International Journal of Advanced Research in Biological Sciences
ISSN: 2348-8069
www.ijarbs.com
DOI: 10.22192/ijarbs Coden: IJARQG(USA) Volume 6, Issue 4 - 2019

Research Article

DOI: http://dx.doi.org/10.22192/ijarbs.2019.06.04.003

The prevalence of rheumatic heart disease among Iranian children: A systematic review and meta-analysis

Halime Aali

Department of Internal Medicine, Zabol University of Medical Science, Zabol, Iran.

Abstract

Objective: the aim of this study was to evaluate the prevalence of rheumatic heart disease among Iranian children**.**
Method: the researchers searched the electronic databases including the international databases (MEDLINE [PUBMEDINTERFACE], GOOGLE SCHOLAR and ISI web of science [web of scientific interface]), the national databases (MAGIRAN, SID), and the related national journal**.** Hoy et al's risk of bias tool was applied for assessing the quality of the study
Result: These studies had been conducted on 1542171 participants. The main design of the studies was cross sectional. studies were from Hamedan,Tehran and Khorasan Province. Based on the results of random effects model, The prevalence of rheumatic heart disease among Iranian children in 1542171 patients was %004 (95% confidence interval [CI]: - 0.047, 0.056 %)
Discussion and conclusion: The prevalence of mitral valve involvement especially its isolated involvement is more common in patients. Thus, in dealing with suspected cases, it is essential to give more attention to mitral valve involvement. The recurrence of rheumatic fever is more frequent in patients with the concurrent involvement of both aortic and mitral valves. Thus, in dealing with such patients, it is essential to give due attention to the disease recurrence.

Keywords: rheumatic fever, rheumatic heart disease, cardiac complication, rheumatisem

Introduction

Rheumatic fever is one of the most common causes of children's chronic heart disease all over the world (1). Although the incidence rate of this disease has significantly reduced in developed and modern countries, rheumatic fever and rheumatic heart disease are still regarded as major cardiovascular problems in developing countries (2).

Like acute rheumatic fever, the chronic rheumatic heart disease is frequently seen in areas in which the life standards are very low (3).Given their improved social and economic conditions, the recurrence and severity of the disease have reduced in Western Europe and the United States even before their access to antibiotics and prevention measures (4). Rheumatic fever and rheumatic heart disease is still regarded as one of the most important causes of heart valve disease in developing countries (5). Not only rheumatic fever and its recurrence but also the grave form of the disease is seen as heart valve disease in children; it results in the increased pressure of pulmonary arteries (6).

Most of these patients need operations; if operations are not performed, they will die before they are 20 years old (7).

In such patients, the recurrence of rheumatic fever and carditis is associated with the destruction of cardiac tissues and heart valves and increases the mortality

rate (8). Moreover, the incidence of bacterial endocarditis is deadly and catastrophic in these patients. In spite of the decreased rate of rheumatic heart disease over the recent decades, there have been numerous reports on the recurrence of rheumatic heart disease in both America and Europe as early as 1985 (9). The inflammatory involvements of other organs in a rheumatic fever are irreversible and uncomplicated (10). However, the most serious manifestation of this disease is carditis. Cardiac involvement can create a severe and threatening inflammatory process in heart or leave a chronic lesion that results in a heart scar and dysfunction of both valves and heart itself (11). The incidence rate of rheumatic heart disease varies in different countries; it depends on numerous factors including race, epidemiology, etc. The prevalence rate of rheumatic heart disease is 0.5-3.1% in one thousand people in developed countries (12). However, the prevalence rate of rheumatic heart disease is 100-150 cases in one hundred thousand people in developing countries.

The significance of acute rheumatic fever is related to the disease prevalence, prevention, and its mortality rate in the population (13). This disease is one of the late complications of group A beta-hemolytic streptococcal infection in the respiratory system. This disease is a distributed inflammatory complication that commonly involves heart connective tissue, joints, brain, blood vessels, and subcutaneous tissue (14). Moreover, it can be prevented by the early prescription of antibiotics (penicillin).

Materials and Methods

Eligibility criteria

The method applied for this systematic review was PRISMA guidelines (Moher et al, 2009). Observational studies were included in the present study as well. Moreover, case studies, case reports, clinical trials, and reviews (systematic and narrative reviews) were excluded. The related literature was collected by using medical subject headings (MeSH) and keywords related to rheumatic heart disease in Iran. For findings the related studies, the researchers searched the electronic databases including the international databases (MEDLINE [PUBMEDINTERFACE], GOOGLE SCHOLAR and ISI web of science [web of scientific interface]), the national databases (MAGIRAN, SID), and the related national journal. The formal screening procedure was conducted by two researchers and based on the eligibility criteria as well as consensus (in case of disagreements). The full texts of the articles were provided for all headings having the required eligibility criteria. Other information was collected from the study, so that all questions regarding the eligibility criteria were responded. The exclusion criteria were recorded. None of the authors of the review had any prejudices about the journals, authors, and institutions related to the study. The data extraction items included the general information (corresponding author, publication year, and province), characteristics of the study (study design, sampling method, data collection tool, research location, sample size, abbreviated heading, characteristics of the questionnaire, and psychometric features), and participants' characteristics (demography and sample size). Hoy et al's risk of bias tool was applied for assessing the quality of the study (Hoy et al, 2012).

Results

Research selection

In total, in the initial search, as many as 263 articles were obtained from different databases. From 239 non-duplicate studies, 214 articles were excluded for having non-related subjects. From the remaining 25 studies, 3 cases had the required legibility criteria. From 21 excluded articles, 3 cases were reviews, 7 articles were qualitative, 1 case was letter to the editor, 10 cases were not full texts.

Characteristics of the study

These studies had been conducted on 1542171 participants. The main design of the studies was cross sectional. These studies had been conducted only in 3 provinces out of 31 provinces of the country. Studies were from Hamadan, Tehran and khorasan Province. Most of the studies had been conducted in medical centers (n=3). The studies had been conducted with a simple random sampling method and had low likelihood bias (n=3) (figure 1).

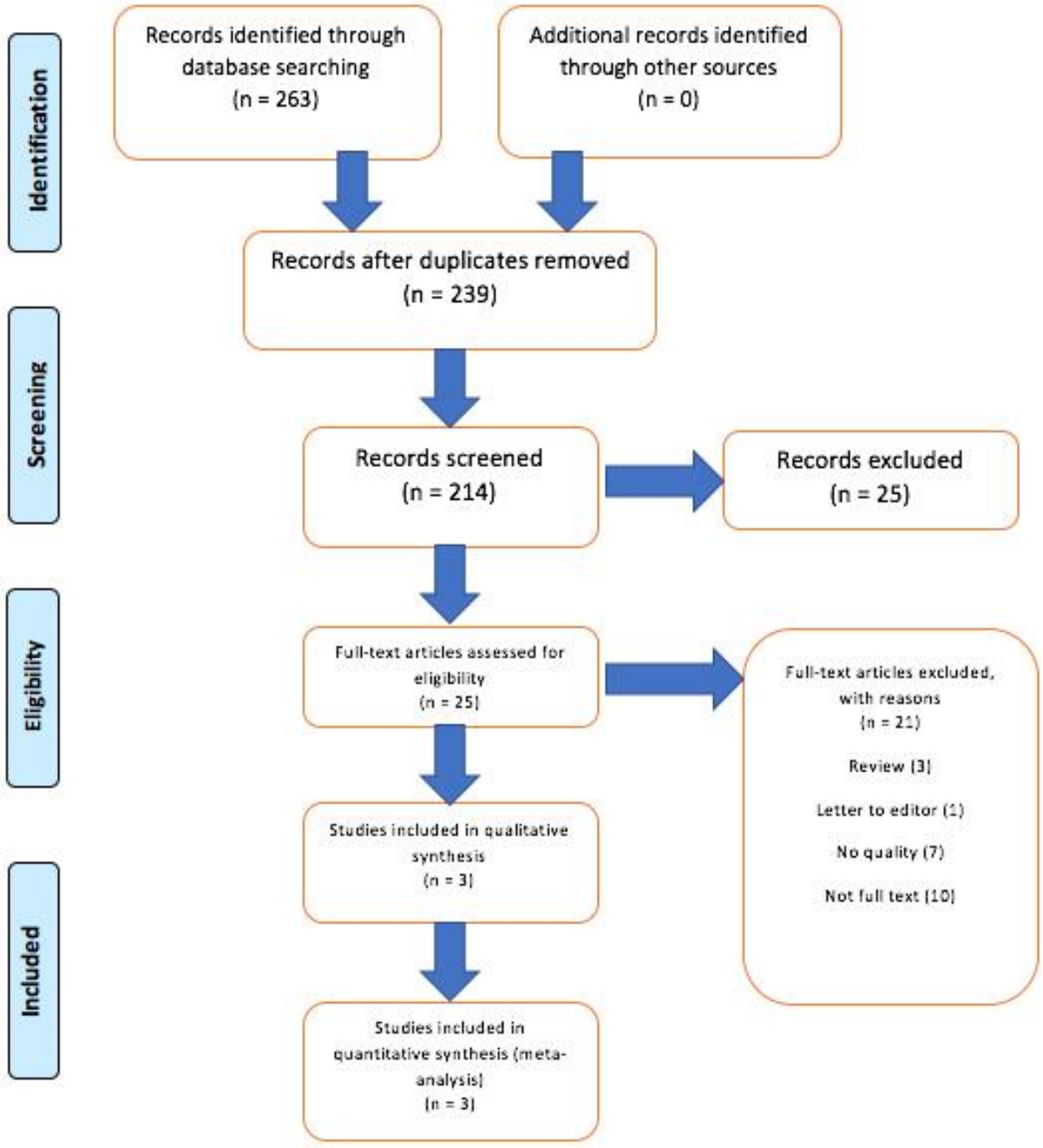

Fig 1.

Table 1: Characteristics of final included studies about prevalence of rheumatic heart disease among Iranian children

ID	Author	Year	N	Province	Prevalence	age	Bias
1	Mahmoodi[22]	2003	167786	Hamedan	1.37	-	Low
2	Zeynaloo[23]	2001	320.000	Tehran	0.036	11±6	Low
3	Dadgar[24]	2000	1054385	Khorasan	0.02	-	Low

Meta-analysis prevalence of rheumatic heart disease among Iranian children:

Based on the results of random effects model, The prevalence of rheumatic heart disease among Iranian children in 1542171 patients was %004 (95% confidence interval [CI]: -0.047, 0.056 %) (table 3) .

Table 2: shows the quality of the articles that is calculated using a checklist which includes 5 criteria.

Author	year	Sample size	age	echocardiography	Doppler echocardiography	angiography
Zeynaloo	2001	√	*	√	√	√
Mahmoodi	2003	√	√	√	√	*
Dadgar	2000	√	*	√	*	*

Table 3: The prevalence of rheumatic heart disease among Iranian children

Study	Year	ES	95% conf. Interval		%weight
			Low	Up	
Mahmoodi	2003	0.137	-0.418	0.692	0.86
Zeynaloo	2001	0.004	-0.061	0.068	62.8
Dadgar	2000	0.002	-0.083	0.087	36.3
Pooled ES	------	0.004	-0.047	0.056	100

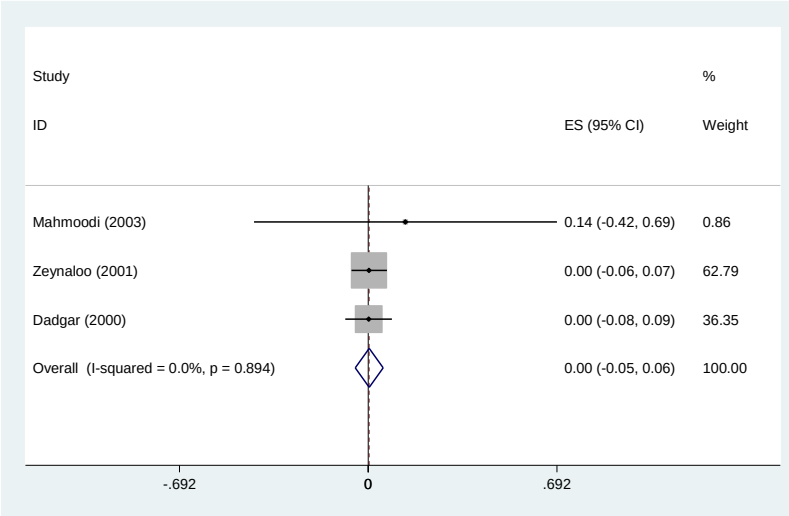

Fig. 2 : The prevalence of rheumatic heart disease among Iranian children and its 95% interval for the studied cases according to the year and the city where the study was conducted based on the model of the random effects model. The midpoint of each section of the line estimates the% value and the length of the lines showing the 95% confidence interval in each study.

Discussion

Based on the results of random effects model, The prevalence of rheumatic heart disease among Iranian children in 1542171 patients was %004 (95% confidence interval [CI]: - 0.047, 0.056 %). Rheumatic fever is classified as one of the disease of connective tissue or collagen vascular. Collagen fibrils and connective tissue are damaged in this disease. This rheumatic process creates an inflammatory reaction involving different organs including heart, joints, and central nervous system (15). The clinical symptoms of rheumatic fever are observed following the infection of adenoids with group A streptococcus after

a delayed period for two weeks. The significance of acute rheumatic fever is its capability in creating heart valve fibrosis resulting in a hemodynamic disorder associated with chronic heart disease (16). The cardiac rheumatic involvements is observed as pancarditis involving endocardium, myocardium, and pericardium. Clinically speaking, rheumatic carditis is always associated with heart murmur and valve inflammation; in such cases, it is recommended to conduct examinations including electrocardiography and echocardiography for suspected cases. Valve inflammation involving mitral and aortic valves and tendinous cords of mitral valve confirm the diagnosis of rheumatic carditis (17).Mitral regurgitation is the main characteristic of rheumatic carditis. The involvement of pulmonary and tricuspid valves are rare to occur. Mitral regurgitation is likely to result in heart failures that causes death in severe forms.

The significance of acute rheumatic fever is related to the prevalence of the disease, prevention, and its mortality in the population (18 and 19).This disease is one of the late apyogenous complications of group A beta-hemolytic streptococcal infection in the respiratory system (20). This disease is a distributed inflammatory complication that commonly involves heart connective tissue, joints, brain, blood vessels, and subcutaneous tissue. Moreover, it can be prevented by the early prescription of antibiotics (penicillin) (21).

Cardiac rheumatic involvement is almost the same in boys and girls. The most prevalent age for this disease is school age. Thus, it is essential to pay more attention toward the primary and secondary prevention of streptococcal infection in school age. The prevalence of mitral valve involvement especially its isolated involvement is more common in patients. Thus, in dealing with suspected cases, it is essential to give due attention to mitral valve involvement. The recurrence of rheumatic fever is more frequent in patients with the concurrent involvement of both aortic and mitral valves. Thus, in dealing with such patients, it is essential to give due attention to the disease recurrence.

References

1. Paar JA, Berrios NM, Rose JD, Cáceres M, Peña R, Pérez W, Chen-Mok M, Jolles E, Dale JB. Prevalence of rheumatic heart disease in children and young adults in Nicaragua. The American journal of cardiology. 2010 Jun 15; 105(12):1809-14.
2. Marijon E, Mirabel M, Celermajer DS, Jouven X. Rheumatic heart disease. The Lancet. 2012 Mar 10;379(9819):953-64.
3. Saxena A, Ramakrishnan S, Roy A, Seth S, Krishnan A, Misra P, Kalaivani M, Bhargava B, Flather MD, Poole-Wilson PP. Prevalence and outcome of subclinical rheumatic heart disease in India: the RHEUMATIC (Rheumatic Heart Echo Utilisation and Monitoring Actuarial Trends in Indian Children) study. Heart. 2011 Dec 15;97(24):2018-22.
4. Bhaya M, Panwar S, Beniwal R, Panwar RB. High prevalence of rheumatic heart disease detected by echocardiography in school children. Echocardiography. 2010 Apr; 27(4):448-53.
5. Allen HD, Driscoll DJ, Shaddy RE, Feltes TF. Moss & Adams' heart disease in infants, children, and adolescents: including the fetus and young adult. Lippincott Williams & Wilkins; 2013 May 30.
6. Reményi B, Wilson N, Steer A, Ferreira B, Kado J, Kumar K, Lawrenson J, Maguire G, Marijon E, Mirabel M, Mocumbi AO. World Heart Federation criteria for echocardiographic diagnosis of rheumatic heart disease—an evidence-based guideline. Nature reviews cardiology. 2012 May;9(5):297.
7. Zühlke L, Engel ME, Karthikeyan G, Rangarajan S, Mackie P, Cupido B, Mauff K, Islam S, Joachim A, Daniels R, Francis V. Characteristics, complications, and gaps in evidence-based interventions in rheumatic heart disease: the Global Rheumatic Heart Disease Registry (the REMEDY study). European heart journal. 2014 Nov 26; 36(18):1115-22.
8. Remenyi B, Carapetis J, Wyber R, Taubert K, Mayosi BM. Position statement of the World Heart Federation on the prevention and control of rheumatic heart disease. Nature Reviews Cardiology. 2013 May; 10(5):284.
9. Kumar RK, Tandon R. Rheumatic fever & rheumatic heart disease: the last 50 years. The Indian journal of medical research. 2013 Apr;137(4):643.
10. Zühlke L, Karthikeyan G, Engel ME, Rangarajan S, Mackie P, Cupido-Katya Mauff B, Islam S, Daniels R, Francis V, Ogendo S, Gitura B. Clinical outcomes in 3343 children and adults with rheumatic heart disease from 14 low-and middle-income countries: two-year follow-up of the Global Rheumatic Heart Disease Registry (the REMEDY Study). Circulation. 2016 Nov 8; 134(19):1456-66.

11. Halime Aali. (2019). Prevalence of cardiovascular complications in Iranian diabetic patients: A systematic review and meta-analysis. Int. J. Curr. Res. Med. Sci. 5(2): 39-45.
12. Webb RH, Wilson NJ, Lennon DR, Wilson EM, Nicholson RW, Gentles TL, O'Donnell CP, Stirling JW, Zeng I, Trenholme AA. Optimising echocardiographic screening for rheumatic heart disease in New Zealand: not all valve disease is rheumatic. Cardiology in the Young. 2011 Aug;21(4):436-43.
13. Parnaby MG, Carapetis JR. Rheumatic fever in indigenous Australian children. Journal of paediatrics and child health. 2010 Sep; 46(9):527-33.
14. Watkins DA, Johnson CO, Colquhoun SM, Karthikeyan G, Beaton A, Bukhman G, Forouzanfar MH, Longenecker CT, Mayosi BM, Mensah GA, Nascimento BR. Global, regional, and national burden of rheumatic heart disease, 1990–2015. New England Journal of Medicine. 2017 Aug 24; 377(8):713-22.
15. Halime Aali. (2019). Prevalence of limb complications in Iranian diabetic patients: A systematic review and meta-analysis. Int. J. Adv. Res. Biol. Sci. 6(2): 242-247.
16. Beaton A, Okello E, Aliku T, Lubega S, Lwabi P, Mondo C, McCarter R, Sable C. Latent rheumatic heart disease: outcomes 2 years after echocardiographic detection. Pediatric cardiology. 2014 Oct 1;35(7):1259-67.
17. Carapetis JR, Zühlke LJ. Global research priorities in rheumatic fever and rheumatic heart disease. Annals of pediatric cardiology. 2011 Jan;4(1):4.
18. Roberts KV, Brown AD, Maguire GP, Atkinson DN, Carapetis JR. Utility of auscultatory screening for detecting rheumatic heart disease in high-risk children in Australia's Northern Territory. Medical Journal of Australia. 2013 Aug; 199(3):196-9.
19. Carapetis JR, Beaton A, Cunningham MW, Guilherme L, Karthikeyan G, Mayosi BM, Sable C, Steer A, Wilson N, Wyber R, Zühlke L. Acute rheumatic fever and rheumatic heart disease. Nature reviews Disease primers. 2016 Jan 14;2: 15084.
20. Lawrence JG, Carapetis JR, Griffiths K, Edwards K, Condon JR. Acute rheumatic fever and rheumatic heart disease: incidence and progression in the Northern Territory of Australia, 1997 to 2010. Circulation. 2013 Jul 30; 128(5):492-501.
21. Malekzadegan, AaliH. "The Study of Success rate of CPR in 0-14 years Trauma Children who admitted to the Emergency of Khatam-Alanbia Hospital Zahedan, Iran 2016."
22. Mahmoudi M, Rezaie N, Mahmoudi M. Prevalence of rheumatic heart disease among students in urban areas of Hamadan province.
23. Zainaloo A, Asadpour, Piranfar. Determination of the incidence of rheumatism in children and adolescents. Research in Medicine. 2001 Sep 1; 25 (3): 137-42.
24. Dadgar A. The prevalence of rheumatic heart disease among 1054,385 students in Khorasan province.

Access this Article in Online	
	Website: www.ijarbs.com
Quick Response Code	Subject: Medical Sciences
DOI:10.22192/ijarbs.2019.06.04.003	

How to cite this article:
Halime Aali. (2019). The prevalence of rheumatic heart disease among Iranian children: A systematic review and meta-analysis. Int. J. Adv. Res. Biol. Sci. 6(4): 15-20.
DOI: http://dx.doi.org/10.22192/ijarbs.2019.06.04.003