

Adherence to Secondary Prophylaxis and Associated Factors Among Rheumatic Heart Disease Patients Visiting Asella Referral and Teaching Hospital, Southeast Ethiopia

Meskele Bireda^{1*}, Melaku Yitbarek¹ and Bereket Zeleke²

¹School of Medicine, College of Medicine and Health Science, Wolkite University, Ethiopia

²Department of Pharmacy, College of Medicine and Health Science, Wolkite University, Ethiopia

*Corresponding Author

Meskele Bireda, School of Medicine, College of Medicine and Health Science, Wolkite University, Ethiopia.

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Abstract

Background: ensuring adequate adherence to secondary prophylaxis has been a challenge and poor among adolescents and chronic patients, due to different factors and barriers. The aim of this study was to assess non-adherence rate and associated factors to secondary prophylaxis among Rheumatic heart disease patients visiting Asella Referral and Teaching Hospital, Southeast Ethiopia.

Methods: Hospital-based cross-sectional study was conducted among selected Rheumatic heart disease patients on follow-up at Asella Teaching and Referral Hospital. Data were collected using a structured questionnaire. The collected data were entered into Epidata 4.6 and analyzed using SPSS version 26. Bivariable logistic regression analysis was used to identify the candidate variables at $p < 0.25$ and multivariable logistic regression analysis was employed to identify significant factors at p value < 0.05 .

Results: A total of 291 patients with Rheumatic heart disease taking prophylaxis were included in the analysis and of those 177 (60.8%) were female and 114 (39.2%) were male, giving a female: male ratio of 1.5:1. About 97 (32.3%) patients were non-adherent to benzathine penicillin-G prophylaxis. Far distance from the hospital and low monthly income found to have a significant association with non-adherence to benzathine penicillin-G prophylaxis: (AOR 4.1 [95% CI 1.9-9.0], $P=0.001$; AOR 3.6 [95% CI 1.6-8.4], $P=0.003$), respectively.

Conclusion: The overall non-adherence rate to benzathine penicillin-G prophylaxis for Rheumatic heart disease was high among patients attending follow up clinic at Asella Teaching and Referral Hospital since they were far from the hospital and their low monthly income.

Keywords: Rheumatic Heart Disease, Non-Adherence Rate, Associated Factor

Abbreviations

ARF: Acute Rheumatic Fever, ATRH: Asella Teaching and Referral Hospital, BPG: Benzathine Penicillin G, CHF: Congestive Heart Failure, GAS: Group A streptococcus, JMC: Jimma Medical Center, NYHA: New York Heart Association, RHD: Rheumatic Heart Disease, SAP: Secondary Antibiotics Prophylaxis, TASH: Tikur Anbessa Specialized Hospital, WHO: World Health Organization

1. Introduction

Rheumatic heart disease (RHD) is an autoimmune disease where the exaggerated immune response damages the heart valve due to long standing acute rheumatic fever [1-3]. For patients those with evidence of rheumatic heart disease long-term anti-streptococcal prophylaxis is indicated for secondary prevention [4]. Secondary prevention of rheumatic fever has multipurpose, applicable and cost effective strategy to prevent colonization or infection of the upper respiratory tract with group A β -hemolytic streptococcal pharyngotonsillitis and the development of recurrent attacks

of rheumatic fever, to reduce mortality and morbidity due to Rheumatic heart disease [5].

The recommended secondary prophylaxis is intramuscular injections of benzathine penicillin-G (BPG), every three to four weeks which is determined by a number of factors, including age, time since the last episode of ARF, ongoing risk of streptococcal infections and potential harm from recurrent ARF and its dosage being adapted to patient's weight [6].

BPG prophylaxis efficacy against ARF largely depends on adherence to treatment [7]. A patient with RHD is expected to receive at least 80% of the annual prescribed injections [8,9]. Otherwise, there is a higher risk of recurrent ARF and its complications like RHD, Infective Endocarditis, Heart Failure and Stroke [10]. However, poor adherence to prophylaxis is the major problem in Secondary antibiotics prophylaxis [11].

Non-adherence is considered as a multidimensional phenomenon. Barriers to adherence include lack of resources for transportation and medications, fear of injection pain, poor patient-provider communication, and poor availability of clinics and providers able to give injections [11].

In Ethiopia different studies show patient with RHD had poor adherence to secondary benzathine prophylaxis. RHD patients attending cardiac clinic of Jimma medical center had low adherence rate (63%) to the secondary prophylaxis due to lack of money, far distance from the setup, painful injection and lack of awareness about the disease [12]. RHD patients on follow-up at four hospitals in Jimma zone had poor adherence rate (55.2%) to SAP and Patients with class I and II heart failure and those living in rural areas, especially >30 km from a hospital, were identified to be poorly adherent to secondary prophylaxis [13].

From our healthcare experiences, RHD is the major pattern of heart failure admission and visit Emergency and Medical follow up clinic at Asella teaching and referral hospital. There is also concern on adherence to monthly BPG prophylaxis. Despite such experience, No study so far showing Adherence rate to Secondary prophylaxis and associated factors among Rheumatic Heart Disease patients visiting Asella Referral and Teaching Hospital.

This study is conducted to bridge the gap and it can be used as a preliminary data on BPG prophylaxis in patients with RHD. This, in turn, supports quality improvement service on adherence to monthly BPG administration which may improve RHD patients' health-related quality of life and treatment outcomes. Findings and recommendations obtained from this study might also help to influence the development of guidelines and policies to optimize the monthly administration of BPG in patients with rheumatic heart diseases. Therefore, this study aimed to evaluate the rate of non-adherence to monthly BPG injection and its factors in patients attending Asella Referral and Teaching Hospital.

2. Methods and Materials

2.1. Study Setting and Design

Asella Referral and Teaching Hospital, Arsi University, is located

in Arsi zone of Oromia, about 173 KM south east of the capital, Addis Ababa. The Hospital provides health service at inpatient and outpatient level as a referral Hospital. From OPD follow up registration book report, around 400 patients were seen in follow clinic monthly. Hospital based cross-sectional study from April 1, 2022 to July 30, 2022.

2.2. Study Population and Sampling Strategy

All patients with RHD and who had been receiving BPG prophylaxis for at least the past 1 year and visiting the follow up clinic from April 1, 2022-July 30, 2022 were included in the study. All patients with physically ill, declined to answer questions, refused to give consent for interview and discontinued BPG by physician order were excluded from the study.

A single population proportion formula was used to calculate the sample size. Using the prevalence (22.1%) of non-adherence rate in TikurAnbessa Specialized Hospital, 5% margin of error at 95% confidence level and 10% inclusion of non-response rate, the calculated final sample size was 291 [14]. Systematic random sampling method used to select the required number of pregnant mothers. All medical patients who visited medical follow up clinic during the study period who fulfilled the study criteria was selected sequentially until the required sample size is achieved.

2.3. Data Collection

Data was collected from selected patients who were visited medical follow up clinic using structured questionnaire and review of medical records using a checklist. Information that was collected includes non-adherence to BPG prophylaxis, Demographic data (age, sex, marital status, religion, education level, employment status, family size, place of residence and monthly income), Clinical characteristics (duration of disease since diagnosis, hospitalization, duration of BPG prophylaxis since started, condition of patient during the interview), Knowledge (Duration of BPD, complication of missing the doses) and Attitude (belief about the importance of SAP, pain of injection).

2.4. Data Processing and Analysis

The collected data after manually checked for completeness were entered using Epi-data 4.6 and analyzed using SPSS version 26. Results were presented using tables, frequencies, percentages. Bivariable logistic regression analysis was used to identify the candidate variables at $p < 0.25$ and multivariable logistic regression analysis was employed to identify significant determinants at p value < 0.05 . Independent predictors were determined using adjusted odds ratio with 95% confidence

Variables	Category	Frequency	Percent (%)
Age in year	<20	24	8.2
	20-29	81	27.8
	30-39	127	43.6
	40-49	40	13.7
	≥50	19	6.5
Sex	Male	114	39.2
	Female	177	60.8
Ethnicity	Oromo	210	72.2
	Amhara	52	17.9
	Gurage	5	1.7
	Other	24	8.2
Religion	Orthodox	96	33
	Muslim	169	58.1
	Protestant	26	8.9
Marital status	Single	73	25.1
	Married	196	67.4
	Divorced	8	2.7
	Widowed	14	4.8
Residence	Rural	194	66.7
	Urban	97	33.3
Education	No formal education	124	42.6
	Primary	80	27.5
	Secondary	63	21.6
	Tertiary	24	8.2
Occupation	Student	17	5.8
	Farmer	132	45.4
	Gov't employee	25	8.6
	Merchant	29	10
	Unemployed	14	4.8
	Daily labor	20	6.9
	House wife	44	15.1
	Other	10	3.4
Distance from the Hospital	<10 km	99	34
	10-19 km	30	10.4
	20-29 km	28	9.6
	≥30 km	134	46
Family Size	≤5	107	36.8
	>5	184	63.2
Monthly Income	≤1000 ETB	30	10.3
	1001-2999 ETB	57	19.6
	≥3000 ETB	204	70.1

Table 1: Socio-Demographic Characteristics of Selected Patients with RHD Attending Adults Follow Up Clinic at Asella Hospital, Southeast Ethiopia, 2022 (n=291)

Most of the patients are Farmers (45.4%) and their monthly income is ≥3000ETB (70.1%) [Figure 1]. Majority of RHD patients had and (46%) were living at the distance of more than 30 kilometers away from ATRH where they seek service [Figure 2].

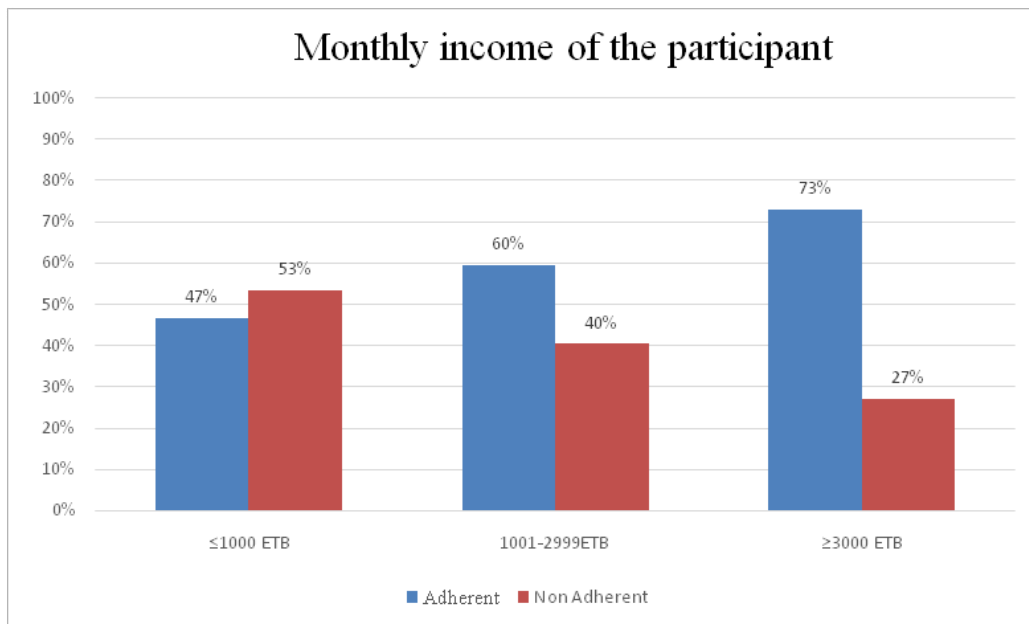


Figure 1: Monthly Income of the Participant with RHD Visiting Asella Referral and Teaching Hospital, Southeast Ethiopia, 2022

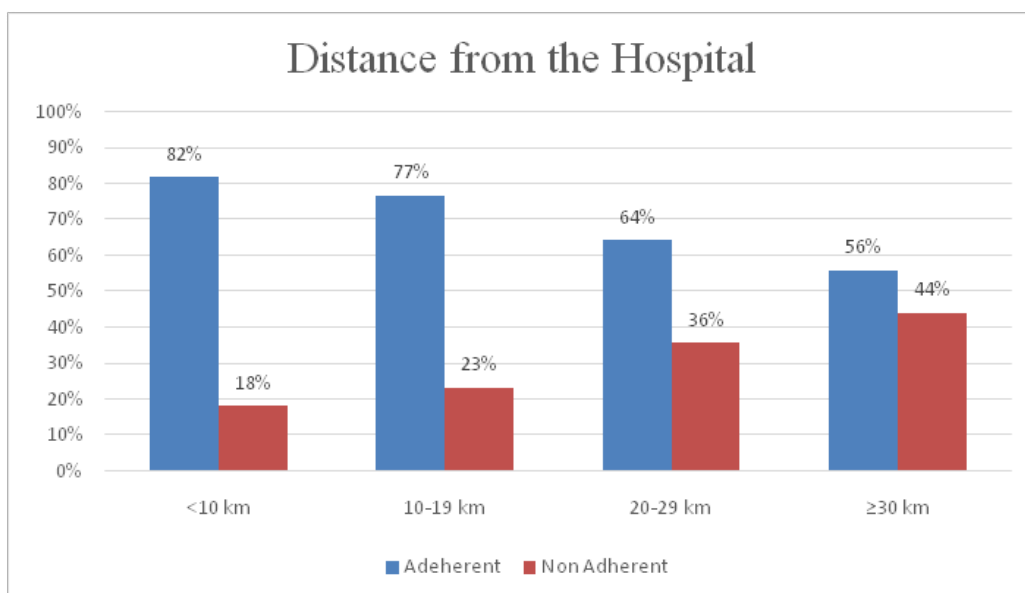


Figure 2: Distance from the Hospital of the Participant with RHD Visiting Asella Referral and Teaching Hospital, Southeast Ethiopia, 2022

3.2. Clinical Characteristics of Participants

The duration of illness of the majority of the participant was >5years (70.4%). Majority of patients (79%) had a history of hospitalization for RHD and a round half (47.8%) were in NYHA class II during interview [Table 2].

Variables	Category	Frequency	Percent (%)
Duration of RHD in years	≤5	86	29.6
	>5	205	70.4
Duration of BPG Prophylaxis in years	≤5	91	31.3
	>5	200	68.7
Hospitalization history	Yes	230	79
	No	61	21
Condition of the patient during Interview	NYHA class I	51	17.5
	NYHA class II	139	47.8
	NYHA class III	68	23.4
	NYHA class IV	33	11.3

Table 2: Clinical characteristics of Selected Patients with RHD Attending Adults Follow Up Clinic at Asella Hospital, Southeast Ethiopia, 2022

3.3. Knowledge and Attitude Related Factors

Majority of the patients (97%) were knowledgeable about the effect of missing the doses and the duration of BPG prophylaxis (84.9%) and the injection pain were moderate among majority of the patients (62%). Majority (77.7%) of the study participants believed the prophylaxis is very important [Table 3].

Variable	Category	Frequency	Percent (%)
Knowledgeable about duration of BPG prophylaxis	Yes	247	84.9
	No	44	15.1
Knowledgeable about the effect of missing the doses of BPG prophylaxis	Yes	282	96.9
	No	9	3.1
Grade of pain of injection	Mild	65	22.3
	Moderate	180	61.9
	Severe	46	15.8
Belief about the importance of the Prophylaxis	Somehow important	65	22.3
	very important	226	77.7

Table 3: Knowledge and Attitude of Selected Patients with RHD Attending Adults Follow Up Clinic at Asella Hospital, Southeast Ethiopia, 2022

3.4. Adherence Status of RHD Patients to Secondary Prophylaxis

Of the 291 RHD patients receiving secondary prophylaxis, 197 (67.7%) were identified as having adherent, while 94 (32.3%) were considered as non-adherent to monthly BPG injections (i.e. missing fewer than three or more injections in the past year respectively). [Table 4 and Figure 3].

Variable	Category	Frequency	Percent (%)
Number of missed doses for the past 1 year	1	48	16.5
	2 or 3	31	10.7
	>3	94	32.3
	None	118	40.5

Table 4: Adherence Status for BPG Prophylaxis of Patients with RHD Attending Adults Follow Up Clinic during Study Period at Asella Hospital, Southeast Ethiopia, 2022

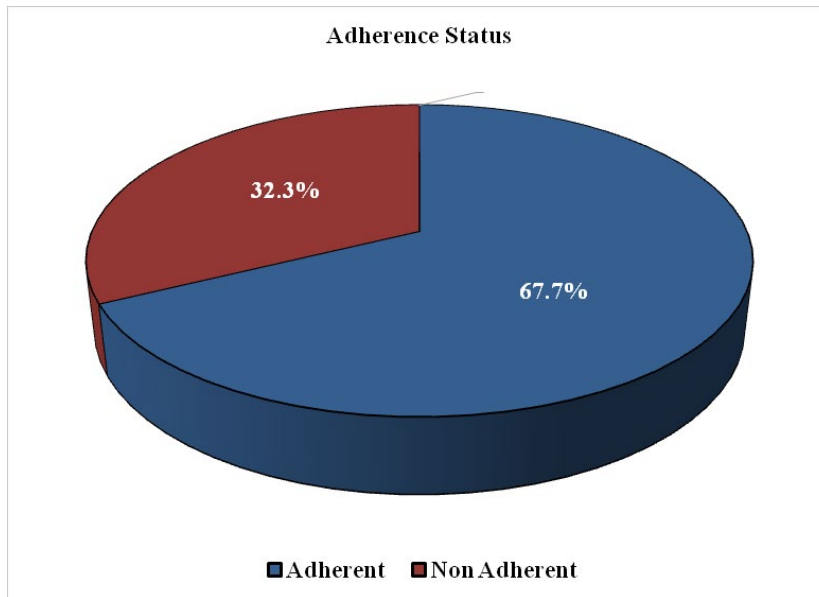


Figure 3: Adherence Status for BPG Prophylaxis of Patients with RHD Attending Adults Follow Up Clinic during Study Period at Asella Hospital, Southeast Ethiopia, 2022

3.5. Reasons for Missing Doses of BPG Prophylaxis

The main reasons to miss their prophylaxis among the 94 RHD patients with non-adherence were long distance from hospital 68 (39.9%), followed by unaffordability 33 (19.1%), inconvenient work schedule 24 (13.9%), irregular or poor drug supply 20(11%) and forget fullness 17(9.8%). [Figure 4].

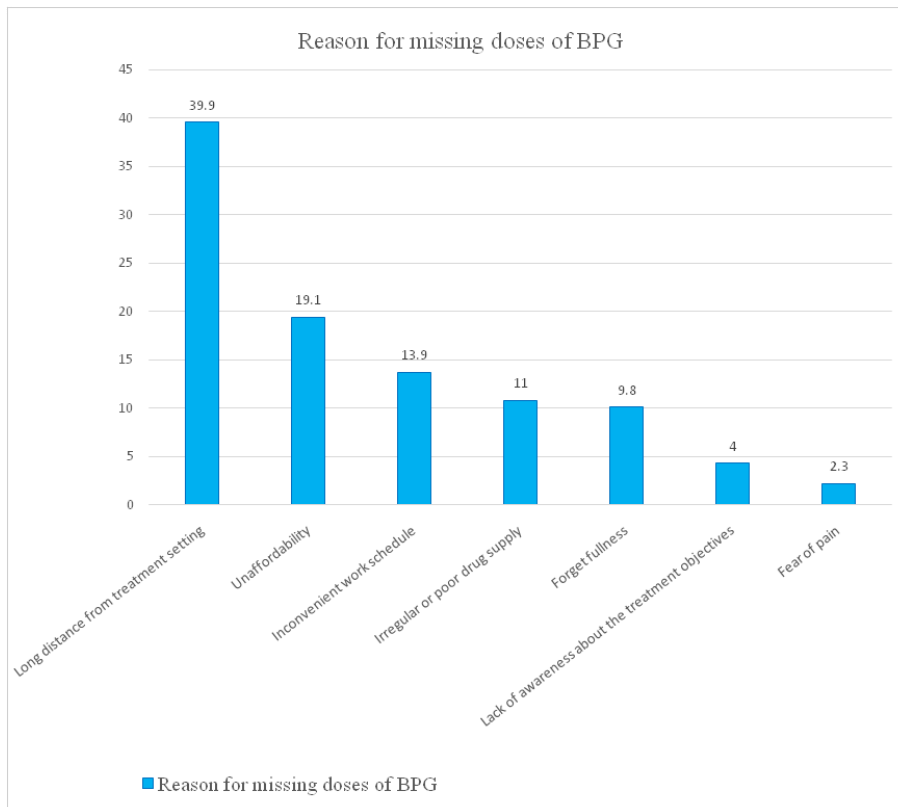


Figure 4: Reason for Missing doses of BPG Among with RHD Visiting Asella Referral and Teaching Hospital, Southeast Ethiopia, 2022

3.6. Factor Associated with Non-Adherence

In multivariable analysis, far from the hospital and low monthly income were found to have a significant association with non-adherence to BPG prophylaxis. Patient who were far (≥ 30 KM) from hospital were 4 times (AOR =4.1, 95% CI [1.9, 9.0]) more likely to be non-adherent to BPG prophylaxis than who were

near (<10KM) to hospital. Furthermore, Patient who had low monthly income (≤ 1000 ETB) were 3.6 times (AOR =3.6, 95% CI [1.6, 8.4]) more likely to be non-adherent to BPG prophylaxis than patient who had high monthly income (≥ 3000 ETB). [Table 5].

Variable	Category	Non-adherence, n		COR (95% CI)	P-value	AOR (95% CI)	P-value
		Yes	No				
Educational status	No formal education	51	73	4.9(1.4-17.3)	.014	1.5(0.4-6.1)	.545
	Primary	24	56	3.0(0.8-11.0)	.098	2.0(0.5-7.6)	.318
	Secondary	16	47	2.4(0.6-9.1)	.203	1.5(0.4-6.0)	.591
	Tertiary	3	21	1		1	
Distance from the Hospital	<10 km	18	81	1		1	
	10-19 km	7	23	1.4(0.5-3.7)	.533	1.4(0.5-3.9)	.568
	20-29 km	10	18	2.5(1.0-6.3)	.053	2.9(1.0-8.3)	.050
	≥ 30 km	59	75	3.5(1.9-6.5)	.000	4.1(1.9-9.0)	.000 *
Family size	≤ 5	28	79	1		1	
	>5	66	118	1.6(0.9-2.7)	.089	1.1(0.6-2.2)	.640
Monthly income	≤ 1000 ETB	16	14	3.1(1.4-6.8)	.005	3.6(1.6-8.4)	.003 *
	1001-2999 ETB	23	34	1.8(1.0-3.4)	.053	2.2(1.1-4.3)	.020 *
	≥ 3000 ETB	55	149	1		1	
Knowledgeable about duration of BPG prophylaxis	Yes	76	171	1		1	
	No	18	26	1.6(0.8-1-3)	.187	1.7(0.8-4.0)	.158
Knowledgeable about effect of missing BPG prophylaxis	Yes	88	192	1		1	
	No	6	5	2.6(0.8-8.8)	.120	3.1(0.7-12.7)	.122

Note: * = significantly associated at $p < 0.05$, 1.0=reference

Table 5: Factors Associated with Non-Adherence to Secondary Prophylaxis by Cross-Tabulation and Logistic Regression

4. Discussion

A patient with RHD was expected to receive at least 80% of annual prescribed injections since receiving <80% places them at higher risk of recurrent ARF and its complications [15]. The overall non-adherence rate of our study was 32.3%, which is comparable with a similar study done in Jimma, Ethiopia (non-adherence rate was 37%) [13]. However, the non-adherence rate in this study is higher than similar study done in Tikur Anbesa specialized Hospital, Ethiopia (non-adherence rate was 22.1%) [16]. The higher non adherence rate in this study can be explained by most of the participants were from a rural area and long distance from the follow up center.

The finding of present study was also inconsistent with the study done in New Caledonia and Jamaica who reported high non-adherence rate of (46%) and (51.3%) respectively [11, 17]. On other hand studies done in New Zealand and in India who revealed minimum non adherence rate of RHD patients to secondary prophylaxis (8%) and (6.4%), respectively. This could be due to duration and sample size of study, study design and sociodemographic difference [18, 19].

The main factor for non-adherence to secondary prophylaxis were far from hospital (AOR 4.1 [95% CI 1.9-9.0], $P=0.001$)

and low monthly income (AOR 3.6 [95% CI 1.6-8.4], $P=0.003$). This finding is consistent with a study done on barriers to BPG prophylaxis in Jimma, Ethiopia the main barriers were lack of money, far distance to the setting, painful injection and lack of awareness about the diseases (12). The present finding was also consistent with other studies conducted in Africa: Uganda, Tanzania and South Africa [21-22].

Majority of the patients (77.7%) of the patients with RHD believed that use of secondary prophylaxis for RHD is very important. The finding of the present study was higher than a study done on determinants of poor adherence to BPG prophylaxis in Ethiopia (51.7%) and in Jamaica (70%) [11, 14]. The higher knowledge of patients about BPG prophylaxis in our study might be attributed to the health care practitioners provided appropriate counseling to their patients about the objectives of BPG secondary prophylaxis and the negative outcomes of missing the doses.

5. Conclusion

The overall non-adherence rate to BPG prophylaxis for RHD was high among patients attending follow up clinic at Asella Teaching and Referral Hospital since they were far from the hospital and their low monthly income.

Recommendation

Primary health facilities should be assessed for the delivery of secondary prophylaxis and the prophylaxis should be delivered at nearby primary health care units. Responsible body need to work on access of the drug at affordable price.

Limitation of the Study

The limitation of this study as it was being done in a single center and will not be representative of the general population of the whole country partially.

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