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Clinical and psychosocial factors affecting treatment adherence in children with rheumatic heart disease

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Abstract

Introduction: The present study aimed to investigate the outcomes of psychiatric symptoms and family functions on treatment adherence in children, in addition to sociodemographic characteristics and clinical factors related to the disease. *Material and Method:* The research sample consisted of 43 children who were followed up with rheumatic heart disease diagnosis during the study. Clinical features were obtained from the patient files. The family assessment device evaluating family functioning and the strengths and difficulties questionnaire scale to screen emotional and behavioural problems in children were used. *Results:* Considering the regularity of treatment in our patients, there were 31 (72%) patients adherent to secondary prophylaxis regularly, 7 (6.9%) patients were partially adherent, and 5 (11.6%) patients non-adherent. Patients were divided into treatment adherent (Group 1) and non-adherent (Group 2). There was no statistically significant impact on treatment adherence whether the patients receive enough information, lifestyle, fear of developing adverse effects, fear of addiction, lack of health insurance, difficulties in reaching the drug or hospital. However, the fear of syringes on treatment adherence had an effect statistically significantly ($p = 0.047$). Forgetting to get a prescription and/or take the drug when the time comes was statistically higher in the non-adherent group ($p = 0.009$). There was no statistically significant effect of psychosocial factors on treatment adherence between groups. *Discussion:* Providing an effective active recall system, involving primary care workers, providing training on the disease and its management, and a comprehensive pain management programme can improve the process, especially for cases where secondary prophylaxis is missed.

Acute rheumatic fever is a non-suppurative inflammatory disease that develops 1–4 weeks after acute pharyngeal infection of group A beta-haemolytic streptococcus and affects the heart, joints, central nervous system, skin, and subcutaneous tissues. Acute rheumatic fever and its chronic sequelae of rheumatic valve disease have an impact on 15.6–19.6 million children, adolescents, and adults worldwide. Every year, approximately 500,000 new cases of acute rheumatic fever and 300,000 new patients with rheumatic heart disease appear, and 233,000 people die due to acute rheumatic fever or rheumatic heart disease.[1] Although living conditions, nutrition, access to health care, and the use of penicillin have significantly changed the epidemiology of acute rheumatic fever and rheumatic heart disease, it continues to be a critical health issue in developing and underdeveloped countries. Since it is a crucial preventable public health concern, acute rheumatic fever should be recognised early, appropriate treatment should be administered, and recurrences should be prevented.

Primary prophylaxis is used to prevent the first rheumatic attack, and secondary prophylaxis is used to prevent recurrences in those with acute rheumatic fever. The drugs used continuously in secondary prophylaxis prevent the colonisation and infection of group A beta-haemolytic streptococcus in the upper respiratory tract and protect the patient with acute rheumatic fever from recurrences. The secondary prophylaxis using intramuscular benzathine penicillin G treatment forms the basis for preventing acute rheumatic fever and rheumatic heart disease. The World Health Organization recommends a benzathine penicillin G every 3–4 weeks, considering conditions such as age, time since the last acute rheumatic fever attack, presence of rheumatic heart disease, and high-risk groups.[2]

More successful outcomes were reported in those given prophylaxis every 3 weeks compared to 4 weeks; therefore, the treatment of every 3 weeks is favoured in the high-risk group.[3]

Since acute rheumatic fever in children has significant physical, mental, emotional, economic, and social impacts on both patients and their families, pharmacological treatment, nutritional support, and psychosocial support should be provided additionally.[4] The treatment regimens of these patients are long and continuous, causing treatment adherence to be vital in managing the disease.

Meta-analyses reported that children with chronic physical diseases are more vulnerable to psychosocial problems in childhood and adolescence.[5-7] When there are psychiatric symptoms accompanying the chronic disease, treatment adherence is impaired, which may lead to adverse outcomes related to the course of the disease.[8,9] Adverse events occurring within or outside the family may cause temporary or permanent impairments in family functioning. It has also been revealed that problems in family functioning are associated with treatment adherence.[10]

Although the reasons for non-adherence to acute rheumatic fever treatment and psychosocial reasons are frequently emphasised in the studies, detailed explanations about which factors are related are very few. In applying penicillin treatment for secondary prophylaxis of acute rheumatic fever, it is essential to evaluate various factors such as patient, disease, treatment, health system-health providers, social-economic factors. The present study aimed to investigate the outcomes of psychiatric symptoms and family functions on treatment adherence in children, in addition to sociodemographic characteristics and clinical factors related to the disease.

Materials and Methods

The research was performed in Celal Bayar University Faculty of Medicine, Department of Pediatric Cardiology. The research sample consisted of 43 children diagnosed with rheumatic heart disease who were admitted during the study. Children with rheumatic heart disease disease were previously diagnosed patients and came to routine control visits. The responsible research assistant informed the children and their families about the study, and consent was obtained from the families.

The diagnosis of acute rheumatic fever was made according to the former Jones criteria[11] until 2015 and according to the Jones criteria revised by the American Heart Academy after 2015.[12] Per revised 2015 American Heart Academy Jones criteria, the presence of two major or one major and two minor criteria together with the findings of a previous group A beta-haemolytic streptococcus infection was considered sufficient for the diagnosis. However, these criteria were not sought in Sydenham's chorea and recurrent carditis cases. Swelling, warmth, redness, tenderness, and limitation of the movement were defined as the typical signs of arthritis inflammation. Involvement of more than one joint was defined as polyarthritis (migratory), and single-joint involvement was defined as monoarthritis. Arthralgia is a pain in one or more joints, and it was defined as a condition without redness, swelling, and temperature increase. The diagnosis and severity of carditis (mild, moderate, severe) was based on physical examination, cardiac auscultation, telecardiography, and echocardiography findings. The presence of mitral and aortic insufficiency without cardiomegaly or heart failure was evaluated as mild carditis. Patients with moderate valve lesion causing cardiomegaly on telecardiography or enlarged cardiac chambers on echocardiography were considered as moderate carditis. Patients with severe cardiomegaly and/or heart failure findings resulting from a severe valve lesion or a previous history of cardiac surgery due to rheumatic heart disease were considered severe carditis.[13]

Sydenham's chorea was diagnosed with the presence of movement disorders such as rapid and uncontrolled facial, neck, arm, and leg movements, with the support of a Pediatric Neurology specialist.

Treatment adherence was considered as

1. Regular adherent when the Benzathine penicillin administration was missed less than once a year,
2. Partially adherent when the Benzathine penicillin administration was missed two-three times per year,
3. Non-adherent when the Benzathine penicillin administration was missed four times or more in a year.[14]

Data acquisition tools

Sociodemographic data form

The form developed by the researchers included questions evaluating the personal characteristics of patients such as age, gender, education level of parents, employment status of parents, coupledom of parents, sibling status, place of origin (province–district–village)

Information about the disease

Clinical features such as disease type (acute rheumatic fever arthritis, acute rheumatic fever carditis (mild, moderate, severe), disease duration, age at diagnosis, medical treatments, history of operation, accompanying clinical findings, comorbidities, recurrence status) were obtained from the patient files.

Scales

Strengths and Difficulties Questionnaire

It is a scale developed to screen emotional and behavioural problems in children. It contains 25 questions, some of which question positive and some negative behavioural characteristics. It consists of five subscales: Attention Deficit and Hyperactivity, Conduct Problems, Emotional Problems, Peer Problems, and Social Behaviours. Each subdomain can be evaluated within itself, and a separate score can be obtained for each, as well as the "Total Difficulty Score" can be calculated with the sum of the first four titles.[15] Its Turkish validity and reliability have been studied.[16]

Family assessment device

Family assessment device is a measurement tool that determines which subjects the family can or cannot fulfil its functions. The scale was developed by Epstein[17] and was translated into Turkish by Bulut (1990)[18] through validity and reliability studies. Family assessment device scores range from one (healthy) to four (unhealthy). Family assessment device consists of seven subscales. These consist of 60 questions, one of which focuses on general functions, which addresses each problem area in family functions one by one. These subscales are problem-solving, communication, roles, emotional responsiveness, paying attention, behaviour control, and general functions.

Analysis of data

SPSS 15 statistics package programme was used. Continuous variables were presented as mean and standard deviation values, and categorical variables as numbers and percentages. Chi-square test for categorical data and Mann–Whitney U-test for numerical data compared the variables of patients with and without treatment adherence. A p-value of <0.05 was considered statistically significant.

Results

The study included 43 children with rheumatic heart disease diagnosed with a mean age of 16.2 ± 2.83 years and their mothers.

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21 (48.8%) patients were female, and 22 (51.2%) were male. While 36 (83.7%) of the patients had attended school, 7 (16.3%) had not. Thirty-six (83.7%) of the patients were not employed, and 7 (16.3%) had a job.

Considering the education levels of the mothers, 31 (72.1%) were primary school, 10 (23.3%) were high school, 2 (4.7%) were higher education graduates. When the education level of the fathers was examined, 33 (76.7%) were primary school graduates, 7 (16.2%) were high school graduates, and 3 (6.9%) were higher education graduates. According to the monthly income level of families, 17 (39.5%) people were below the income-expenditure, 22 (51.2%) people whose income was equal to their expenses, and 4 (9.3%) people whose income was above the expenditure. While 36 (83.7%) of the patients lived in the city/district, 7 (16.2%) lived in the village.

When the clinical characteristics of the patients were evaluated, the mean diagnosis time (mean ± SD) of the patients was 5.58 ± 2.56 years. There were 40 (93.0%) people who did not have a comorbid disease. However, 3 (7%) of them had comorbidities, being hyperthyroidism, myasthenia graves, and psoriasis for each one.

While there were 34 (79.1%) patients with clinical findings (such as chest pain, palpitations, and fatigue), 9 (20.9%) patients were asymptomatic. Diseases were in three groups according to major findings. There were only 13 (30.2%) patients with acute rheumatic fever carditis, 24 (55.8%) patients with acute rheumatic fever carditis and Sydenham chorea, and 6 (14%) patients with acute rheumatic fever carditis. There were 27 (62.8%) patients with mild carditis, 12 (27.9%) patients with moderate carditis, and 4 (9.3%) patients with severe carditis. Thirty-nine (90.6%) patients had secondary prophylaxis every three weeks and 4 (9.3%) patients every four weeks. While there were 2 (4.7%) patients with recurrence, there was no recurrence in 41 (95.3%) patients (Table 1).

Considering the adherence to treatment in our patients, 31 (72%) patients were adherent to secondary prophylaxis regularly, 7 (6.9%) patients were partially adherent, and 5 (11.6%) patients were non-adherent.

When the relationship between the sociodemographic and clinical characteristics with treatment adherence was evaluated, the patients were divided into adherent (Group 1) and non-adherent (Group 2) groups. There was no statistical difference between Groups 1 and 2 regarding age and gender ($p = 0.183$, $p = 0.399$, respectively). There was no statistical difference between the groups in terms of living in rural areas and cities as well. When the educational status of the parents was examined, no statistical difference was determined between the groups in terms of adherence to treatment ($p = 0.129$, $p = 0.080$) (Table 1). When acute rheumatic fever carditis, acute rheumatic fever arthritis+carditis coexistence, acute rheumatic fever carditis + Sydenham chorea coexistence were grouped, no statistical difference was observed ($p = 0.971$). The presence of mild, moderate, or severe carditis and the presence of recurrence did not have a statistically significant effect on treatment adherence ($p = 0.541$, $p = 0.485$, respectively) (Table 1).

There was no statistically significant effect on treatment adherence whether the patients received enough information, their lifestyle, fear of developing adverse effects, fear of addiction, lack of health insurance, difficulties in reaching the drug/hospital, whether the treatment was long-term, and whether they received adequate support from the physician ($p = 0.665$, $p = 1.00$, $p = 0.460$, $p = 0.123$, $p = 1.00$, $p = 0.301$, $p = 0.460$, $p = 0.22$, $p = 0.110$, respectively). However, the effect of fear of syringes on treatment adherence was determined statistically ($p = 0.047$). Forgetting to get a prescription and/or take the drug when the time comes was statistically higher in the non-adherent group ($p = 0.009$) (Table 2).

When the relationship between both the total score and subscale scores (problem-solving, communication, roles, emotional responsiveness, attention, behaviour control, and general functions in the family) of the Family assessment device, and the total score and subscale scores (attention deficit hyperactivity, behavioural problems, emotional problems, peer problems, and social behaviours) of the Strengths and Difficulties Questionnaire and treatment adherence were evaluated, no statistical difference was found between the groups (Table 3).

Discussion

Despite the use of echocardiographic diagnosis for the diagnosis of acute rheumatic fever and screening for early detection of rheumatic heart disease, progress in the development of group A streptococcal vaccines, and efforts to improve the quality of life of people with rheumatic heart disease, poor living conditions continue to be a critical health problem in poor countries that have problems in accessing nutrition and health care. Secondary prophylaxis has been the most effective treatment in preventing rheumatic heart disease, the most important cause of morbidity and mortality in acute rheumatic fever. Acute rheumatic fever can recur due to repeated group A beta-haemolytic streptococcus infections, and each relapse can worsen rheumatic heart disease. Therefore, the priority in disease management is to prevent recurrences of acute rheumatic fever by using long-term penicillin. However, it is vital to look at the rates of adherence to secondary prophylaxis for acute rheumatic fever and rheumatic heart disease and to understand the factors that prevent treatment adherence correctly in managing the disease.

Inadequate adherence to prophylaxis has been described as predisposing to develop the recurrent disease.[19-21] In a study by Camara et al., treatment non-adherence was an independent risk factor for recurrence risk.[22] In a study from Brazil in 2010, non-adherence to penicillin was strongly associated with recurrent acute rheumatic fever.[20] In our study, the rate of complete adherence to treatment was very low (72%). Treatment non-adherence was 28%, and we found the recurrence risk to be 8.3% in this group. For a disease with high morbidity and mortality, 100% complete adherence is vital. In a systematic review evaluating the adherence in secondary prophylaxis in patients with acute rheumatic fever and rheumatic heart disease, treatment adherence rates were found in wide ranges.[14]

Some patient demographic and clinical factors also have an uncertain relationship with secondary prophylaxis adherence. Eissa et al. revealed that service delivery was better for women than men.[23] However, Stewart et al. found that men and women were equally likely to receive monthly benzathine penicillin G.[24] There was no difference in treatment adherence in terms of age and gender in our study. Rurality and limited access to health services were associated with low treatment adherence.[14] Basilli et al. indicated that low adherence to treatment was more common in children in semi-urban-rural areas.[25] Mincham et al. determined that remote localisation that would cause limited access to health services and the absence of an effective reminder system for injections negatively affected adherence.[26] In two Indian studies, it was observed that the lack of local health services and long distance affect treatment adherence negatively.[27,28] While these studies revealed that rural and long distances might be compelling factors

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Table 1. The relationship of patients' sociodemographic and clinical characteristics with treatment adherence

	Total Patients N (43)	Adherent Group N (31)	Non-adherent Group N (12)	p-value*
Age (mean)	16.2 ± 2.83	15.8± 2.89	17.1 ± 2.51	0.183
Gender;				0.510
Female	21 (48.8%)	14 (45.1%)	7 (58.3%)	
Male	22 (51.2%)	17 (54.8%)	5 (41.7%)	
School attendance status;				0.378
Yes	36 (83.7%)	27 (87.1%)	9 (75.0%)	
No	7 (16.3%)	4 (12.9%)	3 (25.0%)	
Employment;				
Yes	5 (11.6%)			
No	38 (88.4%)			
Mother's educational status;				0.129
Primary/Middle School	31 (72.1%)	20 (64.5%)	11 (91.7%)	
High school	10 (23.3%)	9 (29.0%)	1 (8.3%)	
University	2 (4.7%)	2 (6.5%)	0	
Father's educational status;				0.080
Primary/Middle School	33 (76.7%)	21 (67.7%)	12 (100%)	
High school	7 (16.2%)	7 (22.6%)	0	
University	3 (6.9%)	3 (9.7%)	0	
Number of siblings;				0.723
<2	28 (65.1%)	21 (67.7%)	7 (58.3%)	
>2	15 (34.9%)	10 (32.3%)	5 (41.7%)	
Income rate;				0.680
Income below expense	17 (39.5%)	11 (35.5%)	6 (50.0%)	
Income equals expense	22 (51.2%)	17 (54.8%)	5 (41.7%)	
Income over expense	4 (9.3%)	3 (9.7%)	1 (8.3%)	
Clinical sign;				0.088
Yes	9 (20.9%)	4 (12.9%)	5 (41.7%)	
No	34 (79.1%)	27 (87.1%)	7 (58.3%)	
Disease type (according to major findings);				0.886
ARF, carditis	13 (30.2%)	9 (29.0%)	4 (33.3%)	
ARF, arthritis+carditis	24 (55.8%)	18 (58.1%)	6 (50.0%)	
ARF, carditis+sydenham chorea	6 (14%)	4 (12.9%)	2 (16.7%)	
Degree of carditis;				0.369
Mild	27 (62.8%)	18 (58.1%)	9 (75.0%)	
Moderate	12 (27.9%)	9 (29.0%)	3 (25.0%)	
Severe	4 (9.3%)	4 (12.9%)	0(0.0%)	
Recurrence;				0.485
Yes	2 (4.7%)	1 (3.2%)	1 (8.3%)	
No	41 (95.3%)	30 (96.8%)	11 (91.7%)	
Frequency of treatment;				0.563
BPG injection every 3 weeks	39 (90.7%)	27 (87.1%)	12 (100%)	
BPG injection every 4 weeks	4 (9.3%)	4 (12.9%)	0	

*Chi-Square Test, BPG: Benzathine Penicillin G.

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Table 2. The effect of the patient, treatment, health system-health providers, social-economic factors on treatment adherence

	Adherent Group N = 31 (%)	Non-adherent Group N = 12 (%)	p-value*
Sufficient information			0.665
Yes	26 (83.9%)	9 (75.0%)	
No	5 (16.1%)	3 (25.0%)	
Life style			1.000
Affects	5 (16.1%)	2 (16.7%)	
Does not affect	26 (83.9%)	10 (83.3%)	
Fear of syringe			0.047
Yes	5 (16.1%)	6 (50.0%)	
No	26 (83.9%)	6 (50.0%)	
Fear of adverse effects			0.460
Yes	8 (25.8%)	5 (41.7%)	
No	23 (74.2%)	7 (58.3%)	
Fear of addiction			0.123
Yes	2 (6.5%)	3 (25.0%)	
No	29 (93.5%)	9 (75.0%)	
Health insurance			1.000
Yes	29 (93.5%)	11 (91.7%)	
No	2 (6.5%)	1 (8.3%)	
Difficulty reaching medicine			0.301
Yes	2 (6.5%)	2 (16.7%)	
No	29 (93.5%)	10 (83.3%)	
Prolonged treatment duration			0.460
Yes	23 (74.2%)	7 (58.3%)	
No	8 (25.8%)	5 (41.7%)	
Support from the physician			1.000
Yes	30 (96.8%)	12 (100%)	
No	1 (3.2%)	0	
Difficulty admission to hospital			0.110
Yes	5 (16.1%)	5 (41.7%)	
No	26 (83.9%)	7 (58.3%)	
Forgetting to get a prescription and/or take the drug			0.009
Yes	6 (19.4%)	8 (66.7%)	
No	25 (80.6%)	4 (33.3%)	

*Chi-Square Test.

Table 3. The relationship between scale scores and treatment adherence

	Adherent group n = 31 Mean ± SD	Non-adherent group n = 12 Mean ± SD	p-value*
Family assessment device			
Communication	1.67 ± 0.48	1.84 ± 0.35	0.086
Roles	1.71 ± 0.37	1.87 ± 0.39	0.183
Affective responsiveness	1.64 ± 0.36	1.97 ± 0.54	0.076
Affective involvement	2.25 ± 0.44	2.45 ± 0.64	0.399
Behaviour control	1.89 ± 0.33	2.05 ± 0.28	0.142
General functions	1.45 ± 0.39	1.54 ± 0.34	0.414
Strengths and difficulties questionnaire			
Emotional problems	2.25 ± 2.33	3.75 ± 2.63	0.081
Conduct problems	1.54 ± 1.23	1.75 ± 1.35	0.679
Hyperactivity	3.32 ± 1.83	3.08 ± 1.78	0.698
Peer problems	2.71 ± 1.71	2.08 ± 1.62	0.414
Social behaviour	8.51 ± 1.61	9.00 ± 1.04	0.547
Total score	9.83 ± 4.66	10.66 ± 4.88	0.584

*Mann–Whitney U-test.

for secondary prophylaxis due to less access to health services, we did not detect an adverse effect of more rural-semi-urban and long distance on treatment adherence in our study. The retrospective study of Gasse et al., including multivariate logistic regression analysis, concluded that a household of ≥6 individuals was protective against poor adherence. It is hypothesised that this may be due to older siblings in the household helping to seek health care.[29] However, we did not find the effect of living in a crowded household and low socio-economic environment on treatment adherence in our study.

Basilli et al. found that non-adherence was more common in children whose families were not satisfied with the health services provided.[25] Mincham et al.[26] and Harrington et al.[30] demonstrated that negative patient-staff interaction, limited trust in treatment, lack of sense of belonging to health care affect treatment adherence in Austria. Harrington et al. showed that the availability of appropriately trained, socially, and culturally competent personnel was a factor associated with higher adherence.[30] Also, Harrington et al. found that a suitable environment for injections, the willingness of staff to treat patients at home, and the presence of reminder systems encourage uptake.[30] When we questioned the factors related to the health system and health providers, such as whether s/he has received sufficient information about the disease, whether s/he has received the necessary support for the continuity of treatment by a doctor, whether s/he has difficulties in applying to the hospital or doctor for treatment, we did not detect any negative effects on treatment adherence. Bassili et al. identified that non-adherence was more common in patients whose parents had only moderate to poor knowledge of the disease.[25] Robertson et al. reported no relationship between disease knowledge and disease knowledge and adherence.[31] Conflicting results have also been reported regarding the relationship between the education level of patients' parents and adherence to secondary prophylaxis. Bassili et al.[25] found that non-adherence was more common in children whose parents had lower education and occupation, whereas Kumar et al. did not find a relationship between parents' education level

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with adherence to secondary prophylaxis.[28] The present study could not indicate a relationship between parental education level and employment with adherence to secondary prophylaxis.

Gasse et al.[29] reported that adequate health care coverage was protective against poor adherence, but Bassili et al. defined non-adherence more commonly in children with health insurance than those without.[25]

Eissa et al. also revealed that adherence was higher in patients with moderate or severe disease than patients with mild disease.[23] Similarly, Gasse et al.[29] found that a history of symptomatic acute rheumatic fever was protective against poor adherence, but in the study of Stewart et al., patients with more severe disease were less likely to receive monthly benzathine penicillin G.[24]

When we grouped them as acute rheumatic fever carditis, acute rheumatic fever arthritis + carditis coexistence, acute rheumatic fever carditis + Sydenham chorea coexistence, and the presence of mild, moderate, severe carditis and the presence of recurrence, we did not find a statistical effect on treatment adherence.

Intramuscular benzathine penicillin G injections can be painful, and the pain, fear, and distress associated with the first injection can affect a person's expectations of future injections. Fear/dislike of injections, believing that injections are no longer necessary because they are healthy, were found to be factors associated with non-adherence.[27] Our study observed that fear/dislike of injections negatively affected treatment adherence. Providing comprehensive pain management for those experiencing pain will increase adherence to secondary prophylaxis. Protocols for non-pharmacological strategies[32] such as distraction techniques for all, analgesia if the pain is present,[33] and sedation procedures for people with uncontrollable pain or needle phobia.[34]

In our study, when the relationship between psychiatric symptoms and family functions in children in addition to sociodemographic and clinical factors was examined, we did not find any negative effects of the Family assessment device and the Strengths and Difficulties Questionnaire on treatment adherence. It is stated that when there are psychiatric symptoms accompanying the chronic disease, treatment adherence is impaired, which may lead to negative consequences related to the course of the disease.[8,9] In a study of individuals aged 12–24 with chronic diseases, a significant negative relationship was determined between internalising scores (anxiety and depression symptoms) and adherence to treatment in the 19–24 age group, while no relationship was found with treatment adherence in the 12–18 age group.[35] A review stated no difference in family functionality in children with chronic diseases compared to the families of healthy children. In the same review, it was emphasised that family functionality is affected by many factors such as the developmental period and age of the child, factors related to the disease, from whom the information related to family functionality was obtained, whether there is another sick child in the family. Since there is no methodological consistency in the studies, this condition may affect the results.[36]

In our sample group, factors such as most of the patients had mild degrees of carditis and therefore did not cause an important clinical finding, few people needed daily treatment, most of their daily activities were not affected might not have caused problems in family functionality and psychological symptoms. Accordingly, they might not be an effective factor in treatment adherence.

For better adherence to treatment, understanding the factors associated with adherence, together with physicians, nurses, community health workers, and patients' awareness of these factors, especially the situations that affect their motivation, may help overcome the obstacles to taking secondary prophylaxis. Providing an effective active recall system involving primary care workers, training on the disease and its management, and a comprehensive pain management programme can improve the process, especially for cases where secondary prophylaxis is missed. It should also be noted that these interventions can only be realised with sufficient and continuous financial support and personnel resources. However, the development of effective vaccination against group A beta-haemolytic streptococcus can help reduce both the risk of initial infection and the risk of recurrence.

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Ecem Yigit: Study concept, resource
Sermin Yalın Sapmaz: Supervision, critical reviews
Senol Coskun: Study design, data analysis and interpretation

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