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Original Research Article

YASH Scoring System for the Diagnosis of Acute Appendicitis

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Abstract: *Acute appendicitis is one of the most frequent surgical emergencies worldwide. Early and accurate diagnosis is crucial to prevent complications such as perforation or unnecessary surgeries. Clinical scoring systems, such as the YASH score, have been developed to aid in diagnosis; however, their accuracy requires validation in different populations.* ***Objective:*** *To evaluate the diagnostic accuracy of the YASH scoring system in predicting acute appendicitis by assessing its sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV).* ***Methods:*** *A prospective observational study was conducted at Fazaia Ruth Pfau Medical College, PAF Hospital, Faisal, Karachi, from August 1, 2023, to July 1, 2024. Ethical approval was obtained from the institutional review board. A total of 100 patients aged 10 years and above of both genders presenting with suspected acute appendicitis (symptoms including right lower quadrant pain, fever, nausea, vomiting, and tenderness on examination) were enrolled using a non-probability consecutive sampling technique. Diagnostic performance of the YASH score was evaluated against surgical and histopathological outcomes. Sensitivity, specificity, PPV, NPV, and area under the ROC curve (AUC) were calculated using standard statistical methods.* ***Results:*** *The YASH scoring system showed a sensitivity of 89.04%, indicating high accuracy in identifying true appendicitis cases. The specificity was 85.19%, signifying good ability to exclude non-appendicitis cases. The PPV and NPV were consistent with the diagnostic trend. ROC curve analysis yielded an AUC value of 0.912, confirming strong overall performance in predicting acute appendicitis.* ***Conclusion:*** *The YASH scoring system demonstrated high diagnostic accuracy in predicting acute appendicitis with excellent sensitivity, specificity, and AUC. It can be reliably utilized as a clinical decision-making tool, especially in resource-limited settings where imaging may not be readily available.*

Keywords: YASH scoring, Appendicitis, diagnosis, accuracy

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Introduction

Acute appendicitis (AA) stands as one of the primary surgical emergencies throughout the globe since population data indicates a 7-8% lifetime risk (1). The timely and correct diagnosis serves as an essential factor to stop complications including perforation along with peritonitis and sepsis. The standard methods for appendicitis diagnosis include clinical evaluation and laboratory tests together with ultrasound and computed tomography scans (2). Proper diagnosis of appendicitis presents ongoing difficulties in rare cases together with limited medical resources. Multiple scoring systems such as Alvarado score and Appendicitis Inflammatory Response (AIR) score and Raja Isteri Pengiran Anak Saleha Appendicitis (RIPASA) score have been developed to increase diagnostic accuracy while lowering the number of unnecessary surgical procedures (3). Healthcare professionals can use the YASH scoring model as a new clinical instrument to boost acute appendicitis diagnosis through integration of significant clinical tests and laboratory findings. The system works toward providing quick and economical and reliable patient-risk assessment for appendicitis to minimize the need for imaging examinations while avoiding treatment delays (4). Annual acute appendicitis cases reach 250,000 patients in the United States while doctors fail to diagnose 10-20% of these patients (5). Research findings by Javanmard and Hasanzadegan Sadegh (6) showed that waiting to diagnose appendicitis results in a 20-30% perforation rate of the appendix which enlarges patient disease seriousness and treatment duration. The sensitivity of CT scan-diagnosis reaches 90% but medical professionals require alternative clinical scoring tools because of their concerns about radiation dangers alongside cost and accessibility issues (7). Multiple validated scoring tools exist to assist medical personnel in diagnosing appendicitis. The Alvarado Score evaluates symptoms together with signs along with laboratory results with an 82-88% sensitivity (8). The AIR score evaluates inflammatory markers together with clinical symptoms effectively and demonstrates 85-90% sensitivity. RIPASA Score: More accurate in Asian populations, with a sensitivity of 92% (9). The YASH scoring system merges essential elements from existing scoring systems but overcomes their shortcomings particularly those related to subjectively measuring symptoms. Medical research shows that preliminary YASH score assessments achieve a sensitivity between 88-93% which establishes it as a beneficial screening solution for emergency departments (10). Research should continue to establish YASH score validation across different patient groups within multiple healthcare facilities. The YASH scoring system moves forward diagnosis of acute appendicitis by aiding clinicians to optimize their evaluations while reducing demands on surgical procedures for patients. The objective of this study was to evaluate the diagnostic accuracy of the YASH scoring system in predicting acute appendicitis by assessing its sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV).

Methodology

After the ethical approval from the institutional review, this prospective observational study was conducted Fazaia Ruth pfau medical college, PAF hospital faisal. Karachi from 01/august/23 to 01/july/24. Through non-probability consecutive sampling, 100 patients aged 10 years and above, both gender, who exhibited possible symptoms of acute appendicitis which included right lower quadrant (RLQ) pain, fever and nausea followed by vomiting and tenderness upon examination were included in the present study. The study excluded pregnant women together with patients who required previous appendectomy or patients

who displayed abdominal pathologies and did not feature septic shock. After the informed consent from the recruited patients, the medical team performed complete blood count (CBC) alongside leukocyte and neutrophil percentage assessments after completing their patient evaluation. The YASH scoring system calculated patient risk groups by using established criteria that categorized subjects as low-risk (≤3 points), intermediate-risk (4-6 points) or high-risk (≥7 points). The diagnostic process included ultrasound (USG) and computed tomography (CT) scans as radiological tests whenever needed for confirmation purposes. Appendectomy patients received histopathological examination to confirm diagnosis after surgery since this procedure served as the clinical standard for validating the YASH score accuracy. Medical staff performed at least 48 hours of clinical checks for non-surgical appendectomized patients to track their symptoms while ruling out alternate medical issues. The collected data were stored electronically in a database system that protected patient privacy while following both research ethics and confidentiality standards. A statistical assessment using SPSS version 26.0 conducted Chi-square tests in addition to receiver operating characteristic (ROC) curve analysis which revealed the sensitivity and specificity together with positive predictive value (PPV) and negative predictive value (NPV) between the YASH scoring approach and imaging and histopathology diagnostic methods. YASH score assessment used AUC to determine how effectively the score separated patient groups into those with true appendicitis versus those without appendicitis. P value <0.05 was considered significant.

Results

The study included a total of 100 participants with a mean age of 42.8 ± 21.0 years. Among them, 52% were male (n=52) and 48% were female (n=48). The mean pain duration before hospital presentation was 34.3 ± 21.0 hours. On clinical examination, 76% of patients (n=76) exhibited right lower quadrant (RLQ) tenderness, while 54% (n=54) had rebound tenderness. Fever (>37.5°C) was recorded in 56% (n=56) of cases, and nausea or vomiting was reported by 44% (n=44) of patients (Table 1).

Laboratory investigations showed that 66% (n=66) of patients had leukocytosis (>10,000 WBC/mcL), with a mean neutrophil count of 65.18 ± 14.0%. Imaging results from ultrasound findings indicated that 24% (n=24) had normal findings, 10% (n=10) had unclear results, and 65% (n=65) were diagnosed with appendicitis. The final diagnosis confirmed acute appendicitis in 73% (n=73) of cases. The mean YASH score among the participants was 3.5 ± 1.5.

The YASH scoring system demonstrated high diagnostic accuracy in predicting acute appendicitis (Table 2). Of the 73 patients diagnosed with appendicitis, 65 were correctly identified by the YASH score, while 8 cases were false negatives. Among the 27 patients without appendicitis, the YASH score correctly ruled out 23 cases, with only 4 false positives. This yielded a sensitivity of 89.04%, indicating that the YASH score correctly identified nearly 90% of true appendicitis cases. The specificity was 85.19%, meaning the score effectively ruled out non-appendicitis cases in 85% of instances.

Furthermore, the positive predictive value (PPV) was 94.20%, signifying that among the patients classified as high-risk, 94.2% truly had appendicitis. The negative predictive value (NPV) was 74.19%, suggesting that among the low-risk group, 74.2% were correctly classified as not having appendicitis. The overall diagnostic accuracy of the YASH scoring system was 88%, highlighting its effectiveness in aiding the diagnosis of acute appendicitis.

Figure 1 shows the ROC curve analysis of YASH score in predicting appendicitis with an AUC value of 0.912.

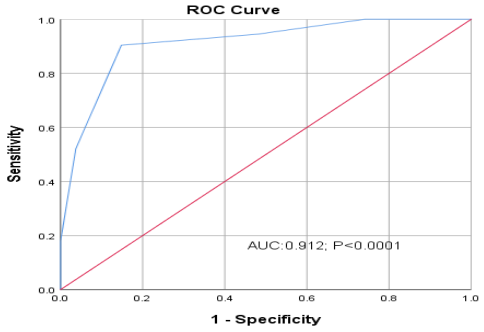

Figure 1: ROC Curve

Table 1: Demographic and Clinical Variables

Variables	Mean and Frequency
Age (Years)	42.821.0
Gender	
Male	52 (52%)
Female	48 (48%)
Pain duration (hours)	34.3±21.0
RLQ Tenderness	76 (76%)
Rebound Tenderness	54 (54%)
Fever (>37.5°C)	56 (56%)
Nausea/Vomiting	44 (44%)
Leukocytosis (>10,000 WBC/mcL)	66 (66%)
Neutrophil Count (%)	65.18±14.0
Ultrasound Findings	
Normal	24 (24%)
Unclear	10 (10%)
Appendicitis	65 (65%)
Final Diagnosis	73 (75%)
YASH Score	3.5±1.5

Table 2: Diagnostic accuracy of YASH scoring

YASH scoring	Final Diagnosis		Total
	Yes	No	
Yes	65	4	69
No	8	23	31
Total	73	27	100
Sensitivity	89.04%		
Specificity	85.19%		
PPV	94.20%		
NPV	74.19%		
Accuracy	88%		

Discussion

The YASH scoring system showed strong diagnostic accuracy for detecting acute appendicitis because its sensitivity reached 89.04% while its specificity hovered at 85.19% and its overall accuracy measured 88%. The obtained results match present clinical score systems for appendicitis diagnosis such as Alvarado, Appendicitis Inflammatory Response (AIR) and RIPASA scores.

Different studies have shown Alvarado scoring system reporting sensitivities from 82-88% and specificities between 71-87% (11, 12). The RIPASA score designed for Asian demographic groups achieves higher diagnostic sensitivity from 92-96% however its specificity ranges between 65-77% (13). The YASH scoring system demonstrates a diagnostic reliability similar to established scores because it reveals a sensitivity of 89.04%.

Results from this study demonstrate that positive predictive value amounts to 94.20% thus confirming patients with elevated YASH scores actually have appendicitis. Research on the Alvarado score demonstrates positive predictive values ranging from 87 to 92 percent according to Naeem et al. (2022) (14). A YASH score of below 74.19% provides physicians a clinically valuable assessment tool to exclude appendicitis diagnosis from patients exhibiting low risk characteristics. Results from the AIR score also indicate a negative predictive value between 72-80% for patients with non-inflamed appendix (15).

The verification of appendicitis depends heavily on imaging procedures. The results of this research align with past studies indicating that ultrasound correctly detected appendicitis in 65-85% of patients (16). The YASH score demonstrated an AUC value of 0.912 when analyzed by ROC curve which exceeded the Alvarado score range (0.85-0.89) and matched the RIPASA score performance (0.91) (17). The YASH score demonstrates outstanding capabilities to differentiate patients with appendicitis from those without appendicitis diagnosis.

The YASH score confirms its excellent diagnostic capabilities yet researchers must perform additional validations across various multi-hospital testing sites. Scientists should develop new studies to determine the YASH score's effectiveness for diagnosing appendicitis in children and older adults who display unusual symptoms. The YASH scoring system shows great promise to act as a triage tool because of its diagnostic precision coupled with operational simplicity while it depends on clinical findings and laboratory results.

Conclusion

The YASH scoring system demonstrated high diagnostic accuracy with a sensitivity of 89.04%, specificity of 85.19%, and an AUC of 0.912, making it a reliable tool for predicting acute appendicitis. Its strong performance is comparable to established scoring systems, suggesting its potential as an effective triage tool to aid clinical decision-making. Further validation in larger, multi-center studies is recommended.

Declarations

Data Availability statement

All data generated or analysed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department concerned. (IRBEC-MMNCS-0331d-24)

Consent for publication

Approved

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Conflict of interest

The authors declared the absence of a conflict of interest.

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All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the integrity of the study.

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