

## Original Research Article

# External validation of Tzanakis scoring system in acute appendicitis in a rural hospital

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### ABSTRACT

**Background:** Acute appendicitis is one of the most common cause of acute abdomen surgery. Several scoring systems have been adopted by physicians to aid in the diagnosis and decrease the negative appendectomy rate. Tzanakis scoring system is one such score. Objective of present study was the validation of this scoring system in our population and compare its accuracy with histopathological examination (HPE).

**Methods:** A retrospective study was carried out at the Department of Surgery at Mohammad Afzal Beigh Memorial Hospital Anantnag India. Tzanakis score was calculated in 288 patients who underwent appendectomy from September 2016-2018 and HPE results were analysed.

**Results:** 276 patients were eligible for the study. The sensitivity and specificity of Tzanakis score in diagnosing appendicitis was 90.66% and 73.68% respectively. The overall diagnostic accuracy was 86.23% with positive predictive value of 97.89% and negative predictive value of 36.84%.

**Conclusions:** Tzanakis scoring system is an accurate modality in establishing the diagnosis of acute appendicitis and preventing a negative laparotomy.

**Keywords:** Appendicitis, Appendectomy, Tzanakis scoring system

### INTRODUCTION

Acute appendicitis is one of the most common surgical emergencies.<sup>1</sup> The incidence is 1.5-1.9 per 1,000 in the population, and is approximately 1.4 times greater in men than in women.<sup>2</sup>

The diagnosis of acute appendicitis is clinically supported by laboratory investigation such as elevated white cell count. Despite being a common problem diagnostic errors are common resulting in median incidence of perforation of 20% and a negative laparotomy rate ranging from 2-30%.<sup>3</sup>

For establishing diagnosis of acute appendicitis Alvarado and modified Alvarado score is widely used. However, these scoring systems have low accuracy.<sup>4</sup> To improve diagnostic accuracy ultrasonography can be added.<sup>5</sup> As such in 2005, Tzanakis and co-workers published a simplified scoring system based on a combination of clinical evaluation, ultrasonography and laboratory marker of inflammatory response. There are four variables and 15 points. A score of 8 or more makes a diagnosis of acute appendicitis and establishes a need for surgery.<sup>6</sup> Sonography is a common radiological investigation that is now routinely available in nearly all health centres. Current study was conducted to establish

the external validity of this scoring system in a rural hospital in our population.

**METHODS**

This was a retrospective study carried out at the Department of Surgery at Mohammad Afzal Beigh Memorial Hospital Anantnag Jammu and Kashmir India. The hospital records of all patients admitted with acute right lower abdominal pain and suspected appendicitis between September 2016 to September 2018 were retrieved from Medical record database of the Hospital. All cases had undergone thorough history and detailed clinical examination at the time of admission as part of routine management. Complete blood picture, total and differential white blood cell counts and ultrasonography were ordered for all as per the hospital protocol. The study population consisted of 288 patients who had undergone emergency appendicectomy. Patients were either subjected to emergency appendicectomy at the time of admission or after few hours of conservative management. Patients who were managed exclusively by conservative management, patients having generalized peritonitis, appendicular abscess, appendicular lump/mass and pregnancy or an alternative diagnosis with normal appearing appendix detected during operation were excluded from the study. Tzanakis score was calculated in all patients. Patients with scores below the cut off value (i.e.<8) were also subjected to surgery based on clinical examination. An established ultrasonographic criteria was followed to differentiate between acutely inflamed appendix from normal. Confirmation of acute appendicitis as the final diagnosis was obtained from a histological analysis of the resected appendix. Ethical approval for the study was obtained from the Ethics Committee Review Board of Mohammad Afzal Beigh Memorial Hospital, Anantnag, Jammu and Kashmir, India.

**RESULTS**

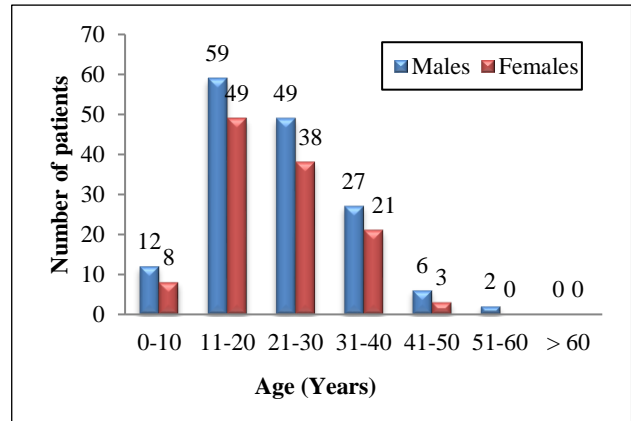
The study population consisted of 288 patients who had undergone emergency appendicectomy. Seven patients had incomplete records. Histopathology was not available in 5 patients. Two hundred seventy-six patients were finally included in study (Figure 1).

One hundred fifty-five were males and 121 were females (Figure 2). Male female ratio was 1.28:1. Mean age of patient was 17 years, ranging from 6-60 years. Majority of cases (n=108) were in 2<sup>nd</sup> to 3<sup>rd</sup> decade of life.

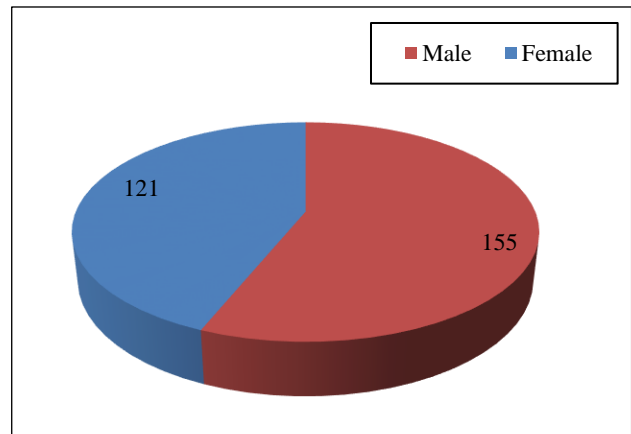
A positive diagnosis of acute appendicitis was confirmed on histological analysis of the resected appendix in 257 patients, while 19 patients had a normal appendix indicating a negative appendicectomy rate of 7% (Table 1).

Majority of the patients had a score ranging from 13-15. All the patients in this group had a positive

histopathological diagnosis of acute appendicitis. None of the patients with a score less than 4 underwent appendicectomy.



**Figure 1: Age and sex distribution.**



**Figure 2: Sex distribution.**

Two hundred thirty-eight patients had a Tzanakis-score ≥8, whereas thirty-eight patients had a score <8 (Table 2).

**Table 1: Tzanakis-score verses histopathological diagnosis.**

Tzanakis -Score	Number of patients	Positive HPE	Normal HPE
0-3	0	0	0
4-6	33	23	10
7-9	40	34	6
10-12	92	89	3
13-15	111	111	0
	276	257	19

The sensitivity and specificity of Tzanakis score in diagnosing appendicitis was 90.66% and 73.68% respectively. The overall diagnostic accuracy was 86.23% with positive predictive value of 97.89% and negative predictive value of 36.84%.

**Table 2: Distribution of cases with Tzanakis score cut off of 8.**

T-score	HPE	
	Positive	Normal
≥8	233	5
<8	24	14

The mean duration of hospital stay was 3 days. The rate of postoperative complications was 2% and consisted mainly of superficial wound infections. All patients were discharged alive.

## DISCUSSION

Male predominance was found in our study with male to female ratio 1.28. Mean age in our study was 17 years which is comparable to other studies. Sharma et al, also reported similar findings in their study. They found mean study population was 24.8±11.69 years with male female ratio 1.13:1.8.<sup>7</sup>

This study has shown a negative appendectomy rate of 6%. Majority of our patients presented late which increases the chance of positive clinical findings as well as laboratory parameters for acute appendicitis. It also increases the sensitivity of sonography. This has probably led to a more accurate preoperative diagnosis and hence the lower rate of negative appendectomy in our setup as was also observed by Kumar et al in their study.<sup>8</sup>

In our study the sensitivity and specificity of Tzanakis score in diagnosing acute appendicitis was 90.66% and 73.68% respectively. The overall diagnostic accuracy was 86.23% with positive predictive value of 97.89% and negative predictive value of 36.84%. This is in accordance to other published studies. Tzanakis et al, reported that sensitivity and specificity of 95.4% and 97.4% respectively.<sup>6</sup> Shashikala V et al reported sensitivity, specificity, positive predictive value and negative predictive value of Tzanakis score 79.62%, 83.3%, 97.72% and 31.25% respectively.<sup>9</sup> Sigdel GS et al, reported sensitivity specificity positive and negative predictive value and overall diagnostic accuracy of Tzanakis score as 91.48%, 97.27% and 33.33% 66.66 and 90% respectively.<sup>10</sup>

This study had some limitations. Study is retrospective in nature. We had relatively small number of patients. Both clinical and ultrasonographic evaluations were done by different persons, allowing place for inter-observer difference in findings.

## CONCLUSION

Despite the recent advancements made in the field of medicine the diagnosis of acute appendicitis remains a problem for the surgeons. Many surgeons and physicians

try different scoring system to make diagnosis more accurate. Good clinical judgment aided by investigations and scoring systems can help to reduce the negative appendectomy rate. Tzanakis scoring system can be used as an effective modality in the establishment of accuracy in diagnosis of acute appendicitis. This only limitation is observer bias which may vary the results.

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*Ethical approval: The study was approved by the Institutional Ethics Committee of Mohammad Afzal Beigh Memorial Hospital, Anantnag, Jammu and Kashmir, India*

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