

Changing trends in Rheumatic heart disease: A retrospective tertiary care hospital-based study in the western region of Saudi Arabia

Ziyad M. Alsharif ¹, Amjad M. Jawhari ², Shatha K. Al-halabi ², Shumokh K. Alsharif ², Samar M. Koursan ², Manal T. Alotaibi ², EL Shazly A. khalik³.

(1) Department of Cardiac Surgery, University Medical City, Riyadh, Saudi Arabia.

(2) College of Medicine, Taif University, Al-Taif 21944, Saudi Arabia.

(3) Department of cardiology, AL Azhar University, Cairo, Egypt - Department of cardiology, KAASH, Taif, Saudi Arabia.

Corresponding author

Amjad Mohammed Jawhari

Shehar district, Taif city , Saudi Arabia 21944

Phone : +966 530 999 440

Email: Amjad.M.Jawhari@gmail.com

ORCID : 0000-0003-2814-2126

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Abstract

Background: Rheumatic heart disease is a significant public health concern.

Thirty million people are currently thought to be affected by rheumatic heart disease globally. Despite the decreasing trend, there is still a significant disease burden, especially in developing nations.

Objective: To determine trends in rheumatic heart disease in the western region of Saudi Arabia, in one decade. (2010-2020)

Methods: A retrospective study was done in a hospital in Taif region, Saudi Arabia, where 81 patients randomly selected from a population of over 688,693 were included. Data was collected from patients' files, laboratory results data, and echocardiographic results.

Results: The mean age of patients was 47 ± 18 years. The most commonly reported chronic diseases or surgery were; hypertension 30 (16.4%) and cardiac diseases 24 (13.1%). Almost one-third of the participants presented with a cardiac complication of rheumatic fever in a form of shortness of breath 46 (26.9%). The most common echo finding was mitral valve regurgitation 28 (33.3%).

Conclusion: Mitral regurgitation (33.3%) and mitral stenosis (33.3%) were echocardiographic findings accounting for more than half of cases. The most commonly reported signs of rheumatic heart disease were murmur and atrial fibrillation which goes with international study findings. We recommend raising the level of public awareness about rheumatic heart disease in order to lower the incidence of the disease.

Keywords: Heart, Rheumatic Heart Disease, Tertiary Care Centers, Saudi Arabia.

Introduction

Rheumatic heart disease (RHD) is a preventable yet serious public health problem in low- and middle-income countries and marginalized communities in high-income countries, including indigenous populations [1]. Despite the decreasing trend, RHD is still a significant disease burden, especially in developing nations [2].

Acute rheumatic fever (ARF) and rheumatic heart disease (RHD) are significant public health concerns worldwide [3]. Despite decreasing incidence, there is still a significant disease burden, especially in developing nations [2]. This study will provide a background on the prevalence of RHD in Taif city.

Thirty million people are currently thought to be affected by rheumatic heart disease globally [4]. In 2015, rheumatic heart disease was estimated to be responsible for 305,000 deaths and 11.5 million disability-adjusted life years lost. Of these deaths, 60% occurred prematurely (before the age of 70) [5]. These figures are uncertain due to incomplete data in many countries. Despite the availability of effective prevention and treatment measures, there has been little change in the contribution of rheumatic heart disease to overall global mortality between 2000 and 2015.

A previous Saudi study found 24 cases of rheumatic heart disease for every 10,000 students (6-15 years). Females and rural areas had greater prevalence rates. According to this survey, 34% of participants were beta-hemolytic streptococci carriers [6].

We were motivated to conduct this study because there is a dearth of information from the Taif region that compares evolving patterns in RHD. This hospital-based study aimed to determine trends in rheumatic heart disease in the western region of Saudi Arabia in one decade (2010–2020) at a hospital in Taif region.

Materials and Methods

Study design, setting and time: A retrospective study was conducted in a tertiary hospital in Taif region, Saudi Arabia, from 2010 to June 2020. Taif city has a 2020 estimated population of 688,693 people, making it the 6th most populous city in the kingdom.

Study participants: medical records of three hundred (300) patients who attended the study setting and had a confirmed diagnosis with rheumatic heart disease through echocardiographic imaging were reviewed. Of them only 81 patients with complete medical information were included.

Data collection: A checklist was prepared to collect data by the research ethics committee of Directorate of Health Affairs in Taif city (ethical approval No.:449) about patients' demographics, past medical history (previous diseases), most common clinical presentation, most common examination, investigation findings and echocardiographic findings, and most common valvular abnormalities.

Data analysis: The SPSS program version 26 was used for analysis. Analytic statistics using percentage, mean, standard deviation, and chi-square test were used. A p-value of less than 0.05 was considered as statistically significant.

Results

Final data of 81 patients were enrolled in data entry and analysis with a mean age of $47 \pm SD 18$. More than two-thirds were females 57 (70.4%); 40 (49.4%) were of the middle socio-economic class (Table 1).

The most commonly reported chronic diseases or surgery in order were; hypertension 30 (16.4%), cardiac diseases 24 (13.1%), diabetes mellitus 19 (10.4%), post valve replacement 11 (6%) and others. The most frequently reported diseases and surgeries were post CABG, valve repair, SLE and APD with a frequency of 1 (0.5%) (Table 2).

Almost one-third were presented with a cardiac complication of rheumatic fever in a form of shortness of breath 46 (26.9%). Other presenting complaints were chest pain 27 (15.8%), previous history of RF 20 (11.7%), palpitation 14 (8.2%). Only 1 patient (0.6%) was asymptomatic or presenting with cyanosis or syncope (Table 3).

As for cardiovascular complications, 29 (22.5%) had a murmur, 17 (13.2) have atrial fibrillation. Of them, 19 (14.7%) had negative findings. Only one (0.8%) had pleural effusion, S4, atrial flutter and dilated right atrium, dilated right ventricle, and pulmonary edema. Dilated left atrium and dilated left ventricle were found in 4 (3.1%) and 11 (8.5%) had other examination findings (Table 4).

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Regarding investigations results, 24 (30.8%) were anemic, 14 (17.9%) were normal, 13 (16.7%) had leukocytosis, 12 (15.4%) have low albumin level and only one (1.3%) has an erythrocyte sedimentation rate more than 50. In 14 (17.9%) investigations were not found (Table 6).

The most common echo findings were; 28 (23%) MR, 28 (23%) MS, 13 (10.7%) AR, 12 (9.8%) TR, 8 (6.6%) cardiomyopathy, 4 (3.3%) valve abnormality and 1 (0.8%) had TS or mitral valve click. Of patients, 5 (4.1%) had normal echo and in 19 (15.6%) no abnormality was found (Table 7). The most common valvular abnormalities were MR and MS (33.3%), AR (15.5%), TR 12 (14.3%), and AS, TS, or mitral valve click (1.2%) (Table 7).

Most cases were recruited in 2017 13 (16%), 11 (13.6%) were in 2020, 9 (11.1%) of cases in 2015 and a similar number in 2018. Seven cases were in 2012 and seven also in 2019 (Table 8).

Table 1: Distribution of patients according to their demographic data

Variable		N	%
Age (Mean \pm SD)	47 \pm 18		
Gender	Male	24	29.6%
	Female	57	70.4%
Socioeconomic status	Low Socioeconomic status	5	6.2%
	Middle Socioeconomic status	40	49.4%
	Not mentioned	36	44.4%

N.B.: SD = Standard Deviation

Table 2: Distribution of patients according to their past medical history (previous diseases)

Variable	N	%
DM	19	10.4%
HTN	30	16.4%
IHD	9	4.9%
History of Cardiac surgery	10	5.5%
Cardiac disease	24	13.1%
DVR (double valve replacement)	2	1.1%
Post CABG	1	0.5%
Valve Repair	1	0.5%
Post valve replacement	11	6.0%
TIA	5	2.7%
CVA	8	4.4%
Asthma	3	1.6%
Renal diseases	3	1.6%
Renal stones	3	1.6%
Renal failure	2	1.1%
ESRD	2	1.1%
Liver disease	3	1.6%
Gastritis or gastroenteritis	3	1.6%
Epilepsy	2	1.1%
Hypothyroidism	7	3.8%
Autoimmune diseases	4	2.2%
SLE	1	0.5%
APD	1	0.5%
MVD	8	4.4%
Other	11	6.0%
Medically Free	10	5.5%

N.B.: DM= diabetes mellitus, HTN= hypertension, IHD = ischemic heart disease, DVR= double valve replacement, Post CABG= coronary artery bypass graft, TIA, CVA= cerebrovascular accident, ESRD= End-Stage Renal Disease, SLE=systemic lupus erythematosus, APD=action potential duration, MVD=Coronary Microvascular Disease.

Table 3: Distribution of patients according to their most common clinical presentation

Variable	N	%
Fatigue	13	7.6%
SOB	46	26.9%
Chest pain	27	15.8%
Chest discomfort	11	6.4%
Palpitation	14	8.2%
Dizziness	11	6.4%
Syncope	1	0.6%
Heart failure	4	2.3%
Cyanosis	1	0.6%
History of Autoimmune disease	3	1.8%
Asymptotic	1	0.6%
Previous history of RF	20	11.7%
Other	16	9.4%
None	3	1.8%

N.B.: SOB=shortness of breath

Table 4: Distribution of patients according to their most common examination findings

Variable	N	%
Tachypnea	3	2.3%
Tachycardia	6	4.7%
Looks Stressed	4	3.1%
Pulmonary edema	1	0.8%
Crepitation	5	3.9%
Basal crackles	2	1.6%
Pulmonary Hypertension	3	2.3%
Plural effusion	1	0.8%
Lower limb edema	6	4.7%
Ascites	2	1.6%
S4	1	0.8%
Decreased air entry	5	3.9%
Murmur	29	22.5%
Arrhythmia	3	2.3%
A. fib	17	13.2%
Atrial flutter	1	0.8%
Dilated RA	1	0.8%
Dilated RV	1	0.8%
Dilated LA	4	3.1%
Dilated LV	4	3.1%
Other	11	8.5%
None	19	14.7%

N.B.: RA= right atrium, RV= right ventricle, LA= left atrium, LV= left ventricle

Table 5: Distribution of patients according to their most common investigation findings

Variable	N	%
Normal	14	17.9%
ESR >50	1	1.3%
Anemia	24	30.8%
Leukocytosis	13	16.7%
Low albumin	12	15.4%
Not found	14	17.9%

N.B.: ESR= erythrocyte sedimentation rate

Table 6: Distribution of patients according to their most common echocardiographic findings

Variable	N	%
Normal echo	5	4.1%
Cardiomegaly	2	1.6%
AR	13	10.7%
AS	1	0.8%
MR	28	23.0%
MS	28	23.0%
TR	12	9.8%
TS	1	0.8%
Cardiomyopathy	8	6.6%
Mitral valve click	1	0.8%
Valves abnormality	4	3.3%
Not found	19	15.6%

N.B.: AR= aortic regurgitation, AS= aortic stenosis, MR=Mitral regurgitation, MS= mitral stenosis, TR= tricuspid regurgitation, TS= tricuspid stenosis

Table 7: Distribution of patients according to their most common valvular abnormalities

Variable	N	%
AR	13	15.5%
AS	1	1.2%
MR	28	33.3%
MS	28	33.3%
TR	12	14.3%
TS	1	1.2%
Mitral valve click	1	1.2%

N.B.: AR= aortic regurgitation, AS= aortic stenosis, MR=Mitral regurgitation, MS= mitral stenosis, TR= tricuspid regurgitation, TS= tricuspid stenosis

Table 8: Distribution of patients according to year of recruitment

Variable	N	%
2010	5	5.8
2011	6	7.4
2012	7	8.6
2013	3	3.7
2014	5	6.2
2015	9	11.1
2016	6	7.4
2017	13	16.0
2018	9	11.1
2019	7	8.6
2020	11	13.6

Discussion

This study found that 16% were reported as having surgery on their heart. A cardiac consequence of rheumatic fever showed up in almost one-third of the individuals as shortness of breath 46 (26.9%). Mitral valve regurgitation was the most typical echo result, with 28 (33.3%). Understanding Rheumatic Heart Diseases (RHD) by studying its wide range of pathological effects is an important measure to overcome its serious complications [7]. These complications can cause significant morbidity and mortality and burden by affecting the young age group [8]. It can range from simple asymptomatic valvular lesions to more serious complications such as arrhythmias, stroke and heart failure [9].

The main purpose of this study was to determine trends in rheumatic heart disease in the western region of Saudi Arabia in one decade (2010–2020). In this study, more than two-thirds of patients were females and slightly less than one-third were males. Half of them were of the middle socio-economic class. This gender difference was also observed in previous studies [10]. Other epidemiological studies of RF and RHD reported no gender predilection for the incidence of RF; however, RHD is more prevalent in females [11,12].

The high prevalence of rheumatic heart disease in low- and middle-income countries was supported by many studies [2, 3,13]. In low- and middle-income nations, the prevalence of rheumatic heart disease was shown to range from 2.7 cases per 1000 people (for “clinically evident” disease) to 21.1 cases per 1000 people (for “clinically quiet” disease), according to a recent meta-analysis [14]. More than two-thirds of cases were recruited in the period between 2015 and 2020. This reflects more progression and evolution in patient diagnosis and more development of the health sector which is one of the goals of Saudi vision 2030. So the only reported cases were the very late presenting and complicated cases and could also be due to reduced patient awareness of RHD and its complications resulting in decreased treatment-seeking behavior [15,16].

The past medical or surgical history of the patients were reported. The most commonly reported chronic diseases or surgery in order were; hypertension which was diagnosed by sixteen percent followed by cardiac diseases in thirteen percent, diabetes mellitus post valve replacement, and others. This result could be attributed to the fact that most hypertensive patients are asymptomatic and are found with the appearance of the symptoms of RHD and subsequent routine blood pressure measuring, so, they accidentally discover that they are hypertensive. The relation here is not a casual relation but a coincidental finding. But causation relation was reported in another study conducted in Nigeria, where the relation was through elevation of blood pressure in the pulmonary circulation which is pulmonary hypertension [17].

Shortness of breath was the most common presenting complaint in about one-third of the participants who presented with a cardiac complication of rheumatic fever followed by chest pain. This is a very serious issue here as dyspnea in patients with RHD always indicates some degree of heart failure and so further evaluation and more attention should be given to prevent the progression of the disease [2].

Concerning the signs of RHD, about one-fifth of patients had murmur and thirteen percent had atrial fibrillation. Relatively rare or late presenting signs are effusion, S4, atrial flutter and dilated right atrium, dilated right ventricle, and pulmonary edema. The most serious of these late presenting complications was atrial fibrillation which may lead to stagnation of blood, thrombus formation and then shooting embolus to the different organs in the body and results in stroke or renal infarction [18].

About one-third of the patients were anemic, and less than twenty percent were normal. The same percentage had leukocytosis and fifteen percent had low albumin levels. These are considered constitutional laboratory findings for many of the chronic diseases and are not specific for RHD but with the other findings, all will guide to the diagnosis.

Mitral regurgitation (MR) and mitral stenosis (MS) were the most reported echocardiographic findings. In addition, about half of the patients had MR or MS and only ten percent of the patients had AR. The right heart valves were the least valves affected. In this study, MS and MR had the same prevalence in contradiction to another study conducted in Brazil which found that the most reported was mitral regurgitation [19].

Limitation

A limitation of the present study was being a single center study that could prevent the generalization of the study results. Other limitations were the small sample size, being a retrospective study and lack of the ASO titre.

Conclusion

In the present study, shortness of breath was the highest presenting complaint followed by chest pain, previous history of renal failure, and palpitations, respectively. The most common reported signs of RHD are murmur and atrial fibrillation; rare or late presenting signs are effusion, S4, atrial flutter, and dilated right atrium, and dilated right ventricle. The most common comorbidities with RHD are hypertension, cardiac diseases, and diabetes mellitus. We recommend more public awareness about RHD in order to lower the incidence of the disease. In addition, improvement in diagnostic techniques through updating the health system through continuous and advanced training of health care professionals is needed.

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Ethical approval: The design of the work has been approved by directorate of health affairs – research and studies department – Taif and it conforms to standards currently applied in the country of origin by Number of (449) dated 1 November 2020. The patient's written informed consent was obtained and any information should be as anonymized as much as possible.

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References

1. Belay W, Aliyu MH. Rheumatic Heart Disease is Missing from the Global Health Agenda. *Ann Glob Health* 2021; 17;87(1):110-6.
2. Seckeler MD, Hoke TR. The worldwide epidemiology of acute rheumatic fever and rheumatic heart disease. *Clin Epidemiol* 2011; 22;3:67-84.
3. Sani MU, Karaye KM, Borodo MM. Prevalence and pattern of rheumatic heart disease in the Nigerian savannah: an echocardiographic study. *Cardiovasc J Afr* 2007; 18(5):295-9.
4. Mutagaywa RK, Wind AM, Kamuhabwa A, Cramer MJ, Chillo P, Chamuleau S. Rheumatic heart disease anno 2020: Impacts of gender and migration on epidemiology and management. *Eur J Clin Invest* 2020;50(12):e13374.
5. Dougherty S, Beaton A, Nascimento BR, Zühlke LJ, Khorsandi M, Wilson N. Prevention and control of rheumatic heart disease: Overcoming core challenges in resource-poor environments. *Ann Pediatr Cardiol* 2018;11(1):68-78.
6. Almadhi AA, Alshammri MR, Altamimi NO, Hadal SA, Al Madhi AA, et al. Rheumatic Fever and Rheumatic Heart Disease-Related Knowledge, Attitude, and Practice in Saudi Arabia. *Cureus* 2021;13(11):e19997.
7. Dougherty S, Khorsandi M, Herbst P. Rheumatic heart disease screening: Current concepts and challenges. *Ann Pediatr Cardiol* 2017;10(1):39-49.
8. Sika-Paotonu D, Beaton A, Raghu A, Raghu A, Steer A, Carapetis J, et al. Acute Rheumatic Fever and Rheumatic Heart Disease. 2017 Mar 10 [Updated 2017 Apr 3]. In: Ferretti JJ, Stevens DL, Fischetti VA, editors. *Streptococcus pyogenes: Basic Biology to Clinical Manifestations* [Internet]. Oklahoma City (OK): University of Oklahoma Health Sciences Center; 2016-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK425394/>
9. Lewey J, Andrade L, Levine LD. Valvular Heart Disease in Pregnancy. *Cardiol Clin* 2021;39(1):151-61.
10. Negi PC, Kandoria A, Asotra S, Ganju NK, Merwaha R, Sharma Ret al. Gender differences in the epidemiology of Rheumatic Fever/Rheumatic heart disease (RF/RHD) patient population of hill state of northern India; 9 years prospective hospital based, HP-RHD registry. *Indian Heart J* 2020;72(6):552-6.
11. Lawrence JG, Carapetis JR, Griffiths K. Acute rheumatic fever and rheumatic heart disease: incidence and progression in the Northern Territory of Australia, 1997 to 2010. *Circulation* 2013;128(5):492–501.
12. Shrestha NR, Pilgrim T, Karki P. Rheumatic heart disease revisited: patterns of valvular involvement from a consecutive cohort in eastern Nepal. *J Cardiovasc Med* 2012;13(11):755–9.
13. Watkins DA, Johnson CO, Colquhoun SM, Karthikeyan G, Beaton A, Bukhman G, et al. Global, Regional, and National Burden of Rheumatic Heart Disease, 1990-2015. *N Engl J Med* 2017;377(8):713-22.
14. Rothenbühler M, O'Sullivan CJ, Stortecy S, StefaninGGi, Spitzer E, Estill J, et al. Active surveillance for rheumatic heart disease in endemic regions: a systematic review and meta-analysis of prevalence among children and adolescents. *Lancet Glob Health* 2014;2:e717-e26
15. Mougrabi MM, Aljuaid RS, Alrabie AD, Althumali NK, Alkhaldi LH, Alotaibi WD. Awareness of rheumatic fever and rheumatic heart disease among the population in taif, Saudi Arabia 2020. *J Family Med Prim Care* 2021;10(8):3056-63.
16. Prasad A, Prasad A, Singh BK, Kumar S. Compliance to the secondary prophylaxis and awareness of rheumatic heart disease: A cross-sectional study in low-income province of India. *J Family Med Prim Care* 2020;9(3):1431-35.
17. Akinwusi PO, Peter JO, Oyedeji AT, Odeyemi AO. The new face of rheumatic heart disease in South West Nigeria. *Int J Gen Med* 2013;23;6:375-81
18. Al-Sekait MA, al-Sweliem AA, Tahir M. Rheumatic heart disease in schoolchildren in western district, Saudi Arabia. *J R Soc Health* 1990;110(1):15-9.
19. Carapetis JR, Beaton A, Cunningham MW, Guilherme L, Karthikeyan G, Mayosi BM, et al. Acute rheumatic fever and rheumatic heart disease. *Nat Rev Dis Primers* 2016 14;2:15084-141.