ACUTE PANCREATITIS ASSESSED WITH COMPUTED TOMOGRAPHY USING A MODIFIED COMPUTED TOMOGRAPHY SEVERITY SCORE: A PROSPECTIVE STUDY.

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Abstract
Introduction
The analysis of the seriousness of acute pancreatitis has a noteworthy part in treatment. Moderate pancreatitis can be managed by medicines, but severe pancreatitis needs thorough observation and specific treatment. The present research aims to evaluate the relation with patient result changeability of a modified CT severity score for the examination of subjects with acute pancreatitis with the present CT severity index.

Materials and Methods
This is prospective research carried out at Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India, in which 50 patients were included for 6 months. All the detailed history of the patients was recorded. Scans were performed utilizing GE bright speed 16-slice computed tomography. The bolus tracking technique was utilized for a distinctive scan by placing the tracker in the aorta.

Results
29 subjects were males, and 21 subjects were females. The major cause of acute pancreatitis is alcohol intake. Acute pancreatitis in 33 patients was caused by the intake of alcohol. 13 had acute pancreatitis caused by bile stones. 3 patients with acute pancreatitis had idiopathic causes. 1 patient had other causes. In 11 patients' cardiovascular system is involved. In 15 patients, the respiratory system was involved and in 24 cases the renal system was involved.

Conclusion
A modified tomography scan is a great method for the examination of acute pancreatitis. It aids in the detection of pancreatic necrosis and localized complications. In the current analysis, no remarkable interconnection was seen with the requirement of operative procedure

Recommendation
Modified computed tomography can be used in the evaluation of the severity of acute pancreatitis. It even helps in the detection of the requirement of surgical intervention.

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Introduction
Acute pancreatitis is a composite disorder with varying clinical sequences. Most of the cases with moderate disorders to recuperate fully, however, 16-20% of cases grow serious acute pancreatitis with localized and structural problems, and cause death in 25-30% of cases [1, 2]. Recognition of cases with serious acute pancreatitis is crucial as these cases can get an advantage from moving to a special unit or ICU and are observed very carefully.

Acuteness grouping is crucial at the time of the starting of the first work of the patients. Frequently utilizing the CT scoring index is the CT severity index devised by [3] and the modified CT severity index suggested by [4]. These scoring systems utilize intravenous agents to find out the existence and degree of the necrotic pancreas, as well as the reactive alterations and localized problems.

The best possible prognostic procedure that permits a distinction between cases with moderate and

serious pancreatitis should be precise, simple to utilize, broadly accessible, and have the least interobserver changeability. There are many scoring systems for the detection of severity pancreatitis like Ramson's criteria [5], the path physiology and chronic health analysis scoring system [6], etc. The CT scale severity index by [3] has ten pointer severity parameters, numbers are given according to the existence and non-appearance of collection of fluid, along with the evaluation of the level of the necrotic pancreas. The drawback of the CT scale severity index is score from the index does not remarkably correspond with the successive occurrence of OP or organs surrounding the pancreas [7]. Patients with severe pancreatitis require operation or subcutaneous intermediation for the management.

The prime symptom of acute pancreatitis is peritoneal discomfort. Acute pancreatitis is an inflammation of the pancreas due to bile stones, alcohol intake, and drugs. Acute pancreatitis is commonly divided into mild and severe types. Mild pancreatitis is related to the least failures of organs and slow healing and is also known as interstitial pancreatitis. The diagnosis of acute pancreatitis is frequently established by leukocytosis, a rise in the levels of serum amylase, and serum lipase. The evaluation of the seriousness of acute pancreatitis is crucial for the treatment. The seriousness of acute pancreatitis can also be evaluated by computed tomography. Computed tomography is the standard technique for the evaluation of severity of acute pancreatitis. CT scan is a non-intrusive technique for examining the anatomy of the pancreas in severe conditions [5]. Computed tomography aids in the prompt detection and stages of severity of acute pancreatitis and its issues which helps in the proper treatment plan for the disorder.

The modified Mortele CT score index was simple to evaluate and was seen to correspond more nearly with case results factors such as duration of hospitalization, the requirement of operation and the prevalence of infection, failure of an organ, and mortality as compared to the presently used Balthazar CT score index [3]. If there is failure of the cardiovascular system, respiratory system, and renal system then it is called organ failure as per SOFA [8]. If the organ failure continues for more than 2 days, it is known as continuous organ failure. The present research aims to evaluate the relation with subjects resulting in the changeability of a modified CT severity score in the examination of subjects with acute pancreatitis with the present CT severity index.

Materials and Methods
Study design
A prospective study.

Study setting
The present research was done at Indira Gandhi Institute of Medical Sciences (IGIMS), Patna, Bihar, India for 6 months [start and end dates].

Study population
In the study, 50 patients were included.

Inclusion criteria
Patients suspicious of acute pancreatitis and undergone modified computed tomography scan, patients who gave consent.

Exclusion criteria
Patients under the age of 18, with a history of chronic pancreatitis, who were pregnant, with incomplete CT images or poor image quality that precludes accurate assessment using the modified CT severity score, and with acute pancreatitis secondary to trauma or surgery.

Sample size determination
Patients who enrolled after filling the inclusion criteria. For calculating sample size the following formula was used:

$$N\Delta = \frac{2(Za+Z1-\beta)2\sigma2}{2}$$

Where, N= sample size, Z is a constant
Za is set by convention according to an accepted error of 5% as 1.649 Z1-β is set by convention according to accepted 1-β or power of study of 80% as 0.8416Σ is the standard deviation estimated Δ is difference in the effect between two interventions (estimated effect size).

Data collection
All the detailed history of the patients was recorded. Scans were performed utilizing GE bright speed 16-slice computed tomography. The bolus tracking technique was utilized for a distinctive scan by placing the tracker in the aorta.

Bias
There was a possibility that bias may have occurred during the beginning of the research but was circumvented by providing all patients with similar details and keeping the confidentiality of the category allotment from the staff who gathered the details.

Ethical consideration:
This research was sanctioned by the ethical council of IGIMS. Consent was taken from all the research subjects. The privacy of the subjects was kept.

Statistical analysis:

Statistical package for social sciences version 21.0 statistical analysis software was utilized for the statistical evaluation. The categorical data was described as prevalence and percentage. For theoretical data, the chi-square test or Fisher exact test was utilized. Determinable data was evaluated by a T-test.

Results

Among the initial cohort of 58 participants recruited for the study on acute pancreatitis, 8 individuals were subsequently excluded based on specific criteria. 3 individuals with a documented history of chronic pancreatitis were excluded from the study to ensure a clear distinction between acute and chronic cases. 1 Pregnant participant was also excluded due to the unique physiological considerations and potential complications associated with pancreatitis during pregnancy. Furthermore, 2 participants whose CT images were incomplete or of poor quality, hindering accurate assessment using the modified CT severity score, were excluded to maintain data reliability. Lastly, 2 cases where acute pancreatitis was secondary to trauma or recent surgery were excluded, as these scenarios could introduce confounding variables that might affect the study's outcomes.

Table 1: Classification as per the gender of the patients

Sex	Number of patients
Man	29
Women	21

As shown in Table 1, 29 subjects were men, and 21 subjects were women.

Table 2: Classification as per the cause of acute pancreatitis

Cause of acute pancreatitis	Number of patients
Bile stone	13
Alcohol intake	33
Idiopathic	3
Others	1

In Table 2 classification as per cause of acute pancreatitis is shown. The major cause of acute pancreatitis is alcohol intake. Acute pancreatitis in 33 patients was caused by the intake of alcohol. 13 had acute pancreatitis caused by bile stones. 13 had acute pancreatitis caused by bile stones. 3 patients with acute pancreatitis had idiopathic causes. 1 patient had other causes.

Table 3: Classification as per the organ failure

Organ failure	Single organ failure	Multiple organ failure	No organ failure
Transient	4	2	35
Persistent	6	3	

As shown in Table 3, 4 subjects with transient and 6 subjects with persistent single organ failure. 2 subjects with transient and 3 subjects with persistent had multiple organ failure. 35 subjects had no organ failure.

Table 4: Classification as per the involvement of organ system

Organ system involved	Number of patients
Cardiovascular system	11
Respiratory system	15
Renal system	24

As shown in Table 4, in 11 patients' cardiovascular system is involved. In 15 patients, the respiratory system was involved and in 24 patients the renal system was involved.

Table 5: Classification as per the age group of the patients

Age	Number of patients
15-25 years	3
25-35 years	28
35-45 years	8
45-55 years	6
Above 55 years	5
Total	50

According to Table 5, 3 subjects were in the age range of 15-25 years, 28 subjects were in the age range of 25-35 years, 8 subjects were in the age range of 35-45 years and 6 subjects were in the age range of 45-55 years. 5 subjects were in the age range of above 55 years.

Discussion

The results of the study offer insights into various aspects of acute pancreatitis, including demographic characteristics, etiological factors, organ involvement, and age distribution among patients. Firstly, the distribution of patients by gender indicates a higher prevalence of acute pancreatitis among men, with 29 male patients compared to 21 female patients. This could suggest potential gender-related risk factors or differences in disease manifestation between men and women.

Regarding the causes of acute pancreatitis, alcohol intake emerges as the most common etiological factor, accounting for a significant proportion of cases (33 out of 50). This underscores the significance of lifestyle choices and substance abuse in disease development. Bile stones represent another substantial cause, contributing to 13 cases, while idiopathic causes and other factors are relatively less frequent, reaffirming the importance of gallstone-related complications in pancreatitis.

In terms of organ failure, the data delineates between transient and persistent organ failure. Among patients experiencing transient organ failure, a subset had single organ failure (4 cases) while others had multiple organ failure (2 cases), which sheds light on the dynamic nature of organ involvement during acute pancreatitis. Similarly, among patients with persistent organ failure, some exhibited single organ failure (6 cases) while others had multiple organ failure (3 cases). Notably, the majority of patients did not experience organ failure. Understanding these patterns is crucial for prognostication and treatment planning.

The involvement of organ systems reveals the impact of acute pancreatitis on various physiological functions. Cardiovascular system involvement was observed in 11 patients, respiratory system involvement in 15 patients, and renal system involvement in 24 patients, underscoring the multisystem nature of acute pancreatitis and its potential complications. The involvement of cardiovascular, respiratory, and renal systems highlights the systemic nature of acute pancreatitis and its potential to impact multiple organ systems simultaneously. This underscores the need for comprehensive management strategies addressing systemic complications.

Finally, the age distribution highlights that the highest number of patients falls within the age range of 25-35 years, suggesting that acute pancreatitis predominantly affects younger adults, possibly influenced by lifestyle factors such as alcohol consumption. However, cases were also observed across other age groups, including 15-25 years, 35-45 years, 45-55 years, and above 55 years, indicating the diverse demographic affected by this condition, necessitating age-tailored approaches to diagnosis and management.

Overall, these findings provide valuable insights into the epidemiology and clinical presentation of acute pancreatitis, which can inform healthcare professionals in diagnosis, management, and prevention strategies for this condition.

The foundation of the computed tomography severity index was an important progress in the analysis of cases with severe pancreatitis [3,9]. Although the CT severity index has been widely utilized for the detection of severe pancreatitis it has disadvantages also. Failure of organs, outer pancreatic problems, and inter-pancreatic problems do not correspond to the score from the index. The majority of the cases were in the age range of 35-45 years which is close to the research carried out by Freeny et al [10]. The occurrence of alcohol intake and bile stones is frequent in 40 and 50 years of age. The disorder is slightly prevalent in males as compared to females; the same outcomes were found in the research carried out by Freeny et al [10]. Alcohol consumption is the main cause of acute pancreatitis accounting for 55% of patients. The same outcomes were observed in the research carried out by Dugernier et al [11] and Freeny et al [10]. But, as per a study done by Bollen et al [1], the main cause of acute pancreatitis was bile stone. Similarly, in research done by Casas et al [12], the prime reason for acute pancreatitis was biliary stone.

In this current research, there is a notable association of stages of the seriousness of pancreatitis based on a modified CT score index with patients' results in scales. However, the

result of the modified CT score index is related closer to patients as compared to the Ct score index in the present research. The notable dissimilarity between the modified CT score index and CT score index is modified CT score index distinguishes solely the existence and lack of collection of fluids, which is why there is no requirement of calculation of fluid collection which is needed in the CT score index. In research conducted by Banday et al [13], was observed that an association of gastrointestinal was observed in 13 cases which were the same as the result of Balthazar et al [3]. Both the modified computed tomography score index and computed score index indicate the inflammatory response of the pancreas and the extent of the necrotic pancreas. The mean period between the outset of severe pancreatitis and computed tomography in the present research was a week. The best period for examining probable problems of severe pancreatitis is three days later [14]. Due to this precision of computed tomography is reduced to examine the problem.

There is a notable relation between necrosis and persistent organ failure as seen in this research which is similar to the research done by Wig et al [15]. Another evaluation is that there is a notable relationship between persistent organ failure and infection. The patients who died of persistent organ failure also had an infection. On the other hand, no death was seen in cases where there was no persistent transient organ failure or infection. According to this research, it was seen that a modified computed tomography score index is the best way of examining acute pancreatitis. Subjects having moderate pancreatitis do not need operative procedures, it is treated by medicines and patients do not need to be admitted to the medical center. On the other hand, in acute pancreatitis surgical intervention is required with hospital stay.

Generalizability

The findings from this study on acute pancreatitis offer valuable insights applicable to a larger population. Understanding epidemiological trends, clinical management strategies, resource allocation, research priorities, and public health policies can guide efforts to address acute pancreatitis more effectively. These insights inform targeted prevention strategies, optimize clinical care, allocate resources efficiently, prioritize research efforts, and shape public health interventions to reduce the burden of acute pancreatitis on a broader scale.

Conclusion

A modified tomography scan is a great method for the examination of acute pancreatitis. It aids in the diagnosis of necrotic pancreas and localized complications. In the current analysis, no remarkable interconnection was seen with the requirement of operative procedures. The result of the

modified CT score index is related closer to patients as compared to the computed tomography score index in the present research. The modified computed tomography scan index has interobserver changeability as compared to the computed tomography score index. However, the outcome of the duration of the hospitalization and the probability of organ failure are somehow correlated with the modified CT score index.

Limitations

The restraints of the current study involve a smaller number of patients associated with this analysis. The observation of the current research cannot be extrapolated for a larger number of people. Additionally, the lack of the combined category also acts as a limitation of this study's findings.

Recommendation

Modified computed tomography can be used in the examination of the seriousness of acute pancreatitis. It even helps in the detection of the requirement for surgical intervention

List of Abbreviations

CT: Computed tomography
SOFA: Sepsis-related organ failure assessment

Conflict of interest

There was no difference of opinion.

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