Original Research Article

**Most common cause of cardiomegaly without significant murmur in pediatric age group at tertiary care hospital, Hyderabad, India: a prospective observational study**

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Received: 19 February 2019  
Accepted: 09 March 2019

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**ABSTRACT**

**Background:** Following the invention of monaural stethoscope by Laennec and X ray by Roentgen in 18th century there was spectacular advancements in cardiology. The myocardium can be affected by various disease process unrelated to abnormal pressure or volume loads. These processes may be inflammatory, metabolic, infiltrative, ischemic or primary with significant overlap. These diseases usually present as cardiomegaly. In pediatric age group cardiac diseases will present early, sometimes without any signs and symptoms like sudden death due to less cardiac reserve. Few cases of sudden death also showed huge cardiomegaly in postmortem X rays. authors want to carry out this study to find out most common cause of cardiomegaly with silent chest as authors usually miss the diagnosis and these cases may present as sudden death without giving much time to intervene. The aim of the study is to know the most common cause of cardiomegaly without significant murmur in pediatric age group above one year.

**Methods:** Prospective observational study done at a tertiary care hospital Hyderabad over a period of one year from January 2018 to January 2019.

**Results:** Most common cause of cardiomegaly without significant murmur was cardiac beriberi. It is mostly prevalent in rural areas of Telangana, mostly occurring in breastfed babies and below six years. All cases were recovered after proper treatment. Fortunately, it is associated with nil mortality, if timely treatment was initiated.

**Conclusions:** Cardiac beriberi which is easily preventable and if treated in proper time it will associated with nil mortality. As it was occurring commonly breastfed babies supplementation of Thiamine to mothers was very useful as a preventive strategy.

**Keywords:** Beriberi, Cardiomegaly, Myocardium, Pediatrics, Thiamine

**INTRODUCTION**

Myocardial disease with cardiomegaly may present acutely with signs of congestive heart failure, tachypnea, rales, tachycardia or enlarged quite heart. These diseases mostly cause sudden death.¹ As there is no significant murmur likely to miss serious diseases. Therefore, it is necessary to study the causes of cardiomegaly without significant murmur, in order to find out possible causes and to prevent sudden death. Cardiomegaly is radiological finding rather than clinical finding often missed by only percussion findings particularly in
children. Measurement of CT (cardio thoracic) ratio is the simplest way to estimate the heart size in children.\(^2\)\(^4\)

Vibrations with frequencies of 50-100db per second registered between heart sounds are called murmurs.\(^5\) Murmurs graded into 6 types according to intensity-barely audible, soft but easily audible, moderately loud but not accompanied by a thrill, louder and associated with thrill, audible with stethoscope barely on chest and audible with stethoscope off the chest. Murmurs arise from cardiovascular structures in the absence of anatomical abnormalities are called innocent murmurs.\(^6\)

All innocent murmurs accentuated or brought out in a high output states and they have special characters. Here authors studied only cases of cardiomegaly with quite heart. authors excluded all significant murmurs associated with congenital, acquired heart diseases, innocent murmurs and hemic murmurs.

**METHODS**

This is a prospective observational study done at Niloufer Hospital, Hyderabad during period from 2018 January to 2019 January.

**Inclusion criteria**

- Authors included all admission cases both intramural and extramural babies above 1 year of age and below 18 years of age.

**Exclusion criteria**

- Authors excluded cases under one year of age and known congenital heart diseases and with significant murmur causing heart defects.
- Hemic murmur (Anemia) and innocent murmur cases were excluded.

Selection criteria based on the cardiothoracic ratio of posterior-anterior erect view during inspiration. X-ray taken and CT ratio calculated by unknown persons not involved in study to decrease the bias. In Beriberi cases blood sampling done along with routine samples before the thiamine administration.

Objectives of study were to know the clinical profile of cardiomegaly and to know the most common cause of cardiomegaly without a significant murmur.

**Statistical analysis**

Sample size calculated as 60 at alpha error 0.05 and power of 80 by Open Epi software. Authors used simple statistical methods to analyze the data for that authors used SPSS version 25 and Microsoft X l to create graphs and tables. Authors attached present study proforma over case sheets and collected at the time of discharge or death.

**RESULTS**

During period of study, cases of cardiomegaly without significant murmur diagnosed in 60 cases. Incidence of cases of cardiomegaly without significant murmur was 0.3 per 1000 per year.

| Table 1: Different causes of cardiomegaly without significant murmur. |
|---------------------------------------------------------------|
| **Etiology**                  | **Number of cases (n=60)** | **Percentage** |
|-------------------------------|---------------------------|----------------|
| Beriberi                      | 15                        | 25             |
| Dilated cardiomyopathy        | 6                         | 10             |
| Myocarditis                   | 9                         | 15             |
| Scorpion string               | 5                         | 8.3            |
| Bronchiolitis                 | 7                         | 11.6           |
| Connective tissue diseases (SLE) | 2                        | 3.33           |
| Protein energy malnutrition   | 3                         | 5              |
| Renal parenchymal disease     | 4                         | 6.6            |
| Status epileptics             | 2                         | 3.3            |
| Others                        | 7                         | 11.6           |

Most common causes were Beriberi (25%), Myocarditis (15%) and followed by Bronchiolitis (11.6%) among others (11.6%) include storage diseases (3.3%), pericardial effusion (1.6%), SVT (1.6%), Diphtheria (1.6%), Idiopathic (3.3%) (Table 1).

| Table 2: Demographic profile of cardiomegaly. |
|------------------------------------------------|
| **Sex**                 | **Number of patients (n=60)** | **Percentage** |
| Male                    | 36                         | 60             |
| Female                  | 24                         | 40             |
| **Age**                 |                            |                |
| 1-2 years               | 15                         | 25             |
| 2-4 years               | 8                          | 13.3           |
| 4-6 years               | 7                          | 11.6           |
| 6-8 years               | 8                          | 13.3           |
| 8-10 years              | 8                          | 13.3           |
| 10-12 years             | 6                          | 10             |
| 12-14 years             | 6                          | 10             |
| 14-16 years             | 1                          | 1.66           |
| 16-18 years             | 1                          | 1.66           |
| **Area**                |                            |                |
| Urban                   | 12                         | 20             |
| Rural                   | 48                         | 80             |

Cardiomegaly cases more in male gender than female and majority of cases presented in 1-2 years of age (25%), most cases were come from rural areas (Table 2). All of these Cases presented with clinical features of CCF (congestive cardiac failure).
Overall most common presenting symptoms of cases of cardiomegaly without significant murmur is breathlessness present in 95% of cases, next common symptom fatigue present in 66.66%, irritability, palpitations present in 48.35%, 43.3% respectively. Orthopnea present in 33.3% cases.

Most common presenting symptom of beriberi is breathlessness seen in all cases, fatigue and vomiting in 66.6% cases. Beriberi associated with cheilitis in 60% cases. Convulsions present in 10% cases. The most common symptom of cardiomypathy is breathlessness and fatigue found in all cases, palpitation seen in 71.4% and chest pain in 35% cases of cardiomypathy.

Commonest symptom of myocarditis is breathlessness seen in all cases; second common is chest pain found in 66.6% cases. Fever associated with myocarditis seen in all cases; second common is chest pain in 35% cases of cardiomyopathy.

Fever associated with myocarditis found in 66.6% cases. Beriberi associated with cheilitis in 60% cases. Convulsions present in 10% cases. The most common symptom of cardiomypathy is breathlessness and fatigue found in all cases, palpitation seen in 71.4% and chest pain in 35% cases of cardiomypathy.

Beriberi mostly present with a mild cardiomegaly (CT ratio 0.5-0.6), Dilated cardiomypathy present with a Moderate to severe cardiomegaly. Acute conditions like myocarditis, bronchiolitis present with a Mild cardiomegaly (Table 3).

Commonest symptom of myocarditis is breathlessness seen in all cases; second common is chest pain found in 66.6% cases. Fever associated with myocarditis found in 55.55% cases; Bronchiolitis commonly presented by cough and breathlessness. Other less common signs and symptoms of cardiomegaly cases are sweating, cyanosis, edema, orthopnea, PND (Paroxysmal nocturnal dyspnea).

CT ratio is obtained by measuring ratio of the largest diameter of the heart above diaphragm to widest diameter of chest in X ray PA view in expiratory film. To determine the presence or absence of cardiomegaly lateral view of heart also required, as isolated right ventricle and left atrial enlargement may not be obvious on PA film but obvious on a lateral film. CT ratio consists of transverse diameter of the heart to maximal internal width of the chest. The transverse of heart is the sum of maximum mid left and mid right diameters. These are determined by drawing a horizontal line from the midline to the farthest left and farthest right borders of heart. In infants CT ratio more than 0.6 and in children’s more than 0.5 is considered as cardiomegaly.7 Stills murmur, pulmonary ejection murmur, pulmonary flow murmur, venous hum and carotid bruit are innocent murmurs, except pulmonary flow murmurs others will persistent in pediatric age group, as pulmonary flow murmur will disappear by six months of age. A cardiac or valvular murmur heard in anemic persons who has no valvular lesion is called hemic murmur. it is caused by reduction in viscosity of blood usually occur in conditions like blood loss and anemia. The murmur is soft and waxes and wanes with respiration. It is loudest at the peak of inspiration. Typically, it is grade 1 or 2 murmur high pitched ejection systolic murmur best heard in aortic and pulmonary area. There were fewer studies, done previously about the common causes of cardiomegaly without significant murmur. Venugopolan et al, Jarallah et al, noticed that cardiomypathy was the most common cause of cardiomegaly without murmur but in present study, wet beriberi was the most common cause and cardiomyopathy was the second most common cause. It was explained by following fact as most of the cases of

| Etiology                        | Number of cases | Deaths | Percentage |
|---------------------------------|-----------------|--------|------------|
| Beriberi                        | 15              | 1      | 1.66       |
| Dilated cardiomyopathy          | 6               | 3      | 50         |
| Myocarditis                     | 9               | 2      | 22.22      |
| Scorpion sting                  | 4               | 0      | 0          |
| SLE                             | 2               | 1      | 50         |
| Others                          | 7               | 3      | 42.8       |

No mortality found due to Scorpion sting and least in Beriberi, though Scorpion sting cases were lesser than Beriberi. Mortality is higher in cases with dilated cardiomyopathy and SLE (Table 4).
present institute come from the nearby endemic areas for beriberi such as Nalgonda, Mahabubnagar and Medak. The incidence and mortality of Venugopalan study comparable to present study. Results of Hong YM, Lip Shultz SE studies on cardiomypathy were almost similar to present study. Batra AS, Drucker NA studies on pediatric myocarditis results were similar to present study. 

Cardiac beriberi is one of the severe forms of thiamine deficiency causes fatty degeneration of cardiac muscle. The child with Wet beriberi is undernourished pale, almost similar as thiamine deficiencies to all pregnant women to prevent beriberi. To promote the growth of thiamine rich staple Cassava, which is economical.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Chekkali CM, Kotha R, Singh H, Bapanpalli N, Anjum S, Alimelu, et al. Most common cause of cardiomegaly without significant murmur in pediatric age group at tertiary care hospital, Hyderabad, India: a prospective observational study. Int J Contemp Pediatr 2019;6:xxx-xx.