

ORIGINAL RESEARCH

To determine the usefulness of Tzanakis score in the diagnosis of acute appendicitis

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ABSTRACT

Background: Clinical examination, Ultrasonography, and inflammatory indicators are used in the Tzanakis scoring system. By the application of this reliable Ultrasound-based score for diagnosing acute appendicitis, the process of decision making has improved. Hence, the present study was conducted to assess the usefulness of Tzanakis score in the diagnosis of acute appendicitis.

Material & methods: The present cross-sectional study was conducted over a period of six months to assess the usefulness of Tzanakis score in the diagnosis of acute appendicitis. 50 patients were included in the study. The clinical diagnosis of acute appendicitis was made; the elements of Tzanakis score were recorded in every patient. All the data collected through the proforma were entered into the Statistical Package for Social Sciences (SPSS) version 18.0 and analyzed. The value of $p < 0.05$ was considered statistically significant.

Results: True Positive cases of acute appendicitis on histopathology were 38 and Tzanakis score diagnosed 37 cases of acute appendicitis. True positive were 33, false positive 4, false negative 5, and true negative were 8. Sensitivity of Tzanakis score in diagnosing acute appendicitis was 86.42%, specificity 66.66%, positive predictive value 89.18%, negative predictive value 61.53% and diagnostic accuracy was 76%.

Conclusion: The present study concluded that diagnostic accuracy of Tzanakis score to diagnose acute appendicitis was 76%. Therefore, Tzanakis score at a cut-off total score of 8 is a very useful tool to diagnose acute appendicitis.

Keywords: Diagnostic accuracy, Tzanakis score, acute appendicitis.

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Introduction

The Appendix (Vermiform Appendix) is a vestigial organ in humans, as it has no purposeful function. However, its propensity to inflame makes it useful in surgery. An infection that results in "Acute clinical Appendicitis". Acute appendicitis is an inflammation of the appendix due to common pathology, blockage of the lumen.¹ Although appendectomy is one of the most commonly performed surgical procedure, with a life time risk of 8.6% in men and 6.7% in women, it remains a diagnostic dilemma with the rate of diagnostic problems and hence negative appendectomies reaching as high as 20-33% and 30% respectively.^{2,3} Clinical examination is helpful in diagnosis of acute appendicitis in only 70 to 87% of the cases.⁴ About 20% to 33% of patients with suspected

acute appendicitis have atypical findings making clinical diagnosis difficult which requires plasma markers and imaging techniques.^{5,6} Due to this overlap of symptoms, the rate of negative appendectomy has been reported to range from 20% to 40%.⁷ Different scoring systems are in use for diagnosis of acute appendicitis. Tzanakis scoring system is a combination of clinical examination, ultrasonography (USG) and inflammatory markers. This scoring system has been reported to be 95.4% sensitive, 97.4% specific and 96.5% accurate in diagnosing acute appendicitis.⁸ The present study was conducted to assess the usefulness of Tzanakis score in the diagnosis of acute appendicitis.

Material & methods

The present cross-sectional study was conducted over a period of six months to assess the usefulness of Tzanakis score in the diagnosis of acute appendicitis. 50 patients were included in the study. Both male and female patients between 10 to 50 years of age who presented with right iliac fossa (RIF) pain of less than 3 days duration suspected to have acute appendicitis and who had undergone emergency appendectomy as the primary procedure were included in the study. Patients presenting with non-RIF pain, pregnant, patients having appendicular mass or appendicular abscess and patients who underwent incidental appendectomy were excluded from the study. All the patients were initially assessed by adequate history, thorough examination and investigations (total leukocyte count, urine examination and ultrasound of abdomen) were done. Other investigations such as those required for evaluation of fitness for general anesthesia were also carried out. The clinical diagnosis of acute appendicitis was made; the elements of Tzanakis score were recorded in every patient on presentation and the sum was calculated later so as it played no role in the management of patients. It

consists of four parameters with a total score of 15 including presence of right lower abdomen tenderness (4 points), rebound tenderness (3 points), total leukocyte count $>12,000/\text{mm}^3$ (2 points) and positive findings of acute appendicitis on ultrasonography as presence of thick walled/non-compressible tubular structure with or without peri-appendicular fluid in RIF (6 points). Patients having score greater than 8 were placed in high probability group. Informed written consent was obtained for surgery from participants. Preoperatively, the patients were kept nil by mouth for 6 hours, received intravenous fluids/ antibiotics and analgesics. Appendectomy was performed via Grid iron or Lanz incision and appendectomies, resected appendix was sent for histopathological examination. All the data collected through the proforma were entered into the Statistical Package for Social Sciences (SPSS) version 18.0 and analyzed. Mean and standard deviation was used for quantitative data like age while frequency and percentage were calculated for qualitative data like gender. The value of $p < 0.05$ was considered statistically significant.

Results

A total of 50 patients were included in this study.

Table 1: Comparison of Tzanakis score and histopathology

		Histopathology		Total
		Inflamed	Normal	
Tzanakis score	>8	True Positive 33	False Positive 4	37
	≤ 8	False Negative 5	True Negative 8	13

True Positive cases of acute appendicitis on histopathology were 38 and Tzanakis score diagnosed 37 cases of acute appendicitis. True positive were 33, false positive 4, false negative 5, and true negative were 8.

Table 2: Statistical analysis of Tzanakis score

Parameter	Results
Sensitivity	86.42%
Specificity	66.66%
Positive Predictive Value	89.18%
Negative Predictive Value	61.53%
Diagnostic Accuracy	76%

Sensitivity of Tzanakis score in diagnosing acute appendicitis was 86.42%, specificity 66.66%, positive predictive value 89.18%, negative predictive value 61.53% and diagnostic accuracy was 76%.

Discussion

Acute appendicitis is the most commonly performed surgical procedure with emergency appendectomy making upto 10% of all emergency abdominal surgeries.⁹

True Positive cases of acute appendicitis on histopathology were 38 and Tzanakis score diagnosed 37 cases of acute appendicitis. True positive were 33, false positive 4, false negative 5, and true negative were 8. Sensitivity of Tzanakis score in diagnosing acute appendicitis was 86.42%, specificity 66.66%, positive predictive value 89.18%, negative predictive value 61.53% and diagnostic accuracy was 76%.

Makor A, et al enrolled 160 participants of mean age 30.4 years with male:female ratio of 2:1. The Tzanakis

score had sensitivity of 100% (95% CI 98-100), positive predictive value 97 % (95% CI 95-99), specificity of 64% (95% CI 31-89), negative predictive value of 100%, and overall diagnostic accuracy of 98% with 3% negative appendectomy rate. The study concluded that Tzanakis score is found to be a sensitive and specific tool that should be considered for preoperative diagnosis of acute appendicitis in resource limited settings.¹⁰

IFTIKHAR A, et al found the sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy of Alvarado score at optimal cut-off threshold of ≥ 7.0 , were calculated as 74%, 55%, 90%, 27% and 71.66% respectively. The cut-off threshold point of Tzanaki score was set at more than 8, which yielded a 94.11% sensitivity and an 88.88% specificity. The positive predictive value was 99.95% and the negative predictive value was 72.72%. The Alvarado and Tzanaki scoring systems had negative appendectomy rates of 9.5% and 2.04%, respectively. The study concluded that Tzanaki scoring system has a better diagnostic accuracy for acute appendicitis as compared to the Alvarado score.¹¹

Vasanthan K, et al conducted a study among the 50 patients analyzed, Tzanakis' specificity was 100%, but HPE expected Alvarado's was 81.82 percent. The accuracies of both scores likewise differed greatly. The Tzanakis score predicted 100% accuracy, while the Alvarado score predicted 50% accuracy. In a prior study, Tzanakis scored outperformed Alvarado in predicting acute appendicitis. Conclusion: For diagnosing acute appendicitis, Tzanakis's scoring system is a relatively appropriate scoring system to use compared with that of Alvarado.¹²

Shrestha D, et al found the sensitivity, specificity of Tzanakis score of all 320 patients who underwent appendectomy was 84% and 71% respectively. The diagnostic accuracy was 84% with positive predictive value 98% and negative predictive value 17%. Conclusions: The Tzanakis scoring system is simple, effective and easy to be applicable for the diagnosis of acute appendicitis.¹³

Conclusion

The present study concluded that diagnostic accuracy of Tzanakis score to diagnose acute appendicitis was 76%. Therefore, Tzanakis score at a cut-off total score of 8 is a very useful tool to diagnose acute appendicitis.

References

1. Sheikh S, Mohmad S, Malik MA, Anjum N, Waqar-ul-Hamid IU, Ahamad R. A Study of SNOT 22 Scores in Adults with no Sinonasal Disease. EXECUTIVE EDITOR. 2016 Jul 1;1:3156.
2. Shuaib A, Shuaib A, Fakhra Z, Marafi B, Alsharaf K, Behbehani A. Evaluation of modified Alvarado scoring system and RIPASA scoring system as diagnostic tools of acute appendicitis. World journal of emergency medicine. 2017; 8(4):276.-280. Doi: 10.5847/wjem.j.1920- 8642.2017.04.005.
3. Karapolat B. Can RIPASA Scoring System Predict the Pathological Stage of Acute Appendicitis? Emergency Medicine International 2019; Article ID 8140839. <https://doi.org/10.1155/2019/8140839>.
4. Rajbhandari AP, Dhakal N, Koirala R, Shrestha ML. Comparison of ultrasonographic diagnosis with 'Tzanakis' Score in acute appendicitis. J Soc Surg Nepal. 2016;19(1):9-12. DOI:10.3126/JSSN. V19I1.24549
5. Schellekens DHSM, Hulsewé KWE, Van Acker BAC, Van Bijnen AA, De Jaegere TMH, Sastrowijoto SH, et al. Evaluation of the diagnostic accuracy of plasma markers for early diagnosis in patients suspected for acute appendicitis. AcadEmerg Med. 2013;20(7):703-10. DOI: 010.1111/acem.12160 PMID: 23859584
6. Baird DLH, Simillis C, Kontovounisios C, Rasheed S, Tekkis PP. Acute appendicitis. BMJ. 2017;357:j1703. DOI: 10.1136/bmj.j1703 PMID:28424152.
7. Soder BL, Dart BW, Stanley JD. Appendicitis current practices in a tertiary referral center. American Surgeon. 2016;82:E45-6. DOI:10.1177/000313481608200204
8. Tzanakis NE, Efstathiou SP, Danulidis K, Rallis GE, Tsioulos DI, Chatzivasilou A, et al. A new approach to accurate diagnosis of acute appendicitis. World J Surg. 2005;29(9):1151-6. DOI: 10.1007/s00268-005- 7853-6 PMID: 16088420s
9. Pal KM, Khan A. Appendicitis, a continuing challenge. J Pak Med Assoc. 1998; 48: 189-92.
10. Makor A, Jombwe J, Galukande M, Elobu AE. Diagnostic accuracy of the Tzanakis score for acute appendicitis in a resource-limited setting: A tertiary hospital-based survey. East and Central African Journal of Surgery. 2018 Dec 31;23(3):100-3.
11. IFTIKHAR A, ARSALAN M, AZAZ S, WAQAR S, SHAH SA, AHSAN MF. A Comparison between the Diagnostic Accuracy of Alvarado and Tzanaki Scoring Systems in Acute Appendicitis. P J M H S Vol. 15, No.12, DEC 2021:3175-77.
12. Vasanthan K, Saravanan N S. Accuracy of Acute Appendicitis Prediction Using Alvarado Score and Tzanaki's Score. Int J Sci Stud 2021;9(6):107-112.
13. Shrestha D, Baral D. Tzanakis score as a diagnostic tool for an acute appendicitis: An institution-based retrospective study. JGMC Nepal. 2023;16(1): 41-4. DOI: 10.3126/jgmcn.v16i1.50566