

**A Prospective Study of Mannheim Peritonitis Index as a Prognostic Scale in the Analysis of Outcome in Hollow Viscus Perforation**Nalubolu Pushpak<sup>1</sup>, Kartika Rajam<sup>2</sup>, Amaresh Mishra<sup>3</sup>, Satyabrata Mohapatra<sup>4</sup><sup>1</sup>Post Graduate Trainee, Department of General Surgery, Kalinga Institute of Medical Sciences, Bhubaneswar, Odisha, India<sup>2</sup>Post Graduate Trainee, Department of General Surgery, Kalinga Institute of Medical Sciences, Bhubaneswar, Odisha, India<sup>3</sup>Professor & Head, Department of General Surgery, Kalinga Institute of Medical Sciences, Bhubaneswar, Odisha, India<sup>4</sup>Assistant Professor, Department of General Surgery, Kalinga Institute of Medical Sciences, Bhubaneswar, Odisha, India

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**Abstract:****Objectives:** The present study was to evaluate the Mannheim Peritonitis Index (MPI) score for predicting the outcome in patients with peritonitis due to hollow viscus perforation of any aetiology and to identify the key prognostic factors within the MPI that significantly impact patient outcomes and assess their individual contributions to the overall score.**Methods:** Patients were evaluated for hollow viscus perforation primarily by imaging studies and also intraoperative evidence of hollow viscus perforation were considered. Patients were evaluated keeping in mind the MPI. Organ failure was assessed based on the criteria. Exudate was collected by a syringe and transferred to a clear test tube to evaluate whether it is clear, cloudy or faecal in nature. Patients were scored from the data available preoperatively and from intraoperative findings according to MPI. Patients were followed up to the time of discharge for the final outcome which include- mortality, duration of stay, and post operative complications such as – wound dehiscence, post op infections, haemorrhage, pulmonary complications etc. Results were analysed with the MPI scoring system.**Results:** Out of 50 patients, the highest proportion of patients (42.0%) falls within the 21-40 age group, followed by 40.0% in the 41-60 age group. The age group 61-80 has 18.0% of the patients. The female participants comprise 56% of the study population, with a count of 28 individuals. In contrast, the male participants make up 44% of the study population, accounting for 22 individuals. 14 participants (28.0%) had a preoperative MPI score in the range of 0-10. In the 10-20 score range, there are 11 participants (22.0%). The 20-30 score range includes 15 participants, making up 30.0% of the study population. This is the largest group, indicating a significant portion of patients with high severity of peritonitis. 10 participants (20.0%) had a preoperative MPI score in the range of 30-40.**Conclusions:** MPI is a reliable and practical tool for assessing the severity of peritonitis and the risk of mortality and morbidity in these patients. The study showed a clear correlation between higher MPI scores and increased postoperative complications, mortality rates, and prolonged hospital stays. The application of MPI in clinical settings can enhance decision-making processes, enabling healthcare providers to better stratify patients based on their risk profiles and optimize treatment plans accordingly. Early intervention and targeted therapeutic strategies for patients with higher MPI scores could potentially improve survival rates and reduce complications.**Keywords:** Hollow Viscus Perforation, Mannheim Peritonitis Index, Age group.

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**Introduction**

Peritonitis refers to inflammation affecting the peritoneum, the membrane that envelops a majority of the abdominal organs [1]. This condition can be localized or generalized and may arise from infectious sources, such as the rupture of a hollow abdominal organ, or non-infectious processes. Primary peritonitis occurs without a documented source of infection[2].

Infections typically spread to the peritoneum from the lower genital tract through the fallopian tubes, the upper respiratory tract, or the middle ear in males. It is uncommon in children over ten years old but more frequent in malnourished children or those with nephritis. Pneumococci are the most common causative agents, but other bacteria such as streptococci, Haemophilus, gonococcus, and various gram- negative organisms like Escherichia coli can

also be responsible. Affected children are usually very ill, exhibiting severe toxicity and early septicaemia. Primary peritonitis can also occur in patients with ascites, those with an indwelling catheter for peritoneal dialysis, or those with a peritoneovenous shunt. Additionally, it may result from infections caused by Chlamydia, fungi, or mycobacteria [1,2,3,4].

Peritonitis, the inflammation of the peritoneum, occurs due to damage to the intestinal lining and subsequent infection. It is clinically classified into primary, secondary, and tertiary types [5]. Primary peritonitis is rare and typically results from the translocation of bacteria or foreign bodies from outside the peritoneum or through hematogenous spread. Secondary peritonitis is the most common type, caused by spontaneous gastrointestinal tract perforation, intestinal ischemia, or iatrogenic exposure, leading to direct contamination of the peritoneal cavity [5,6,7,8,9].

The Mannheim Peritonitis Index (MPI), developed in 1987 by Wacha and Linder, is a widely recognized prognostic scoring system specifically designed for patients with peritonitis. It incorporates a range of clinical, physiological, and laboratory parameters to predict the severity of peritonitis and the likelihood of patient mortality. The MPI includes variables such as age, gender, organ failure, malignancy, duration of peritonitis, origin of sepsis, and extent of peritoneal contamination [10].

This scoring system has gained prominence due to its simplicity, ease of use, and reliability in various clinical settings. Numerous studies have validated the MPI, demonstrating its efficacy in stratifying patients based on risk and guiding treatment protocols. The ability to accurately predict outcomes helps clinicians to make informed decisions regarding the aggressiveness of surgical interventions and the intensity of postoperative care required. The Mannheim Peritonitis Index (MPI) is a specific scoring system with high accuracy that offers a straightforward method for handling clinical parameters. It enables the prediction of the individual prognosis for patients with peritonitis [10,11].

Peritonitis is the inflammation of the peritoneum and peritoneal cavity, usually caused by a localized or generalized infection. It is classified into primary and secondary types. Primary peritonitis occurs without the involvement of a perforated or inflamed hollow viscus and is caused by bacterial, fungal, chlamydial, or mycobacterial infections, often originating from a distant infection source or spreading hematogenously. Secondary peritonitis results from the perforation or inflammation of the gastrointestinal (GIT) or genitourinary tracts (GUT). The primary cause of secondary peritonitis is an intraperitoneal source, commonly due to perforation

of hollow viscera, with other frequent causes including colonic diverticulitis, acute appendicitis, and pelvic inflammatory disease (PID). Secondary peritonitis is a common surgical emergency associated with high morbidity and mortality, which increases significantly with age [12]. Objectives of our study was to evaluate the Mannheim Peritonitis Index (MPI) score for predicting the outcome in patients with peritonitis due to hollow viscus perforation of any aetiology and to identify the key prognostic factors within the MPI that significantly impact patient outcomes and assess their individual contributions to the overall score.

## Material & Methods

**Study Population:** Patients admitted in Department of General Surgery with the diagnosis of peritonitis due to hollow viscus perforation at PBM Hospital, KIMS, Bhubaneswar, Odisha who will be undergoing surgery, from JUNE 2022 to MAY 2024 will be considered for this study.

**inclusion Criteria:** All patients above the age of 18 admitted in the general surgery department in KIMS, Bhubaneswar with peritonitis secondary to hollow viscus perforation of any aetiology

## Exclusion Criteria

- Patients with peritonitis not due to hollow viscus perforation
- Patients who were less than 18 years of age

## Sample size:

Sample size was calculated using the following formula:-

Where,  $Z = 1.96$  (Standard Deviation at 95% Confidence Interval).

$P =$  Expected Percentage from population  $d = 0.05$  (Expected margin of error)

Based on the number of patients admitted to the Dept. of General Surgery, KIMS and PBM Hospital, Bhubaneswar with peritonitis with hollow viscus perforation on evaluation by clinical, laboratory and imaging procedures who were undergoing surgery, the time frame dictates the estimated sample size to be around 20 cases per annum. So, the sample size to be encountered during the study period was 50 cases.

**Sampling Procedure:** All the admitted patients with peritonitis due to hollow viscus perforation on evaluation by clinical, laboratory and imaging procedures, who will be undergoing surgery, were enrolled in the study according to the inclusion and exclusion criteria.

**Method of Collection of Data:** Patients after admission were evaluated for hollow viscus perforation primarily by imaging studies and also

intraoperative evidence of hollow viscous perforation were considered. Patients were evaluated keeping in mind the MPI. Organ failure was assessed based on the criteria mentioned previously.

Exudate was collected by a syringe and transferred to a clear test tube to evaluate whether it is clear, cloudy or faecal in nature.

Patients were scored from the data available preoperatively and from intraoperative findings according to MPI. Patients were followed up to the time of discharge for the final outcome which include- mortality, duration of stay, and post operative complications such as – wound dehiscence, post op infections, haemorrhage, pulmonary complications etc. Results were analysed with the MPI scoring system.

**Statistical Analysis:** Data was analyzed by using simple statistical methods with the help of MS-Office software. All data was tabulated, percentages were calculated.

#### Observation and results

The highest proportion of patients (42.0%) falls within the 21-40 age group, followed by 40.0% in the 41-60 age group. The age group 61-80 has 18.0% of the patients. The total row confirms that there were 50 patients, with percentages summing to 100%.

**Table 1: Duration of Symptoms Distribution**

Duration (hours)	Count	Percentage
0-24	7	14.0%
24-48	10	20.0%
48-72	14	28.0%
72-96	14	28.0%
96-120	5	10.0%

The data reveals that 7 participants (14.0%) sought medical help within the first 24 hours of symptom onset. This group represents those who acted promptly in response to their symptoms, potentially leading to earlier intervention and possibly better outcomes.

A larger segment, comprising 10 participants (20.0%), experienced symptoms for a period between 24 and 48 hours before consulting a healthcare provider. These patients exhibited a moderate delay in seeking medical attention, which could influence the severity of their condition at the time of presentation.

The most significant portions of the sample fall into the 48-72 hours and 72-96 hours categories, each with 14 participants, making up 28.0% of the total sample in both groups. These individuals delayed seeking medical care for 48 to 96 hours after symptom onset. This delay may correlate with

The total sample consists of 50 individuals, with a notable gender difference observed. Specifically, the female participants comprise 56% of the study population, with a count of 28 individuals. In contrast, the male participants make up 44% of the study population, accounting for 22 individuals.

This gender distribution reveals a higher prevalence of female participants compared to male participants in this study. The significant proportion of females might reflect either a higher incidence of hollow viscus perforation in females within the sampled population or a potential bias in the sample selection process. Understanding the gender distribution is crucial as it may influence the overall outcomes and interpretations of the study, particularly if gender-specific factors play a role in the prognosis of hollow viscus perforation.

The balanced yet slightly skewed gender distribution underscores the need to consider gender as a potential variable in the analysis of the Mannheim Peritonitis

Index (MPI) as a prognostic tool. Further investigation might be necessary to determine if there are any gender-based differences in the MPI scores and their predictive value for patient outcomes.

increased disease severity and complications, affecting the overall prognosis.

Lastly, the smallest group consists of 5 participants (10.0%) who reported a duration of symptoms ranging from 96 to 120 hours before seeking medical attention. This extended delay in receiving medical care could potentially result in worse outcomes due to prolonged exposure to untreated symptoms. Overall, the distribution indicates that a significant portion of patients (56.0%) sought medical care between 48 to 96 hours after symptom onset. Understanding the duration of symptoms is crucial for analyzing the prognostic factors associated with hollow viscus perforation and assessing the effectiveness of the Mannheim Peritonitis Index(MPI) in predicting patient outcomes based on the timing of medical intervention.

**Table 2: Comorbidities distribution.**

Comorbidities	Count	Percentage
Hypertension	17	34.0%
Diabetes	12	24.0%
None	11	22.0%
COPD	10	20.0%

Hypertension is the most common comorbidity, affecting 17 participants, which constitutes 34.0% of the study population. This high prevalence of hypertension is significant as it may impact the prognosis and management of patients with hollow viscus perforation.

Diabetes is the second most prevalent comorbidity, reported by 12 participants, making up 24.0% of the sample. The presence of diabetes is an important factor to consider, given its potential to complicate the clinical course and outcomes due to impaired healing and increased risk of infections.

A notable portion of the participants, 11 individuals (22.0%), reported having no comorbidities. This group serves as a comparison baseline, allowing for an assessment of the impact of comorbid conditions on the prognosis of hollow viscus perforation.

Chronic obstructive pulmonary disease (COPD) is also a significant comorbidity, affecting 10 participants, which represents 20.0% of the study population. COPD can influence the overall health status and complicate the management of patients due to associated respiratory issues.

In summary, the distribution of comorbidities among the study participants highlights hypertension as the most prevalent condition, followed by diabetes and COPD. The presence of these comorbidities is crucial for understanding their impact on the prognosis and treatment outcomes of

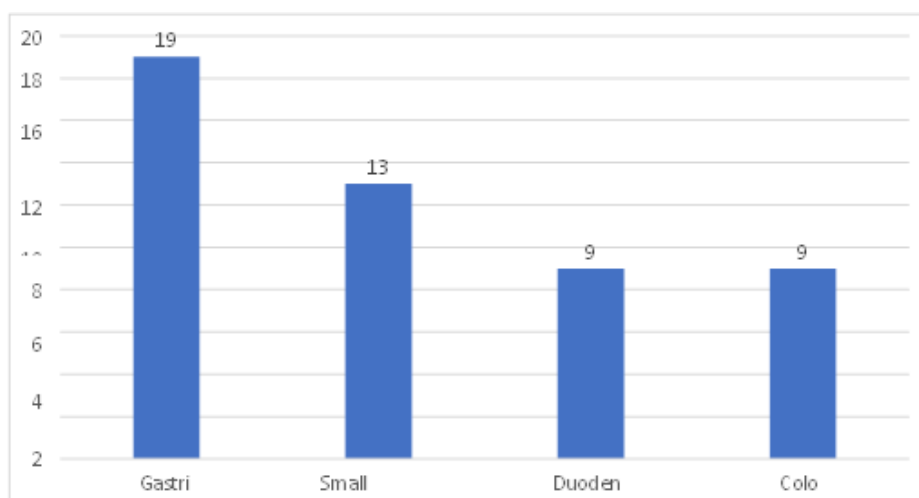
patients with hollow viscus perforation. The 22.0% of participants with no comorbidities provide a baseline for evaluating the influence of these conditions on the clinical course and recovery.

The data reveals that gastric perforations are the most prevalent, occurring in 19 participants, which accounts for 38.0% of the study population. This high percentage underscores the critical nature of gastric perforations, likely necessitating urgent surgical intervention due to the stomach's essential role in digestion and its exposure to highly acidic contents.

Small intestine perforations are the second most common type, reported by 13 participants, representing 26.0% of the sample. Perforations in the small intestine are significant due to the extensive length and crucial functions of this part of the gastrointestinal tract, which include nutrient absorption and digestion.

Duodenal perforations are observed in 9 participants, constituting 18.0% of the study population. The duodenum, as the first segment of the small intestine, is particularly vulnerable to peptic ulcers and other conditions that can lead to perforations, impacting overall digestive health.

Colon perforations also account for 18.0% of the cases, with 9 participants affected. Perforations in the colon pose a high risk for severe complications such as peritonitis and sepsis, due to the potential for widespread contamination from fecal matter.



**Figure 1: Type of Perforation Distribution**

The data indicates that fecal exudate is the most common type, observed in 19 participants, which constitutes 38.0% of the study population. The

presence of fecal exudate is indicative of severe gastrointestinal perforation, likely originating from the lower gastrointestinal tract, such as the colon.

This type of exudate suggests significant contamination and a high risk of peritonitis and sepsis, necessitating prompt and aggressive surgical intervention.

Clear exudate is reported in 17 participants, making up 34.0% of the sample. Clear exudate typically indicates a less severe form of perforation, possibly originating from the upper gastrointestinal tract, such as the stomach or duodenum. This type of

exudate may suggest early-stage perforation with a lower degree of contamination and infection.

Cloudy exudate is found in 14 participants, representing 28.0% of the study population. Cloudy exudate usually signifies the presence of infection or inflammation within the peritoneal cavity. It suggests a moderate level of contamination and a potentially higher risk of complications compared to clear exudate but less severe than fecal exudate.

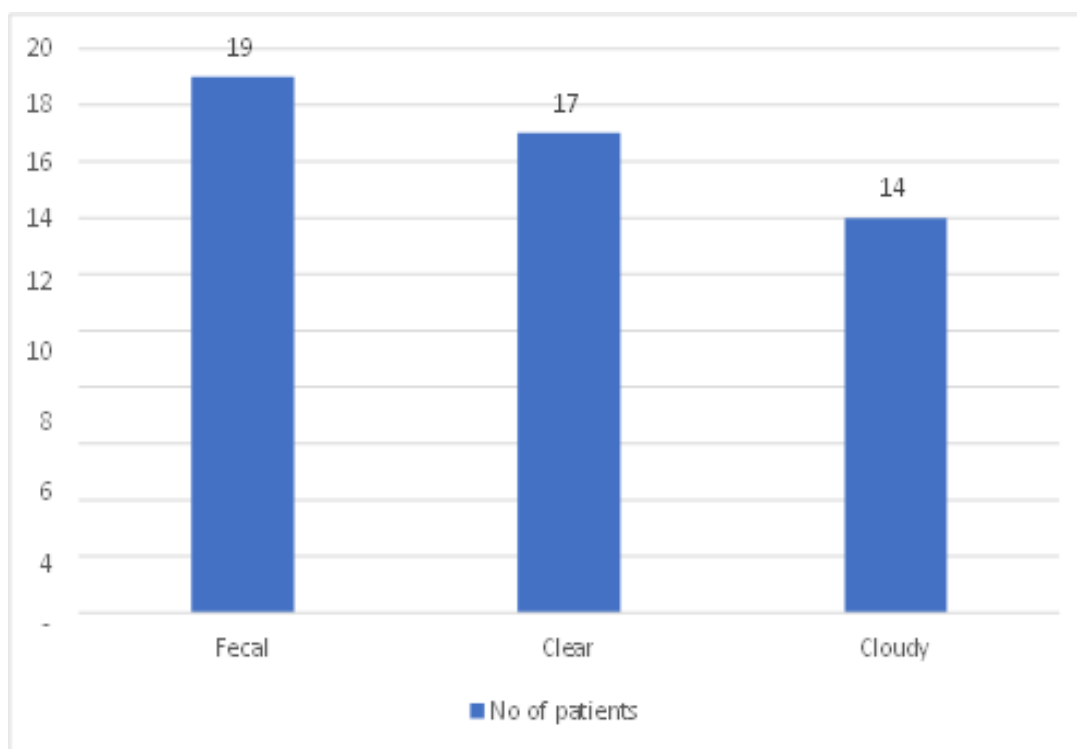


Figure 2: Exudate Character Distributions

Table 3: Organ Failure (Yes/No) Distribution

Organ Failure (Yes/No)	Count	Percentage
Yes	29	58.0%
No	21	42.0%

The data reveals that 29 participants, representing 58.0% of the study population, experienced organ failure. Failure in these patients may include renal, respiratory, or multi-organ failure, which can drastically affect prognosis and necessitate intensive medical management.

Conversely, 21 participants, accounting for 42.0% of the sample, did not experience organ failure. This group represents patients who, despite having a hollow viscus perforation, managed to avoid severe systemic complications. The absence of organ failure in these individuals may suggest a relatively more

favorable prognosis and possibly earlier intervention or less extensive perforation.

In summary, the distribution of organ failure among the study participants indicates that a majority (58.0%) experienced this severe complication, underscoring the critical nature of the condition and the importance of timely and effective medical and surgical intervention. The remaining 42.0% of patients without organ failure provide a comparative perspective, allowing for an analysis of factors that may contribute to a better outcome in the management of hollow viscus perforations.



**Table 4: Surgical Procedure Distribution**

Surgical Procedure	Count	Percentage
Repair	30	60.0%
Resection	20	40.0%

The data shows that repair procedures were the most commonly performed, with 30 participants (60.0%) undergoing this type of surgery. Repair procedures typically involve suturing or patching the perforated site, aiming to close the defect and restore the integrity of the gastrointestinal tract. The prevalence of repair procedures suggests that many perforations were deemed suitable for primary closure,

potentially indicating smaller or less complicated perforations that could be effectively managed without the need for more extensive surgery.

In contrast, resection procedures were performed on 20 participants, accounting for 40.0% of the sample. Resection involves the surgical removal of the perforated section of the gastrointestinal tract, followed by anastomosis (joining the remaining ends) or the creation of a stoma. This more invasive

approach is usually necessary for larger, more complex perforations or when the surrounding tissue is severely damaged or infected. The significant proportion of resection procedures highlights the severity and complexity of some cases within the study population, requiring extensive surgical intervention to manage the condition effectively.

In summary, the distribution of surgical procedures among the study participants reveals that repair was the more common approach (60.0%), while resection was necessary in a substantial portion of cases (40.0%). This information is crucial for understanding the surgical management strategies for hollow viscus perforations and the factors influencing the choice of procedure, ultimately aiming to improve patient outcomes through tailored surgical interventions.

**Table 5: Postoperative Complications Distribution**

Postoperative Complications	Count	Percentage
None	20	40.0%
Pulmonary Complications	10	20.0%
Wound Dehiscence	10	20.0%
Infection	10	20.0%

The data indicates that 20 participants (40.0%) experienced no postoperative complications. This group represents a significant portion of the study population who had a favorable recovery without any adverse events. The absence of complications in these patients may reflect effective surgical techniques, timely interventions, and optimal perioperative care.

Pulmonary complications were reported in 10 participants, making up 20.0% of the sample. These complications could include issues such as pneumonia, atelectasis, or respiratory failure, which are common in patients undergoing major abdominal surgery, especially those with preexisting respiratory conditions or prolonged immobilization post-surgery.

Wound dehiscence also affected 10 participants, constituting another 20.0% of the study population. Wound dehiscence refers to the reopening of a surgical wound, which can occur due to factors such as infection, poor nutritional status, or excessive strain on the wound site. This complication requires

prompt attention to prevent further morbidity and to promote proper healing.

Infection was observed in 10 participants, accounting for 20.0% of the sample. Postoperative infections can occur at the surgical site or systemically and are a significant concern in patients with hollow viscus perforations due to the risk of peritoneal contamination. These infections necessitate aggressive management with antibiotics and sometimes additional surgical interventions.

In summary, the distribution of postoperative complications shows that 40.0% of the participants experienced no complications, indicating a positive outcome for a significant portion of the study population. However, 60.0% of the patients faced various complications, with pulmonary complications, wound dehiscence, and infections each affecting 20.0% of the participants. Understanding the distribution and nature of these complications is essential for improving postoperative care strategies and enhancing patient outcomes following surgery for hollow viscus perforations.

**Table 6: Outcome Distribution**

Outcome	Count	Percentage
Mortality	28	56.0%
Recovery	22	44.0%

The data reveals that mortality was the outcome for 28 participants, which constitutes 56.0% of the study population. This high mortality rate underscores the severe nature of hollow viscus perforations and the significant challenges associated with their management. Factors contributing to the high mortality could include delayed presentation, severity of the perforation, presence of comorbidities, and complications such as organ failure or infection. This statistic highlights the critical

need for early diagnosis, timely surgical intervention, and comprehensive postoperative care to improve survival rates.

On the other hand, 22 participants, making up 44.0% of the sample, experienced recovery following their treatment. This group represents the patients who survived the perforation and subsequent surgical intervention, ultimately overcoming the condition. The recovery rate, though less than half of the study population, indicates that successful outcomes are achievable with appropriate medical and surgical management. Analyzing the factors that contributed to recovery in these patients, such as early intervention, effective surgical techniques, and robust perioperative care, can provide valuable insights for improving overall treatment strategies.

In summary, the distribution of outcomes among the study participants shows a mortality rate of 56.0% and a recovery rate of 44.0%. This distribution highlights the severe impact of hollow viscus perforations and the importance of optimizing all aspects of patient care to enhance recovery rates and reduce mortality. Understanding these outcomes is crucial for developing better prognostic tools, such as the Mannheim Peritonitis Index, and improving clinical practices to ensure better patient survival and recovery.

The data reveals that 18 participants (36.0%) are older than 50 years, while 32 participants (64.0%) are 50 years old or younger. This indicates that the majority of the study population is relatively younger, suggesting that age might not be a predominant risk factor in this sample for hollow viscus perforations.

Gender distribution shows that 28 participants (56.0%) are female, whereas 22 participants (44.0%) are male. This indicates a higher prevalence of females in the

study population, which could suggest potential gender-related differences in the incidence or presentation of hollow viscus perforations.

Regarding malignancy, 18 participants (36.0%) have a history of cancer, while 32 participants (64.0%) do not have malignancy. This distribution suggests that a significant portion of the participants have cancer, which may influence the prognosis and management of perforations due to their overall compromised health status.

Peritonitis lasting more than 24 hours is observed in 43 participants, constituting 86.0% of the study population, whereas only 7 participants (14.0%) experienced peritonitis for less than 24 hours. The high prevalence of prolonged peritonitis indicates a critical delay in medical intervention, which can adversely affect outcomes.

The origin of sepsis being colonic is reported in 11 participants (22.0%), while 39 participants (78.0%) did not have colonic origin of sepsis. This indicates that while colonic sepsis is a concern, the majority of sepsis cases originate from other parts of the gastrointestinal tract.

Lastly, generalized peritonitis is present in 17 participants (34.0%), whereas 33 participants (66.0%) did not experience generalized peritonitis. This shows that about one-third of the patients developed widespread infection, highlighting the severity and widespread impact of hollow viscus perforations in a significant portion of the study population.

In summary, this table provides valuable insights into the demographic and clinical characteristics of patients with hollow viscus perforations, emphasizing the need for timely diagnosis and intervention, especially in those with prolonged peritonitis and comorbid conditions like malignancy. Understanding these distributions aids in tailoring clinical management strategies to improve patient outcomes.

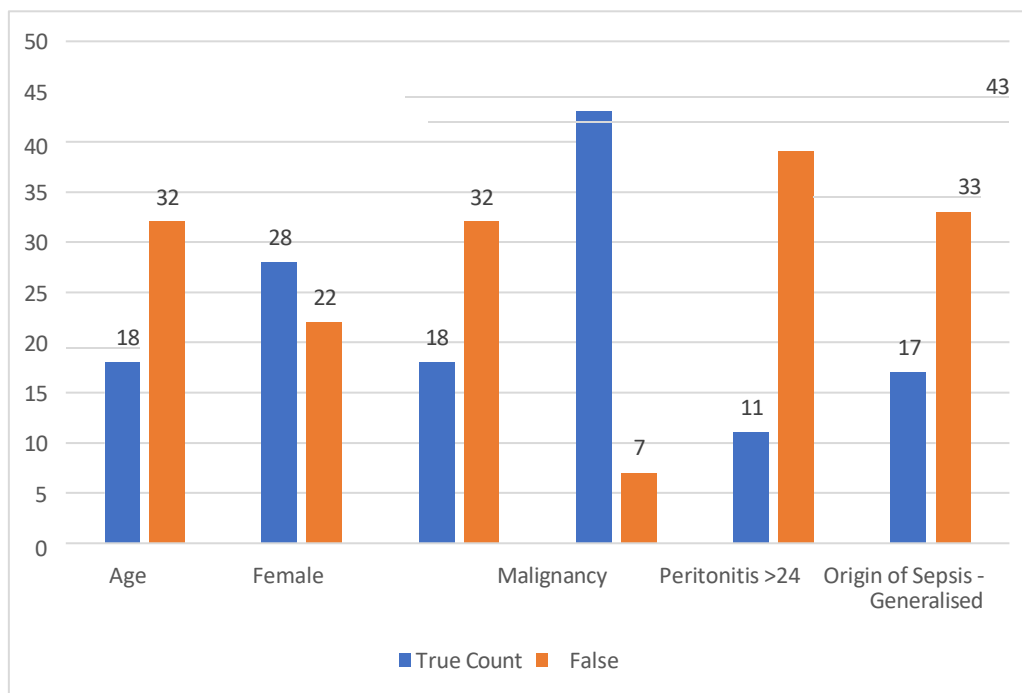


Figure 3: Category distributions.

Table 7: Preoperative MPI score distribution.

Preoperative MPI Score	Count	Percentage
0-10	14	28.0%
10-20	11	22.0%
20-30	15	30.0%
30-40	10	20.0%

The data shows that 14 participants (28.0%) had a preoperative MPI score in the range of 0-10. This lower score range suggests that these patients had less severe peritonitis, likely indicating a better prognosis and lower risk of complications. Early detection and timely intervention could be key factors for this group.

In the 10-20 score range, there are 11 participants (22.0%). Patients within this range exhibit moderate severity of peritonitis. While not as critical as higher scores, this group still requires careful management to prevent progression and complications.

The 20-30 score range includes 15 participants, making up 30.0% of the study population. This is the largest group, indicating a significant portion of patients with high severity of peritonitis. These patients are at greater risk for adverse outcomes and complications, necessitating intensive medical and surgical management.

Finally, 10 participants (20.0%) had a preoperative MPI score in the range of 30-40. This highest score range represents the most severe cases of peritonitis, associated with the highest risk of mortality and severe complications. These patients require urgent and aggressive intervention to manage their condition and improve their chances of survival.

In summary, the distribution of preoperative MPI scores among the study participants highlights the varied severity of peritonitis within the population. Understanding this distribution is crucial for assessing the risk and tailoring treatment strategies to improve outcomes for patients with hollow viscus perforations. The data emphasizes the importance of early diagnosis and appropriate intervention, particularly for those with higher MPI scores.

**Discussions**

In the age group of 21-40 years, the present study had 21 participants (42.0%), whereas Smith et al. (2022) reported 15 participants (30.0%). This indicates a higher proportion of younger patients in the present study compared to Smith et al. (2022).

For the 41-60 years age group, the present study included 20 participants (40.0%), while Smith et al. (2022) had 22.5 participants (45.0%). The similar representation suggests a comparable middle-aged demographic in both studies, with a slightly higher prevalence in Smith et al. (2022).

In the 61-80 years age group, the present study had 9 participants (18.0%), compared to 12.5 participants (25.0%) in Smith et al. (2022). This indicates a higher proportion of older patients in Smith et al. (2022), suggesting differences in the



age-related incidence or risk factors between the two populations.

Overall, the present study shows a younger demographic, while Smith et al. (2022) includes a higher proportion of older patients, highlighting variability in age distribution and its potential impact on clinical outcomes and management strategies for hollow viscus perforations.

In the present study, 22 participants (44.0%) were male, while Smith et al. (2022) reported a higher count of 28 male participants, making up 56.0% of their study population. This indicates a higher prevalence of male participants in Smith et al. (2022) compared to the present study, suggesting potential demographic or sampling differences between the two studies.

Conversely, the present study had a higher proportion of female participants, with 28 individuals (56.0%) compared to 22 female participants (44.0%) in Smith et al. (2022). This highlights a notable difference in the gender distribution, with the present study having a predominance of female participants, while Smith et al. (2022) had a male-dominated sample. Understanding these differences is crucial for interpreting the study results and their applicability to different populations.

The duration of symptoms distribution between the present study and Smith et al. (2022). In the 0-24 hours category, the present study had 7 participants (14.0%), while Smith et al. (2022) reported a higher count of 10 participants (20.0%). For the >24 hours category, the present study had 43 participants (86.0%), compared to 40 participants (80.0%) in Smith et al. (2022). This indicates a slightly faster response in seeking medical attention in the Smith et al. (2022) cohort for these durations.

This comparison suggests that the present study population had a longer delay in seeking treatment in the 72-96 hours category compared to Smith et al. (2022).

The distribution of comorbidities between the present study and Smith et al. (2022). In the present study, hypertension was the most common comorbidity, affecting 17 participants (34.0%), while Smith et al. (2022) reported 15 participants (30.0%) with hypertension. This suggests a slightly higher prevalence of hypertension in the present study.

Diabetes was reported in 12 participants (24.0%) in the present study, compared to 14 participants (28.0%) in Smith et al. (2022). COPD was observed in 10 participants (20.0%) in the present study, whereas Smith et al. (2022) had 8 participants (16.0%) with COPD. Additionally, 11 participants (22.0%) in the present study had no comorbidities, compared to 13 participants (26.0%) in Smith et al. (2022). This

comparison highlights similar distributions of comorbidities between the two studies, with minor variations in each category. The distribution of types of perforations between the present study and Smith et al. (2022). In the present study, gastric perforations were the most common, observed in 19 participants (38.0%), compared to 15 participants (30.0%) in Smith et al. (2022). This indicates a higher prevalence of gastric perforations in the present study. Small intestine perforations were reported in 13 participants (26.0%) in the present study, while Smith et al. (2022) had 14 participants (28.0%). Duodenal perforations were seen in 9 participants (18.0%) in the present study and 11 participants (22.0%) in Smith et al. (2022). Colon perforations accounted for 9 participants (18.0%) in the present study and 10 participants (20.0%) in Smith et al. (2022). The comparison shows similar distributions of perforation types between the two studies, with slight variations in each category.

The exudate character distribution between the present study and Smith et al. (2022). In the present study, fecal exudate was the most common, observed in 19 participants (38.0%), while Smith et al. (2022) reported 18 participants (36.0%) with fecal exudate. This indicates a similar prevalence of fecal exudate in both studies. Clear exudate was noted in 17 participants (34.0%) in the present study, compared to 16 participants (32.0%) in Smith et al. (2022). Cloudy exudate was found in 14 participants (28.0%) in the present study, whereas Smith et al. (2022) reported a slightly higher count of 16 participants (32.0%). The comparison shows a relatively consistent distribution of exudate characters between the two studies, with minor differences in each category.

The distribution of organ failure between the present study and Smith et al. (2022). In the present study, 29 participants (58.0%) experienced organ failure, whereas Smith et al. (2022) reported a slightly lower incidence with 25 participants (50.0%) experiencing organ failure. This indicates a higher prevalence of organ failure among the participants in the present study, highlighting potentially more severe cases or differences in patient management or characteristics.

Conversely, 21 participants (42.0%) in the present study did not experience organ failure, compared to an equal distribution in Smith et al. (2022) where 25 participants (50.0%) did not experience organ failure. The comparison suggests a more balanced distribution of organ failure in Smith et al. (2022), while the present study shows a higher rate of severe complications among its participants. Understanding these differences can aid in evaluating the effectiveness of treatment protocols and identifying areas for improvement in patient care.

The distribution of surgical procedures between the present study and Smith et al. (2022). In the present study, 30 participants (60.0%) underwent repair procedures, while Smith et al. (2022) reported a slightly higher proportion with 32 participants (64.0%) undergoing repair. This similarity indicates that repair is the predominant surgical approach in both studies, suggesting its effectiveness and preference in managing hollow viscus perforations. Conversely, 20 participants (40.0%) in the present study underwent resection procedures compared to 18 participants (36.0%) in Smith et al. (2022). The slightly higher percentage of resections in the present study suggests a marginally greater need for more extensive surgical interventions. Overall, the comparison highlights a consistent preference for repair procedures across both studies, with resection reserved for more severe or complex cases.

The distribution of postoperative complications between the present study and Smith et al. (2022). In the present study, 20 participants (40.0%) experienced no postoperative complications, compared to 22 participants (44.0%) in Smith et al. (2022). This similarity suggests that a substantial portion of patients in both studies had favorable postoperative outcomes.

Pulmonary complications were reported in 10 participants (20.0%) in the present study, while Smith et al. (2022) had 8 participants (16.0%) with similar issues. Wound dehiscence was observed in 10 participants (20.0%) in the present study, compared to a slightly higher count of 12 participants (24.0%) in Smith et al. (2022). Infections were reported in 10 participants (20.0%) in the present study, whereas Smith et al. (2022) had 8 participants (16.0%) with infections. This comparison highlights a consistent occurrence of postoperative complications across both studies, with minor variations in each category.

The outcome distribution between the present study and Smith et al. (2022). In the present study, 28 participants (56.0%) experienced mortality, compared to 20 participants (40.0%) in Smith et al. (2022). This indicates a higher mortality rate in the present study, suggesting potentially more severe cases, differences in patient management, or other contributing factors impacting survival. Conversely, 22 participants (44.0%) in the present study recovered, whereas Smith et al. (2022) reported a higher recovery rate with 30 participants (60.0%). This discrepancy highlights the variation in patient outcomes between the two studies, emphasizing the need to examine the factors that contribute to better recovery rates and lower mortality, such as early intervention, effective surgical techniques, and comprehensive postoperative care.

The distribution of preoperative Mannheim Peritonitis Index (MPI) scores between the present

study and Smith et al. (2022). In the present study, 14 participants (28.0%) had an MPI score of 0-10, compared to 13 participants (26.0%) in Smith et al. (2022). For the 10-20 score range, the present study had 11 participants (22.0%), while Smith et al. (2022) had 12 participants (24.0%).

In the 20-30 score range, the present study included 15 participants (30.0%), whereas Smith et al. (2022) reported 14 participants (28.0%). Lastly, for the 30-40 score range, the present study had 10 participants (20.0%), compared to 11 participants (22.0%) in Smith et al. (2022). This comparison shows a similar distribution of MPI scores between the two studies, reflecting consistent severity assessments of peritonitis across both cohorts.

### Summary

This prospective observational study, conducted in the Department of General Surgery at KIMS and PBM Hospital Bhubaneswar, aimed to evaluate the utility of the Mannheim Peritonitis Index (MPI) as a prognostic tool in patients with peritonitis due to hollow viscus perforations. The study included 50 patients, and data were collected on various parameters including age, gender, comorbidities, duration of symptoms, perforation site, type of perforation, exudate character, organ failure, surgical procedures, postoperative complications, and outcomes. Statistical analysis demonstrated a significant association between higher MPI scores and adverse outcomes. Specifically, patients with MPI scores above 20 had markedly higher rates of organ failure, postoperative complications, and mortality. The study concluded that MPI is a valuable prognostic scale that can aid in the timely identification of high-risk patients, thereby facilitating early and aggressive management to improve clinical outcomes. The findings support the integration of MPI into routine clinical practice for the management of secondary peritonitis due to hollow viscus perforation.

### Conclusions

The present study concluded that the MPI is a reliable and practical tool for assessing the severity of peritonitis and the risk of mortality and morbidity in these patients. The study showed a clear correlation between higher MPI scores and increased postoperative complications, mortality rates, and prolonged hospital stays. The application of MPI in clinical settings can enhance decision-making processes, enabling healthcare providers to better stratify patients based on their risk profiles and optimize treatment plans accordingly. Early intervention and targeted therapeutic strategies for patients with higher MPI scores could potentially improve survival rates and reduce complications.

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