Prevalence of rheumatic and congenital heart disease in school children of Andhra Pradesh, South India

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Objective: To determine the prevalence of rheumatic heart disease (RHD) and congenital heart disease (CHD) using clinical and echocardiographic criteria in rural and urban school children in Andhra Pradesh, South India.

Materials and methods: A total of 4213 school children between 5 and 16 years of age were screened. 1177 were from rural schools and 3036 from urban schools. Prevalence of RHD and CHD was estimated.

Results: Clinically RHD was present in 3 (prevalence 0.7/1000). Using echocardiography RHD was detected in 32 (7.6/1000), 11 (7.3/1000) from rural and 21 (7/1000) from urban schools. (P = 0.000, O.R = 0.093 and C.I. = 0.023 – 0.317). Total prevalence of RHD is 8.3/1000.

Clinically CHD was present in 39 (9.2/1000) children, rural 9 (7.6/1000) and urban 30 (9.9/1000). Using echocardiography CHD was detected in 44 (10.4/1000) children, rural 11 (9.3/1000) and urban 33 (10.8/1000).

Conclusion: RHD was detected several fold using echocardiographic screening than by clinical examination alone. Longitudinal follow-up of children with echocardiographically diagnosed subclinical RHD is needed.

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There were two field teams. Each team consisted of one senior cardiologist, three nurses and one microbiology technician. One team performed clinical examination and another team performed the echocardiographic study.

The field team visited the school after informing the District Collector, District Medical & Health Officer, District Education Officer and Head Masters of the School. Informed consent was taken from all the students and their parents. The Proforma included details of demography, birthplace and current residential address, number of family members, family background and history of past illness (symptoms, duration, recurrence and treatment). A record of absentees was maintained and they were examined subsequently. The attendance rate was 96%. The first field team headed by cardiologist examined 4213 students, a detailed clinical examination and cardiac auscultation was done. The second field team headed by another cardiologist performed echocardiogram on all school children (4213) using SonoSite M-Turbo Portable Colour Doppler System with a Digital 10/4 LCD screen display with P10X/4–8 MHz phased array transducer. SonoSite Inc 21919 30th Drive SE, Bothell, WA 98021 3904, USA. Tel.: (425) 951-1200, Fax: (425) 951–1201, http://www.sonomite.com. Clinically and echocardiographically diagnosed RHD students were further evaluated (425) 951-1201, http://www.sonosite.com. Clinically there was no RHD case detected in urban school children. In contrast using Echocardiogram/Doppler the second field team detected RHD in 32 (7.6/1000) additional cases in school children, 11 (9.3/1000) from rural and 21 (7/1000) from urban schools (P = 0.000, O.R. = 0.093 and CI = 0.023–0.317). So the total number of RHD cases detected by both the field teams, clinical and echocardiogram, in the rural schools are 14 (3+11) (11.9/1000) and 21 (0+21) (6.9/1000) in the urban schools and the total number of RHD cases in both rural and urban schools are 35 (3+32) (8.3/1000) (Table 2).

In rural schools 16 children had history of sore throat and throat culture was positive in 1. In urban schools 34 had history of sore throat and culture was positive in 2 (Table 2).

Other prominent cardiac lesions detected clinically in rural schools were Congenital Heart Disease (CHD) in 9 (7.7/1000) that included Atrial Septal Defect (ASD) in 5 (4.2/1000), Patent Ductus Arteriosus (PDA) in 1 (0.9/1000), Dextro Cardia (Situs inversus totalis without structural heart disease) in 1 (0.3/1000), Cyanotic Congenital Heart disease in 1 (0.9/1000). Additionally the echocardiographic examination, apart from the above 9 cases in rural school, could detect 2 cases of silent Patent Ductus Arteriosus. So the total number of CHD cases detected by both the field teams (clinical & echocardiogram) in the rural schools were 11 (9.3/1000).

Other prominent cardiac lesions detected clinically in urban schools were CHD in 30 (9.9/1000) that included ASD in 13 (4.2/1000), PDA in 7, Ventricular Septal Defect (VSD) in 6 (1.9/1000), Dextro Cardia (Situs inversus totalis without structural heart disease) in 1 (0.3/1000), Valvular Pulmonic Stenosis (PS) in 2 (0.6/1000).

### Table 1

<table>
<thead>
<tr>
<th>Age of children (years)</th>
<th>Rural Boys (%)</th>
<th>Rural Girls (%)</th>
<th>Rural Total (%)</th>
<th>Urban Boys (%)</th>
<th>Urban Girls (%)</th>
<th>Urban Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5–10</td>
<td>134 (22.9)</td>
<td>127 (21.4)</td>
<td>261 (22.1)</td>
<td>455 (27.5)</td>
<td>350 (25.2)</td>
<td>805 (26.5)</td>
</tr>
<tr>
<td>11–16</td>
<td>450 (77)</td>
<td>466 (78.5)</td>
<td>916 (77.8)</td>
<td>1196 (72.4)</td>
<td>1035 (74.7)</td>
<td>2231 (73.4)</td>
</tr>
<tr>
<td>Total</td>
<td>584</td>
<td>593</td>
<td>1177</td>
<td>1651</td>
<td>1385</td>
<td>3036</td>
</tr>
</tbody>
</table>

### Table 2

<table>
<thead>
<tr>
<th>Age group</th>
<th>Clinical and echocardiographic RHD (Total)</th>
<th>Throat culture positive cases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rural Total</td>
<td>Per thousand</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5–10</td>
<td>3</td>
<td>2.6</td>
</tr>
<tr>
<td>11–16</td>
<td>11</td>
<td>9.4</td>
</tr>
</tbody>
</table>

(P = 0.000, odds ratio = 0.093, CI 0.023–0.317)
Rheumatic fever and rheumatic heart disease are the most common cardiovascular diseases in children and young adults. The prevalence of RHD varies across the globe, the highest being in sub-Saharan Africa (5.7–55.4/1000) with least being in the developed nations where the prevalence is less than 1/1000. In India the prevalence of RHD as reported (Table 4) by ICMR, Padmavathi, Grover et al., Avasthi et al., Patel et al., Jacob Jose et al., Periwal et al., Bhaya et al. and Saxena et al. varied from 1 to 51/1000. This drastic difference could not only be due to variation in prevalence of RHD from country to country and region to region, but also due to methods adopted for detection—clinical or echo or clinical plus echo.

Our study was conducted in one district of Andhra Pradesh. It is situated in the southeast portion of Andhra Pradesh and is one of the biggest districts with 17,626 sq. km. area. Of the 3 million population 20% live in urban and 80% in rural areas. In our study all the school children were clinically examined by a field team headed by a cardiologist and another field team headed by another cardiologist screened all school children by echocardiogram. The first field team clinically diagnosed RHD in 3 (2.5/1000) rural school children. Of these 3 children, one had isolated rheumatic mitral regurgitation. Second case was a previously diagnosed rheumatic mitral regurgitation which was on secondary prophylaxis. Third case was also a previously diagnosed CRHD with MR which was on secondary prophylaxis. Clinically there was no RHD case detected in urban school children. Whereas, using Echocardiogram/Doppler the second field team detected RHD in 32 (7.6/1000) additional cases school children (30 cases had Mild MR and 2 cases had Mild AR, 11 (9.3/1000) from rural and 21 (7/1000) from urban schools (P = 0.000, O.R. = 0.093 and C.I. = 0.023–0.317). The total number of RHD cases detected by both the field teams, clinical and echocardiogram, in the rural schools are 14 (11.9/1000) and 21 (6.9/1000) in the urban schools and the total number of RHD cases in both rural and urban schools are 35 (8.3/1000).

The real incidence of CHD is difficult to determine; however, it is around 8/1000. Live births the total prevalence of CHD, by both the field teams, in both rural and urban schools, in our study was 10.4/1000 (9.3/1000 in rural and 10.9/1000 in urban school children). This prevalence is higher than that of Periwal et al study, where prevalence of 1.6/1000 was reported. The prevalence of ASD in our study was 4.3/1000, PDA 3.1/1000, PS 0.5/1000, COA 0.2/1000 and Dextro Cardia (Situs inversus totals without structural cardiac defect) 0.7/1000. The prevalence of ASD in our study is higher than the other studies. The real incidence of CHD is difficult to determine; however, it is around 8/1000.
The prevalence of RHD is several folds higher using echocardiographic screening compared to clinical examination. The CHD prevalence, on the other hand using echocardiographic screening is almost the same as clinical examination i.e., Clinical auscultation had much lower diagnostic efficiency in detecting RHD than CHD. In conclusion, the decline in RHD in India is not uniform. RHD continues to remain a major cardiac illness with an enormous disease burden that translates into huge economic and social losses. Our data support inclusion of echocardiography in screening protocols, even in the most resource-constrained settings and identify lower socioeconomic groups as most vulnerable.

6. Limitations of the study

The study was confined to one district only. It is likely that the results could be different if more districts in the state are included in the study. Our results cannot be generalised to the rest of India. We feel that many such echocardiographic studies should be done in different parts of the country to accurately find out the true prevalence of RHD and CHD in India.

7. Conclusions

The prevalence of clinical RHD in school children of Ongole Mandal of Prakasam District Andhra Pradesh, South India was 3 (0.7/1000), rural 3 (2.6/1000) and nil urban whereas the prevalence using echocardiogram was 11 (9.3/1000) in rural and 21 (7/1000) in urban (P = 0.000, O.R. = 0.093, C.I. 0.023–0.317). The total number of RHD cases detected both clinically and echocardiographically are 35 (8.3/1000). The prevalence of congenital heart disease was 10.4/1000 (9.3/1000 rural and 10.9/1000 urban), Prevalence of GAS sore throat was 0.7/1000 (0.8/1000 rural and 0.3/1000 urban).

The prevalence of RHD was several folds higher using echocardiographic screening compared to clinical examination. The CHD prevalence, on the other hand using echocardiographic screening is almost the same as clinical examination i.e., Clinical auscultation had much lower diagnostic efficiency in detecting RHD than CHD.

Conflicts of interest

All authors have none to declare.

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