

# Validation of Ripasa Score in Diagnosis of Suspected Acute Appendicitis

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## Abstract

**Background:** To assess validation of RIPASA score in diagnosis of suspected acute appendicitis. **Subjects and Methods:** One hundred ten cases of acute appendicitis of both genders were selected. Parameters such as RIF tenderness, RIF guarding, rebound tenderness, Rovsing's sign and fever was recorded. The RIPASA score was computed as per guidelines. RIPASA score of  $<7.5$  was considered as cut off to label a person as high or low probability of appendicitis. **Results:** Baseline characteristics comprised of anorexia in 90%, right iliac fossa pain in 96%, migration of pain in 84%, fever in 87%, nausea and vomiting in 92%, RIF tenderness in 85%, rebound tenderness in 80%, guarding in 37%, Rovsing's Sign in 43%, duration of symptoms  $<48$  hours was seen in 52%, duration of symptoms  $>48$  hours was seen in 48%, negative urine analysis in 96%, positive histopathology in 91% and positive ultrasound sonography in 92%. A non-significant difference was observed ( $P > 0.05$ ). Sensitivity of RIPASA score was 97.4% and ultrasound was 94%, specificity of RIPASA score was 67.5% and ultrasound was 67.2%, positive predictive value of RIPASA score was 97.2% and ultrasound was 97.2% and negative predictive value of RIPASA score was 66.8% and ultrasound was 52.4% [Table 3]. **Conclusion:** RIPASA score can be considered as a useful tool in making clinical decisions. The RIPASA appendicitis scoring system is a promising tool in detecting appendicitis.

**Keywords:** Acute appendicitis, RIPASA, Fever.

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## Introduction

Acute appendicitis is one of the most common surgical emergencies encountered in every surgeon's life with a lifetime prevalence approximately 8%.<sup>[1]</sup> Even in the present scenario of recently developed new diagnostic techniques accurate diagnosis of acute appendicitis and decreasing the burden of negative appendectomy rate remains a challenge for surgeons. Various scoring systems have been developed to assist diagnosis of acute appendicitis.<sup>[2]</sup> These scores combine clinical history and physical examination with few laboratory parameters. Alvarado and modified Alvarado scores are one of the most popular and most common used scores but validity of these scores are low in Asian population.<sup>[3]</sup>

The exact diagnosis of the disease can be made only after surgery and pathological examination of the surgical specimen.<sup>[4]</sup> Diagnostic accuracy can be further improved through the use of ultrasonography or computed tomography imaging. However, these modalities are costly and are not readily available.<sup>[5]</sup> Several scoring systems, such as the Alvarado and modified Alvarado scoring system, have been

introduced since 1986 to help with the clinical decision-making process in achieving an accurate diagnosis of acute appendicitis in the fastest and cheapest way.<sup>[6]</sup>

Raja Isteri Pengiran Anak Saleha Appendicitis (RIPASA) is a new scoring system. RIPASA has been developed for a better diagnosis of acute appendicitis; this score includes 14 clinical parameters, which have higher sensitivity, specificity, and diagnostic accuracy than Alvarado scoring, especially in the Asian population.<sup>[7]</sup> The present study was conducted to assess validation of RIPASA score in diagnosis of suspected acute appendicitis.

## Subjects and Methods

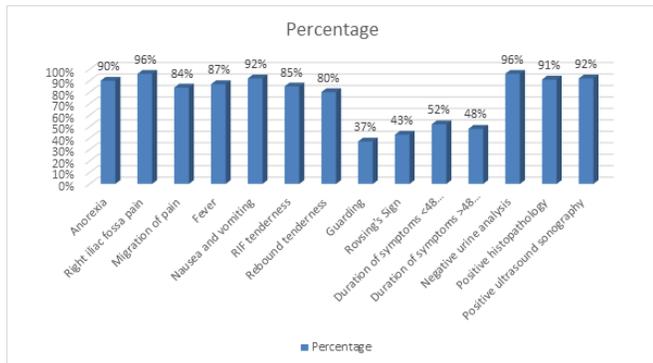
A total of one hundred ten cases of acute appendicitis of both genders. All selected patients were informed regarding the study and their written consent was obtained. Institutional ethical committee approved the study. All patients had pain in right iliac fossa. Exclusion criteria were patients with antibiotic treatment in the past 48 hours for the pain, those not

giving written consent for surgery and pregnant subjects.

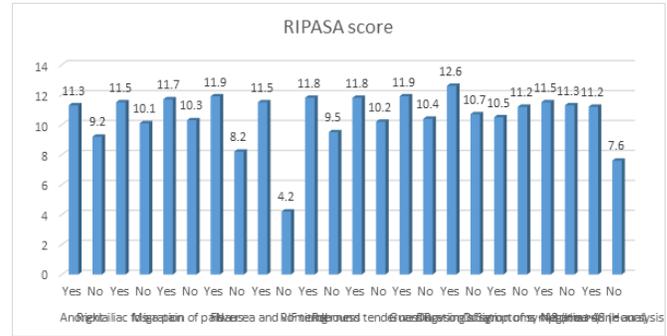
A detailed case history was taken. Parameters such as RIF tenderness, RIF guarding, rebound tenderness, Rovsing’s sign and fever was recorded. Laboratory investigations comprised of CBC, routine urine test. The RIPASA score was computed as per guidelines. RIPASA score of <7.5 was considered as cut off to label a person as high or low probability of appendicitis. Operative notes and histopathology reports were reviewed and correlated with the RIPASA score. Results of the study was compiled and spreads in MS excel sheet for statistical inference. The level of significance was set below 0.05.

## Results

Baseline characteristics comprised of anorexia in 90%, right iliac fossa pain in 96%, migration of pain in 84%, fever in 87%, nausea and vomiting in 92%, RIF tenderness in 85%, rebound tenderness in 80%, guarding in 37%, Rovsing’s Sign in 43%, duration of symptoms <48 hours was seen in 52%, duration of symptoms >48 hours was seen in 48%, negative urine analysis in 96%, positive histopathology in 91% and positive ultrasound sonography in 92%. A non-significant difference was observed ( $P > 0.05$ ) [Table 1, Figure 1].



The mean RIPASA score in patients with anorexia had 11.3 and with no anorexia had 9.2, in patients with right iliac fossa pain had 11.5 and those who had not had 10.1, in patients with migration of pain had 11.7 and those having no had 10.3, in fever was 11.9 and those without fever had 8.2, in patients with nausea and vomiting had 11.5 and those without it had 4.2, in RIF tenderness was 11.8 and without it had 9.5, in rebound tenderness was 11.8 and without it had 10.2, in guarding was 11.9 and without it had 10.4, in Rovsing’s Sign was 12.6 and without it had 10.7, in those having duration of symptoms <48 (Hours) had 10.5 and without it had 11.2, in those having duration of symptoms >48 (Hours) had 11.5 and without it had 11.3 and in negative urine analysis had 11.2 and without it had 7.6. A non-significant difference was observed ( $P > 0.05$ ) [Table 2, Figure 2].



Sensitivity of RIPASA score was 97.4% and ultrasound was 94%, specificity of RIPASA score was 67.5% and ultrasound was 67.2%, positive predictive value of RIPASA score was 97.2% and ultrasound was 97.2% and negative predictive value of RIPASA score was 66.8% and ultrasound was 52.4% [Table 3].

## Discussion

The mortality rates associated with acute appendicitis is reported to be 26% and has dropped to less than 1% due to early surgical intervention and antibiotics.<sup>[8]</sup> Despite being a common problem, acute appendicitis remains a difficult diagnosis to establish, particularly among the young, the elderly and females of reproductive age.<sup>[9]</sup> Failure to diagnose early appendicitis converts acute appendicitis to perforated appendicitis to perforated appendicitis, a disease with potential complication including perforation and sepsis with its attendant morbidity and occasional mortality.<sup>[10]</sup> The diagnosis particularly difficult among the young, the elderly and gynaecological inflammatory conditions.<sup>[11]</sup> Raja Isteri Pengiran Anak Saleha Appendicitis (RIPASA) score has been developed for the diagnosis of acute appendicitis. Raja Isteri Pengiran Anak Saleha Appendicitis (RIPASA) score is a simple qualitative scoring system based on 14 fixed parameters (two demographic, five clinical symptoms, five clinical signs, and two clinical investigations, and one additional parameter FNRIC).<sup>[12]</sup> The present study was conducted to assess validation of RIPASA score in diagnosis of suspected acute appendicitis.

Our results showed anorexia in 90%, right iliac fossa pain in 96%, migration of pain in 84%, fever in 87%, nausea and vomiting in 92%, RIF tenderness in 85%, rebound tenderness in 80%, guarding in 37%, Rovsing’s Sign in 43%, duration of symptoms <48 hours was seen in 52%, duration of symptoms >48 hours was seen in 48%, negative urine analysis in 96%, positive histopathology in 91% and positive ultrasound sonography in 92%. Daber et al,<sup>[13]</sup> evaluated the usefulness of this scoring system in patients with a provisional diagnosis

**Table 1: Baseline characteristics**

Characteristics	Percentage	P value
Anorexia	90%	>0.05
Right iliac fossa pain	96%	
Migration of pain	84%	
Fever	87%	
Nausea and vomiting	92%	
RIF tenderness	85%	
Rebound tenderness	80%	
Guarding	37%	
Rovsing's Sign	43%	
Duration of symptoms <48 (Hours)	52%	
Duration of symptoms >48 (Hours)	48%	
Negative urine analysis	96%	
Positive histopathology	91%	
Positive ultrasound sonography	92%	

**Table 2: Assessment of RIPAS score**

Characteristics	Variable	RIPASA score	P value
Anorexia	Yes	11.3	>0.05
	No	9.2	
Right iliac fossa pain	Yes	11.5	>0.05
	No	10.1	
Migration of pain	Yes	11.7	>0.05
	No	10.3	
Fever	Yes	11.9	<0.05
	No	8.2	
Nausea and vomiting	Yes	11.5	<0.05
	No	4.2	
RIF tenderness	Yes	11.8	<0.05
	No	9.5	
Rebound tenderness	Yes	11.8	>0.05
	No	10.2	
Guarding	Yes	11.9	>0.05
	No	10.4	
Rovsing's Sign	Yes	12.6	<0.05
	No	10.7	
Duration of symptoms	Yes	10.5	>0.05
	No	11.2	
Duration of symptoms	Yes	11.5	>0.05
	No	11.3	
Negative urine analysis	Yes	11.2	<0.05
	No	7.6	

**Table 3: Predictive validity of RIPASA score and ultrasound as compared to histopathology**

Parameters	RIPASA score	Ultrasound
Sensitivity	97.4%	94%
Specificity	67.5%	67.2%
Positive predictive value	97.2%	97.2%
Negative predictive value	66.8%	52.4%

of acute appendicitis in a general hospital. The mean age of study population was 27.25 years and majority were males 29 (72.50%). Clinical presentation by patients included pain in right iliac fossa 39 (97.50%), migration of pain 34 (85%), anorexia 37 (92.50%), nausea and vomiting 39 (97.50%) and fever 33 (82.50%). The mean RIPASA score in the study population was 11. The RIPASA score had sensitivity of 97.3% in predicting histopathology; the specificity of 66.7%, diagnostic accuracy of 95%. RIPASA score has a sensitivity of 97.3% and specificity of 66.7%. The diagnostic accuracy OF RIPASA score was 95%. Considering the high sensitivity and specificity, as compared to previous scoring systems and almost comparable sensitivity and specificity with ultrasonography, RIPASA score can be considered as a useful tool in making clinical decisions in resource poor settings. The RIPASA appendicitis scoring system is a promising tool in detecting appendicitis.

We observed that the mean RIPASA score in patients with anorexia had 11.3, in patients with right iliac fossa pain had 11.5, in patients with migration of pain had 11.7, in fever was 11.9, in patients with nausea and vomiting had 11.5, in RIF tenderness was 11.8, in rebound tenderness, in guarding was 11.9, in Rovsing’s Sign was 12.6, in those having duration of symptoms <48 (Hours) had 10.5, in those having duration of symptoms >48 (Hours) had 11.5 and in negative urine analysis had 11.2. Singh et al,<sup>[14]</sup> in their study 200 patients presented to emergency or surgical OPD with right iliac fossa pain and suspected to have acute appendicitis. In present study of 200 patients, M:F ratio of 1.56:1. Sensitivity of the RIPASA score was 95.89% with specificity 75.92% and diagnostic accuracy of 90.5%, expected and observed rate of negative appendectomy were 8.5 and 12.35%, respectively. So there is net reduction in negative appendectomy rate by 3.85%. RIPASA score at a cutoff value of 7.5 is easier, cheap, and better diagnostic tool in equivocal case of right iliac fossa pain in Indian scenario of limited availability of recent diagnostic tool in remote areas and affordability of these tool in the available set up, simultaneously, it also helps to reduce negative appendectomy rates.

Díaz-Barrientos et al,<sup>[15]</sup> compared the modified Alvarado score and the RIPASA score in the diagnosis of patients with abdominal pain and suspected acute appendicitis. The RIPASA score with 8.5 as the optimal cutoff value: ROC

curve (area .595), sensitivity (93.3%), specificity (8.3%), PPV (91.8%), NPV (10.1%). Modified Alvarado score with 6 as the optimal cutoff value: ROC curve (area .719), sensitivity (75%), specificity (41.6%), PPV (93.7%), NPV (12.5%). The RIPASA score showed no advantages over the modified Alvarado score when applied to patients presenting with suspected acute appendicitis.

### Conclusion

RIPASA score can be considered as a useful tool in making clinical decisions. The RIPASA appendicitis scoring system is a promising tool in detecting appendicitis.

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