

Evaluation of Modified Alvarado Score in the Diagnosis of Acute Appendicitis in the Rural Setup where Modern Imaging Facilities Are Not Available

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Abstract

Introduction: Acute appendicitis is the most common surgically correctable cause of abdominal pain, the diagnosis of which remains difficult in many instances. Some of the signs and symptoms can be subtle to both the clinician and the patient and may not be present in all instances.

Materials and Methods: This study was conducted on patients presenting with pain in the right lower quadrant of Abdomen, lasting fewer than 7 days who after clinical examination were provisionally diagnosed to have acute appendicitis and were admitted in Prathima Institute of Medical Sciences, Karimnagar in the study period of June 2011 to September 2014. Modified Alvarado score was applied on all these patients.

Results: Group I: twenty two patients were in first group (1-4) who were not considered likely to have appendicitis. They were observed and were treated conservatively. Discharged after 2-3 days and were followed up every month for 6 months and none of them required surgery. Group II: Twenty eight patients were in second group (5-6), 7 were operated upon clinical suspicion of high probability of acute appendicitis.

Conclusion: From the present study it may be concluded that high scores (7-9) in modified Alvarado score is dependable aid in early diagnosis of acute appendicitis in men but the same is not true as far as women are concerned, because of other conditions mimicking appendicitis like pelvic inflammatory disease, ruptured ectopic pregnancy.

Key Words: Acute appendicitis, ruptured ectopic pregnancy, pelvic inflammatory disease, abdominal pain

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I. Introduction

Acute appendicitis is the most common surgically correctable cause of abdominal pain, the diagnosis of which remains difficult in many instances. Some of the signs and symptoms can be subtle to both the clinician and the patient and may not be present in all instances. Arriving at the correct diagnosis is essential, however, a delay may allow progression to perforation and significantly increased morbidity and mortality. Incorrectly diagnosing a patient with appendicitis although not catastrophic often subjects the patient to an unnecessary operation.¹

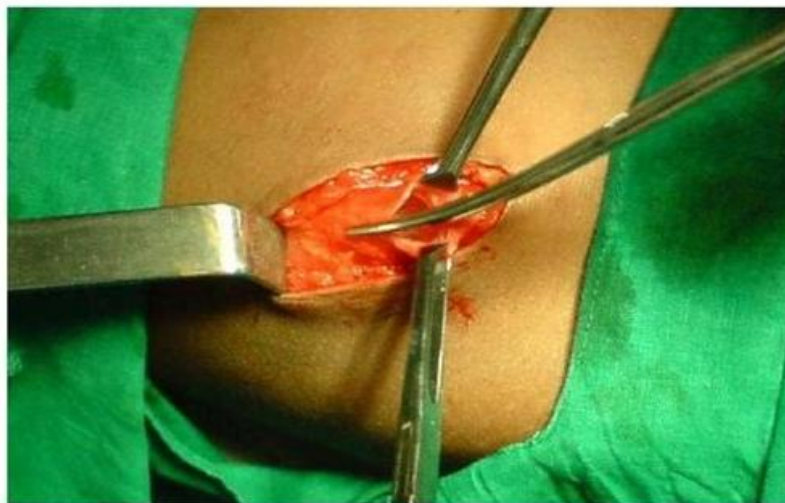
The diagnosis of acute appendicitis is essentially clinical; however a decision to operate based on clinical suspicion alone can lead to removal of a normal appendix in 15-30% cases. The premise that it is better to remove a normal appendix than to delay diagnosis doesn't stand up to close scrutiny, particularly in the elderly. A number of clinical and laboratory based scoring systems have been devised to assist diagnosis. The most commonly used is the Alvarado score and equally its modifications.² The main objective of this study was To evaluate the efficiency of Modified Alvarado Score in the preoperative diagnosis of acute appendicitis.

CLINICAL PHOTOS

GRID IRON INCISION



CUTTING THE EXTERNAL OBLIQUE APONEUROSIS



LIGATING AND DIVIDING MESOAPPENDIX



DIVIDING APPENDIX AT THE BASE



II. Material And Methods

This study was conducted on patients presenting with pain in the right lower quadrant of Abdomen, lasting fewer than 7 days who after clinical examination were provisionally diagnosed to have acute appendicitis and were admitted in Prathima Institute of Medical Sciences, Karimnagar in the study period of June 2011 to September 2014. Modified Alvarado score was applied on all these patients.

INCLUSION CRITERIA

- Patients with provisional clinical diagnosis of acute appendicitis and willing for surgery are included in the study

EXCLUSION CRITERIA

- Patients of age less than or equal to 12 years
- Patients with generalised peritonitis due to appendicular perforation
- Patients with appendicular mass or abscess
- Patient not willing for surgery
- Patient with previous history of any abdominal surgery

Collection of Data: A total of 101 consecutive cases of suspected acute appendicitis who were admitted, investigated and treated were taken for the study. After detailed examination and investigations a modified Alvarado score was applied to each case.

MODIFIED ALVARADO SCORE

This consists of three symptoms, three sign and a laboratory finding as described by Alvarado and later modified by Kalan et al.

Table 1 - MODIFIED ALVARADO SCORE

Symptoms / Signs / Investigation	SCORE	
	Yes	No
Symptoms		
Migration of pain to right iliac fossa	1	0
Anorexia	1	0
Nausea / Vomiting	1	0
Signs		
Tenderness over right iliac fossa	2	0
Rebound tenderness over right iliac fossa	1	0
Temperature > 37.3°C	1	0
Investigation		
Leucocytosis > 10x 10 ⁹ /L	2	0
Total Score	9	0

Following decisions were taken: Cases with score of 1-4 were observed and not operated and were followed up after discharge for next six months for development of acute appendicitis.

Cases with score 5-6 were observed for next 24 hours for revision of scoring. If score became > 7 or their clinical condition was highly suspicious of acute appendicitis as decided by treating surgeon they were subjected for appendicectomy.

Patients with score of 7 - 9 who were considered candidates for appendicectomy.

All the specimens of appendix were sent for histopathological confirmation of acute appendicitis. Final correlation between the scoring system and final diagnosis was made.

101 patients who constituted present study group were divided in to 3 groups.

- Group-I Patients who were between score 1-4
- Group-II Patients who were between score 5-6
- Group-III Patients who were between score 7-9

III. Results

Group – 1: twenty two patients were in first group (1-4) who were not considered likely to have appendicitis. They were observed and were treated conservatively. Discharged after 2-3 days and were followed up every month for 6 months and none of them required surgery.

Group – II: Twenty eight patients were in second group (5-6), 7 were operated upon clinical suspicion of high probability of acute appendicitis.

Rest of the 21 cases were not operated, were observed and discharged after 3 to 4 days of stay in hospital and followed up every month for 6 months and none of them required surgery during the period of observation.

Of the 7 patients, whose score was 5-6 who were operated, 5 were males and 2 were females.

Group – III 51 of the patients in third group, 47 patients underwent appendicectomy.

Distribution of cases according to modified Alvarado Score (5-6)

TABLE -2 - DISTRIBUTION OF CASES ACCORDING TO MODIFIED ALVARADO SCORE (5-6)

Category of cases	No. of cases operated	No. of cases with HP appendicitis	No. of Cases without HP appendicitis	Proportion of true positive.
Male (n = 17)	5	3	2	60%
Female (n = 6)	2	1	1	50%
Total (n = 23)	7	4	3	57.1%

3 out of 5 males and 1 out of 2 females had acute appendicitis. The overall negative appendicectomy rate of patients with scores < 6 is 42.9%.

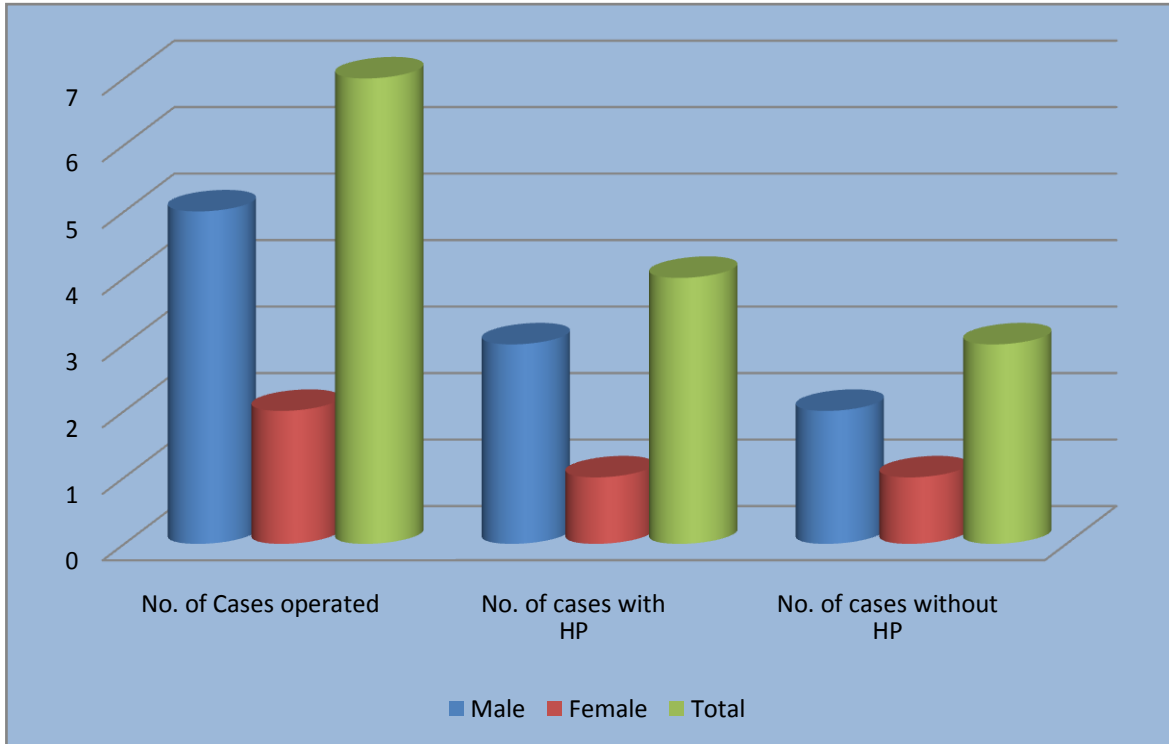


CHART - 1 - DISTRIBUTION OF CASES ACCORDING TO MODIFIED ALVARADO SCORE (5-6)

TABLE - 2 - DISTRIBUTION OF CASES ACCORDING TO MODIFIED ALVARADO SCORE (7-9)

Category of cases	No. of cases operated	No. of cases with HP appendicitis	No. of Cases without HP appendicitis	Proportion of true positive.
Male (n = 31)	31	29	2	93.54%
Female (n = 20)	20	15	0	75%
Total (n = 51)	51	44	2	86.27%

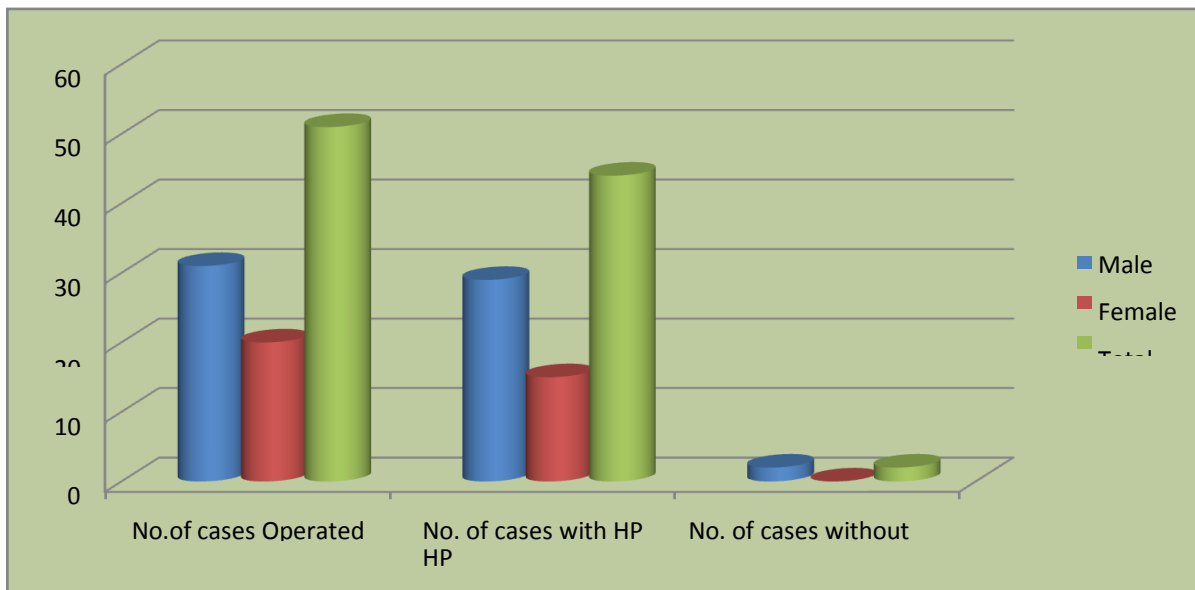


CHART - 2 - DISTRIBUTION OF CASES ACCORDING TO MODIFIED ALVARADO SCORE (7 - 9)

5 female patients on laparotomy had other pathologies like pelvic inflammatory disease, ruptured ectopic pregnancy etc has been discarded

Three patients had pelvic inflammatory diseases, and two patients had ruptured ectopic pregnancy. 44 cases out of 51 cases had acute appendicitis. The sensitivity of modified Alvarado score of > 7 was 86.27% (proportion of true positive).

The sensitivity was highest among males i.e., 93.54% while in females, it was 75%. Negative appendicectomy rates was highest among females (25%), where as in case of males it was 6.46%.

2 males patients with normal appendix had Meckel’s diverticulitis.

TABLE -4 - SEX DISTRIBUTION

Sex	No. of cases with score (1-4)	No. of cases with score (5-6)	No. of cases with score (7-9)	Total	Per (%)
Male	11	21	31	63	62.3%
Female	11	7	20	38	37.62%

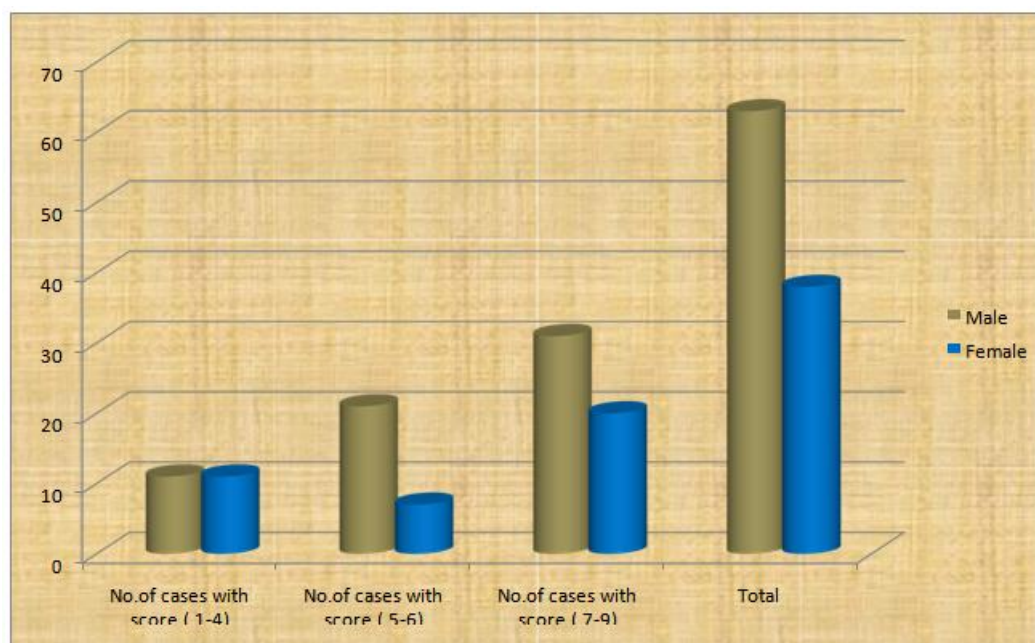


CHART – 3 - SEX DISTRIBUTION

Interpretation

In our study there were 63 (62.37%) male patients , 38 (37.62%) female.

TABLE –6 - SYMPTOMS DISTRIBUTION

Symptoms	No.of cases with score (1-4)	No.of cases with score (5-6)	No.of cases with score (7-9)	Total	Per (%)
Migration of Pain to RIF	3	8	48	59	58.41
Anorexia	15	16	44	75	74.25
Nausea/ Vomiting	7	20	44	71	70.29

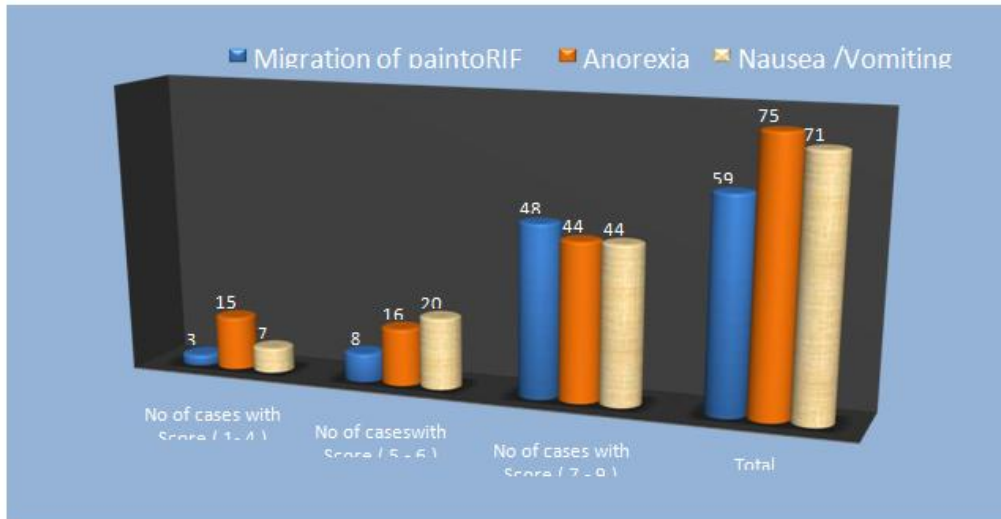


CHART – 4 - SYMPTOMS DISTRIBUTION

Interpretation:

The common symptoms seen in the present study were anorexia (74.25%) and nausea and vomiting (70.29%).

TABLE –7 - DISTRIBUTION OF SIGNS

SIGNS	No. of cases with score (1-4)	No. of cases with score (5-6)	No. of cases with score (7-9)	Total	Per (%)
Tenderness over RIF	5	25	48	78	77.2
Rebound tenderness over RIF	0	7	31	38	37.63
Elevated Temp. > 37.30C	11	20	40	71	70.29

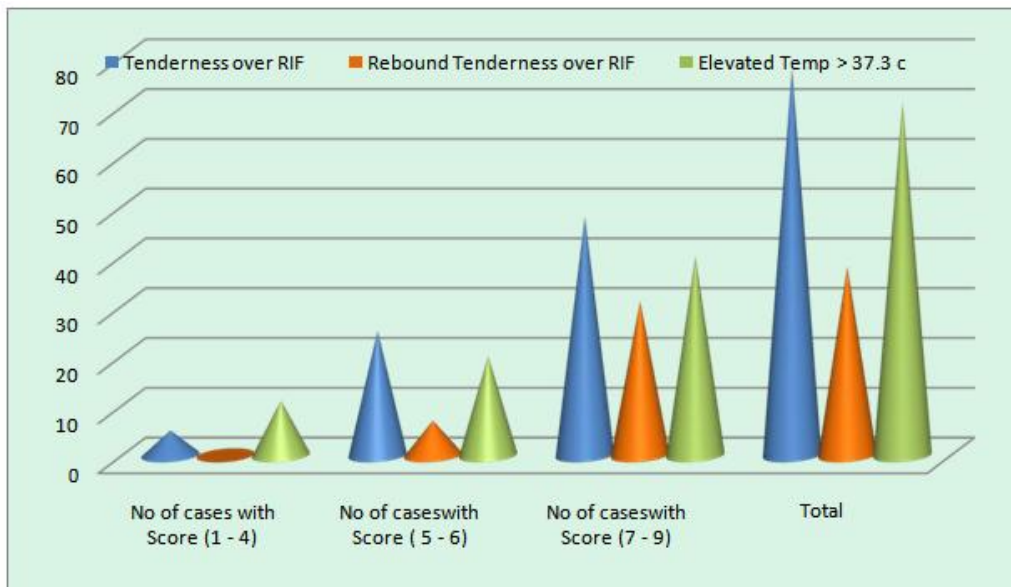


CHART –5 - DISTRIBUTION OF SIGNS

Interpretation:

The most common sign seen in the present study was tenderness over RIF (77.22%) . The next common signs were elevated temperature > 37.30 C (70.29%) and rebound tenderness over RIF(37.63%).

TABLE – 7 - DISTRIBUTION OF LAB DIAGNOSIS

LAB DIAGNOSIS	No. of cases with score (1-4)	No. of cases with score (5-6)	No. of cases with score (7-9)	Total	Per (%)
Tenderness over RIF	8	17	48	73	72.27

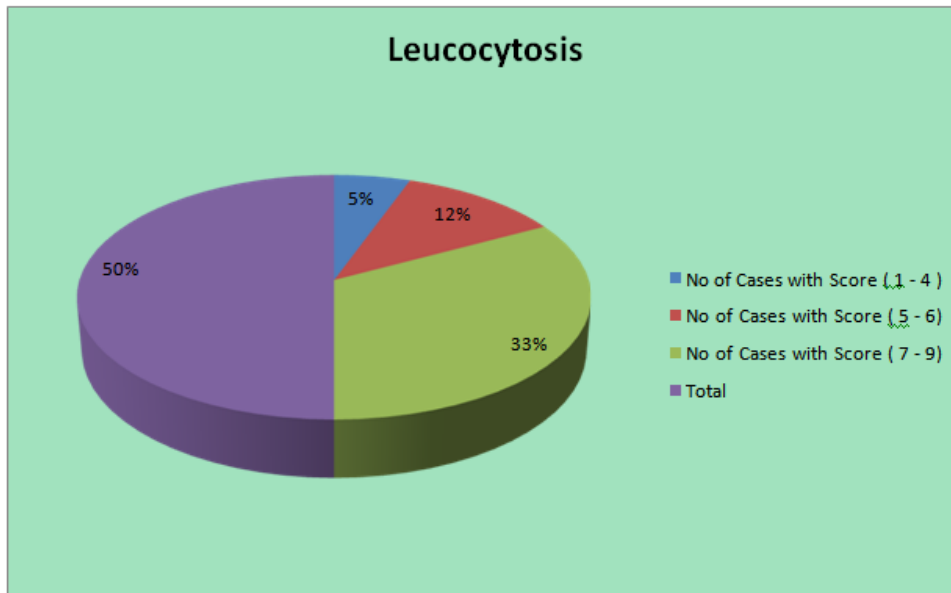


CHART – 6 - DISTRIBUTION OF LAB DIAGNOSIS

Interpretation

The leucocytosis seen in present study is 72.27%

IV. Discussion

The result of present study showed that a high score (>7) in men was a satisfactory aid in the early diagnosis of acute appendicitis, the overall sensitivity in men with scores >7 was 93.54% , with a negative appendectomy rate of 6.46%.

But in females the negative appendectomy rates were quite high in groups with score of 5 to 6 as well as 7 to 9. The negative appendectomy rate in the above groups being 50% and 25% respectively.

Sensitivity of acute appendicitis 93.54% for males in the present study with score of 7 to 9 correlates well with the figures of studies by Kalan M, Rich AJ, Talbot D, Cunliffe WJ (who have reported 93%) and P.K. Bhattacharjee, T. Chowdhary, D.Roy (who have reported 94.1%).

Sensitivity of acute appendicitis 75% for females in the present study with score of 7 to 9 correlates well with the figures of studies by Kalan M, Rich AJ, Talbot D, Cunliffe WJ (who have reported 67%) and P.K. Bhattacharjee, T. Chowdhary, D.Roy (who have reported 71.9%).

The overall sensitivity of acute appendicitis being 86.27% in the present study with score of 7 to 9 correlates well with the figures of studies by Kalan M, Rich AJ, Talbot D, Cunliffe WJ (who have reported 83.7%) and P.K. Bhattacharjee, T. Chowdhary, D.Roy (who have reported 82.7%).

TABLE – 8 - COMPARISION OF MODIFIED ALVARADO SCORE (5-6)

Category	Present Study	Kalan M, Rich AJ, Talbot D, Cuniffe WJ	P.K. Bhattacharjee, T.Chowdhary D.Roy
Male	60%	67%	83.3%
Female	50%	50%	66.7%
Total	57%	62.6%	73.7%

TABLE – 9 - COMPARISION OF MODIFIED ALVARADO SCORE (7- 9)

Category	Present Study	Kalan M, Rich AJ,	P.K. Bhattacharjee,
		Talbot D, Cuniffe WJ	T.Chowdhary D.Roy
Male	93.54%	93%	94.1%
Female	75%	67%	71.9%
Total	86.27%	83.7%	82.7%

V. Conclusion

From the present study it may be concluded that high scores (7-9) in modified Alvarado score is dependable aid in early diagnosis of acute appendicitis in men but the same is not true as far as women are concerned, because of other conditions mimicking appendicitis like pelvic inflammatory disease, ruptured ectopic pregnancy.

It is simple to use and easy to apply since it relies on history, clinical examination and basic lab investigation. It is cost effective and can be used in all rural areas and district hospitals with basic lab facilities.

REFERENCES

- [1]. Peranteau WH, Smink DS: "Appendix, Meckel's and other small bowel diverticula In Manigot's abdominal operations, Michael J Zinner, Stanley W Ashley McGraw Hill; 12th edition, 2013; 643-644.
- [2]. P Ronan O' Connel. "The Vermiform Appendix". Chapter 71. In Bailey and Love's - Short practice of surgery, Norman S Williams, Christopher J.K. Bulstrode, P Ronan O' Connel; London. Arnold: 26th edition. 2013;1199-1214.
- [3]. Alvarado A. "A practical score for the early diagnosis of acute appendicitis". Ann Emerg Med, 1986;15:557-65.
- [4]. Kalan M. et Al. "Evaluation of the modified Alvarado score in the diagnosis of acute appendicitis, a prospective study". Ann R Coll Surg Engl 1994;76:418-9.
- [5]. Bhattacharjee PK, Chowdhury T, Roy D. "Prospective evaluation of Modified Alvarado score for diagnosis of acute appendicitis." J Indian Med Assoc, May 2002; 100 (5): 310- 1, 314.
- [6]. Bernard M Jaffe and David H Berger. "The appendix". Chapter 30. In Schwartz's - Principles of Surgery, F Charles Brunicaudi; New York. McGraw- Hill: 9th edition. 2010;1073-92
- [7]. John Maa and Kimberly S. Kirkwood. "The appendix". Chapter 51. In Sabiston textbook of surgery. Courtney M Townsend, R Daniel, Beauchamp, B Mark Evers, Kenneth L Mattox; Saunders : 2012; 2(19):1279-1293.
- [8]. Ellis H: Appendix, in Schwartz SI (ed): Maingot's Abdominal Operations, 8th ed. Norwalk: Appleton-Century-Crofts, 1985;2:1255.
- [9]. Fitz RH: Perforating inflammation of the vermiform appendix: With Special reference to its early diagnosis and treatment. Trans Assoc Am Physicians 1886;1:107.
- [10]. McBurney C: Experience with early operative interference in cases of disease of the vermiform appendix. NY State Med J 1889; 50:676.

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