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"Comparative Study of Tzanakis Score Vsalvarado Score in the Effective Diagnosis of Acute Appendicitis"

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ABSTRACT:

Background: Inflammation of the appendix is called appendicitis. Appendicitis is one of the most important clinical causes of acute abdominal pain, with an incidence of 110/100,000.(1)

Methods: This was a prospective, comparative, cross-sectional study, which was conducted at ANIL NEERUKONDA HOSPITAL,Sangivalasa,Visakhapatnam. Patients with acute appendicitis were included in the study. After taking relevant history, examination and laboratory investigations ,patients were scored according to Alvarado scoring system and Tzanakis scoring system and documented in the proforma. Sensitivity, specificity, positive predictive value, negative predictive value were assessed and compared for both scoring systems.

Results:200 patients were included in this study. Tzanakis score: sensitivity– 79.6%, specificity- 83%, PPV– 97%, NPV– 35.50%, negative appendicectomy rate 2%.

Alvarado score: sensitivity– 59%, specificity– 33.3%, PPV- 86.6%, NPV– 10%, negative appendicectomy rate 8%

Conclusions: When the two scoring systems were compared, the Tzanakis scoring system was proved to be superior to the Alvarado scoring system. Therefore a good clinical examination along with the aid of the Tzanaki scoring system helps in better diagnosis of acute appendicitis.

I. INTRODUCTION:

Inflammation of the appendix is called appendicitis. Appendicitis is one of the most important clinical causes of acute abdominal pain, with an incidence of 110/100,000(1). Acute appendicitis is considered an emergency by Sir HeneageOgilive. Good clinical practice is essential in diagnosing acute appendicitis.

The main goal is early recognition and timely intervention in treating acute appendicitis.

Appendicectomy is a common surgery in general practice. 30% of surgical emergencies registered as appendicectomy in many institutions. No literature says that appendicitis is preventable.

The risk of acute appendicitis was 9% and 7% in men and women, respectively. Diagnosing acute appendicitis by clinical skills was 70-80% only. 20% of patients have a deviation from normal clinical signs in establishing a diagnosis. False positives and false negatives remain common with rates of negative appendectomy ranging from 15% to 26 %(2). Puylaert was the first to diagnose acute appendicitis via ultrasonography(3).

The addition of various operator-dependent techniques to graded compression sonography is useful for allowing improved visualization of both normal and abnormal appendix(4).

Most of the acute appendicitis patients can be diagnosed clinically due to their typical history and clinical findings. Many factors are responsible for acute appendicitis like dietary habits, luminal causes, and familial. The laparoscopic approach is the best approach to diagnosis and treatment of the conditions encountered in patients with suspected appendicitis(5).

Patients presenting in the emergency department and primary care settings, especially in low-resource countries, could benefit from the implementation of the Alvarado score as a triage decision rule(6).

By taking a cutoff point of 7 for the MASS score, a sensitivity of 65.7%, and specificity of 37.5%(7).

Tzanakis scoring system is an effective modality in the establishment of accuracy in the diagnosis of acute appendicitis, but the limitation is observer bias, which may vary the scoring system. (8])

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The factors considered in this score were clinical evaluation, ultrasonography, and inflammatory markers.

A score of more than eight is for surgical intervention having a sensitivity and specificity of 95% and 97% correspondingly[9].

Ultrasound has a high predictive value for the diagnosis of appendicitis. [10].

In a tertiary care center like ANIL NEERUKONDA HOSPITAL, SANGIVALASA, VISAKHAPATNAM, there is no comparative data to analyze which scoring system is better in detecting acute appendicitis.

This study helps us in knowing the efficacy of two scoring systems in detecting acute appendicitis and decreasing the incidence of appendicular perforation and negative appendicectomy.

II. AIMS AND OBJECTIVES

This study aims to evaluate the following:-

1) To compare the efficacy of Alvarado scoring and Tzanakis scoring in diagnosing acute appendicitis.

2) To evaluate sensitivity, specificity, positive predictive value, the negative predictive value of both the tests.

3) To reduce the incidence of appendicular perforation and negative appendicectomy.

III. SCORING SYSTEM

ALVARADO SCORING

	PARAMETERS	SCORE
SYMPTOMS	MIGRATORY RIF PAIN	1
	ANOREXIA	1
	NAUSEA/VOMITING	1
SIGNS	RIF TENDERNESS	2
	REBOUND TENDERNESS	1
	ELEVATED BODY TEMPERATURE	1
LAB INVESTIGATIONS	LEUCOCYTOSIS	2
	SHIFT TO LEFT	1
	TOTAL	10

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- ✓ Low risk includes 1 to 4
- ✓ Intermediate risk includes 5 and 6
- ✓ High risk includes 7 to 10.

TZANAKISSCORING

PARAMETERS	SCORE
PRESENCE OF RIGHT LOWER ABDOMINAL TENDERNESS	4
REBOUND TENDERNESS	3
LABORATORY FINDINGS: PRESENCE OF WHITE BLOOD CELLS GREATER THAN 12,000 IN THE BLOOD	2
ULTRASOUND FINDING: PRESENCE OF POSITIVE ULTRASOUND SCAN FINDINGS FOR APPENDICITIS.	6
TOTAL	15

- SCORE > 8-INDICATING ACUTE APPENDICITIS REQUIRING SURGERY.

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DIFFERENTIAL DIAGNOSIS OFACUTEAPPENDICITIS:-

The following factors are for the differential diagnosis of acute appendicitis:-

- ✓ Anatomical location of the inflamed appendix.
- ✓ Age
- ✓ Gender

GYNAECOLOGICAL	Pelvic inflammatory disease Ruptured ovarian cyst Ruptured ectopic pregnancy Twisted ovarian cyst Salphingitis
UROLOGIC	Acute pyelonephritis Ureteral stone Testicular torsion Acute epididymitis

	CAUSES
OTHER GIT CAUSES	Acute gastroenteritis Meckels diverticulitis Intussusception Cohn's enteritis Peptic ulcer Ca caecum Right sided diverticulitis Acute mesenteric adenitis Epiploic appandagitis

AIMS AND OBJECTIVES

- To compare the efficacy of Alvarado scoring and Tzanakis scoring in diagnosing acute appendicitis.
- To evaluate the sensitivity, specificity, positive predictive value, negative predictive value of both the tests.
- To reduce the rate of incidence of appendicular perforation and negative appendicectomy.

IV. MATERIALS AND METHODS

- STUDY POPULATION:- AGE > 18 YEARS.
- STUDY SAMPLE SIZE:- 200 PATIENTS.
- STUDY PERIOD:- NOVEMBER 2020 TO SEPTEMBER 2021.
- STUDY DESIGN:- CROSS-SECTIONAL STUDY.
- METHODOLOGY:-
- All values are multiplied by 100 to get percentages.
- The data were tabulated in Microsoft excel. Data analysis was done using SPSS.

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- INCLUSION CRITERIA:
- All patients clinically diagnosed with acute appendicitis undergoing open or laparoscopic appendicectomy were included.

EXCLUSION CRITERIA:
- Children under 18 years of age.
- Patients not willing for surgery
- Appendicular perforation, appendicular abscess, appendicular mass.
- Equivocal ultrasonographic diagnosis
- Patients undergoing interval appendicectomy.

V. DATA COLLECTION:-

The patient who was admitted to ANIL NEERUKONDA HOSPITAL, Sangivalasa, Visakhapatnam from November 2020 to September 2021, underwent appendicectomy for suspected cases that were listed in this study. Alvarado and tzanakis scoring were done based on the patient's symptoms, signs, laboratory investigations. Whether the patient should be operated or not is purely dependent on the surgeon but not on the scoring system.

Based on the gross appearance intraoperatively and histology follow up, a negative appendicectomy rate was calculated.

Based on the above collection data, tzanaki and Alvarado scoring, sensitivity, specificity, positive predictive value, negative predictive value were calculated.

		DIAGNOSIS OF APPENDICITIS ON HISTOPATHOLOGY	
		POSITIVE	NEGATIVE
TZANAKIS OR ALVARADO SCORE	POSITIVE	TRUE POSITIVE (TP)	FALSE POSITIVE (FP)
	NEGATIVE	FALSE NEGATIVE(FN)	TRUE NEGATIVE (TN)

SENSITIVITY= TP/(TP+FN).
SPECIFICITY=TN/(TN+FP).
POSITIVE PREDICTIVE VALUE(PPV)=TP/(TP+FP).
NEGATIVE PREDICTIVE VALUE(NPV)=TN/(TN+FN).
All values are multiplied by 100 to get percentages.

VI. STATISTICAL ANALYSIS

The statistical test used:- chi-square test
Null hypothesis:- mean values of both the tests have no significant value
Significant value:- 0.05. If we get a P-value as less than 0.05, we reject the null hypothesis. If the P-value is greater than 0.05, we accept the null hypothesis.

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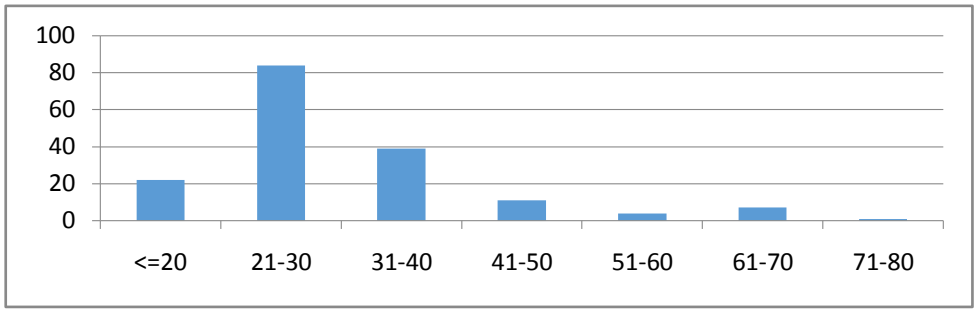
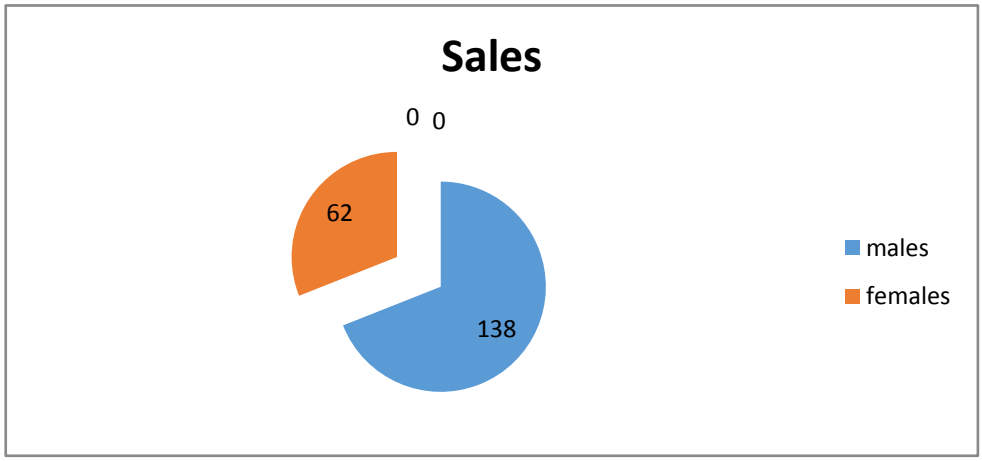
VII. RESULTS:-

AGE DISTRIBUTION:-



GENDER DISTRIBUTION:-



TYPE OF PROCEDURE DONE:-

One hundred sixty patients underwent open appendicectomy, and 40 patients underwent laparoscopic appendicectomy.

SYMPTOMS:-

Symptoms	No of patients	Percentage
Right iliac fossa pain	180	90
Anorexia	164	82
Nausea/Vomiting	144	72
Fever	128	64
Urinary frequency	24	12
Constipation	16	8
Diarrhea	8	4

INTRAOPERATIVE FINDINGS REGARDING POSITIONS OF APPENDIX:-

Position of the appendix	No of cases	Percentage
Retrocaecal	120	60%
Ileal	8	4%
Pelvic	60	30%
Subcaecal	12	6%

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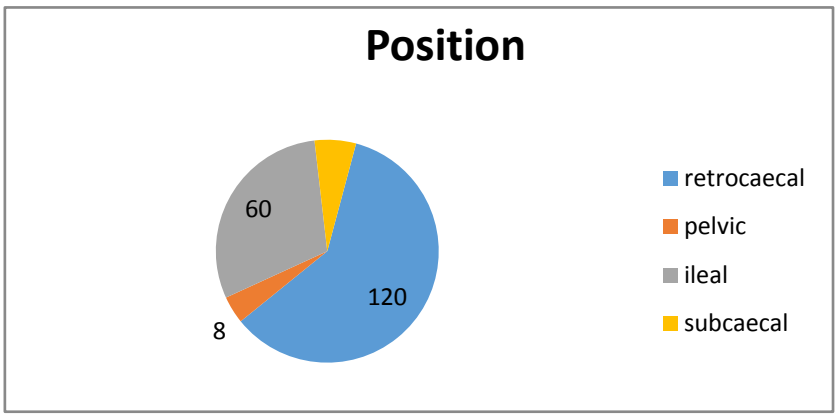
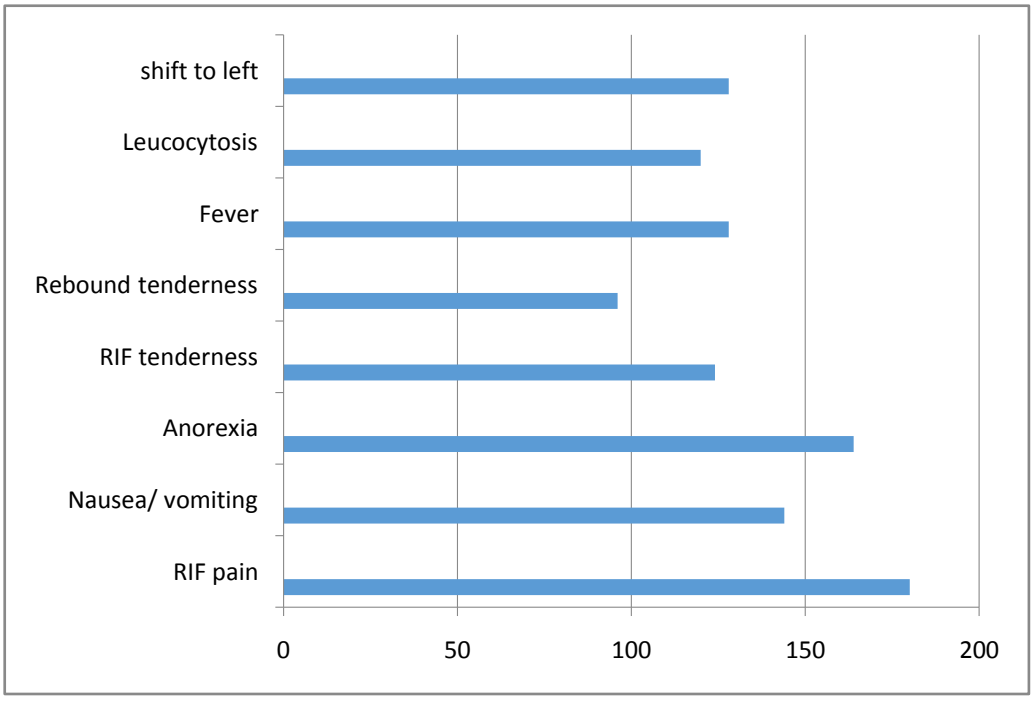


PARAMETER EVALUATION OF ALVARADO SCORING SYSTEM:-

PARAMETERS	Positive No. of Patients	Percentage
RIF pain	180	90
Nausea/ Vomiting	144	72
Anorexia	164	82
RIF tenderness	124	62
Rebound tenderness	96	48
Fever	128	64
Leucocytosis	120	60
Shift to left	128	64



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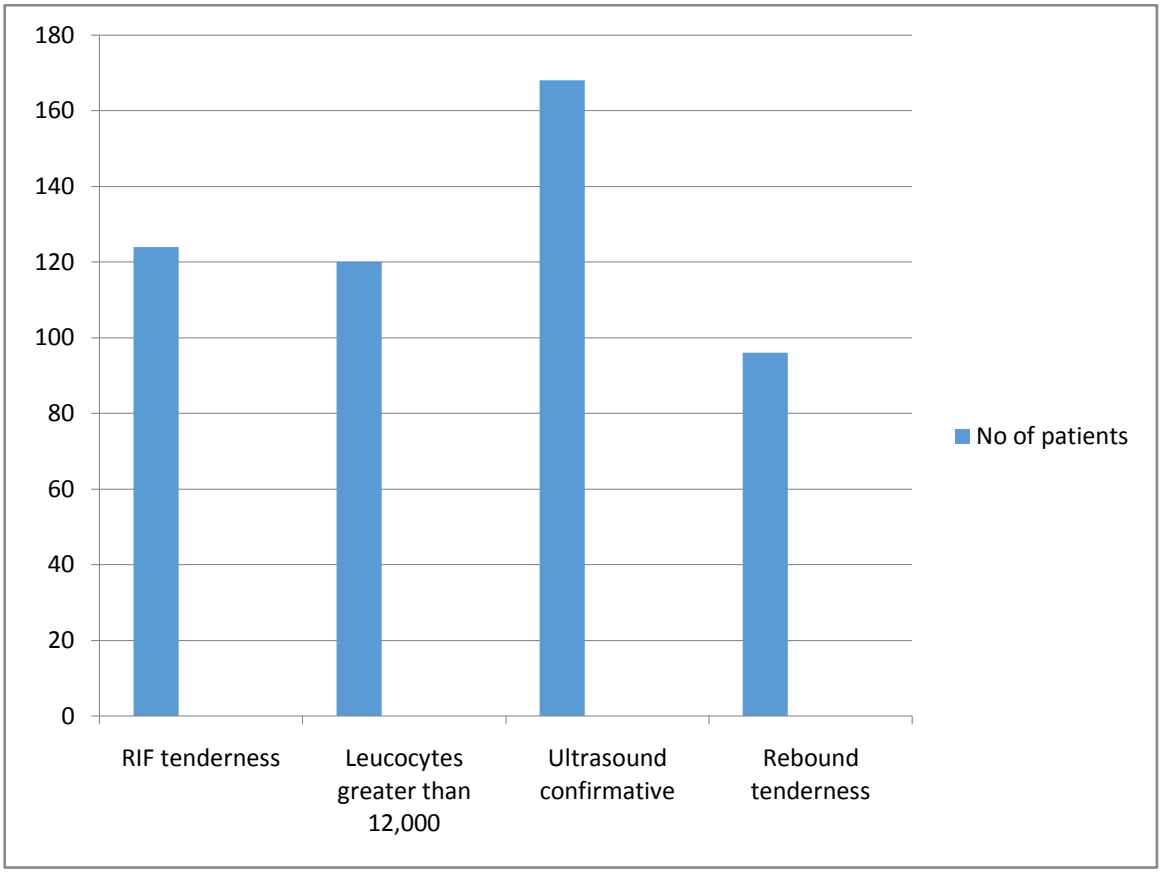
PARAMETER EVALUATION OF TZANAKIS SCORE:-

PARAMETERS	Positive No of Patients	Percentage
RIF tenderness	124	62
Raised Leucocytes greater than 12,000/cu.mm in blood	120	60
Ultrasound confirmation of appendicitis	168	84
Rebound tenderness	96	48



CO RELATION BETWEEN ALVARADO SCORE AND ACUTE APPENDICITIS:-

TZANAKIS SCORE	APPENDICITIS PRESENT	APPENDICITIS ABSENT
LESS THAN 8	36	20
GREATER THAN 8	140	4

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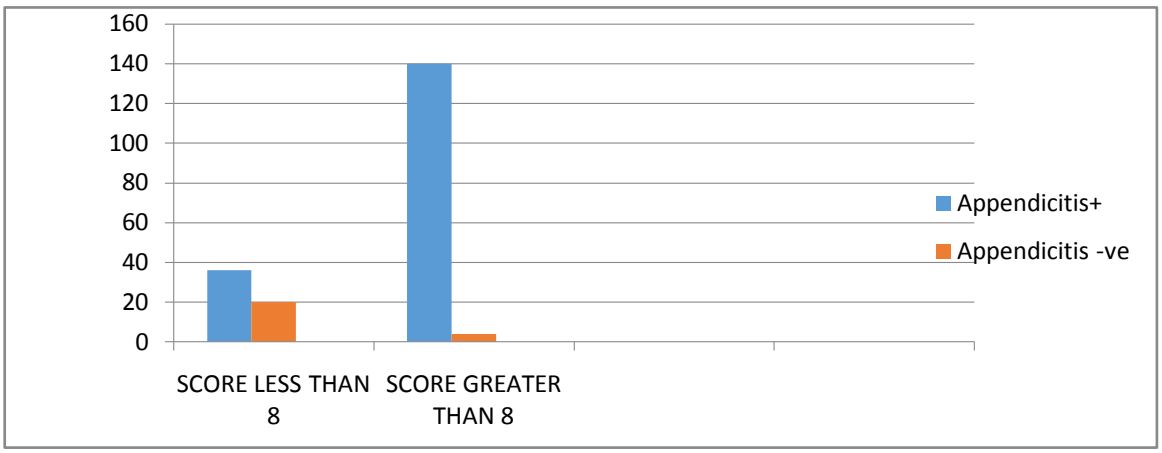

SENSITIVITY, SPECIFICITY, NEGATIVE PREDICTIVE VALUE AND POSITIVE PREDICTIE VALUE OF ALVARADO SCORE:-

Alvarado score	Appendicitis	Appendicitis	
Scoring resulting in greater than 7 for appendicectomy	YES	NO	TOTAL
YES	104(TP)	16(FP)	120
NO	72(FN)	8(TN)	80
	176	24	200

Sensitivity:- 59%, Specificity:-33.3%, Positive Predictive Value:- 86.6%,Negative predictive value:- 10%, Negative appendicectomy rate :-8%.

SENSITIVITY, SPECIFICITY, NEGATIVE PREDICTIVE VALUE AND POSITIVE PREDICTIVE VALUE OF TZANAKIS SCORING:-

Tzanakis score	Appendicitis	Appendicitis	
Scoring of greater than 8 resulting in appendicectomy	YES	NO	TOTAL
YES	140	4	144
NO	36	20	56
	176	24	200

SENSITIVITY:- 79.6%, SPECIFICITY:- 83%, NEGATIVE PREDICTIVE VALUE:- 35.5%, POSITIVE PREDICTIVE VALUE:- 97%, NEGATIVE APPENDICECTOMY RATE:- 2%.

DIFFERENCES IN THE ACCURACY OF ALVARADO SCORE AND TZANAKIS SCORE:-

	ALVARADO SCORING IN %	TZANAKIS SCORING IN %
SENSITIVITY	59	79.6
SPECIFICITY	33.3	83
NEGATIVE PREDICTIVE VALUE	10	35.5
POSITIVE PREDICTIVE VALUE	86.6	97
NEGATIVE APPENDICECTOMY RATE	8	2

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VIII. DISCUSSION:-

Two hundred patients underwent appendicectomy for suspected clinical and laboratory correlation during this period.

Out of 200 patients, 24 patients were found to be negative appendicitis. 12% of the negative appendicectomy rate was noted.

AGE DISTRIBUTION:-

The most common distribution was noted as 21 to 30 years of age.

J. A. H. Lee et al. also had similar findings in their study.

Appendix during the 'teens is particularly liable to obstruct and hence to become inflamed because of the large proportion of lymphoid tissue which it contains[41].

Appendicitis in the elderly is associated with higher morbidity and mortality because of the later and atypical presentation of appendicitis in this age group, a high index of suspicion and early operation are important in avoiding perforation and subsequent morbidity[42].

Appendicitis is uncommon in children under the age of 5, but the proportion of cases complicated by peritonitis is large, and the death rate in the population of this age is relatively high[43].

The incidence of nonperforated appendicitis was highest among adolescents and young adults (13–40 years of age), perforated appendicitis occurred at almost the same incidence in all sex and age groups[44].

SUSAN et al. proved that young children (0–4 years old) had the lowest annual incidence of acute appendicitis, but they had a 5-fold increased risk of complicated disease (odds ratio: 4.9; 95% confidence interval: 4.0–5.9), compared with teenagers[45].

Therefore the age of the patient plays an important role in the management of acute appendicitis.

GENDER DISTRIBUTION:-

Male predominance has been noted in this study.

Incidence rates in males were higher than rates in females in all racial/ethnic groups for most ages[46]. Roger Luckmann et al. also had similar results in their study.

Gideon et al. also had similar findings in their study. Acute appendicitis was more common in males, and during the summer months[47].

Salo et al. state that girls had negative appendectomies more often, despite having more preoperative imaging, and they had operative complications more frequently, despite having less frequent perforations[48].

Lein et al. study published that males were more susceptible than females to recurrent appendicitis[49].

Oguntola et al. proved that there is an increase in the incidence of appendicitis in both the genders, with a slightly higher proportion of males[50].

On comparing with other studies, males are considered to have a higher incidence of acute appendicitis.

STAY IN THE HOSPITAL:-

Approximately over 2- 10 days.

The average number of days of hospital stay is 4.7 days, with a deviation of 1.6.

From a hospital utilization point of view, laparoscopy should be considered as the first-line approach for all patients with appendicitis[51].

Thomas et al.state that extraluminal air and moderate or severe periappendiceal inflammatory stranding are statistically significant independent predictors for appendiceal perforation and are associated with increased hospital stay[52].

Delay in patient presentation adversely affects the stage of disease in acute appendicitis and leads to increased incidence of infectious complications and prolonged hospital stay[53].

SYMPTOMS:-

Pain in the right iliac fossa is considered to be the main complaint by the majority of the patients. Other symptoms include:-

- Nausea
- Vomiting
- Fever
- Constipation/diarrhea
- Urinary frequency

The clinical findings in young and old patients are similar, except for a higher rate of abdominal distension in old patients[54].

Andy et al. state that abdominal pain is the primary presenting complaint of patients with acute appendicitis. Nausea, vomiting, and anorexia occur in varying degrees[55].

Mike Hardin et al. stated that abdominal pain is a common presenting symptom in outpatient care; family physicians serve an important role in the diagnosis of appendicitis[56].

Richard Nshuti et al. published that most of our patients with complicated disease present late with vague pain abdomen with the most common reasons for this delay being lack of access to medical clinics and prior treatment by general practitioners and Complications were higher in males and those aged 45 years and above[57].

Sometimes many other diseases can mimic and present as acute appendicitis.

Muller et al. stated that leukemia and lymphoma of the appendix presented as acute appendicitis[58].

An acute scrotum is an exceptional form of presentation of acute appendicitis in the pediatric age group, which was presented by MENDEZ et al. in their study[59].

Enterobius vermicularis may be a cause of symptoms resembling acute appendicitis, although the mechanism for this does not involve mucosal invasion by the parasite[60].

POSITION OF THE APPENDIX:-

The most common location of the appendix was retrocaecal, which is followed by a pelvic presentation.

MedicinskiArhiv et al. stated that the position of the appendix is more common in the falling position followed by pelvic position[61].

Irfan Ahmed et al. published that the pelvic position of the appendix is more common than retrocecal position[62].

*Golalipour, M. J et al. studies showed that pelvic position of the appendix is more common, followed by retrocaecal in 32.4%, preileal in 18.8%, and subcaecal in 12.8% respectively[63].

Gary K. Shen et al. showed that retrocecal appendicitis does not alter the presentation and morbidity when compared to others[64].

Humaira Naushaba et al. showed that retrocaecal was more common, followed by pelvic and post ileal position[65].

My study	Retrocecaecal position
MedicinskiArhiv et al	Falling position
Irfan Ahmed et al	Pelvic position
*Golalipour, M. J et al	Pelvic position
Gary K. Shen et al	Retrocaecal position
Humaira Naushaba et al	Retrocaecal position

T D Owen et al. states that the incidence of morbidity and mortality was decreased with the usage of Alvarado score[66].

M. Kalan et al. published that the Alvarado score was very helpful in the diagnosis of acute appendicitis[67].

Robert Ohle et al. also showed similar results stating the Alvarado scoring system was very helpful in diagnosing acute appendicitis[68].

Manne Andersson et al. stated that this clinical score was helpful in diagnosing suspected acute appendicitis cases and prevent the need fora diagnostic laparoscopy[69].

T D Owen et al	Preferred Alvarado score

M. Kalan et al	Preferred Alvarado score
Robert Ohle et al	Preferred Alvarado score
Manne Andersson et al	Preferred Alvarado score
CHAN MY et al	Preferred Alvarado score

Before dealing with the tests of validity, the following definitions are to be noted regarding tests of validity.

SENSITIVITY:-
Also called a true positive rate or probability of detection. It measures the proportion of actual positives that are correctly identified as such.
E.g., -the percentage of sick people who are correctly identified as having the condition.
Mathematically it can be defined as:-

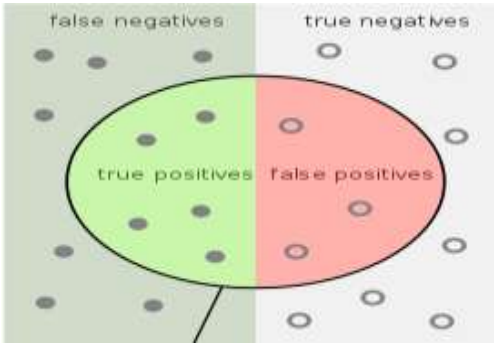
$$\text{Sensitivity} = \frac{\text{number of true positives}}{\text{Number of true positives + false negatives}}$$

Any test with high sensitivity is useful in ruling out disease.

SPECIFICITY:-
Also called a true negative rate. It measures the proportion of actual negatives that are identified as such.
E.g., -the percentage of healthy people who are correctly identified as not having the condition.
Mathematically it can be defined as follows:-

$$\text{Specificity} = \frac{\text{number of true negatives}}{\text{Number of true negatives + false positives}}$$

= probability of a negative test.
Any test with high specificity rules in a disease.
The term positive and negative don't represent the value of condition interest. It will represent the presence or absence.



POSITIVE PREDICTIVE VALUE:-
It is defined as a positive prediction in the event of a true positive. The ideal value of a PPV with a test is one, and the worst possible value is zero.
PPV can also be derived from sensitivity, specificity, and prevalence.

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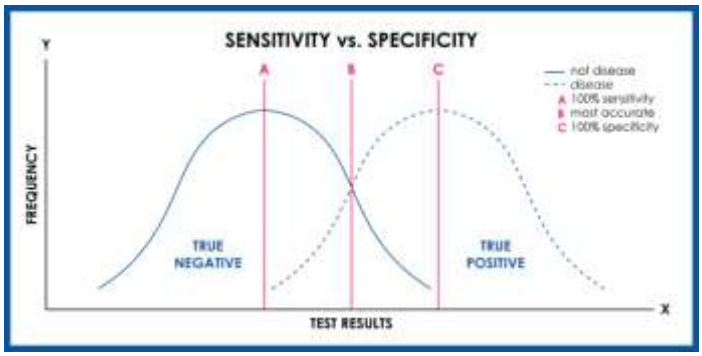
Positive predictive value = number of true positives

Number of true positives + false positives

Positive predictive value = sensitivity x prevalence

Sensitivity x prevalence + (1specificity) x (1- prevalence)



NEGATIVE PREDICTIVE VALUE:-

It is defined as a negative prediction in the event of true negative. The ideal value for the best test is one, and the worst would be zero.

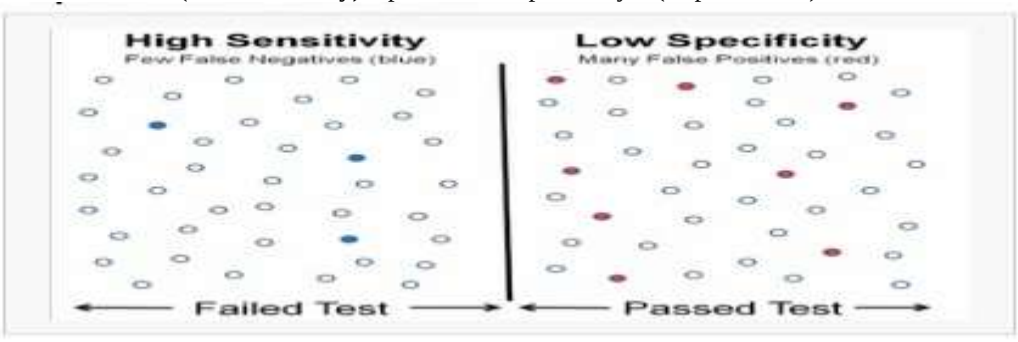
It can also be computed from the sensitivity, specificity, prevalence.

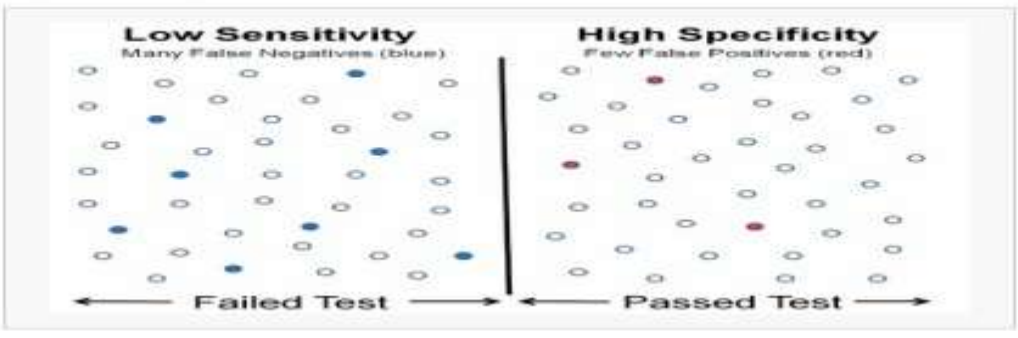
Negative predictive value = number of true negatives

Number of true negatives + false negatives

Negative predictive value = specificity x (1- prevalence)

(1- **Sensitivity)** x prevalence+specificity x (1- prevalence)





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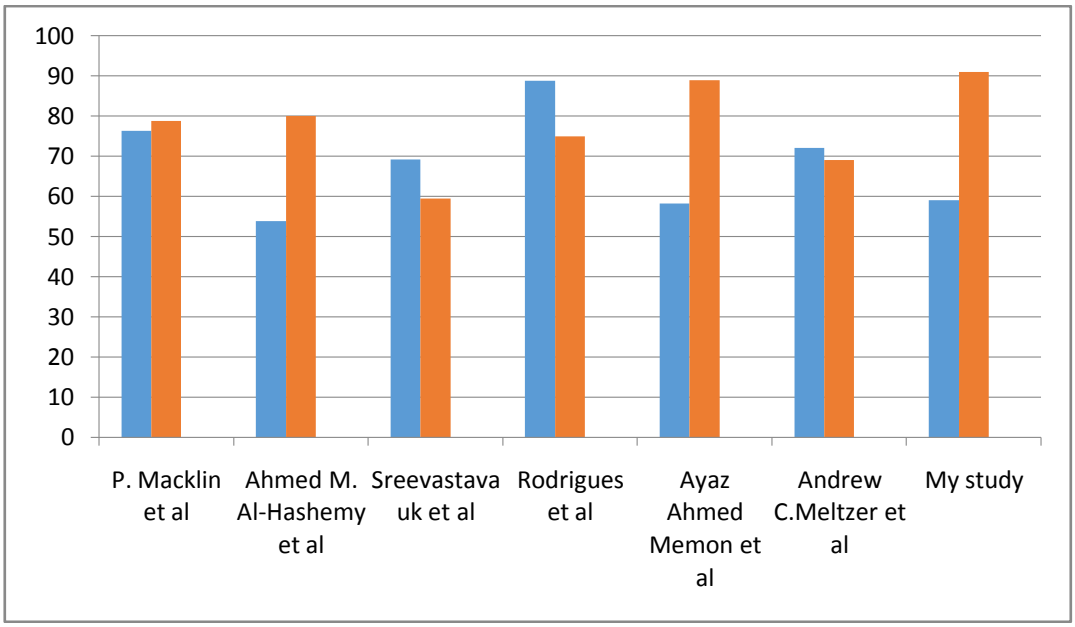
The sensitivity of the Alvarado score was 59% in this study. However, many studies showed a sensitivity of 73-91%.
The specificity in this study was 33.3%. Many studies were showing the specificity of 78-92%[43].
The sensitivity and specificity in this study are comparatively very low when compared to other studies[70].
BR Malla et al.also reported the same in their study. In their study, the sensitivity, specificity, positive predictive value, and negative predictive value of Alvarado score was 76.0%, 75.0%, 97.2%, and 21.4%,respectively[71].
P. Macklin et al. showed the overall sensitivity of a modified Alvarado score of > or = 7 was 76.3%, and its specificity was 78.8%[72].
Ahmed M. Al-Hashemy et al. published that the overall sensitivity of the Alvarado score was 53.8%, and its specificity was 80%[73].
Srivastava UK et al. studies showed a sensitivity and specificity of 69.2 and 59.4, respectively[74].
Rodrigues et al. showed a sensitivity and specificity of 88.8 and 75 %[75].
Sensitivity, 89%; specificity, 59%; positive predictive value, 93.1%, as stated by Pogorelić et al. in their study[76].
The sensitivity was 58.2%, specificity was 88.9%, and the positive predictive value was 98.1%, as published by Ayaz Ahmed Memon et al. [77].
With a sensitivity of 72%, a low modified Alvarado score is less sensitive than clinical judgment in excluding acute appendicitis, as stated by Andrew C.Meltzer et al.[78].

Studies	Sensitivity(%)	Specificity(%)
BR MALLA et al	76	75
P. Macklin et al	76.3	78.8
Ahmed M. Al-Hashemy et al	53.8	80
Srivastava UK et al	69.2	59.4
Rodrigues et al	88.8	75
Ayaz Ahmed Memon et al	58.2	88.9
Andrew C.Meltzer et al	72	69
My study	59	91



The above bar diagram represents the sensitivity and specificity of the Alvarado score described by various authors in their study.
When compared to other studies, sensitivity is very low, and Specificity is high in my study.

Some authors used the tzanakis score as a diagnostic modality for detecting acute appendicitis.
The sensitivity and specificity of tzanakis score published by various authors are as follows:-

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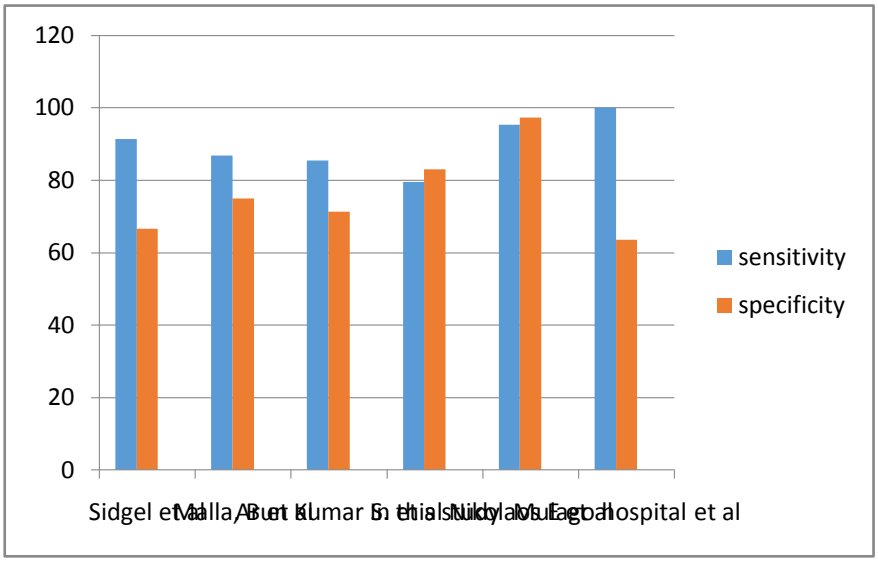
Tzanakis score	Sensitivity(%)	Specificity(%)
Sidgel et al	91.4	66.6
Malla, B et al	86.9	75
Arun Kumar S. et al	85.4	71.4
In this study	79.6	83
Nikolaos E et al	95.4	97.4
Mulago hospital et al	100	63.6
Muhammad Mansoor Iqbalet al	99	91

The sensitivity and specificity of the Tzanakis score in this study were 79.6% and 83%, respectively.

Many other studies also reported the same. Hegde et al. also reported similar results in their study[79]. When compared to other studies, the sensitivity of the tzanakis score is low, and specificity is high.



In this study, I have compared both the scores regarding the sensitivity, specificity, positive predictive value, negative predictive value to know which score is preferred to the other.

In this study, all the tests of validity were proved to higher in the tzanakis score when compared to the Alvarado score.

From the results published, we can prefer the tzanakis score to Alvarado score and prevent the incidence of negative appendicectomy.

The following are the studies that proved that the tzanakis score is superior to the Alvarado score in diagnosing acute appendicitis.

AUTHOR	RESULT
In this study	Tzanakis score was superior
Sigdel GS et al	Tzanakis score was superior
Malla B et al	Tzanakis score was superior
Harsha hedge et al	Tzanakis score was superior
Anoop Sharma et al	Alvarado score was superior
S. Dharmarajan et al	Tzanakis score was superior
R. Anupriya et al	Tzanakis score was superior
Faris Muhammed et al	Tzanakis score was superior
Arvind Raj, R et al	Tzanakis score was superior
Shahid-ul-Haq Dar et al	Tzanakis score was superior

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The sensitivity of 95% and specificity of 97% were reported by Tzanakis et al. in their study with which our results were also correlating[80]

Other studies also have obtained similar results in their study[81]. Anoop Sharma et al. reported that Alvarado is superior to the Tzanakisscore[82].

In comparison to different studies with my study, most of the results were in favor of my study, stating the tzanakis score being superior to the Alvarado score.

Diagnosing acute appendicitis is a very difficult situation for a surgeon because various other pathologies can mimic as acute appendicitis. As a result of late diagnosis, the patient may land up in complications leading to increased morbidity and mortality. Therefore, in addition to the clinical evaluation, various scoring systems have been implemented for the accurate diagnosis of acute appendicitis. Apart from the above mentioned two various other scoring systems are available:-

- Pediatric appendicitis score
- Appendicitis inflammatory response score
- RIPASA score.
- Ohman scoring system

As the pain in the right iliac fossa mimics many other disease conditions, accurate confirmation of acute appendicitis is becoming difficult. Therefore these scoring systems were introduced to have added benefit to the diagnosis.

These scoring systems were introduced to prevent the high incidence of negative appendicectomy rates. A negative appendicectomy rate of 15-25% has been accepted for the prevention of complications.

Some of the complications that are related to the negative appendicectomies were:-

- ✓ Fecal fistula
- ✓ Adhesions
- ✓ Risk of hernia
- ✓ Surgical site infections

Because of all the above-listed complications, scoring systems are essential in the accurate diagnosis. Wound infections are less common in the laparoscopic method than the open method[83].

Various other parameters are available in effective diagnosis of acute appendicitis like

- ✓ Leucocytosis
- ✓ Raised C reactive protein
- ✓ Radiological tools like ultrasound, CT, and laparoscopy.

Due to the late presentation of the patients in our hospital, diagnosing acute appendicitis clinically has become very easy for us, resulting in low negative appendicectomy rates in this study.

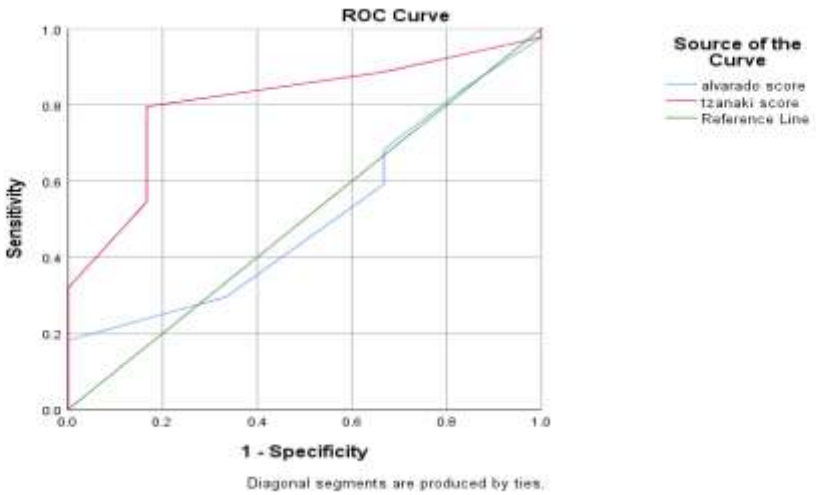
This study showed that the usage of the Tzanakis score is very helpful in diagnosing acute appendicitis when compared to the Alvarado score.

The p-value obtained during this study using chi-square test was more than 0.05, indicating a null hypothesis on comparision of alvarado score with histopathology and Tzanakis score with histopathology.

The sensitivity, specificity, positive predictive value, negative predictive value was more in favour of Tzanakis score when compared to Alvarado score.

Moreover, the following graph represents additional details regarding which one to prefer.

RECEIVER OPERATING CHARACTERISTIC CURVE:-



From the above figure, the area under the curve corresponding to the tzanakis score was more when compared to the Alvarado score, indicating that the tzanakis score was superior to the Alvarado score.

DRAWBACKS OF THIS STUDY:-

- ✓ Interpersonal misinterpretation due to the involvement of clinical and radiological factors for diagnosing acute appendicitis.
- ✓ Due to the low sensitivity of ultrasound, it may decrease the scoring value in the case Tzanakis scoring system. Therefore experienced sinologists and advanced ultrasound devices will be helpful.

DRAWBACKS OF ULTRASONOGRAPHY:-

- ➢ The normal appendix may be greater than 7mm due to fecal impaction or lymphoid hyperplasia.
- ➢ Inflamed Meckel's diverticulum can be visualized as an appendix in ultrasonography.
- ➢ Air-filled bowel loops obscure the view of the appendix.
- ➢ In the case of obese individuals, diagnosing with ultrasonography is very difficult, hence expert opinion is a must.

IX. CONCLUSION:-

When the two scoring systems were compared, the Tzanakis scoring system was proved to be superior to the Alvarado scoring system. Therefore a good clinical examination along with the aid of the Tzanaki scoring system helps in better diagnosis of acute appendicitis.

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