

## ORIGINAL ARTICLE

## ADHERENCE AND BARRIERS TO SECONDARY PROPHYLAXIS FOR RHEUMATIC HEART DISEASE AT TIKUR ANBESSA SPECIALIZED HOSPITAL

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## ABSTRACT

**Introduction:** Rheumatic heart disease (RHD) is one of the major causes of cardiovascular disease in developing countries. Secondary prophylaxis is effective for preventing recurrent acute rheumatic fever (ARF) and the progression of RHD. The purpose of the study was to assess adherence and barriers to use secondary prophylaxis for RHD at Tikur Anbessa Specialized Hospital (TASH).

**Methods:** Cross-sectional study was conducted from June 5, 2020, to September 4, 2020, at Tikur Anbessa Specialized Hospital, Ethiopia. A structured questioner was used for the data collection on awareness, adherence, and barriers for benzathine penicillin prophylaxis in adults with RHD. Data were analyzed using SPSS version 26.

**Results:** A total of 385 patients participated in this study, 305(79.6%) patients were aware about sore throat associated with heart disease, and about 288 (75.6%) patients know that benzathine penicillin prevents tonsillitis. Adherence rate was 77.9%. The main barriers for nonadherence in this study were the unavailability of medications, schedule forgetfulness, and health professionals' refusal to inject benzathine penicillin. Increased age was found to have a significant association with adherence to B. penicillin. For each one-year increase in the age of patients with RHD, the adherence decreases by 3% [AOR= 0.97; 95% CI 0.95, 0.99], P value = 0.006

**Conclusion:** Adherence level to monthly benzathine penicillin injection was low, which is below WHO recommendation. This study has revealed major barriers that affect adherence to secondary prophylaxis for RHD that can be used to develop interventions to improve adherence.

**Key words:** Rheumatic heart disease, adherence, barriers, secondary prophylaxis.

## INTRODUCTION

Rheumatic fever (RF) and RHD remain significant causes of cardiovascular disease in the world today. They are major public health problems in many developing countries (1).

The prevalence of RHD across World Health Organization (WHO) regions remains high. Although RF and RHD have progressively declined in developed countries over the past 50 years, they continue to increase at a striking rate in developing countries. Linked to poverty and poor access to health care facilities, estimates suggest that roughly 50% of cardiac patients in less developed countries have RF and/or RHD (2).

In Ethiopia, the prevalence of Rheumatic Heart Disease is 19 per 1000 population which is much higher than the prevalence of other developing countries (3). It accounts for 34 % of all spectrums of cardiovascular diseases on follow up at major referral hospitals in Ethiopia (4).

Secondary prophylaxis through the administration of benzathine penicillin G (BPG) to patients with a previous history of RF and/or RHD is effective at preventing streptococcal pharyngitis and recurrence of rheumatic fever.

The long-term follow-up studies have proved that the early initiation of secondary prophylaxis is very effective to stop or slow down further progression of RHD (5).

This study was conducted to better understanding current adherence rate and barriers to secondary prophylaxis in patients with RHD at the largest referral hospital of the country. This study will have a significant impact to tackle these barriers.

## METHODS

*Study design and period*

Tikur Anbessa Specialized Hospital is located in capital city Addis Ababa, Ethiopia. It is the largest specialized referral teaching hospital in the country. In addition to teaching, the hospital also provides both inpatient and outpatient services to patients referred from different parts of the country. Currently, it is the only governmental hospital where cardiac surgery is practiced in the country with a follow-up clinic for congenital and acquired heart disease in children and adults. The study period was from June 5, 2020 to September 4, 2020 GC, TASH, Addis Ababa, Ethiopia. Cross sectional study using structured questioners on adherence for the BPG prophylaxis for the last one year and barriers to use BPG prophylaxis.

Adult patients with Rheumatic Heart Disease prescribed with monthly BPG for at least one year' on follow up at the cardiac clinic and who gave informed consent were included in the study. Sample size was calculated using single population proportion formula. Convenience sampling method was used to include all patients with RHD fulfilling the inclusion criteria.

A structured questionnaire adopted and modified from different literatures was prepared in English and translated to Amharic. The data was collected through patient interview, and review of medical charts and injection cards. The questionnaire was pre-tested in order to check the questionnaire is clear and addressing the objective of the study. Training was given to data collectors. The data collectors were general practitioner and 4<sup>th</sup>-year medical students. The data collectors were trained and supervised by the investigators. The collected data was checked for completeness before data entry process.

Data was entered and analyzed using SPSS version 26 (IBM® SPSS®). Association was done by chi-square test for categorical tests and considered to be statistically significant when the P value was below 0.05. Confidence interval was set at 95%.

Ethical clearance was obtained from Department of Internal Medicine research ethical committee. A written informed consent was obtained from the patients before data collection. The patients' response was fully confidential.

## OPERATIONAL DEFINITION

**Rheumatic Heart Disease (RHD):** Refers to the major long-term sequel of acute rheumatic fever, which involves the cardiac valves leading to stenosis or regurgitation with resultant hemodynamic disturbance.

**Acute rheumatic fever (ARF)** is delayed, nonsuppurative sequel following group A streptococcus pharyngitis and may consist of arthritis, carditis, chorea, erythema marginatum, and subcutaneous nodules

**Good adherence or adhered to prophylaxis:** if the rate of adherence is covering  $\geq 80\%$  of prophylaxis. i.e., patient has not missed any injection or only missed three or less injections in the last one year or received prophylaxis nine or more times).

**Poor adherence or not adhered to prophylaxis:** if the rate adherence is  $<80\%$ , i.e. patient had missed their regular injection more three times in the last one year.

## RESULTS

A total of 385 patients with RHD attending adult cardiac clinic participated in the study. Among the participants, 276 (71.7%) were females and 345 (89.6%) were urban residents.

The mean age was 31 years, (SD, 10.7). Most of participants were from Addis Ababa 259 (67.3%) (Table 1).

**Table 1.** Socio-demographic characteristics of patients with RHD attending adult cardiac clinic at TASH, Addis Ababa, Ethiopia, 2020

Variables	No.	Percent (%)
Age category (n=385)		
<20 years	54	14.0
20-29 years	140	36.4
30-39 years	114	29.6
40-49 years	49	12.7
50-59 years	21	5.5
$\geq 60$ years	7	1.8
Sex (n=385)		
Female	276	71.7
Males	109	28.3
Residence (n=385)		
Rural	40	10.4
Urban	345	89.6
Region (n=385)		
Addis Ababa	259	67.3
Oromia	82	21.3
Amhara	21	5.5
SNNPR	20	5.2
Others	3	.8
Marital status (n=383)		
Single	147	38.4
Married	205	53.5
Divorced	23	6.0
Widowed	8	2.1
Occupation (n=383)		
Government employee	76	19.8
Non-government employee	71	18.5
Student	59	15.4
House wife	63	16.4
Farmer	17	4.4
Merchant	16	4.2
No occupation	81	21.1
Family Income (n= 378)		
> 1000 Ethiopian birr	269	71.2
< 1000 Ethiopian birr	82	21.7
No income	27	7.1
Level of Education (n= 372)		
No formal education	40	10.8
Primary school	124	33.3
Secondary school	133	35.8
Teriary	75	20.1

Among 383 participants, 219 (57.2%) had history of sore throat. However, only 148 (67.9%) of them received medical doctor or other health professional prescribed medications for the sore throat. Antibiotics were the most prescribed medications 152(69.2%). Three hundred five respondents (79.6%) were aware that sore throat is associated with heart disease, while 55(14.4) of them were not aware and 23(6%) did not have any clue about it. Three hundred two (79.5%) have heard about rheumatic heart disease before. With regard to the purpose of benzathine penicillin, 288(75.6%) believe that it prevents tonsillitis, 123 (32.2%) think it is a cure for RHD and 30(7.9%) think that it prevents worsening (Table 2).

**Table 2.** Awareness regarding rheumatic heart disease among patients with RHD attending adults cardiac clinic at TASH, Addis Ababa, Ethiopia, 2020.

Variables	No.	Percent (%)
History of sore throat (n=383)		
Yes	219	57.2
No	164	42.8
Treatment for sore throat (n=218)		
Antibiotics	152	69.7
Salt	16	7.3
Traditional herbs	44	20.2
Other	6	2.8
Person prescribed the medication for sore throat (n=218)		
Myself	22	10.1
Friend/Relative	44	20.2
Medical doctor/ other health professional	148	67.9
Others	4	1.8
Awareness of complications of sore throat (n=379)		
Yes	294	77.6
No	85	22.4
Sore throat associated with heart disease (n=383)		
Yes	305	79.6
No	55	14.4
No idea	23	6.0
Ever heard about rheumatic heart disease (n=380)		
Yes	302	79.5
No	78	20.5
Benzathine penicillin prophylaxis for RHD, alleviate the symptoms (n=382)		
Yes	70	18.3
No	312	81.7
Benzathine penicillin prophylaxis for RHD, prevent worsening (n=382)		
Yes	30	7.9
No	352	92.1
Benzathine penicillin prophylaxis for RHD, cure the disease(n=382)		
Yes	123	32.2
No	259	67.8
Benzathine penicillin prophylaxis for RHD, prevent tonsillitis (n=381)		
Yes	288	75.6
No	93	24.4

Among 384 participants in the past 1 year, 211(54.9%) did not miss monthly injection, 37(9.6%) patients missed one injection, 51(13.3%) missed two to three injections and 85(22.1%) missed more than three injections yielding adherence rate of 77.9 %. About 85(22.1%) patients did not adhere for monthly BPG injection. Two hundred and thirty three (61.8%) waited until next appointment when they missed injection. Seven (1.9%) took alternative medication (herbal) when they missed monthly injection. Most of patients, 287 (75.3%) never experienced adverse reaction to benzathine penicillin. Most of the patients, 230 (59.9%) in this study were diagnosed with RHD diagnosed in the past 10 years and 113(29.4%) patients were diagnosed to have RHD in the past 11-20 years (Figure 1). About 240 (62.3%) were started on benzathine penicillin prophylaxis in the past 10 years (Table 3).

**Table 3.** Adherence to b. penicillin prophylaxis for RHD among patients with RHD attending adult cardiac clinic at TASH, Addis Ababa, Ethiopia, 2020

Variables	No.	Percent (%)
Serious reaction (more than local swelling and pain) following a previous b. penicillin injection (n=381)		
Yes	94	24.7
No	287	75.3
Attend appointment for BPG penicillin prophylaxis (n=382)		
Alone	216	56.5
With a family member	163	42.7
With others	3	.8
Benzathine penicillin prophylaxis card is useful (n=380)		
Yes	341	89.7
No	39	10.2
Time since BPG prophylaxis started ( n=385)		
<10 years	240	62.3
11- 20 years	110	28.6
21-30 years	31	8.1
Do not know	4	1
Injections missed in the past 1 year (n=384)		
None	211	54.9
One	37	9.6
Two to three	51	13.3
More than three	85	22.1
What do you do if you miss monthly benzathine penicillin (n=377)		
Wait until my next appointment	233	61.8
Go a few days latter	137	36.3
Take alternative medication (herbal)	7	1.9
Hospital admissions in the last 1 year (n=385)		
No admission	279	72.5
Once	45	11.7
Twice	13	3.4
Three times	20	5.2
Four and more	28	7.3
Co-morbidities (n=385)		
No	339	88.1
Hypertension	13	3.4
Diabetes mellitus	5	1.3
Ashma	3	.8
Other	25	6.5

In this study, the main reason for missing injection for most of patients, 216 (56.1%), were due to lack of medication supply followed by schedule forgetting, 167(43.4%) and health professional refusal to inject benzathine penicillin, 149(38.7%). For majority of patients, 376(97.9%), the usual waiting time at clinic during injection was less than 1 hour (Table 4).

Importance of benzathine injection prophylaxis that had been explained by doctor for majority, 346(90.1%) patients. Regarding effectiveness of the medication, 362(94%) believed that the drug is effective. For 267 (69.7%) participants, cost associated to coming to clinic (like days off work, transportation etc.) prevent coming to injection clinic. About 346(90%) agreed secondary prophylaxis card or booklet that list dates of injections is very useful. Majority, 294(76.5%), agreed analgesic mix or taking divided dose injection can increase adherence. From this study, long waiting time at clinic was not an obstacle to monthly injection, 266(69.4%) (Table 4).

**Table 4.** Barriers to monthly b. penicillin injection among patients with RHD attending adult's cardiac clinic at TASH, Addis Ababa, Ethiopia, 2020

A Variables	No.	Percent (%)	
Felt well and healthy	55	14.3	
Forgetting	167	43.4	
Unavailability of transport	22	5.7	
Transport cost	25	6.5	
No medication supply/ stock out	216	56.1	
Cost related to BPG injection	79	20.5	
Fear of side effect	54	14.0	
Fear of pain	28	7.3	
Health professional refuse to administer BPG	149	38.7	
Being busy	45	11.7	
Distance	11	2.9	
Other reason	4	1.0	
Why health professionals refuse to give injection (n=379)			
Fear of of side effects	254	67.0	
Lack of training how to inject	60	15.8	
Because they feel that it is not their responsibility	21	5.5	
Inadequate number of health professional in remote areas	26	6.9	
Other	18	4.7	
Usual waiting time at clinic where you receiving prophylaxis (n=384)			
< 1 hour	376	97.9	
1 hour and more	8	2.1	
Doctor has explained what rheumatic heart disease is	Agree	347	90.4
	Neutral	8	2.1
	Disagree	29	7.6
Doctor clarified me why the injections are important	Agree	346	90.1
	Neutral	8	2.1
	Disagree	30	7.8
I believe that this medication is effective	Agree	362	94.5
	Neutral	14	3.7
	Disagree	7	1.8
Cost associated to coming to clinic (days off work, transportation, etc), prevent me from coming	Agree	267	69.7
	Neutral	26	6.8
	Disagree	90	23.5
Secondary prophylaxis cards or booklets that list dates of injections are very useful (Reminder)			
Agree	346	90.1	
Neutral	30	7.8	
Disagree	8	2.1	
Taking analgesic mix or divided dose injection can increase adherence	Agree	294	76.6
	Neutral	70	18.2
	Disagree	20	5.2

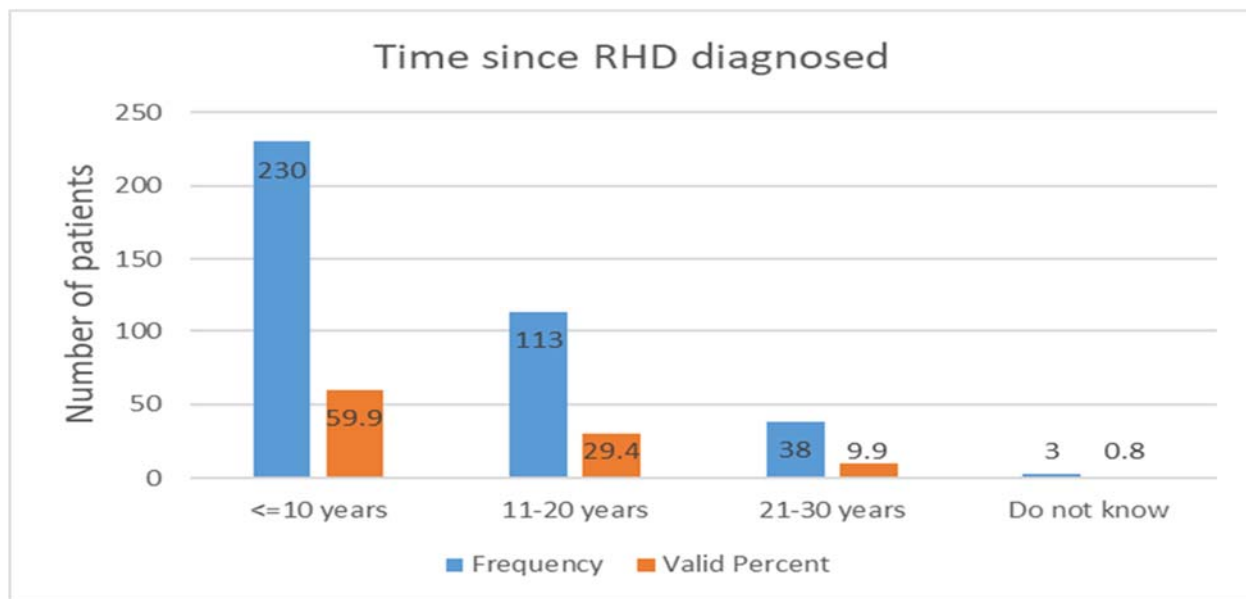
However, in multivariable analysis, only increased age was found to have significant association with adherence to BPG. As a result, for each one-year increase in the age of patients with RHD attending adult cardiac clinic at TASH, the adherence to BPG decreases by 3% [AOR= 0.97; 95% CI 0.95, 0.99] (Table 5)

Table 5. Bivariable and Multivariable Logistic Regression analysis results of factors associated with adherence to b. penicillin patients with RHD attending adults' cardiac clinic at TASH, Addis Ababa, Ethiopia, 2020

Explanatory Variables	Adherence to b. penicillin			AOR(95% CI)	P-value
	Adhered	Not adhered	COR(95% CI)		
Age in year	30.03 ± 10.4 <sup>‡</sup>	34.0 ± 11.2 <sup>‡</sup>	0.97(0.95, 0.99)*	0.97(0.95, 0.99)	0.006
<b>Time since benzathine penicillin prophylaxis started</b>					
≤ 10 years	194 (80.8%)	46 (19.2%)	1		
11 - 20 years	83 (76.1%)	26 (23.9%)	0.76 (0.44, 1.31)		0.317
21 – 30 years	19 (61.3%)	12 (38.7%)	0.38 (0.17, 0.83)*		0.015

<sup>‡</sup> mean ± SD \* statistically

significant at p value of ≤ 0.05



**Figure 1.** Time since RHD diagnosed among patients with RHD attending adult cardiac clinic at TASH, Addis Ababa, Ethiopia, 2020. (n=384)

## DISCUSSION

Out of 385 study participants, females were 276 (71.7%), most of them were from urban area 354 (89.6%). The mean age of participants was 31 years. From the study participants, 219(57.2%) reported having had history of sore throat which is lower than the study done in Cameroon (71.1%) which is probably due to different sociodemographic background. Antibiotics were the most prescribed medications, 152(69.7%) and health professionals prescribed treatment for majority of the patients (67.9%) that is higher than Cameroon study, 45% and 35.8% respectively (6).

In this study, 305(70.6%) patients were aware that sore throat is association with heart disease which is better than the Cameroon study in which 70% participants did not know the association between sore throat and rheumatic heart disease (6). About 302(79.6%) have heard about rheumatic heart disease. With regard to knowledge of BPG prophylaxis among patients, 288(75.6%) patients responded as it prevents tonsillitis, and 30(7.9%) patients were aware that it useful to prevent worsening rheumatic heart disease.

Out of 384 participants, 211(54.9%) did not miss monthly injection, 37(9.6%) missed one injection, 51(13.3%) missed two to three injection and 85 (22.1%) missed more than three injections in the past one year. The overall adherence rate for this study was 77.9%, which is better than similar study done in Jimma, Ethiopia (adherence rate was 55.2%) (7). The better adherence rate in this study can be due to the fact that most of participants were from urban area and they have better understanding of benefit of BPG prophylaxis. However, the adherence rate in this study is lower than Indian patients (93.6%) (8) which may be due to difference in socioeconomic background as compared to our patients. Our study finding adherence rate is comparable to Pakistan study finding (73.5%) (9).

Major barriers for prophylaxis in this study was unavailability of drug 216(56.1%), forgetfulness 167(43.4%), health professional refusal to give injection 149(38.7%), cost related to BPG injection 79(20.5%) and fear of side effects 54(14%). This finding is consistent with study done on barriers to BPG prophylaxis in Jimma, Ethiopia where the main barriers were unavailability of medication and drug side effects (10).

This study finding barriers are also consistent with Indian study, the main barriers were non-availability of drug, pain and fear of injection (8). Other influencing factors for prophylaxis in different studies were, treatment schedule, distance from healthcare facility, perception that the symptoms are benign and self-limited and lack of awareness, which were not in this study finding. Poor recall system was barrier in other study, which is similar to this study finding. For majority of participants, 376 (97.9%), the usual waiting time at clinic was less than 1 hour, which is much less than Egypt study, for whom 66% patients waiting for 1 to 3 hours average 2 hours (11).

In this study, for each one-year increase in the age of patients with RHD, the adherence decreases by 3%. This could be probably better family or care giver support for young patients as compared to older patients.

### LIMITATION

The limitation of this study is that it was conducted in a single tertiary care center and may not be representative of the country. The other limitation of the study, as it was done over a short period of time and the data may not be complete.

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### CONCLUSION

Adherence to BPG prophylaxis for RHD was low (77.9%) in patients attending the cardiac clinic at TASH. This study finding barriers might be used as input to find solutions to increase adherence. In addition, creating awareness regarding the benefit of BPG prophylaxis is essential.

### ACKNOWLEDGMENT

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### CONFLICT OF INTEREST

No conflict of interest.