PUBLIC HEALTH RESEARCH

Insights from a Rheumatic Heart Disease Registry in a Tertiary Centre in Sabah

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ABSTRACT

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Introduction Rheumatic heart disease is still endemic in developing countries and among the indigenous population in developed countries. However, there is no comprehensive data on rheumatic heart disease patients in Malaysia. The Cardiology Department of Queen Elizabeth ll Hospital (QEH ll), Sabah started this hospital-based registry in 2010. The objective of this analysis was to report the demographic profile, severity of disease, types of valve involvement and the practice of secondary prophylaxis among these patients.

Methods This was a retrospective record review involved a three-year review of patients registered under the rheumatic heart disease registry in QEH ll, Sabah from December 2010 to November 2013. It included patients who attended the cardiology clinic who were diagnosed with rheumatic heart disease.

Results A total of 627 rheumatic heart disease patients were registered over a period of three years. Mean age was 41 (16.2) year old, 67.5% were female, and 51.2% of the patients had severe valvular dysfunction with mitral regurgitation as the commonest valve affected (67.3%). There was an increasing trend in the percentage of patients receiving secondary prophylaxis (oral and intra-muscular) from the year 2010 to the year 2013 (23.2% and 67.6% respectively). Abnormal ECG, pulmonary regurgitation and not on any secondary prophylaxis were found to be associated with severe rheumatic heart disease.

Conclusions Rheumatic heart disease is prevalent in Sabah. Most patients had severe form of valve dysfunction when diagnosed. Awareness and advocacy on secondary prophylaxis warrant immediate improvement.

Keywords Rheumatic heart disease - Registry - Secondary prophylaxis.

INTRODUCTION

Rheumatic heart disease (RHD) is a consequence of the damage to the heart valves resulting from a delayed autoimmune sequel to group A streptococcal infections. RHD can become a chronic condition leading to congestive heart failure, stroke, endocarditis and even death. It is one of the most common causes of acquired heart disease among children and young adults. Acute rheumatic fever (ARF) and RHD continue to be a significant contributor to cardiovascular morbidity and mortality among young people in developing nations. It is estimated that there are over 15 million cases of RHD worldwide, with 282,000 new cases and 233,000 deaths annually.[1] An article published in 2011 reported that the incidence of ARF is decreasing in all World Health Organization Regions except for America and Western Pacific where it appears to be in the increasing trend.[2]

There is a lack of information on the prevalence of RHD in Malaysia, even though it is believed that it is common in Malaysia. Earlier studies reported several rates. A study on RHD among primary school children in Kelantan conducted between August 1988 to December 1990 reported a rate of 0.11 per 1000 population.[3] A 10-year data on paediatric admission in University Hospital Kuala Lumpur (1981-1990) reported that 0.21 per 1000 paediatric admission per year was due to ARF.[4] However, to date, there is no nationwide registry on RHD in Malaysia. It is recommended that patient registry is one of the key element of RHD control program.[5]

The Cardiology Department, in collaboration with the Clinical Research Centre, Queen Elizabeth ll Hospital, Kota Kinabalu, Sabah developed a hospital-based registry to assess the burden of RHD in Sabah. This RHD registry was developed in 2010. It collects important data on patient socio-demographic characteristics, disease characteristics and practice patterns.

This paper presents the demographic profile of the RHD patients receiving treatment at Queen Elizabeth II Hospital, severity of the disease, valve involved and the practice of secondary prophylaxis. With this knowledge, we hope to gain further insight into the disease burden and eventually formulate appropriate preventive strategies and collaboration for future research.

METHODS

This was a three year retrospective record review of patients registered in the RHD registry of Queen Elizabeth ll Hospital, Kota Kinabalu, Sabah from December 2010 to November 2013. Queen Elizabeth ll Hospital is an adult tertiary government-funded referral hospital in Sabah, one of the thirteen states in Malaysia, with an area of 73,619 km^2. The state is divided into five administrative division with a total population in 2010 was 3.1 million and more than 20 ethnic groups.

All patients who attended the Cardiology Clinic and diagnosed with RHD, are enrolled in this registry. Patients' information was extracted from the case note and recorded using a data collection form. Variables collected included demographic profile of the patients namely age, sex, home address and ethnicity, current disease status, types of secondary prophylaxis medication, ECG changes (atrial fibrillation, PR interval and right ventricular hypertrophy) and disease extent in term of valves abnormality.

Diagnosis of RHD was made based on medical history, physical examination and echocardiogram.[6] Severity of RHD at diagnosis is defined based on World Heart Federation Guidelines, into mild, moderate and severe.[7] Patients with congenital heart disease, infective endocarditis and whose echocardiogram findings not in line with WHF criteria are excluded.

Data analysis was done using IBM SPSS Statistical Software ver 20.0 to provide descriptive summaries and make comparisons. Simple and multiple logistic regression analysis (using forward stepwise method) were used to look for factors associated with severe RHD. Statistical significance level was considered to be less than 0.05.

RESULTS

Demographic profiles

A total of 627 RHD patients were registered over a period of three years. More than two thirds, 441 patients (70.3%) were known case of RHD at registration. The demographic profiles of these patients are summarized in Table 1. Mean age was 41 years old with a standard deviation of 16.2 (range from 13 to 94 years old). The commonest age group was 31–40 years old (Figure 1). There were more female (67.5%) and Kadazan-Dusun ethnic group (34.0%). Half of the patients, (50.1%) were from the West Coast Division as shown in Figure 2.

Table 1 Demographic profiles of RHD patients

Variable	Mean (SD)	Frequency (%)
Age at registration	41 (16.2)	
Gender		
Male		204 (32.5)
Female		423 (67.5)

Ethnicity	
Kadazan Dusun	213 (34.0)
Bajau	113 (18.0)
Malay	49 (7.8)
Chinese	86 (13.7)
Indian	2 (0.3)
Others	164 (26.2)

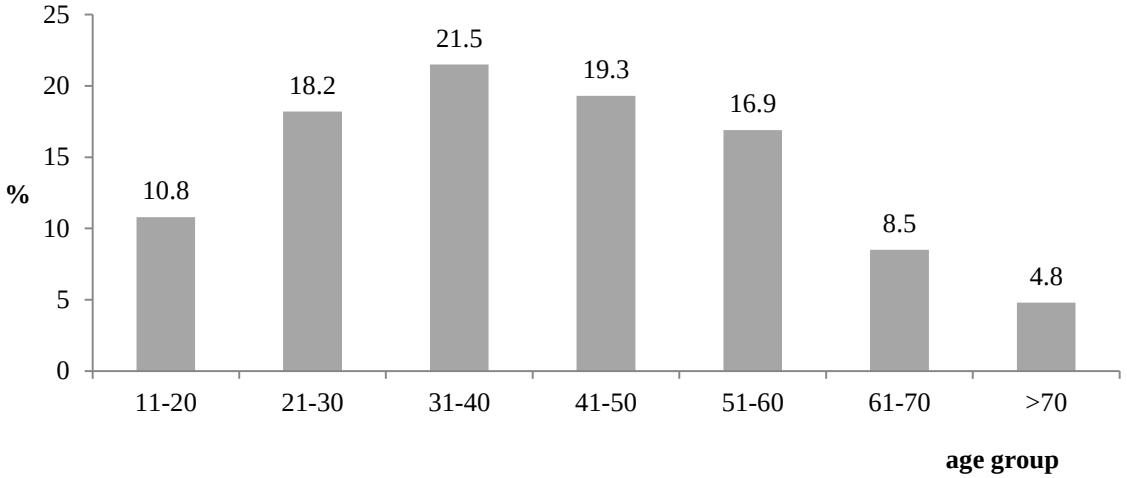

Figure 1 Percentage of RHD patients by age group

Figure 2 Percentage of patients by division

Severity of disease and type of valve involvement

In term of patients' disease status, half of the patients (51.2%) had severe form of RHD during enrolment into the registry. There was an association between severity of disease and status of patient during recruitment into this registry (known or new case). A total of 73.1% of the new cases were diagnosed as severe RHD (Table 2).

Table 2 Severity of disease during recruitment

Severity	Status at registration		p value[a]
	New case	Known case	
Mild	34 (18.7%)	148 (34.2%)	<0.001
Moderate	15 (8.2%)	97 (22.4%)	
Severe	133 (73.1%)	188 (43.4%)	

[a] Chi-square test for independence

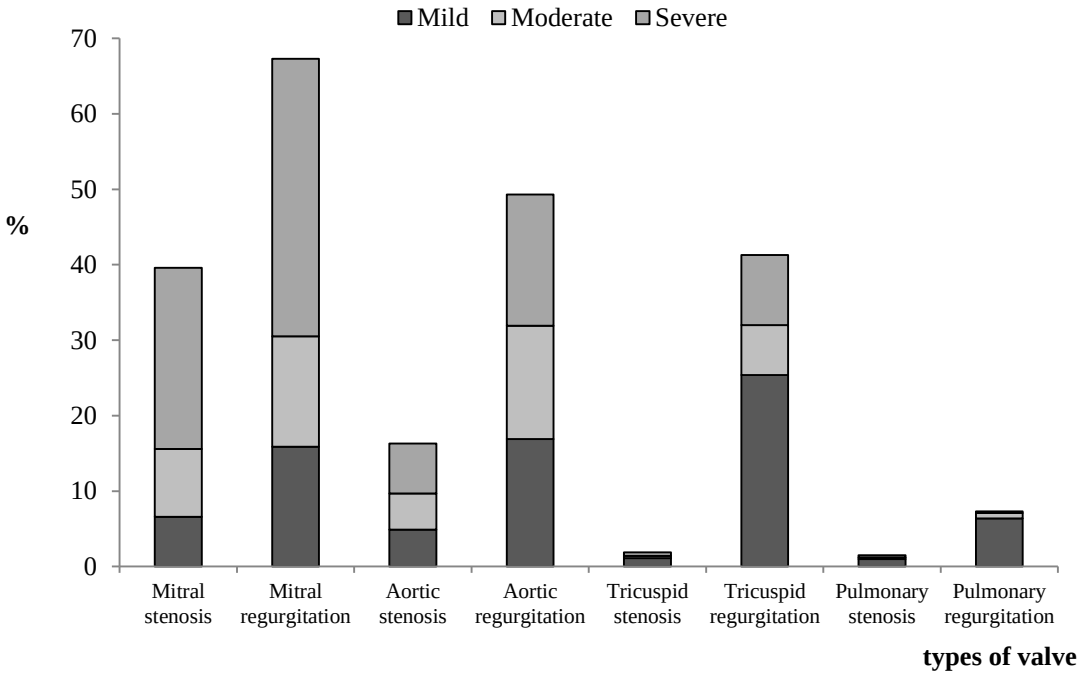

Figure 3 Percentage of patients by types of valve involvement

Majority of them, 73.7% were diagnosed based on clinical presentation. However, 65.4% of the patients showed normal sinus rhythm ECG pattern. The most common valve abnormality was mitral regurgitation (67.3%), followed by aortic regurgitation (49.3%) of patients as shown in Figure 3.

Secondary prophylaxis for RHD

Figure 4 shows the number of patients receiving secondary prophylaxis and type of prophylaxis received. 64.7% patients were not on any secondary prophylaxis. 19.4% of the patients were on oral Penicillin V 250mg twice daily, followed by 15.2% who were on IM Benzatine Penicillin G (BPG) 4 weekly.

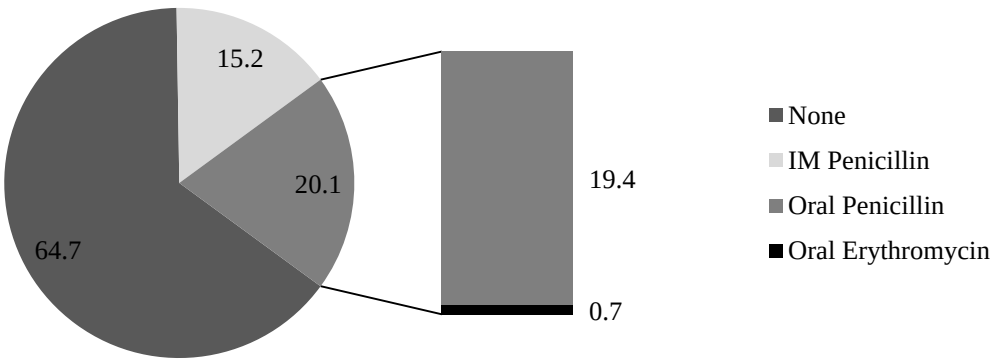

Figure 4 Percentage of patients received secondary prophylaxis

Table 3 shows that secondary prophylaxis given to patients was significantly associated with the year of registration and patients' age group. More patients were on IM BPG for prophylaxis in 2013 (57.7%) compared to the previous three years. Majority of the patients who were not on any prophylaxis were 40 years old or older (83.9%).

Table 3 Factors associated with practice of secondary prophylaxis

Variable	n	Secondary prophylaxis None n (%)	Oral n (%)	IM n (%)	χ^2 statistic[a] (df)	P value[a]
Year of registration						
2010	99	76 (76.8)	14 (14.1)	9 (9.1)	123.54 (6)	**<0.001**
2011	358	249 (69.6)	81 (22.6)	28 (7.8)		
2012	84	48 (57.1)	21 (25.0)	15 (17.9)		
2013	71	23 (32.4)	7 (9.9)	41 (57.7)		
Age group						
Less than 40	295	130 (44.1)	93 (31.5)	72 (24.4)	106.29 (2)	**<0.001**
Equal or more than 40	317	266 (83.9)	30 (9.5)	21 (6.6)		

[a] Chi-square test for independence

Table 4 and 5 show the results from simple logistic regression and multiple logistic regression analysis respectively. The significant variables associated with severe RHD as compared to mild-moderate RHD were those RHD patients with abnormal ECG readings, presence of pulmonary regurgitation and patients who were not on any secondary prophylaxis.

Table 4 Factors associated with RHD severity (using simple logistic regression)

Variable	Crude OR	95% CI OR	χ^2 statistic[a] (df)[a]	P value[a]
Age (years)	1.004	(0.994 , 1.014)	0.644 (1)	0.422
Sex				
Male	1.165	(0.830 , 1.636)	0.784 (1)	0.376
Female	1.000			
Divisions			0.621 (5)	0.987
Kudat	0.955	(0.528 , 1.728)	0.023 (1)[b]	0.880[b]
Interior	1.128	(0.687 , 1.850)	0.227 (1)[b]	0.634[b]
Sandakan	0.903	(0.373 , 2.188)	0.051 (1)[b]	0.822[b]
Tawau	0.927	(0.433 , 1.986)	0.038 (1)[b]	0.846[b]
Others	1.277	(0.464 , 3.516)	0.225 (1)[b]	0.636[b]
West Coast	1.000			
Ethnicity			14.091 (4)	0.007
Others	0.739	(0.489 , 1.117)	2.059 (1)[b]	0.151[b]
Malay	1.148	0.612 , 2.154)	0.186 (1)[b]	0.667[b]
Bajau	1.917	(1.187 , 3.097)	7.075 (1)[b]	0.008[b]
Chinese	1.117	(0.676 , 1.848)	0.187 (1)[b]	0.665[b]
Kadazan Dusun	1.000			
Secondary prophylaxis				
Yes	0.670	(0.479 , 0.937)	5.464 (1)	0.019
No	1.000			
ECG				
Abnormal	1.606	(1.122 , 2.299)	6.698 (1)	0.010
Normal	1.000			
Valve surgery				
Yes	1.060	(0.764 , 1.472)	0.122 (1)	0.726
No	1.000			
Pulmonary regurgitation				
Yes	3.132	(1.511 , 6.494)	9.416 (1)	0.002
No	1.000			
Pulmonary stenosis				
Yes	0.725	(0.193 , 2.727)	0.226 (1)	0.634

No	1.000			
Tricuspid regurgitation				
Yes	1.153	(0.833 , 1.596)	0.733 (1)	0.392
No	1.000			
Tricuspid stenosis				
Yes	1.281	(0.402 , 4.084)	0.176 (1)	0.675
No	1.000			
Aortic regurgitation				
Yes	1.268	(0.919 , 1.748)	2.095 (1)	0.148
No	1.000			
Aortic stenosis				
Yes	0.835	(0.542 , 1.285)	0.674 (1)	0.412
No	1.000			
Mitral regurgitation				
Yes	1.155	(0.821 , 1.626)	0.684 (1)	0.408
No	1.000			
Mitral stenosis				
Yes	0.709	(0.511 , 0.985)	4.201 (1)	0.040
No	1.000			

OR = Odds Ratio [a] Likelihood Ratio (LR) test [b] Wald test

Table 5 Significant factors associated with RHD severity (using multiple logistic regression)

Variable	Adj OR	95% CI OR	χ^2 statistic[a] (df)[a]	P value[a]
ECG				
Abnormal	1.634	(1.063 , 2.512)	5.016 (1)	0.025
Normal	1.000			
Pulmonary regurgitation				
Yes	3.751	(1.656 , 8.498)	10.042 (1)	0.002
No	1.000			
Secondary prophylaxis				
Yes	0.659	(0.442 , 0.982)	4.191 (1)	0.041
No	1.000			

Adj OR = Adjusted odds ratio [a] Likelihood Ratio (LR) test

DISCUSSION

Our results show that RHD is still prevalent in Sabah. Mean age of RHD patients who were registered in this registry was 41 years old. This is comparable to a study in Africa which showed that the median age for RHD was 41 years old for females and 42 years old for male.[8] Another study from Australia[9] showed that among Aboriginal and Torres Strait Islander communities, the highest rates of RHD found in adults aged 35-39.9 years. However, ARF is commonly reported in children between the ages of 6 and 15.[10,11] Some of this group of children will later on progress to RHD during their adulthood. Unlike other cardiovascular diseases which is more prevalent among the elderly, half of the RHD patients were aged 40 years old or less.[12]

Majority of the patients were diagnosed based on clinical presentations of RHD. Only a few of them were diagnosed through systematic screening. This is also in concordance that some patients were diagnosed with RHD at a later stage of the disease. It is reported that, an earlier diagnosis of RHD can be achieved through active screening for ARF.[13] This has not been implemented in Malaysia yet. However, regular awareness and advocacy drives are given to all attending medical officers in our state to improve their knowledge on ARF and RHD.

All four heart valves can be involved in rheumatic carditis, however it was reported that there is a predominance of mitral valve involvement.[2] Furthermore, valvular regurgitation is frequently the hallmark of rheumatic fever with carditis. This pattern was seen among our RHD patients too. The commonest type of valve involvement was mitral regurgitation, followed by aortic regurgitation. Similar findings were observed also in studies done in Urban African and Nepal.[8, 14]

RHD patients who have recurrences of ARF are at risk to develop carditis. Nevertheless, this complication is preventable. Secondary prophylaxis with 3 to 4 weekly IM BPG can prevent recurrences of RF and progression of RHD to more severe disease.[15, 16] There is ample evidence that this strategy is cheap, cost effective and very practical especially in developing countries.[16] The Australian guideline stated that all patients with ARF or RHD

should continue secondary prophylaxis for a minimum of 10 years after the last episode of ARF, or until the age of 21 years (whichever is longer). Those with moderate or severe RHD should continue secondary prophylaxis up to the age of 35–40 years.[5] This study also supported that those patients who were on secondary prophylaxis were less likely to have severe disease when other variables were controlled in multiple logistic regression.

This study showed that 35.3% of patients were prescribed antibiotics for secondary prophylaxis. Most of the patients who did not receive secondary prophylaxis were the older patients, aged more than 40 years old with less vulnerability to the recurrence of RF or to progress to more severe disease.[16] There was increasing trend in percentage of patients being prescribed with IM BPG from year 2010 to 2013. This showed a good sign and should be continually improved.

More awareness on RHD should be created especially among health care personnel and further improvement on its control program should be implemented in this country. With continuous awareness and advocacy drives, hopefully the Ministry of Health will include RHD prevention and control program in the National Non Communicable Disease in the near future.

Although it is known that hospital morbidity data often give biased information about the magnitude of diseases, they are the only available data that we can easily capture for the time being. Besides the emphasis on the prescription of secondary prophylaxis, adherence to secondary prophylaxis is of equal importance. The target for good adherence to scheduled injections based on WHF recommendation on RHD is >80%.[7] However our registry data does not have record on the adherence as yet. Our data originated from one single centre in Sabah, and it does not allow calculation of exact incidence rates. Furthermore, the registry does not comprehensively include all RHD cases and may accidentally include non-rheumatic valvular heart disease as well.

In conclusion, these data make clear to us that ARF and RHD still exist in significant numbers around Sabah and need to be taken care of. Secondary prophylaxis with IM BPG should be enhanced to prevent recurrence and more severe disease.

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