



Clinical Profile and Factors Related to Compliance with Benzathine Penicillin G Prophylaxis among RF/RHD Patients at the Tarlac Provincial Hospital, Philippines

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Authors' contributions

This work was carried out in collaboration between the authors. Author LVS designed the study, wrote the protocol, performed the analyses of the study, the statistical treatment, added more literature and finalized the paper. Author RTR gathered the data, wrote the first draft of the manuscript and the literature searches. Both authors read and approved the final manuscript.

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ABSTRACT

Rheumatic fever (RF) and Rheumatic heart disease (RHD), despite a documented decrease in their incidence, remain as problems in both industrialized and industrializing countries even at the beginning of the 21st century. The most devastating effects are on children and young adults in their most productive years.

To determine the clinical profiles of RF/RHD patients at Pediatric Department of Tarlac Provincial Hospital, Tarlac city, Philippines and the factors related to their compliance with Benzathine Penicillin G Prophylaxis treatment, the ex post-facto research was done using the charts of patients. Out patients and ward patients diagnosed with RF/RHD patients were identified using the Jones Criteria. They served as the subjects of the study.

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The onset of the RF/RHD was seen in age ranging from 6 years to 17 years old with most of them occurring at 7-15 age range. The male to female ratio was 1.3:1. The RF/RHD patients came from different towns of Tarlac, the most number of which came from the city of Tarlac. The patients, being clientele of a provincial and non-paying hospital, came from poor family with low educational attainment, and low monthly income from skilled or unskilled work. Carditis (55% of the 58 cases) and polyarthritis (43%) were the most frequent manifestations seen among patients. In the minor manifestations of RF, majority had episodes of acute tonsillopharyngitis (82%) and fever (82%). Laboratory results, showed abnormal ESR (55 or 95% of the 58 cases), ASO titers (47 or 81%), PR intervals (18 or 31%), and leukocytosis (30 or 67%). Of the 26 cases who had valvular involvement cases, 7 mitral regurgitation; 2 (7%) had mitral stenosis; and 1 had aortic regurgitation. The rest had combination or triple combinations of valvular involvement. Compliance with Benzathine Penicillin G treatment was 46.6%. Compliance to treatment is related to the occupation of father ($\chi^2= 6.643$, significant at .0361 level) and family income ($\chi^2= 8.088$, significant at .0175 levels).

Poor families who have low paying jobs are less likely to complete the treatment of their sick children. The Department of Health must find ways to provide the secondary chemoprophylaxis to RF/RHD patients for free to improve the compliance rate, thus, provide bigger chance for the RF/RHD patients to survive their disease.

Keywords: Benzathine Penicillin G Prophylaxis; Rheumatic fever (RF) and Rheumatic heart disease (RHD); compliance; Tarlac Provincial Hospital.

1. INTRODUCTION

Rheumatic fever (RF) and Rheumatic heart disease (RHD) remains significant medical and public health problems in developing countries. It constitutes approximately two-thirds of the world's population [1] *Despite a documented decrease in their incidence, these non-suppurative cardiovascular sequel of group A streptococcal pharyngitis stay as problems in both industrialized and industrializing countries even at the beginning of the 21st century. The most devastating effects are on children and young adults in their most productive years* [2]. The most susceptible age group is school-age children from five to 19 years of age [3].

Asia, Africa, Latin America and the eastern Mediterranean regions are the four geographical areas that suffer the most with up to 1% of all schoolchildren showing signs of the disease [3]. The prevalence of 77.8 cases of RHD per 1000 found in Samoa is the highest reported prevalence in the world to date [4]. RHD was significantly higher in rural areas in Samoa where access to medical services is poor. A World Health Organization study estimated that the mean prevalence of RHD among children in developing countries is 2.2 per 1000. This is at odds with findings in other studies conducted in developing countries in Africa, where urban residence has been identified as an important risk factor in RHD. Second, RHD and acute rheumatic fever appear to be particularly

common in the Pacific Region [4]. Aboriginal population of the northern region (Top End) of Australia's Northern Territory topped the annual cases (254 per 1000) from 1976 to 1996 [5]. The majority of these populations live in isolated, rural communities with poor housing and hygiene, and limited access to medical services; conditions which may be likened to those in many developing countries [6]. Environmental and social factors play a crucial role in the development of the disease. A combination of overcrowding, damp conditions, especially during the rainy season in tropical and sub-tropical countries, coupled with poverty and overstretched health services produce fertile ground for circulation of the infection [3]. Elimination of these factors may help control the spread of infection.

The effort and resources required for RF/RHD control are relatively minimal when compared with most other cardiovascular diseases and the effort can be rewarded in a relatively short period of time. Prompt diagnosis and adequate penicillin treatment of group A streptococcal throat/tonsil infections prevent rheumatic fever [7]. WHO has the evidence that the disease can be prevented with a few genuinely cost-effective measures. WHO stresses the importance of primary and secondary prevention, that is early detection and correct treatment of streptococcal sore throat or pharyngitis which would block the initial attack of acute rheumatic fever [3]. The second line of defense is long-term penicillin treatment. When

properly applied, 75% of patients recover completely [3]. Although oral antibiotic regimens can be effective, it has been known for almost 50 years that monthly injections of Benzathine penicillin G is the most effective method for preventing recurrences [8].

In Southeast Asian Countries, the morbidity and mortality of RF/RHD are often related to living standard condition. Even though some countries in the region have made tremendous progress and improved standard of living, there is still a great magnitude of the disease in the region [9] because of poverty. According to Dr Santiago Guzman, of the Philippine Heart Centre, supply of free penicillin is probably the biggest problem in developing countries [3].

In the Philippines, the disease is encountered the whole year around in contrast to western countries where the incidence is highest during winter and spring [10]. It is serious public health issue and remains to be significant cause of morbidity and mortality among Filipino children" [11]. Identified contributory determinants to this are depressed socio economic status, poor housing and overcrowding living conditions, malnutrition and genetic predisposition [11,12]. These are the same conditions identified in other studies conducted in the Pacific Region.

Tarlac Provincial Hospital (TPH), in Tarlac city, is the refuge of the poor people of the province of Tarlac whenever they get sick. For a government hospital, check up is free, and when the patient is confined, hospital board and lodging is free. The only cost that the patient has to shoulder is the medicine. Thus, most the patients of TPH belong to the low-income bracket in the community. These poor component of the population are the most prone to the RF/RHD cases as revealed by literature. To attain the mission of the WHO to totally reduce RF/RHD cases it is necessary to come out with empirical evidence on the background characteristic of the patients and their compliance to the prophylactic program (Benzathine penicillin G). Since patient's compliance to the prophylactic program is the key to the prevention of the disease, it becomes necessary to identify it as a research focus. The problem of non-compliance or "drop-outs" in the treatment is a serious problem and should be given due consideration.

2. GENERAL OBJECTIVE

To determine the clinical profiles of RF/RHD patients at TPH and the factors related to their

compliance with Benzathine penicillin G prophylaxis.

3. SPECIFIC OBJECTIVES

1. To describe the demographic profile of RF/RHD patients at the Tarlac Provincial Hospital as to age, place of residence, sex and socio-economic status.
2. To reveal the common clinical presentations of the disease
3. To determine the factors related compliance/non compliance of patients receiving secondary prophylaxis

4. MATERIALS AND METHODS

This study is an ex-post facto research. The charts of patients diagnosed with RF/RHD were reviewed and analyzed. The charts included results of laboratory tests. The study was conducted at the TPH Pediatric Department. Out-Patients and ward patients diagnosed with RF/RHD patients were identified using the Jones Criteria [10,13]. Based on the criteria, there were 62 cases identified. Of these, 58 cases underwent Benzathine Penicillin G prophylaxis treatment program. Other patients using different treatments were excluded from the study.

Supplementary data on the patients' demographic profile as to age, sex, residence, and parents' educational attainment, occupation and income were asked through a questionnaire.

As to compliance with a 21-day chemoprophylaxis of Benzathine penicillin G injection, the patients were grouped into four categories: [10] completed treatment (are those who completed the treatment program as out-patients); "confined in the hospital, completed treatment (those who were admitted to the hospital and missed one injection each year); "confined in the hospital, partial compliance" (those who were admitted to the hospital, stayed for longer than one year but missed two to three injection a year); and "Dropout from the treatment program" (those who missed more than four injections a year).

To test the factors related to the compliance to the Benzathine penicillin G prophylaxis program, the Chi-square test of independence was used in the study. The limitation of Chi-square to small frequencies was considered in the treatment,

thus, similar categories were fused. All hypotheses were tested at alpha 0.05 level.

5. RESULTS

5.1 Demographic Profile of the RF/RHD Patients

Fifteen cases (25%) were seen as out-patients while 43 (75%) were admitted to the hospital. All of the cases reviewed fell on the Jones criteria.

5.1.1 Age incidence

The onset of the RF/RHD was seen on age ranging from 6 years to 17 years old with most of them occurring at 7-15 age range. Five were 4 to 6 years old; 13 were 7 to 9 years old 18 were 10 to 12 years old; 17 patients were 13 to 15 years old and 5 were 16 to 18 years old. The peak age of incidence was seen at 13-15 age. For the both groups, the most prominent first episode of the RF-RHD was 10 to 12 years of age.

5.1.2 Sex distribution

There is a slight male preponderance noted. Thirty three or 56.8% of the cases were male and 25 or 43.2 percent were female. The male to female ratio was 1.3: 1

5.1.3 Distribution of RF/RHD in the province

It is one of the objectives of the study to find out whether the accessibility of the hospital is a factor to the compliance to the Benzathine Penicillin G prophylaxis program.

The patients were categorized as having residence within the city or outside the city, the travel time of which may range from 30 minutes to one hour. Within the city, there are tricycles (powered by motorcycle with a side car) that could transport the patients to the TPH in 10 to

15 minutes. These fast-moving tricycles abound in the place.

The availability of the public transport system makes it possible for people to travel fast from one place to another. The TPH is accessible to patients who reside in various Towns of Tarlac.

The most number of RF/RHD patients come from Tarlac city (21 or 36.2%). The rest of the cases (37 or 63.8%) come from the different towns of Tarlac; their distances from TPH (which is in Tarlac city) range from 30 minutes to 1 hour ride at most.

5.1.4 Socio-economic status of RF/RHD patients

5.1.4.1 Educational attainment of the patients' parents

Table 1 shows the educational attainment of the parents of RF/RHD patients. Most of parents were either high school undergraduates or graduates or elementary undergraduates or graduates. Some of them had no formal education while only one finished college.

5.1.4.2 Occupation of the patients' parents

Occupation of the parents was tabulated and classified as to skilled, unskilled or unemployed. Since most parents were of low educational level, it follows that nearly everyone ended up as either skilled or unskilled workers. Most fathers were unskilled workers (41 or 71%) with most of them farmers. While skilled workers were mostly carpenters.

Mothers were typically unemployed (29 or 50%), skilled (9 or 15.5%) or unskilled workers (20 or 34.5%). Being of little educational background, most mothers were housemaids.

Table 1. Educational attainment of parents

Level of education	Father		Mother	
	Frequency	%	Frequency	%
No formal education	4	6.9	5	8.6
Elementary level	12	20.7	10	17.2
Elementary graduate	15	25.8	9	15.5
High school level	6	10.4	17	29.3
High school graduate	16	27.5	14	24.1
College level	4	6.9	5	5.1
College graduate	1	1.7	0	0
	58 cases	100%	58 cases	100%

The table shows that most of the cases' parents were of low educational level.

5.1.4.3 Monthly income of the family

Incomes of the parents were combined and were grouped as to levels which when classified as to income status may all fall below the poverty level.

Eighteen or 31% of the families fell on the mealy P4500 (\$104) and below monthly income range; and 21 or 36.2% fell within 4501 to 7,500 pesos (\$105 to \$174) income brackets. There were 19 or 32.8 % who were observed on the highest income range. However, the highest income observed was 8,000 pesos or approximately \$181. This is still very low and below the poverty line declared by the National Statistics Office.

The income of the parents shows how mealy they are. This is the reason why they could hardly afford the treatment and medicine of their children since the cost of the treatment is \$3 to \$10 per injection or a total cost of \$30,000 to \$100,000 [12].

5.2 Clinical Presentation of the RF/RHD

Review of records of patients revealed the following presenting complaints which warrant consultation at TPH.

Forty or 82% of the cases were presented with fever while the rest came in with dyspnea (32 or 55%), joint pains (10 or 17%), easy fatigability (10 or 17%) and pedal edema (8 or 13%). The rest presented cough, orthopnea, chest pain and awkward movement.

The length of stay in the hospital was reviewed in each RF/RHD cases. Forty three patients were confined at TPH. Of these, 18 patients stayed in

the hospital from 5 to 7 days. The shortest stay in the hospital was 5 days and the longest was 20 days. Two of these patients died because of congestive heart failure. Twenty patients stayed in the hospital for almost 2 weeks. This is considered the average stay in the hospital. Five stayed from 15 to 21 days.

The Major and minor manifestations of the RF/RHD are shown in Fig. 1 and Table 4.

Table 2 shows the monthly income of parents of patients.

Table 2. Distribution of patients as to their parents' monthly income

Income range	Frequency	%
Below P4500 (\$104)	18	31.0
P 4500 to P7500 (\$105 to \$174)	21	36.2
Above P7500	19	32.8
Total	58	100

Table 3 presents the Patients' reason for consultation

Table 3. Patients' reason for consultation

Complaint	Frequency	%
Fever	40	82
Dyspnea	32	55
Joint pains	10	17
Easy fatigability	10	17
Pedal edema	8	13
Cough	5	8
Orthopnea	2	3
Chest pain	2	3
Awkward movement	1	1

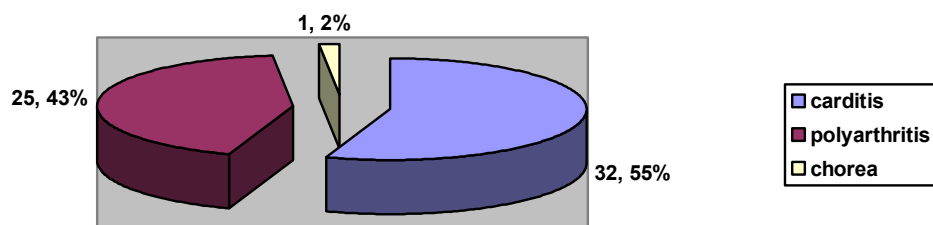


Fig. 1. Major manifestation of rheumatic fever

Table 4. Minor manifestations of RF/RHD

Minor manifestation	Frequency	%
Fever	48	82
Arthralgia	10	18
Acute Thrombocytopenic Purpura (ATP)	48	82

Carditis and polyarthritis were the most frequent manifestations seen among patients. In the initial episode of the RF carditis occurred in 55% of the cases and polyarthritis, which is migratory and asymmetric, was noted in 43% of the cases. There was one case of chorea characterized by awkward movement of the body.

On the minor manifestations of RF, majority had episodes of acute tonsillopharyngitis (82%) and fever (82%). Some patients complained of joint pains (Arthralgia- 18%).

Table 5 shows the laboratory procedures completed to further characterize and confirm their cases.

Table 5. Laboratory/ancillary procedures and results for the RF/RHD cases

Laboratory results	Frequency	%
erythrocyte sedimentation rate (ESR)		
Normal	3	5
Increased	55	95
Antistreptolizin (ASO)	47	81
Leukocytosis	39	67
Electrocardiography (ECG)		
No ECG	10	17
Normal	30	52
Prolonged PR interval	18	31

As to their laboratory results, most patients had abnormal erythrocyte sedimentation rate (ESR) ranging from 35 to 105 mm/ hr, and a mean of 67 mm/ hr. Forty seven patients had positive ASO titers. Electrocardiogram results yielded 18 (31%) patients with prolonged PR intervals; 30 had normal results (52%) while 10 patients had no ECG on their chart. Thirty (67%) patients had leukocytosis on their complete blood count results.

5.2.1 Valvular involvement by 2-dimensional echocardiogram

As shown in table 6, of the 58 cases, only twenty-six underwent 2-dimension

echocardiograms to confirm valvular involvement. Of the 26 cases, 7 had single valve involvement in the form of mitral regurgitation (MR); 2 (3%) had mitral stenosis (MS); and 1 had aortic regurgitation (AR). Those patients examined with double valve involvement were mostly 6 with mitral regurgitation and stenosis. Patients observed with triple valve involvement were generally found with the combination of mitral regurgitation, aortic regurgitation and tricuspid regurgitation (TR). Pulmonary regurgitation (PR) was found in one patient with triple valve involvement.

Table 6. Valvular involvement by 2d echocardiogram

Valvular involvement	Frequency	%
Single		
Mitral regurgitation (MR)	7	12
Mitral Stenosis (MR)	2	3
Aortic regurgitation (AR)	1	2
Double		0
MR,AR	2	3
MR,MS	6	10
MR, Tricuspid regurgitation (TR)	1	2
Triple		0
MR,AR,TR	4	7
MR,MS,TR	2	3
MS,TR, Pulmonary regurgitation (PR)	1	2
Total	26	45

5.3 Compliance of Patients with Secondary Prophylaxis (Benzathine penicillin G)

There were fifty eight (58) patients who were treated with Benzathine penicillin G. Twenty seven of them were confined at TPH with “partial compliance to treatment” status while twenty three patients were “confined at TPH with “complete compliance” status; there were four out-patients who completed the treatment program; and four dropped-out.

Compliance to treatment was averaged at 46.6%.

5.4 Factors Related to Compliance with the Benzathine Penicillin Chemo-prophylaxis

Treatment entails expense on the part of the family of the patients. One injection costs \$3 to

10\$ [12]. Together with the expense, there are other factors related to the compliance of patients to treatment. Factors tested for their relationship with compliance to Benzathine penicillin chemoprophylaxis treatment were: place of residence (access to the hospital) and components of the socio-economic status such as educational attainment of parents and income. Table 7 shows the results using Chi-square statistics.

It could be seen that there are two major correlates of compliance among RF/RHD patients of the TPH. These are occupation of father ($\chi^2= 6.171$, significant at .0361 level) and income of families ($\chi^2= 8.010$, significant at .0182). It was shown in the study that there were more patients whose fathers are skilled workers who completed their treatment. It is shown that these skilled workers had more initiative for the treatment of their children to be completed. On the other hand, there were more parents, whose incomes were below P4500 per month, who complied with the treatment of their sick children compared to those who were receiving more. This is evidence that families may be poor but the care for the family member is far more important than money. The rests of the variables were insignificant.

6. DISCUSSION

The primary manifestations of these RF/RHD patients who consulted at the Out Patient Department of TPH were carditis and polyarthritis. Those who were admitted to the hospital for confinement had cases related to congestive heart failure. The same manifestations were recorded in studies conducted by Philippine Children's Medical City and Philippine General Hospital.

This study showed higher laboratory yield in ASO and ESR test. Compared to other local researches, the subjects were also with rheumatic activity at the time of diagnosis. Leukocytosis [14] and cardiomegaly were documented in the study as well as in other local researches [15,16]. However, further diagnosis of the RF/RHD cases by echocardiography reveals that the 26 patients who underwent 2D echocardiography had mitral valve involvement already from single to double or triple combinations. This implies that at the time that

the patients reported their cases as first episodes, there was already mitral valve involvement. Their cases entered the risk of acute and chronic RF. The severity of the cases speaks of their occurrence long before the patients reported for consultation with the doctor. This further implies that the real onset of the disease was tolerated by the patients and merely ignored; patients reported only for consultation when the disease is already at the acute stage. This is similar finding recorded in the studies conducted by Philippine Children's Medical City and Philippine General Hospital because the environmental context are basically the same: socio-economically underprivileged and similar environmental conditions associated with poverty.

Benzathine penicillin G prophylaxis is the most cost effective treatment declared by WHO community for control of RF/RHD as a secondary prevention [1]. In this study, out of 62 cases observed with RF/RHD, 58 cases underwent the treatment. However, compliance rate was on 46.6% similarly, this was higher compared to what was declared by WHO. The level of non-adherence was significantly high (53.4%). Residence in a town/city and having parents with at least a secondary level of education had better adherence. Since compliance is the key to the success of the treatment notwithstanding the efficacy, there is a need for a program that would provide free treatment to these people.

Compliance with treatment is related to the occupation of parents and similarly to the income which is an offshoot of the occupation. More parents who worked as skilled workers complied better in the treatment of their children. WHO articulated the expense and the compliance when the treatment is shouldered by the family. Compliance is great when the medicine is free [1]. Since most parents in this study had low educational attainment, their works were mostly low earning. This description of the families agrees with most researches on RF/RHD patients' demographic profile. They hardly could afford 100% compliance with treatment. Thus, compliance to treatment was low. RF/RHD compliance is expensive to be afforded by the poor. The remedy to help these people is to provide them free medication to help the children survive the disease.

Table 7. Chi-Square (X^2) statistics for the test on the factors related to compliance with benzathine penicillin chemoprophylaxis

Education of father	Compliance				Total	
	complete		Partial/Dropped		f	%
	f	%	f	%		
Elementary	17	29.3	14	24.1	31	53.4
High school & up	10	17.2	17	29.3	27	46.6
Total	27	46.6	31	53.4	58	100.0
X^2 correction for continuity= 1.838 df=1 prob. = .1752; not significant						
Education of Mother	Compliance				Total	
	Complete		Partial/dropped		f	%
	f	%	f	%		
Elementary	13	22.4	11	19.0	24	41.4
High school & up	14	24.1	20	34.5	34	58.6
Total	27	46.6	31	53.4	58	100.0
$X^2 = 0.953$ df=1 prob. = .3287; not significant						
Income/Month	Compliance				Total	
	Complete		Partial/ Dropped		f	%
	f	%	f	%		
Below P4500(\$104)	13	22.4	5	8.6	18	31.0
P 4500 to P7500 (\$105 to \$174)	9	15.5	12	20.7	40	69.0
Above P7500	5	8.6	14	24.1	19	32.8
Total	27	46.6	31	53.4	58	100.0
$X^2 = 8.010$; df=2; prob. =.0182; significant						
Occupation of Father	Compliance				Total	
	Complete		Partial/ Dropped		f	%
	f	%	f	%		
skilled	24	41.4	16	27.6	40	69.0
unskilled	3	5.2	11	19.0	14	24.1
Total	27	46.6	27	46.6	54	93.1
.171; df=1 prob. =.0130; significant						
Occupation of Mother	Compliance				Total	
	Complete		Partial/ Dropped		f	%
	f	%	f	%		
unemployed	12	20.7	17	29.3	29	50.0
Skilled/unskilled	15	25.9	14	24.1	19	32.8
Total	27	46.6	31	53.4	58	100.0
$X^2 = 0.624$ df=1 prob. = ..4297; not significant						
Distance	Compliance				Compliance	
	Complete		Partial/ Dropped		f	%
	f	%	f	%		
Within Tarlac city	11	19.0	9	15.5	20	34.5
Outside Tarlac city	16	27.6	22	37.9	38	65.5
Total	27	46.6	31	53.4	58	100.0
$X^2 = .876$ df=1 prob= .3494; not significant						

RF remains to be a problem in the Philippines. This study evidenced the continuous existence of the disease among the patients of the TPH, a hospital for the underprivileged sector of Tarlac Province in the Philippines. This concurs with the findings of WHO that, "we are dealing mostly with patients from the low income groups." WHO further stressed a general fact that a monthly

injection of penicillin costs \$3; it is beyond the means of the families [3]. WHO observed that, only 40% of patients continue treatment if they buy the medicine themselves as opposed to 85% compliance when the medicine is given for free [3]. Since compliance rate in the study is 46.6%, it is considered similar to that identified in Molago Hospital in Uganda (46%) [17].

7. CONCLUSION

The RF/RHD patients of TPH came from poor family with low educational attainment, thus may have no means to land on high paying occupations.

The most common age group affected by RF/RHD belongs to the 7-15 years of age. More males are affected by the disease than females. However, sex could not be used as an indicator of predominance because different studies result to odd results.

Minor and major manifestations of the disease were commonly identified on the Jones Criteria. Major manifestations involved carditis and polyarthritis and a few case of chorea. Minor manifestations showed fever and ATP.

The prevention and control of the disease is relatively easy if diagnosed early and treatment regimens are followed strictly. In this study however, almost half of the cases showed mitral regurgitation as the most common valvular manifestation. Some cases, however, had a combination or triple combinations of valvular manifestations as shown on the results of the 2-D echocardiography. This indicates that the reported incidences were not initial RF cases but acute RHDs. This only shows how the families of the affected children tolerated and ignored a very risky disease that may threaten lives.

Compliance with secondary chemoprophylaxis is a chief concern because it is the key to the prevention or further aggravation of the case. Since some of the patients had skipped episodes of injection, it is a major concern of health authorities.

Compliance with the secondary chemo-prophylaxis is related to the parents' occupation and income. People could comply if they have work and money. Thus, it is the role of the government to supply them free medicine aside from free consultation in public health institutions

RECOMMENDATIONS

1. The Provincial Government, thru its health agencies, should conduct an information campaign thru to its health care facilities to raise concern among the people regarding the possible consequences of RF/RHD if it is left untreated. That negligence on simple diseases such as tonsillitis and pharyngitis

may lead to debilitating and detrimental sickness when left untreated; and that the disease becomes much expensive to treat when it is acute and the chances for recovery become minimal with the people's economic status.

2. A referral system from the provincial hospital to the peripheral health facilities should be established so that the 21-day regimen of Benzathine penicillin G can be completed by the patients.
3. Health Care Facilities in the local government should encourage the participation of pediatricians of the locality in supporting the RF/RHD registry so that a clear picture of the magnitude of the disease in the province can be seen.
4. Allied medical professionals should be trained in administering secondary chemoprophylaxis so that skipping injections may no longer be an issue.
5. The Department of Health should find ways to provide the secondary chemoprophylaxis to RF/RHD patients to improve the compliance rate, thus, provide bigger chance for the RF/RHD patients to survive their disease.
6. Local Government Units may allow their rural health workers to administer the injections so that patients may not travel to Tarlac city for the treatment. This may reduce the cost of treatment.

CONSENT

Not applicable.

ETHICAL APPROVAL

Not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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