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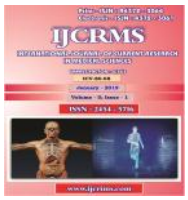

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Prevalence of appendicitis in Iranian patients with acute abdominal pain: a systematic review and meta-analysis

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Abstract

Introduction: Acute abdominal pain is one of the common causes of referral to the emergency department, and although it is spontaneously improved in some cases, it is a symptom of important and acute abdominal issues that can even lead to patient death in a large number of cases.

Methods: The present systematic investigation applies developed methods that are consistent with the accurate instructions in the PRISMA check list. Observational studies, including posting to editors, publications, poor quality articles (based on the Hoy's tool) and studies on adult subjects were only excluded from the study. Only articles in English and Persian are included.

Results: 3 studies conducted on 2173 Iranian patients were included in the meta-analysis. In Iranian patients, the overall Prevalence of appendicitis in Iranian patients with acute abdominal was 15.3%(95% CI :13.9 % , 16.8%; I^2 = 98.9%) .

Discussion: Repeated examination in patients with non-specific signs and symptoms of abdominal pain is very helpful in the diagnosis and treatment of patients and can significantly reduce unnecessary appendectomy cases.

Keywords: Acute abdominal pain ,appendicitis , acut abdomen , prevalence.

Introduction

Acute abdominal pain is one of the common causes of referral to the emergency department, and although it is spontaneously improved in some cases, it is a symptom of important and acute abdominal issues that can even lead to patient death in a large number of cases (1). The natural process of acute abdominal pain depends entirely on its causative agent; in some patients, it may automatically recover with or without treatment, while in others in which the causative agent is somehow dangerous and risky, it can lead to generalized peritonitis and death (2). The diagnosis of acute abdominal pain is still an important aspect in treating patients (3). In order to diagnose correctly, supplementary diagnostic methods, including radiology, ultrasound and lab testing, are commonly needed, and especially advanced imaging techniques such as CT scan plays a significant role during the process of diagnose; currently, laparoscopic video is used to diagnose and treat this disease (4). However, surgery for acute abdominal pain is one of the most difficult issues for surgeons to deal with, and an accurate knowledge of anatomy and abdominal

physiology will lead to a differential diagnosis of the causes of acute abdominal pain (5). Surgery is often essential as an effective treatment (6). Errors and mistakes in the diagnosis or delay of treatment can lead to patient death. The complexity of abdominal acute pain surgery is demands proper knowledge of the causes of the disease, as well as examination and diagnostic investigations with the scientific method to prevent mortality of the patients; additionally, making haphazard and un-analyzed decision by the surgeon in the treatment of this disease may lead to misdiagnosis and unnecessary surgery (7). Diagnosis and timely treatment of patients suspected of acute appendicitis is often based on clinical examinations; despite huge advances made in the field of diagnosis in this regard, the correct diagnosis of this disease remains still and essential problem (8). Nonetheless, proper integration of clinical examinations with laboratory tests canreduce the unnecessary surgeries by 20 to 30 percent (9). The accuracy of diagnosis in patients with intermediate symptoms of acute appendicitis is improved by observation and recurrent examination.

Materials and Methods

The present systematic investigation applies developed methods that are consistent with the accurate instructions in the PRISMA check list.

Inclusion and exclusion criteria

Observational studies, including posting to editors, publications, poor quality articles (based on the Hoy's tool) and studies on adult subjects were only excluded from the study. Only articles in English and Persian are included.

Sampling methods and sample size

All observational studies with any sampling and statistical surveys were included in the present systematic study.

Research strategy

Two separate researchers conducted studies until November 2018 at international (PubMed, Google Scholar, and WOS) and national (SID and Magiran) databases in English and Persian, without any time limit. We examined a list of available articles sources for further related article searches. Specific research strategies have been developed using the MESH vocabulary explorer and free vocabularies, according to the PRESS standard, by a Health scientist librarian specializing in research on systematic review. We used the MEDLINE research strategy to investigate other databases. The key words used in the research strategy included: Acute abdominal pain ,appendicitis , acute abdomen , prevalence , frequency and Iran, which were combined with Boolean agents such as AND, OR, NOT.

Selection of research and data extraction:

Two separate researchers examined the titles and abstracts by considering qualifying criteria. After removing the repetitive research, the full text of the research was examined depending on the qualifying criteria and the required data was extracted. To answer questions regarding qualifications, additional research information was obtained from the authors in case it is required. The general information (first author, province, and year of publication), research characteristics (sampling method, research design, location, sample size and bias risk), and the measurement of results (prevalence of appendicitis) were also collected.

Quality assessment and abstraction:

Hoy's et al. tool was used to assess the methodological quality and the risk of getting away from the truth (bias) for each one of the observational studies. This tool evaluates 10 items for assessing the quality of studies in two dimensions such as foreign (items 1-4, target population, sampling frame, sampling method and the minimum deviation from response) and domestic credits (the issues 5-9 of the data collection method, case definition, research tool, data collection mode were assessed while the issue 10 of the bias evaluation was related to data analysis). The higher index indicated that the bias is likely to reduce and the lower index indicated the risk of more bias. The separate bias risk was investigated by two researchers. Consensus was used to solve the disagreements.

Data combination:

The final data extracted using the STAT 14.0 statistical software, including studies combined with stock diagram and the prevalence of appendicitis, were assessed with random effect of the model.

Results

In the initial search conducted in different databases, 401 articles were reviewed. From among these articles, as many as 336 were considered as duplicate in the screening process of titles and abstracts. As many as 53 articles were excluded for having irrelevant titles. From among the 12 remaining articles, 3 articles met the eligibility criteria. From the 9 articles that were excluded, 3 articles were reviews, 2 articles were letters to editor, 2 article did not have a full text, and 2 articles had poor quality that could not be included in the present study (Figure 1).

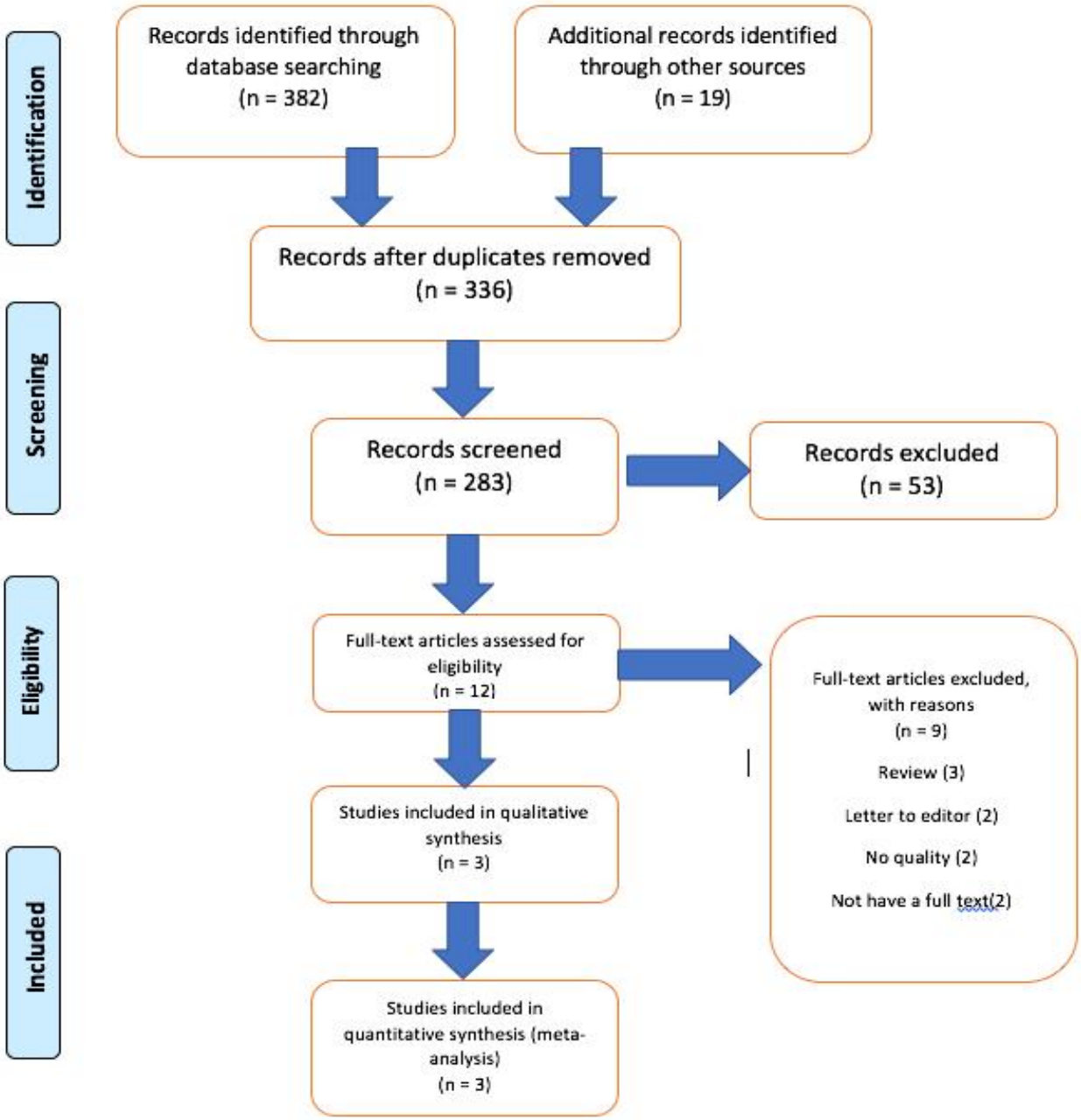

Fig 1. Study selection process

Research characteristics

These 3 studies were conducted on 2173 Iranian patients. all of the 3 studies, provided cross-sectional data. Out of the 3 studies, two were from Yazd and sanandaj(kordestan), one was from Rafsanjan(kerman) province. The place to conduct the studies was in the hospital (n = 3). all of the 3 research studies were included in the final analysis context. (Table 1).

Table 1. Studies included in the systematic review

First Author	year	Provence	Sample size	frequency	Risk of bias
Forousannia[17]	2000	Yazd	400	0.32	Low
Rezaeinasab [18]	2003	Rafsanjan	897	0.08/29	Low
Fallahi [19]	2000	Sanandaj	876	0.20	Moderate

Prevalence of appendicitis in Iranian patients with acute abdominal pain:

3 studies conducted on 2173 Iranian patients were included in the meta-analysis. In Iranian patients, the overall Prevalence of appendicitis in Iranian patients with acute abdominal was15.3%(95% CI :13.9 % , 16.8%; I^2 = 98.9%) [Table 2].

Table 2 :Prevalence of appendicitis in Iranian patients with acute abdominal pain

ID	First Author	Year	Province	ES	95% CI for ES		% Wight
					Lower	Up	
1	Rezaeinasab	2003	Rafsanjan	0.32	0.29	0.35	22.87
2	Fallahi	2000	Sanandaj	0.083	0.065	0.101	63.39
3	Forouzanniya	2000	Yazd	0.20	0.161	0.239	13.74
Sub-total Random pooled ES	----	-----	------	0.153	0.139	0.168	100

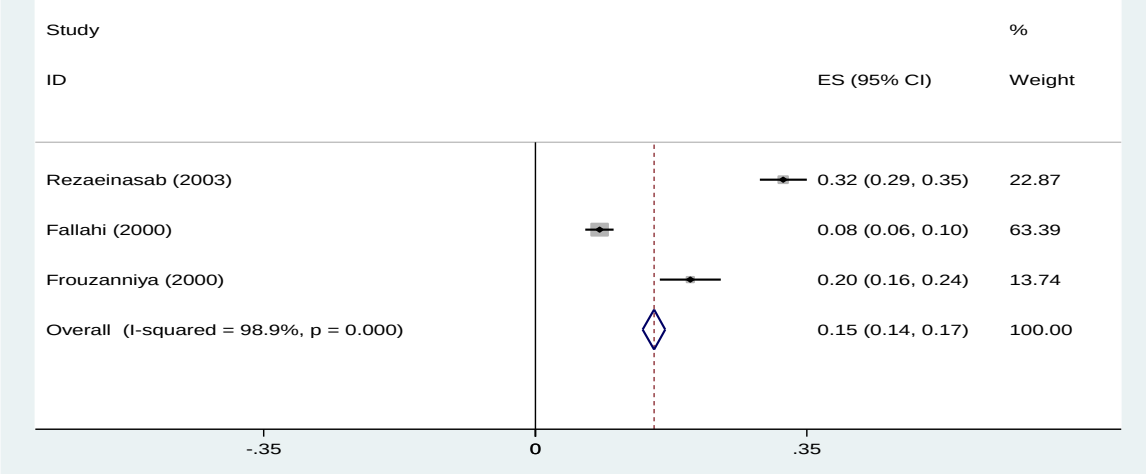

Fig. 2 :Prevalence of appendicitis in Iranian patients with acute abdominal pain and its 95% interval for the studied cases according to the year and the city where the study was conducted based on the model of the random effects model. The midpoint of each section of the line estimates the% value and the length of the lines showing the 95% confidence interval in each study. The oval sign shows Prevalence of appendicitis in Iranian patients with acute abdominal pain .

Discussion

3 studies conducted on 2173 Iranian patients were included in the meta-analysis. In Iranian patients, the overall Prevalence of appendicitis in Iranian patients with acute abdominal was 15.3%(95% CI :13.9 % , 16.8%; I^2 = 98.9%) .Repeated examination is one of the least costly and most useful ways to diagnose acute appendicitis (10).Observation of patients with acute appendicitis with multiple symptoms is important for their specific and negative aspects(11). Firstly, considering the inflammatory nature of acute appendicitis, the course of the symptoms of the patient becomes apparent over time(12). These symptoms include increased tenderness and local symptoms of the appendix, worsening of the general signs of the patient (fever and symptoms) and changes in the results of repeated para-clinical tests to detect minor changes (13). Therefore, observing patients is very useful and important (14).

The rate of negative appendectomy was higher in women than in men, indicating a high percentage of diagnostic errors in acute appendicitis in women mainly due to female genital diseases such as ovarian cystic torsion, ectopic pregnancy, and perforation of ovarian cysts in ovarian cysts with opendicitis; as a result, an unnecessary appendectomy can be avoided with more precise clinical examination, as well as observing such patients (15). The use of the present study would be more efficient and practical for women, because it is more difficult to diagnose acute appendicitis in women, and suspicious cases might must be kept under strict supervision. Also, due to the high cost of many photographic and laboratory methods in acute appendicitis, this method is very helpful for treatment centers that do not have extensive laboratory and para-clinical facilities(16). Finally, it can be concluded that repeated examination in patients with non-specific signs and symptoms of abdominal pain is very helpful in the diagnosis and treatment of patients and can significantly reduce unnecessary appendectomy cases.

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