

ORIGINAL ARTICLE

FACTORS LEADING TO POOR ADHERENCE TO SECONDARY PROPHYLAXIS OF RHEUMATIC FEVER

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Objectives: The objective of this study was to determine the level of adherence and possible barriers to secondary prophylaxis among patients with Rheumatic heart disease (RHD).

Methodology: It is a cross-sectional study conducted at the largest tertiary care cardiac center of Karachi, Pakistan. We included patients with RHD, based on transthoracic echocardiography and adherence to the secondary prophylaxis and possible barriers were assessed using a structured questionnaire.

Results: Among total of 195 patients 66.7% (130) were female, mean age was 32.25 ± 13.78 years. Rural residents were 51.3% (100) and 59.5% (116) of the patients were illiterate. Benzathine Penicillin injection was prescribed to 56.4% (110) patients, out of them 70.0% (77) of the patients were counseled regarding duration of secondary prophylaxis. The most common reason for non-adherence was reported to be a painful injection (19.1%).

Conclusion: Majority of the RHD patients are not being prescribed and effectively counseled regarding secondary prophylaxis. Low adherence to the secondary prophylaxis was observed and the common reasons for non-adherence were painful injection, non-availability of nearby health facility, friends/family advising them otherwise, allergic reaction, and patients feeling sick and unable to take injection.

Keywords: rheumatic fever, rheumatic heart disease, secondary prophylaxis, adherence, factors, barriers

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INTRODUCTION

Acute rheumatic fever is an illness caused by a bacterial infection with Group A streptococcus (GAS).¹ The inflammatory response to infection affects several body systems.² Some patients suffer from a persisting heart damage, termed as "Rheumatic heart disease" (RHD). RHD may occur following a single episode of acute rheumatic fever or may occur after recurrent episodes. RHD has been eradicated/controlled in developed countries, whereas it remains a major health concern in developing countries like Pakistan. The prevalence of RHD is estimated to be much higher in developing countries,³ about 24/1000 versus just 0.3/1000 in industrialised nations.⁴

S F Rizvi et al. found prevalence of 5.7/1000 in rural population of district of Rahim Yar Khan in Pakistan. In this study only 8% patients were taking secondary prophylaxis. S F Rizvi et al. concluded that prevalence of RHD has not declined over decades in Pakistan and majority was not receiving benefits of secondary prophylaxis.⁵

Secondary prevention of rheumatic fever (RF) is defined as continuous administration of specific antibiotics to patients with a previous attack of

rheumatic fever or a well-documented RHD.⁶ The aim is to prevent colonization of upper respiratory tract with GAS and future attacks of rheumatic fever. It is mandatory to give secondary prophylaxis to all patients of RF whether or not they have a residual heart disease.⁷

Secondary prophylaxis of acute rheumatic fever with monthly injections of benzathine penicillin G (BPG) is the only strategy which is considered to be effective at both individual and community levels.⁸ However adherence to three- or four- weekly injections is variable. Several factors are responsible for patient's non-compliance to the prescribed secondary prophylaxis. Hence it remains vital to identify these factors and propose an effective method to combat this issue. Therefore, aim of this study was to determine the level of adherence and possible barriers to secondary prophylaxis among patients with RHD.

METHODOLOGY

This cross-sectional study was conducted at Department of Adult Cardiology, National Institute of Cardiovascular Diseases, Karachi, Pakistan. It is

one of the largest and oldest cardiac institute in South-east Asia.

The study was conducted for 06 months, from February 2018 to July 2018. Prior to commencement of study, approval was obtained from the Ethical review committee of the hospital. Informed verbal consent was taken from adult patients and parents/guardians of pediatric group. We included patients presenting to out-patient department and those admitted in the facility. Inclusion criteria was patients of either gender, age between 5 to 55 years, and diagnosed cases of Rheumatic heart disease on the basis of Transthoracic Echocardiography (features present included thickening, restricted motion, fused commissures and/or calcification of the valve). Transthoracic Echocardiography was performed by an experienced faculty member of the institute. Data was collected using a structured questionnaire. Data regarding demographics, education level and employment status was recorded. The frequency of taking Benzathine Penicillin injection was divided into four groups, once/3 weeks, once/4 weeks, once/6 months or once/year. Those patients who had never taken secondary prophylaxis were considered non-adherent. Patients were questioned about possible barriers to adherence to secondary prophylaxis. Data were analyzed using SPSS version 21. Descriptive summary of the study variables such as frequency (%) or mean ± standard deviation (SD) were presented.

RESULTS

Baseline characteristics: Among total of 195 patients 66.7% (130) were female, mean age was 32.25 ± 13.78 years. Rural residents were 51.3% (100) and 59.5% (116) of the patients were illiterate. Demographic characteristics of the patients are presented in Table 1.

Table 1: Demographic characteristics of the patients

| Characteristics | Total (n = 195) |
|--------------------|---------------------|
| Gender | |
| Male | 65 [33.3%] |
| Female | 130 [66.7%] |
| Age (years) | |
| Mean ± SD | 32.25 ± 13.78 years |
| Up to 40 years | 151 [77.4%] |
| More than 40 years | 44 [22.6%] |
| Residence | |
| Rural | 100 [51.3%] |
| Urban | 95 [48.7%] |
| Education | |
| None | 116 [59.5%] |
| Primary | 31 [15.9%] |
| Secondary | 28 [14.4%] |

| | |
|-------------------|-------------|
| College | 19 [9.7%] |
| Vocational | 1 [0.5%] |
| Ethnicity | |
| Sindhi | 102 [52.3%] |
| Punjabi | 16 [8.2%] |
| Balochi | 7 [3.6%] |
| Pathan | 20 [10.3%] |
| Others | 50 [25.6%] |
| NYHA Class | |
| I | 14 [7.2%] |
| II | 59 [30.3%] |
| III | 90 [46.2%] |
| IV | 32 [16.4%] |

Disease Severity: Mean duration since diagnosis of rheumatic fever was 53.64 ± 66.26 months. Mitral stenosis (MS) was observed in 71.8% (40) cases with 83.6% (117) of them having severe MS. Patients with mitral regurgitation (MR) were 73.8% (144) out of them 47.2% (68) had severe MR. Aortic stenosis (AS) was observed in 19.0% (37) of the patients and 40.5% (15) of them had severe AS. Patients with aortic regurgitation (AR) were 46.7% (91) out of them 12.1% (11) had severe AR. Tricuspid regurgitation (TR) was observed in 71.3% (139) of the patients and 29.5% (41) of them had severe TR. Characteristics of severity of the rheumatic heart disease are presented in Table 2.

Table 2: Characteristics of severity of the rheumatic fever

| Characteristics | Total (n = 195) |
|------------------------------------|----------------------|
| Duration of rheumatic fever | 53.64 ± 66.26 months |
| Mitral stenosis | 140 [71.8%] |
| Mild | 8 [5.7%] |
| Moderate | 15 [10.7%] |
| Severe | 117 [83.6%] |
| Mitral regurgitation | 144 [73.8%] |
| Mild | 33 [22.9%] |
| Moderate | 43 [29.9%] |
| Severe | 68 [47.2%] |
| Aortic stenosis | 37 [19%] |
| Mild | 14 [37.8%] |
| Moderate | 8 [21.6%] |
| Severe | 15 [40.5%] |
| Aortic regurgitation | 91 [46.7%] |
| Mild | 48 [52.7%] |
| Moderate | 32 [35.2%] |
| Severe | 11 [12.1%] |
| Tricuspid regurgitation | 139 [71.3%] |
| Mild | 56 [40.3%] |
| Moderate | 42 [30.2%] |
| Severe | 41 [29.5%] |

Secondary Prophylaxis: Benzathine Penicillin injection was prescribed to 56.4% (110) patients, out of them 70.0% (77) of the patients were counseled regarding duration of secondary prophylaxis and 79.1% (87) patients had taken prophylaxis. Frequency of getting injections was

once in 3 weeks in 19.5% (17), once in 4 weeks in 73.6% (64), once in 6 months in 5.7% (5), and once a year in 1.1% (1) patients. Only 57.3% (63) were still taking the Benzathine Penicillin Injection. Reason for not getting prophylaxis were reported to be painful injection (19.1%), allergic reaction (8.5%), no nearby health facility (12.5%), injection not available at nearby facility (4.2%), financial constraints (14.9%), friends/family advised otherwise (12.8%), felt sick and unable to take injection (8.5%), pregnancy (4.3%), lactation (2.1%), and reason was not specified by 25.5% of the patients. Patients' behaviors towards secondary prophylaxis are presented in Table 3.

Table 3: Patients' behaviors towards secondary prophylaxis

| Characteristics | Total (n = 195) |
|---|--------------------|
| Prescribed Benzathine Penicillin Injection | 110 [56.4%] |
| Counseled regarding duration of secondary prophylaxis | 77 [70%] |
| Took prophylaxis | 87 [79.1%] |
| Once/3 weeks | 17 [19.5%] |
| Once/4 weeks | 64 [73.6%] |
| Once/6 months | 5 [5.7%] |
| Once/year | 1 [1.1%] |
| Still taking secondary prophylaxis | 63 [57.3%] |
| Painful Injection | 9 [19.1%] |
| Allergic Reaction | 4 [8.5%] |
| No nearby health facility | 7 [14.9%] |
| Injection not available at nearby facility | 3 [6.4%] |
| Financial constraints | 1 [2.1%] |
| Friends/Family advised otherwise | 6 [12.8%] |
| Felt sick and unable to take injection | 4 [8.5%] |
| Pregnancy | 2 [4.3%] |
| Lactation | 1 [2.1%] |
| Reason not specified | 12 [25.5%] |

DISCUSSION

RHD remains a major health problem in Pakistan. It has been eliminated from developed countries but still remains a big challenge in developing countries. S F Rizvi et al. studied the prevalence of RHD in a sub-district of Pakistan by screening 9430 people and found 54 cases of RHD (5.7 per 1000).⁵ Amongst the countries struggling with RHD, sub-Saharan Africa has the highest prevalence of disease which is 6.5-30/1000.⁹ Pakistan has higher prevalence in comparison with its neighboring countries, India and Bangladesh.^{10,11}

RHD poses a huge burden on health facilities of developing countries in terms of treatment required such as repeated hospitalizations and therapeutic interventions.⁹ The REMEDY study conducted in African countries, India and Yemen found that majority RHD patients were complicated by congestive heart failure, atrial fibrillation, stroke, pulmonary hypertension, infective endocarditis, and major bleeding.¹²

However, on the contrary, very little attention is being paid to the cost effective method of secondary prophylaxis.¹³ As per American Heart Association guidelines, continuous secondary prophylaxis is recommended for patients with definite evidence of rheumatic heart disease. A single injection of Benzyl Penicillin once/4 weeks (or once/3 weeks) can prevent major morbidity and mortality associated with the sequelae of RHD.¹⁴

Efficacy of Benzathine Penicillin G injections in preventing recurrent rheumatic fever attacks depends on adherence to regimen. However poor adherence to secondary prophylaxis remains an issue to be addressed. Several physician-related, patient-related, demographic, and socio-economic factors have been identified.

In our study, the major factor identified was possible lack of prescription of injection by health care professionals. Out of 195 patients studied, 43.6% were never even prescribed Benzyl penicillin injections, despite being seen by doctors on multiple visits in due course of time. This comprises of almost half of RHD patients in our study sample. An even higher percentage was reported by Lalita et al., this Indian study reported lack of prescription in up to 59% of the patients.¹⁵ This may be due to lack of knowledge, communication and cooperation on physician's part. Gehan et al. evaluated physician's knowledge about prevention of rheumatic fever before and after a teaching session. Their results showed only 50% of the doctors had awareness about primary and secondary prevention of rheumatic fever and RHD. However, marked improvement up to 77% in their awareness level was achieved via lectures, distribution of protocols and posters.¹⁶ Hence cooperation by health care professional remains vital to preventing further ARF recurrences. Health professionals need to prescribe, monitor and ensure compliance among patients.

Amongst patients who were prescribed injections, 1 in every 3 patients (30%) was not counseled regarding the need and the importance of getting prophylaxis. Data collected in children by Ebtisam et al. revealed similar results. In this study 35% children were non-adherent to secondary prophylaxis due to inadequate counseling and another 45% reported their lack of confidence in treatment.¹⁷ Since, 59.5% of our patients are illiterate, these patients ended up not getting prophylaxis despite being given a written prescription. A study conducted in Uganda stated that among patients with low adherence (<80%), 40.9 % had education of less than secondary level. Another study conducted in New Zealand among patients aged 14-21 also identified a link between higher education level and adherence to secondary prophylaxis.¹⁸ A systematic review quotes Bassili et al. stating low compliance rate among children whose parents have low level of education.¹⁹ Hence the vitality of counseling cannot be undermined by health care

providers in developing countries with low level of education among patients/caregivers.

Amongst the several factors studied for poor adherence to secondary prophylaxis, fear of getting a painful injection tops the list (19.1%). This result is consistent with that observed (23%) in a similar study conducted in past.²⁰ However, Sheron et al. reported that 75% of children and 50% of adults missed their appointments because of fear of painful injections.²¹ Several measures can be taken to reduce the pain. Some proposed methods are: use a 21- gauge needle, warm syringe to room temperature before using, allow alcohol from swab to dry before inserting needle, apply pressure with thumb for 10 sec before inserting needle, deliver injection slowly, distract patient during injection with conversation.²² Amir et al. provided evidence that administration of benzathine penicillin injection with lidocaine significantly reduces injection pain without affecting its pharmacokinetics.²³

More than half of our study population lived in rural areas. And 14.9% of patients could not get prophylaxis since there was no nearby facility, 6.4% stated that injection was not available at their nearby facility. Traveling long distances monthly and unequipped health facilities in rural areas are cited as barriers.²⁴ This requires vigilance at government level to provide for the patients living in far-flung areas of the country. Grayson et al. presented an audit of New Zealand health system which showed that provision of rheumatic fever prophylaxis at community level such as schools, work, home, and clinics resulted in higher rates of adherence.²⁵ Further research and measures are required to devise an effective method of delivery of prophylaxis in our geographic area.

CONCLUSION

In conclusion, majority of the RHD patients are not being prescribed and effectively counseled regarding secondary prophylaxis. Low adherence to the secondary prophylaxis was observed and the common reasons for non-adherence were painful injection, non-availability of nearby health facility, friends/family advising them otherwise, allergic reaction, and patients feeling sick and unable to take injection.

AUTHORS' CONTRIBUTION

RA: Concept and design, data acquisition, interpretation, drafting, final approval, and agree to be accountable for all aspects of the work. MF, MABA, SK, KA, KMA, TS, MK: Data acquisition, interpretation, drafting, final approval and agree to be accountable for all aspects of the work.

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