A Descriptive Cross Sectional Study on Awareness Regarding Rheumatic Heart Disease among mothers attending Bashair Teaching Hospital, Khartoum, Sudan 2021.

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Research Article

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Abstract

Background

Early diagnosis and treatment of throat infections caused by group A streptococci represent the basis of the primary prevention of rheumatic heart disease. A preventable condition that is associated with high mortality rates among children, thus mandating a thorough understanding by their primary caretakers. The aim of this study was to assess the level of awareness about rheumatic heart disease in mothers coming to the outpatient department of Bashair teaching Hospital south region of the capital Khartoum.

Methods

A descriptive cross-sectional hospital based study carried in the outpatient department of both pediatrics and obstetric units at Bashair teaching Hospital. The study population was mothers from different age groups. Data was collected through interviewer-administered questionnaire addressed to assess awareness on rheumatic heart disease.

Results

150 mothers were interviewed most of them were in the 26–35 age group (42.67%). Nearly half of the mothers (43.3%) had primary school level of education, only 5.3% of the mothers reported having heard about rheumatic heart disease and only 2% knew the relationship between throat infection and heart disease. Factors associated with an adequate knowledge of RHD were: Monthly income (p = 0.01), post-secondary level of education (p = 0.004), and having heard of RHD (p = 0.001).

Conclusions

Levels of knowledge and awareness on rheumatic heart disease among mothers is low. This study provides an important insight into the perception and practices related to sore throat that can be used to guide future awareness activity campaigns aiming to reduce the risk of RHD in Sudan.

Recommendations:

to execute a large scale campaign aiming to improve the awareness of rheumatic fever and rheumatic heart disease, and to educate mothers about the importance of adequate care of sore throat in children and the hazardous outcomes of its negligence.

Background
Rheumatic heart disease is one of the manifestations of rheumatic fever which is a systemic hypersensitivity reaction (type 2) involving multiple organs, it's the ultimate result of untreated throat infection with group (A) streptococci {1}, the role of group A beta hemolytic streptococci in the disease pathogenesis is supported by outbreaks of ARF followed by outbreaks of pharyngitis {2}.

The most serious manifestation of rheumatic fever is carditis (> 50% of patients) which is inflammation of the heart, carditis can be generalized (pancarditis) involving the pericardium, epicardium, myocardium, and endocardium or localized involving only the endocardium (valvulitis), which is the main manifestation {1}.

Although the initial attack of ARF lead to severe valvular disease, rheumatic heart disease mostly result from cumulative valve damage due to recurrent ARF attacks {1,3}, mitral valve incompetence is the most common valvular lesion in RHD at early stages which ultimately result in the development of heart failure {4}. A 2015 study of rheumatic heart disease cases estimated there were 33.4 million cases of RHD globally and 319400 deaths due to RHD {5}. Rheumatic heart disease is a neglected disease specially in children and teens, Sub-Saharan Africa is the hotspot of the world, with a prevalence of 5·7 per 1000 in children aged 5–14 years in 2005 {1} this number is underestimated owing to the undetected asymptomatic patients, for instance an echocardiography influenced screening study showed that the prevalence of rheumatic heart disease among school children was 30 per 1000 (95% CI) in Mozambique {6}, a relatively similar number of 15 per 1000 children (95% CI) was found in Uganda {7}. In Ethiopia (a neighboring country) the prevalence of RHD according to an Auscultation-based surveys conducted in the late 1990's reported a rural prevalence of 4.6/1000 and an urban prevalence of 6.4/1000 {8,9}.

Problem statement

Ibrahim-Khalil et al found that the prevalence of rheumatic fever was 10/1000 for boys and 14/1000 for girls {10}. Sudan is considered to have a high incidence compared with 2.3 per 1000 in Saudi Arabia and 5.1 per 1000 in Egypt. In Khartoum The prevalence of RHD using echocardiography was 0.3 per 1 000 children compared with a prevalence of 19 per 1 000 in Niyala {11}. In Sudan, the Ministry of Health (MOH) annual report {12} revealed that the total number of patients seen with ARF in out-patients clinics was 36877, with 11976 seen in Khartoum State followed by Western States [Darfur and Kurdofan] (9170) while the least number was seen in River Nile State (195) patients. The same report showed that 509 cases of RHD were admitted to hospitals, including 176 children between 5 and 14 years of age. RHD caused 44 deaths in 2011 (9%). Another report from Gaafar Ibn Auf Paediatric Cardiology clinic showed that total numbers of cases with ARF seen in 2011 were 81 patients while patients presented with RHD were 735, the majority were from Khartoum State but most of them were originally from Western States (Darfur and Kordofan) {13}.

In the same hospital, RHD presented the most common cause of admission to cardiology ward (55% of admissions) and the most common cause of death due to cardiac disease. Furthermore, 95% of patients with RHD seen have severe forms of valve disease needing surgical intervention. Ninety percent of those
with RHD do not have history of ARF indicating that the first episode passed unnoticed and 50% of patients were not compliant with prophylaxis. Many patients are seen for the first time with adverse echocardiographic characteristic such as an ejection fraction < 60% or an end-systolic diameter > 45 mm and severe pulmonary hypertension, which lead to adverse surgical outcome, similar to observations of other centers (14). Primary prevention of acute rheumatic fever is achieved by treatment of acute throat infections caused by group a streptococcus, this is done by administering a course of 10 days oral antibiotics (mainly penicillin) (15).

In an Iranian study evaluating mothers’ knowledge about pharyngitis in children the knowledge scores of mothers in urban areas were significantly higher than mothers in rural areas. Their study demonstrated the crucial need for education to improve rheumatic fever awareness (16).

Sore throat awareness is then a crucial element in rheumatic fever prevention part of which is an understanding of the potential consequences of sore throat (17).

**Justification (rationale):**

Knowledge about one’s own disease is a major determinant of health and health related behaviors but this is not the case in rheumatic fever and rheumatic heart disease since it mainly affects children, as a result it’s the parent’s responsibility to know about their child disease, treatment and prevention of complications.

This study by measuring the degree of parental knowledge should provide data to enable health care providers to construct a guided program for primary and secondary prevention of acute rheumatic fever.

**Objectives**

**a) General:**

To assess mothers awareness regarding rheumatic heart disease development in children.

**b) Specific:**

To assess the knowledge of mothers regarding rheumatic fever and rheumatic heart disease

To ascertain different maternal behaviors towards sore throat in children

To assess mothers health seeking behavior regarding their sick children

**Methods**

**Study design/Setting**
A descriptive cross sectional hospital-based study. Bashair Teaching Hospital; a secondary governmental hospital located in al-Nasr area south of the capital Khartoum. It receives patients from many of Khartoum southern localities, including Al-kalakla, Mayo and other remote areas.

**Study population**

Mothers attending the obstetric and pediatrics outpatient department of Bashair teaching Hospital either seeking health care for themselves or as a co-patient during the study period.

**Sample size**

The sample size (150 mothers) calculated using the following equations; \( n = \frac{N}{1 + N (D^2)} \)

Where:

\( n \) = Sample size

\( N \) = Population

\( D = 0.05 \)

\( n = \frac{240}{1 + (240*0.0025)} = 150 \)

**Sampling technique**

Non-probability Convenience sampling.

**Data collection methods**

Data was collected using a interviewer-administered custom questionnaire addressing the different aspects about rheumatic heart disease.

**Data analysis:**

The data was analyzed manually and by computer using SPSS version 26.

**Ethical Consideration:**

Ethical approval was be obtained from Community Department, Faculty of Medicine, Al-Neelain University. Verbal consent was obtained from each participant.

**Results**

1. **socio-demographic Characteristics:**
A total of 150 mothers were interviewed most of them were in the 26–35 age group (42.67%). Nearly half of the mothers (43.3%) had primary school level of education, 31.3% of them graduated high school and only 8% of them graduated university, the remaining 17.3% didn't receive formal education. Most of the mothers (60.7%) who participated in this study were housewives, 42 (28%) owned a private profession and only 10 (6%) worked as an employee. Their monthly income ranged from 20K-80K SDG, with 47.33% having low income (considered to be 20K or less) and 52.67% having an average monthly income (considered more than 20K and less than 80K SDG).

Table (1) shows the socio demographic characteristic of the mothers:

<table>
<thead>
<tr>
<th></th>
<th>Count</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18–25</td>
<td>18</td>
<td>12.0%</td>
</tr>
<tr>
<td>26–35</td>
<td>64</td>
<td>42.7%</td>
</tr>
<tr>
<td>36–45</td>
<td>54</td>
<td>36.0%</td>
</tr>
<tr>
<td>45 or more</td>
<td>14</td>
<td>9.3%</td>
</tr>
<tr>
<td><strong>origin</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Khartoum</td>
<td>134</td>
<td>89.3%</td>
</tr>
<tr>
<td>Rural states of Sudan</td>
<td>16</td>
<td>10.7%</td>
</tr>
<tr>
<td><strong>occupation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private business</td>
<td>42</td>
<td>28.0%</td>
</tr>
<tr>
<td>Housewife</td>
<td>91</td>
<td>60.7%</td>
</tr>
<tr>
<td>Employee</td>
<td>10</td>
<td>6.7%</td>
</tr>
<tr>
<td>Teacher</td>
<td>5</td>
<td>3.3%</td>
</tr>
<tr>
<td>School keeper</td>
<td>2</td>
<td>1.3%</td>
</tr>
<tr>
<td><strong>educational level</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No formal education received</td>
<td>26</td>
<td>17.3%</td>
</tr>
<tr>
<td>Primary school</td>
<td>65</td>
<td>43.3%</td>
</tr>
<tr>
<td>Secondary school</td>
<td>47</td>
<td>31.3%</td>
</tr>
<tr>
<td>University graduate</td>
<td>12</td>
<td>8.0%</td>
</tr>
<tr>
<td><strong>income per month</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 20k SDG</td>
<td>71</td>
<td>47.3%</td>
</tr>
<tr>
<td>20k-80k SDG</td>
<td>78</td>
<td>52.0%</td>
</tr>
<tr>
<td>More than 80k SDG</td>
<td>1</td>
<td>0.7%</td>
</tr>
<tr>
<td><strong>number of children</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1–3</td>
<td>42</td>
<td>28.0%</td>
</tr>
<tr>
<td>4–6</td>
<td>80</td>
<td>53.3%</td>
</tr>
<tr>
<td>7 or more</td>
<td>28</td>
<td>18.7%</td>
</tr>
</tbody>
</table>
Awareness about different aspects of rheumatic heart disease:

Of the 150 mothers who participated in this study only 8 (5%) reported having heard about rheumatic heart disease, the remaining 142 (95%) didn’t, most of the mothers (95%) didn’t know whether rheumatic heart disease is present in Sudan or not.

Only 3 mothers (2%) knew the relationship between throat infection and heart disease the remaining 147 (98%) didn’t.

Table (2) shows mothers knowledge rheumatic heart disease

<table>
<thead>
<tr>
<th></th>
<th>Count</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>have you ever heard of rheumatic heart disease</td>
<td>no</td>
<td>142</td>
</tr>
<tr>
<td></td>
<td>yes</td>
<td>8</td>
</tr>
<tr>
<td>rheumatic heart disease is present in Sudan</td>
<td>I don't know</td>
<td>143</td>
</tr>
<tr>
<td></td>
<td>yes</td>
<td>7</td>
</tr>
<tr>
<td>rheumatic fever is due to untreated throat infection</td>
<td>I don't know</td>
<td>147</td>
</tr>
<tr>
<td></td>
<td>yes</td>
<td>3</td>
</tr>
</tbody>
</table>

Factors associated with an adequate knowledge of RHD were: Monthly income ($p = 0.01$), post-secondary level of education ($p = 0.004$), and having heard of RHD ($p = 0.001$).

Table (3) demographic factors associated with knowledge about Rheumatic Heart Disease
### Rheumatic P value

<table>
<thead>
<tr>
<th></th>
<th>Poor knowledge</th>
<th>Good knowledge</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>educational level</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>no formal education</td>
<td>100.0%</td>
<td>0.0%</td>
<td>0.004</td>
</tr>
<tr>
<td>primary school</td>
<td>100.0%</td>
<td>0.0%</td>
<td></td>
</tr>
<tr>
<td>secondary school</td>
<td>100.0%</td>
<td>0.0%</td>
<td></td>
</tr>
<tr>
<td>university graduate</td>
<td>41.7%</td>
<td>58.3%</td>
<td></td>
</tr>
<tr>
<td><strong>income per month</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-20k sdg</td>
<td>100.0%</td>
<td>0.0%</td>
<td>0.01</td>
</tr>
<tr>
<td>21k-80k sdg</td>
<td>91.0%</td>
<td>9.0%</td>
<td></td>
</tr>
<tr>
<td>more than 80k sdg</td>
<td>100.0%</td>
<td>0.0%</td>
<td></td>
</tr>
<tr>
<td><strong>have you ever heard of rheumatic heart disease</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>no</td>
<td>100.0%</td>
<td>0.0%</td>
<td>0.001</td>
</tr>
<tr>
<td>yes</td>
<td>12.5%</td>
<td>87.5%</td>
<td></td>
</tr>
</tbody>
</table>

### Sore throat awareness:

About 96 (64%) of the mothers thought throat infection is transmitted through sharing fluid and through cough, 54 (36%) did not know what causes sore throat and thought it was cold weather, however most of the mothers noticed the seasonal variability in the frequency of throat infection with 140 (93%) answering “winter” as the season of this increase. The majority of mothers (95%) didn’t know the causative agent of pharyngitis.

Table (4) shows mothers knowledge about throat infections
children less than 5 years are more vulnerable to acquire throat infections than adults

- I don’t know: 2, 1.3%
- yes: 148, 98.7%

throat infection is mainly transmitted through

- I don’t know: 54, 36.0%
- sharing fluids, through cough: 96, 64.0%

Have you noticed any seasonal difference in the frequency of throat infections? When?

- No seasonal variability: 2, 1.3%
- summer: 8, 5.3%
- winter: 140, 93.3%

Most cases of pharyngitis are viral in origin.

- I don’t know: 143, 95.3%
- yes: 7, 4.7%

3\[Mothers first step of action towards a sore throat:\]

A total of 89 mothers (59%) used home remedies to treat a sore throat while 57 (38%) sought medical help immediately, and 3 (2%) practiced self-prescribed antibiotics.

Regarding mothers adherence to a prescribed course of antibiotics 111 (74%) completed the course fully, while 7 (4.7%) used it till symptoms subsided and 32 (21.3%) didn’t use the antibiotics for they were either not available or the mothers weren’t financially capable of buying them.

Table (5) shows mothers responses to sore throat

<table>
<thead>
<tr>
<th>When your child suffer from sore throat that is accompanied by fever you</th>
<th>Count</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>do nothing</td>
<td>1</td>
<td>0.7%</td>
</tr>
<tr>
<td>use self-prescribed antibiotics</td>
<td>3</td>
<td>2.0%</td>
</tr>
<tr>
<td>use home remedies</td>
<td>89</td>
<td>59.3%</td>
</tr>
<tr>
<td>immediately seek health care</td>
<td>57</td>
<td>38.0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>In case the doctor prescribed a course of antibiotics you</th>
<th>Count</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>don’t use it at all</td>
<td>32</td>
<td>21.3%</td>
</tr>
<tr>
<td>use it till symptoms subsided</td>
<td>7</td>
<td>4.7%</td>
</tr>
<tr>
<td>complete the course</td>
<td>111</td>
<td>74.0%</td>
</tr>
</tbody>
</table>
Discussion

To the best of our knowledge, this is the first survey of RHD awareness in Khartoum state. In this survey, our results show that the level of awareness of RHD among Sudanese females is low. Factors associated with adequate knowledge of RHD were adequate monthly income, post-secondary level of education, and having heard of RHD.

Only 5% of mothers had enough knowledge about different aspects of the disease, this is comparable to a similar study by Nkoke et al. in Cameroon showed that only 5.1% of participants interviewed at outpatient clinics had adequate knowledge on RHD and that about 18.8% knew that sore throat infection precipitates RHD (18).

Only 2% of mothers who participated in the study knew that sore throat was a trigger for RHD this also comparable to previous reports by Saeed and colleagues that showed among RHD patients in Pakistan, only 5% were aware that a sore throat was the cause of the disease (19).

Even doctors had a very primitive understanding of ARF and RHD prevention in Sudan. Later however, the intervention through lectures reached a good standard (20).

Regarding treatment practices, the management of sore throat in our study was sub-optimal with less than half of the mothers using antibiotics, more than half of the mothers (59.33%) used home remedies instead of antibiotics to treat throat infection, This proportion was very close to a study by John Musku in Zambia (21) indicating a high risk of developing ARF and subsequent RHD. Factors that limited the diagnosis and treatment of GAS pharyngitis was the fact that patients did not present for treatment of sore throat; and that there was little patient and community knowledge regarding the importance of treating a sore throat.

With the primary prevention focusing on adequate care of throat infection. Awareness activities was able to improve awareness of RHD in Nepal by 40% (from 8–48%) (22), the Nepal Heart Foundation used a wide variety of activities to improve awareness of RHD such as putting large hoarding boards throughout the cities; mobilizing the media; including RHD materials in school curriculums; showing street dramas; distributing pamphlets, posters, and calendars.

Such awareness activities should be advocated in Sudan through a RHD control program as the level of awareness of ARF/RHD in our study was comparable to that in Nepal. Community programs have resulted in the virtual elimination of rheumatic fever in Cuba (23). This was achieved using comprehensive, integrated programs targeting primary and secondary prevention. The program that stretched over 10 years was able to demonstrate a reduction in rheumatic fever from 18.6 per 100,000 to 2.5 per 100,000. These were both comprehensive community interventions, consisting of awareness campaigns, establishment of registries and medical training with particular emphasis on primary and secondary prevention.
Conclusion

The results of this study show that mothers are lacking knowledge about all aspects of RHD and its treatment. This may have a profound effect on the incidence of rheumatic disease in the setting. This results can be used in the design of awareness activities aimed reducing the risk of RHD in Khartoum. The appropriateness of antibiotics prescribed, and the health care provider awareness and knowledge levels regarding RHD in Sudan has not been reported yet in the literature. This grey area deserves more research.

Recommendations:

Health education campaigns using all available modalities such as the national television, the FM radio, social media and centres to spread the awareness regarding the primary prevention of ARF and RHD proved and should prove beneficial in decreasing the incidence of ARF and RHD.

Health education at the level of primary health care centres should be a cost-effective mean to improve the community practice regarding sore throat care.

Declarations

Ethical Approval

Ethics approval was obtained from the Research and Ethics Committee of Alneelain University. Ethical clearance and approval for conducting this research was obtained from the general manager of the Ministry of health (Khartoum State). Ethical principles of autonomy, beneficence, non-maleficence and justice, as stipulated in the ethical guidelines of the community department at Alneelain university faculty of medicine. Informed written consent was obtained from every respondent who agreed to participate in the study. The respondents informed that the study is not associated with experimental or therapeutic intervention while information was collected from them.

Competing interests

Not Applicable.

Authors' contributions

All the authors played a major role and real contribution to achieve this project. Mustafa Sabir participated in data collection, analysis and final manuscript editing, Ibrahim Awad participated in manuscript plan, editing and writing of the article.

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Our research project was self-sponsored by me and help of my colleague and coauthors. There was no funding from any institute or organization for this paper.

Availability of data and materials

All data and material are available when request from the corresponding author

References


Figures
Figure 1

Shows distribution of mothers according to age group.
Figure 2

Shows distribution of mothers according to their origin.

![Educational level chart]

Figure 3

Shows the distribution of mothers according to their educational level.
Figure 4

Shows the distribution of mothers according to their occupation.
Figure 5

Shows the distribution of mothers according to their monthly income

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- LettertoEditorAimsandScopestatement.docx