old and the oldest patient being 74 years old



**Table 2: Gender wise distribution of patients**

Gender	Drain	Non Drain	Total	$\chi^2$ -value
Male	34(68%)	29(72.50%)	63(70%)	0.21 p=0.64,NS
Female	16(32%)	11(27.50%)	27(30%)	
Total	50(100%)	40(100%)	90(100%)	

- In our study, it was observed that out of 90 cases studied 63(70%) were male patients and 27(30%) were female patients. The M: F ratio was 2.33:1 .

**Table 3: Distribution of patients as Drain placement/ Non-Drain placement**

	No of patients	Percentage
Drain	50	55.56
Non Drain	40	44.44
Total	90	100

In our study, total number of patients (90) were divided into drain & non-drain group. The drain group had 50(55.56%) patients while the non-drain group had 40(44.44%) patients.

**Table 4: Distribution of patients in two groups according to type of surgery**

Type of surgery	Drain	Non Drain	Total	$\chi^2$ -value
Abdominal Wall	9(18%)	9(22.50%)	18(20%)	4.89 p=0.67,NS
Upper gastrointestinal	6(12%)	4(10%)	10(11.11%)	
Appendicular Surgery	2(4%)	5(12.50%)	7(7.78%)	
Hepatobilliary surgery	6(12%)	6(15%)	12(13.33%)	
Pancreatic	6(12%)	5(12.50%)	11(12.22%)	
Splenic	4(8%)	4(10%)	8(8.89%)	
Colorectal	10(20%)	4(10%)	14(15.56%)	
Urological	7(14%)	3(7.50%)	10(11.11%)	
Total	50(100%)	40(100%)	90(100%)	

In our study total, 90 patients were observed which were divided into 8 groups depending upon the type of surgery they underwent. The majority of patients underwent abdominal wall surgeries 18(20%) followed by colorectal surgeries 14 (15.56%), Abdominal wall surgeries 18(20%), Upper gastrointestinal surgeries 10(11.11%), Appendicular surgeries 7(7.78%), Hepatobiliary surgery 12(13.33%), Colorectal surgeries 14(15.56%), Pancreatic 11(12.22%), Splenic 8(8.89%), Urological 10(11.11%).

**Table 7: Distribution of Drain/Non-Drain patients according to length of hospital stay**

Length of hospital stay	Drain	Non Drain	Total	$\chi^2$ -value
0-10 days	4(8%)	11(27.50%)	15(16.67%)	7.60 p=0.10,NS
11-20 days	19(38%)	14(35%)	33(36.67%)	

21-30 days	21(42%)	12(30%)	33(36.67%)	
31-40 days	4(8%)	3(7.50%)	7(7.78%)	
41-50 days	2(4%)	0(0%)	2(2.22%)	
Total	50(100%)	40(100%)	90(100%)	
Mean±SD	22.20±9.61	17.22±8.49	19.98±9.41	

In the present study of 90 patients, the mean length of hospital stay in the drain group was 22.20±9.61 days with 42% of patients seen in the drain group between 21-30 days. While in the non- drain group it was 17.22±8.49 days with 35% patients seen in the non-drain group between 11-20 days.  $p=0.10$  which is statistically insignificant.

**Table 8: Distribution of patients in two groups according to post-operative surgical wound site complications.**

Wound site Complication	Drain	Non Drain	Total	$\chi^2$ -value
Yes	10(20%)	5(12.50%)	15(16.67%)	0.90 $p=0.34$ , NS
No	40(80%)	35(87.50%)	75(83.33%)	
Total	50(100%)	40(100%)	90(100%)	

- In our study conducted on 50 patients in the drain group, 10 (20%) of patients had wound site infection, while among the 40 non-drain patients only 5 (12.50%) of patients had wound site infection. P-value is 0.34 which is statistically insignificant. Among patients with drain, 8 patients developed wound site infection while 2 patients developed wound dehiscence.

**Table 9: Distribution of patients in two groups according to post-operative septic complication.**

Septic infection	Drain	Non Drain	Total	$\chi^2$ -value
Respiratory Infection	1(2%)	0(0%)	1(1.11%)	5.42 $p=0.24$ , NS
Fever	1(2.50%)	0(0%)	1(1.11%)	
Pleural Effusion	4(8%)	0(0%)	4(4.44%)	
Septicaemia	4(8%)	3(7.50%)	7(7.78%)	
Not Any	41(82%)	36(90%)	78(86.67%)	
Total	50(100%)	40(100%)	90(100%)	

- In our study, out of 50 patients in the drain group, septicemia & pleural effusion were

the commonest postoperative complication seen 4(8%) each.

- While in the non-drain group of 40 patients 7.50% of patients had developed septicemia.
- In terms of comparison between both the groups had collaborated p value =0.24 which was statistically not significant.

## **DISCUSSION**

### **Demographic Features**

The present study “Evaluation of importance of drains in elective abdominal surgeries” was conducted in the Department of General Surgery at Jawaharlal Nehru Medical College and Acharya Vinoba Bhave Rural Hospital Sawangi (Meghe), Wardha from September 2018 to October 2020. Total 90 Patients were enrolled into this study period after obtaining clearance from the ethical committee and duly obtaining the consent from the patients were studied prospectively.

<b>STUDIES</b>	<b>NO. OF PATIENTS (n)</b>	<b>MEAN PRESENTATION</b>
Present study	90	45.21±13.88
<b>Imad Wajeh Al-Shahwany et al (2012)(7)</b>	84	27±12YEARS
<b>Chi-Leung Liu et al (2004)(8)</b>	106	53.2 ± 1.4YEARS
<b><u>Aristithes G Doumouras et al (2017)(9)</u></b>	142,631	44.7 ±12.0 YEARS
<b><u>Salamat Khan et al (2015)(10)</u></b>	171	35.57 ± 16.42 YEARS
<b>Jack Hoffmann Et Al (1986)(11)</b>	70	72 YEARS

- In our study maximum number of patients i.e. 23 were in the age group of 31-40yrs, the mean age of presentation was 45.21±13.88 (11-74 years) with the youngest patient being 11 years old and the oldest patient being 74 years old. Our study data was compared to the following studies as mentioned above.

STUDIES	NO. OF PATIENTS	MALE	FEMALE
Present study	90	63(70%)	27(30%)
<b>Imad Wajeh Al-Shahwany et al (2012)(7)</b>	84	62(73.8%)	22(26.2%)
<b>Chi-Leung Liu et al (2004)(8)</b>	104	86 (83%)	18 (17%)
<b>William E. Fisher et al (2011)(12)</b>	226	97(43%)	129 (57%)
<b><u>Salamat Khan</u> et al (2015)(10)</b>	171	116(67%)	55(32.1%)

In our present study, 63(70%) were male patients and 27(30%) were female patients. Data was distributed in a randomized manner giving the M: F ratio of 2.33:1. Our findings were similar to **Imad Wajeh Al-Shahwany et al (2012)(7)** & **Chi-Leung Liu et al (2004)(8)**, the males predominance is more as compared to females. However, There was a exception in the case of the study conducted by **William E. Fisher et al (2011)** (12) where the ratio was 1:1.33 as female patients were in a greater majority as compared to our study.

#### **DISTRIBUTION OF PATIENTS AS DRAIN PLACEMENT/ NON-DRAIN**

STUDY	NUMBER OF PATIENTS (n)	DRAIN	NON-DRAIN
Present study	90	50(55.56%)	40 (44.44%)
<b>Imad Wajeh Al-Shahwany et al (2012)(7)</b>	84	46(54.76%)	38(45.24%)
<b>Zhen Wang (2015)(13)</b>	438	220(51.16%)	218(50.69%)
<b>Chi-Leung Liu (2004)(8)</b>	104	52(50%)	52(50%)
<b>William E. Fisher (2011)(12)</b>	226	179 (79%)	47(21%)
<b>Yao Cheng et al (2016)(14)</b>	711	358(50.3%)	353(49.6%)
<b>Petrowsky et al (2004) (15)</b>	1390	717(51.5%)	673(48%)

#### **PLACEMENT**



In our present study of 90 patients, 50(55.56%) patients had drain placement while 40(44.44%) patients had no drain placement. Our study was similar to **Imad Wajeh Al-Shahwany et al (2012)** (7) where the ratio was 54.76% in the drain group and 45.24% patients in non-drain group & **Zhen Wang et al (2015)** (13) who had 51.16% patients in drain group & 50.595% patients in non-drain group. Other studies as mentioned in the chart

below have a similar pattern of distribution. However there was a exception in case of the study conducted by **William E. Fisher et al (2011)** (12) where the ratio was 79 :21 % respectively as mentioned above.

#### **DISTRIBUTION OF PATIENTS ACCORDING TO TYPE OF SURGERY.**

Present study	Wajeh Al-Shahwany et al 2012(7)	William E. Fisher 2011(12)	Petrowsky et al 2004 (15)	Zhen Wang 2015(4)	Chi-Leung Liu et al 2004(8)	Guilherme Godoy 2011(16)	Yao Cheng et al 2016(14)	Vecchio et al 2015(17)	<a href="#">Cavaliere et al 2019(18)</a>
(n)	(n)	(n)	(n)	(n)	(n)	(n)	(n)	(n)	(n)
18									
7	84	-	-	-	-	-	-		
11	-	226	-	-	-	-	711		
10	-	-	1390	438	-	-	-		
12	-	-	-	-	104		-		
-8	-	-	-	-	-	-	-	2009	
14	-	-	-	-	-				1702
10	-		-	-	-	512	-		

In our study patients were divided into 8 groups depending upon the type abdominal surgery they underwent. The data was compared to studies that were carried out on individual type of abdominal surgeries by different authors and their results were analyzed.

- In our present study the majority of patients underwent abdominal wall surgeries 18(20%)
- In our present study 14 (15.56%) underwent colorectal surgeries.
- In our present study Upper gastrointestinal surgeries was carried on 10(11.11%).
- In our present study Appendicular surgeries was carried on 7(7.78%).
- In present study Hepatobiliary surgery was carried out on 12(13.33%).
- In present study Pancreatic surgeries 11 was carried on (12.22%).
- In present study Splenic surgeries was carried on 8(8.89%).
- In present study Urological surgeries was carried on 10(11.11%).

The data was compared to Studies that were carried on individual types of surgeries and their results were analyzed and incorporated into our study. **Imad Wajeh Al-Shahwany et al (2012)(7)** carried out his study on appendicular surgeries while **William E Fisher (2011)(12)** carried out his study focusing on pancreatic surgeries. There were other studies that were carried out as well like **Petrowsky et al 2004 (15)** & **Zheng Wang et al (2015)(13)** who focused their studies on Gastrointestinal surgeries. While **Guilherme Godoyet et al (2011)(16)** focused on urological studies, **Yao cheng et al (2016)** did his study in pancreatic surgeries.

#### **Distribution of Drain/Non-Drain patients according to length of hospital stay**

Length of hospital stay	Drain	Non Drain	Total	$\chi^2$ -value
0-10 days	4(8%)	11(27.50%)	15(16.67%)	7.60 p=0.10, NS
11-20 days	19(38%)	14(35%)	33(36.67%)	
21-30 days	21(42%)	12(30%)	33(36.67%)	
31-40 days	4(8%)	3(7.50%)	7(7.78%)	
41-50 days	2(4%)	0(0%)	2(2.22%)	
Total	50(100%)	40(100%)	90(100%)	
Mean $\pm$ SD	22.20 $\pm$ 9.61	17.22 $\pm$ 8.49	19.98 $\pm$ 9.41	

- In our present study of, the mean length of hospital stay in the drain group was 22.20 $\pm$ 9.61 days with 42% of patients seen in the drain group between 21-30 days. While in the non- drain group it was 17.22 $\pm$ 8.49 days with 35% patients seen in the non-drain group between 11-20 days. p=0.10 which is statistically insignificant.
- Non- drain patients in the period of 0-10 days contributed around 11(27.50%) with appendicular and abdominal wall surgeries contributing a major portion of it. While colorectal surgeries and pancreatic surgeries contributed towards a longer post-operative recovery.

STUDY	NUMBER OF PATIENTS	LENGTH OF HOSPITAL STAY IN DRAIN GROUP	LENGTH OF HOSPITAL STAY IN NON-DRAIN GROUP	P VALUE
Present study	90	22.20 $\pm$ 9.61 days	17.22 $\pm$ 8.49	Insignificant
<b>Dr Prashant Raj Pipariya et al 2018(19)</b>	200	8.38 $\pm$ 1.86 days	4.68 $\pm$ 1.25 days	Insignificant
<b>Imad Wajeh Al-Shahwany et 2012(7)</b>	84	2 days $\pm$ 12 hours	1 day $\pm$ 12 hours	Insignificant

<b>Cheng Y et al 2015 (20)</b>	711	14.3days	13.8days	Insignificant
<b>Bawahab et al 2014(21)</b>	104	4.48+/-2.18 days	2.5+/- 2.2 days	Insignificant
<b>Adnan Narci et al 2007(22)</b>	226	10.2days	8.3days	Insignificant
Present study	90	22.20±9.61 days	17.22±8.49	Insignificant

- Other studies by **Lewis et al 1990** (23) showed that the hospital stay was 5.9+/-2 days in the drainage group while 5.5+/-2 days in the non-drain group. Another similar study carried out by **Saad et al 1993** (24) showed that the comparison between the drainage group as compared to the non-drain group was not significant.
- In our study, as compared to other studies, most patients remained in the hospital for a longer stay as in all major cases, owing to poor rural setup in our country and lack of access to primary health care workers, patients are willing to stay up to complete treatment until no further medical intervention is required.

#### **Distribution of patients according to post-operative surgical wound site complications.**

- In our present study conducted on 50 patients in the drain group, 10(20%) of patients had surgical site infection, while among the 40 non-drain patients only 5(12.50%) of patients had surgical site infection. P-value is 0.34 which is statistically insignificant.
- The results of this study were similar to the studies conducted by **Cheng Yet al 2016** (14)&**Bawahab et al 2014(21)**. However there were exceptions from the results differed from our studies conducted by **William E. Fisher et al 2011(12)**

STUDIES	NO.OF PATIENTS	SURGICAL SITE COMPLICATIONS (DRAIN GP)	SURGICAL SITE COMPLICATIONS (NON-DRAIN GP)
Present study	90	10(20%)	5(12.50%)
<b>Cheng Yet al 2016 (14)</b>	711	44(12.3%)	46(13.3%)
<b>Imad Wajeh Al-Shahwany et al 2012(7)</b>	84	18(39.13%)	14(36.84%)
<b>Bawahab et al 2014(21)</b>	104	3(2.6%)	2(1.54%)
<b>William E. Fisher et al 2011(12)</b>	226	27(12%)	4(2%)
<b>Dr Prashant Raj Pipariya et al 2018(19)</b>	200	14(14.7%)	21(21%)
<b>Adnan narci et al 2007 (22)</b>	226	30(28.4%)	19(16.2%)

### **Distribution of patients according to post-operative septic complication.**

<b>STUDIES</b>	<b>NO. OF PATIENTS STUDIED</b>	<b>DRAIN GROUP</b>	<b>NON-DRAIN GROUP</b>
<b>Present study</b>	90	4(8%)	3(7.50%)
<b>Chi-Leung Liu et al 2004(8)</b>	104	12(11.5%)	12(11.5%)
<b>William E. Fisher 2011(12)</b>	226	3(2%)	0
<b>Jack Hoffmann Et Al 1986 (11)</b>	70	6(8.5%)	8 (11%)
<b>Dr RN patil et al 2017(25,26)</b>	60	2(3.3%)	0

In our present study, septicemia & pleural effusion was the commonest postoperative systemic complication each seen in **4(8%)** patients of drain group.

In our present study, septicemia was the commonest postoperative systemic complication seen in 3(7.50%) patients of non-drain group.

Similar to our study, other studies such as **Chi-Leung Liu et al (2004)(8)** had **3(2%)** patients developed pleural effusion in drain group while **Jack Hoffmann et al (1986)** (11,27) study had **6( 8.5%) & 8 (11%)** of drain & Non-drain patients developed respiratory complication<sup>28-30</sup>. Studies by Jindal et. al.<sup>31</sup> and Fulzele et. al.<sup>32</sup> reflected on related issues.

### **CONCLUSION-**

- Routine practice of prophylactic drain placement in abdominal surgeries was associated with higher post-operative morbidity related to both wound & systemic complication. It was also associated with a longer hospital stay.
- So, the concept of prophylactic drainage should be reconsidered.

**Funding:** This study has not received any external funding.

**Conflict of Interest:** There are no conflicts of interests.

**Informed consent:** Written & Oral informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

**Data and materials availability:** All data associated with this study are present in the paper and/or the Supplementary Materials.

## Footnotes

**Source of support:** Nil

**Conflict of Interest:** None declared.

## Ethical approval for human

All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards (Institutional Ethics Committee Registration number: ECR/440/Inst/MH/2013/RR-2016).

## Ethical approval

The study was approved by the Medical Ethics Committee of Datta Meghe Institute of Medical Sciences, Deemed University (Ethical approval Ref.No. DMIMS (DU)/IEC/2018-19/7448).

## Data and materials availability

All data associated with this study are present in the paper.

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