

## Chest pain in paediatrics: single centre experience

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### Abstract

**Introduction:** Unlike in adults, chest pain in children is usually benign, although it can be a cause of anxiety to the child and family.

**Objective:** Long term follow up of paediatric cases, referred to our clinic because of chest pain, since we started the paediatric cardiology service in PSCC-Qassim in 2006.

**Method:** A retrospective review was done of all children referred with a complaint of chest pain to the paediatric cardiology service in PSCC-Qassim from 2006 to 2018. Data were collected from the department database. Families were contacted to find out about the child's chest pain and any other medical problems.

**Results:** Two hundred and forty two children were referred to our clinic for evaluation of chest pain from 2006. Of them 56% were girls. The mean age at referral was 9.1±2.4 years and the mean weight at referral was 30±12 kg. On initial presentation, only 6.6% patients reported that the chest pain had some relation to exercise. The commonest symptom was palpitation. On clinical examination, 20.6% patients had innocent murmurs. The electrocardiogram (ECG) was normal in 231 (95.4%) of the cases. Two hundred and nineteen (90.5%) cases had normal echocardiographic findings. There was no statistical significance between the presence of a murmur and abnormal echocardiographic findings. Follow up was done

through telephone contact of families of cases seen in the clinic. The mean age at follow up was 12.8 ± 3.3 years. One hundred and ninety five (80.6%) stated that their children no longer have any chest pain. Forty eight (19.8%) reported that their children still had nonspecific chest pain that did not interfere with their day to day activities. Thirteen (5.4%) stated that their children had other medical problems like asthma, anaemia and hyperthyroidism. None of them reported sudden cardiac death in any of the children.

**Conclusions:** In this study carried out in the paediatric cardiology service in PSCC-Qassim, chest pain in children was benign. Follow up reported no sudden cardiac deaths in any of our cases.

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(Key words: Chest pain, paediatrics, palpitation, sudden cardiac death).

### Introduction

Unlike in adults, chest pain in children is usually benign but can cause anxiety to child and family<sup>1</sup>. It can be due to cardiac or non-cardiac causes. Non-cardiac chest pain is more frequent in children and adolescents. Health care workers should be aware of the pathological causes of chest pain related to the cardiovascular, respiratory, gastrointestinal, or musculoskeletal systems<sup>2</sup>.

### Objective

The objective of the study is long term follow up of paediatric cases, referred to our clinic because of chest pain, since we started the paediatric cardiology service in PSCC-Qassim in 2006.

### Method

A retrospective review was done of all children referred with a complaint of chest pain to the paediatric cardiology service in PSCC-Qassim from 2006 to 2018. Data were collected from the department database. Families were contacted to find out about the child's chest pain and any other medical problems. Data were collected and then analysed using the SPSS programme.

**Ethical issues:** Ethical approval was obtained from the Institutional Research Committee (IRB) of Qassim University, Saudi Arabia (No. 20181019) on 29.10.2018. Informed written consent was

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obtained from the parents of the children participating in the study,

ranged from 2-14 years (mean  $9.1 \pm 2.4$  years). The weight at referral was 5 to 71 kg (mean  $30 \pm 12$  kg). (Table 1).

**Results**

Two hundred and forty two children were referred to our clinic for evaluation of chest pain from 2006. One hundred and thirty five (56%) were girls. Ages

On initial presentation, only 16 (6.6%) patients reported that the chest pain was related to exercise. Commonest symptom was palpitations (Table 2).

**Table 1: Descriptive statistics for children with chest pain**

	Minimum	Maximum	Mean	Standard deviation
Age of presentation (years)	2	14	9.11	2.427
Weight at presentation (kg)	5	71	29.86	12.110
Current age (years)	4	22	12.79	3.297

**Table 2: Associated symptoms for children with chest pain (n=242)**

Symptom	Frequency (%)
Palpitation	16 (06.6)
Shortness of breath with bluish discolouration	02 (0.8)
Syncopal attack	01 (0.4)
Total	19 (07.2)

On clinical examination, 50 (20.6%) patients had innocent murmurs with normal general, cardiovascular and other systems examination. The electrocardiogram (ECG) was normal in 231 (95.4%) of the cases (Table 3).

Two hundred and nineteen (90.5%) paediatric cases referred to the clinic with chest pain had normal echocardiographic findings (Table 4).

**Table 3: Electrocardiographic (ECG) findings (n=242)**

ECG findings	Frequency (%)
Borderline prolonged QT 480, incomplete right bundle branch block	01 (0.4)
Ectopic atrial rhythm	01 (0.4)
Frequent premature ventricular contractions	02 (0.8)
Normal sinus rhythm	231 (95.4)
Normal sinus rhythm, right bundle branch block	01 (0.4)
Normal sinus rhythm, 1st degree heart block	03 (01.2)
Sinus bradycardia, ST elevation	01 (0.4)
Sinus rhythm with right axis deviation with RAE and evidence of RVH	01 (0.4)
Sinus rhythm, left axis deviation, infrequent premature atrial contractions	01 (0.4)

RAE= Right atrial enlargement, RVH= Right ventricular hypertrophy

**Table 4: Echocardiographic (EEG) findings (n=242)**

Echocardiographic findings	Frequency (%)
Bicuspid aortic valve	04 (01.6)
Mitral valve prolapse	05 (02.0)
Thickening of the tip of anterior mitral valve leaflet with mild MR (posterior jet)	02 (0.8)
Secundum atrial septal defect	02 (0.8)
Abnormal septal motion	01 (0.4)
Mild right sided dilatation. Mild TR, PG = 22 mm Hg, Mild PR, trivial MR	01 (0.4)
Moderate pericardial effusion	01 (0.4)
Partial anomalous pulmonary venous drainage	01 (0.4)
Patent foramen ovale Vs Secundum atrial septal defect	03 (01.2)
Trivial mitral regurgitation	01 (0.4)
Small outlet ventricular septal defect	02 (0.8)
Normal	219 (90.5)

MR=Mitral regurgitation, TR=Tricuspid regurgitation, PG=Pressure gradient, PR=pulmonary regurgitation

Correlation between the echocardiographic findings and the presence of a cardiac murmur revealed that 35 (14.5%) cases had a murmur with normal echocardiographic findings and 10 (4.1%) cases had a murmur with some cardiac

abnormalities (Table 5). There was no statistical significance between the presence of a murmur and abnormal echocardiographic findings.

**Table 5: Echocardiographic and cardiac examination cross tabulation (n=242)**

Echocardiographic findings	Cardiac examination		Total
	Normal	Systolic murmur	
Atrial septal defect	01	01	02
Bicuspid aortic valve	01	02	03
Mitral valve prolapse	05	03	08
Mild diastolic dysfunction	01	0	01
Muscular ventricular septal defect	0	02	02
Normal	189	35	224
Partial anomalous pulmonary venous drainage	0	01	01
Trivial mitral regurgitation	0	01	01

Through telephone contact of families of cases seen in the clinic, the current age range of the study population is 4-22 years (mean  $12.8 \pm 3.3$  years). One hundred and ninety five (80.6%) stated that their children no longer have any chest pain. Forty eight (19.8%) reported that their children still had

nonspecific chest pain that did not interfere with their day to day activities. Thirteen (5.4%) children stated that they had medical problems like asthma, anaemia and hyperthyroidism (Table 6). There were no reported sudden cardiac death in any one of those contacted.

**Table 6: Condition on follow up (n=242)**

Condition on Follow up	Frequency (%)
Anaemia and vitamin deficiency	01 (0.4)
Bronchial asthma	06 (02.4)
Behcet disease	01 (0.4)
Eye disease	01 (0.4)
Normal	220 (90.9)
Palpitations	09 (03.7)
Had cardiac intervention (Atrial septal defect closure)	01 (0.4)
Sick cell anaemia	01 (0.4)
Thyrotoxicosis	02 (0.8)

## Discussion

Chest pain is a frequent symptom in children. It is the next frequent cause of referral to paediatric cardiologists after cardiac murmur<sup>3</sup>. Although, in contrast to adult populations, it is rarely associated with serious cardiac diseases, it might lead to major parental concerns and worries and also extensive investigations<sup>1,3</sup>. In some reports, cardiac diseases causing chest pain were identified in 0.48% of cases<sup>4</sup>. In our study we identified minor CHD in 23 (9.5%) patients. One patient had pericardial effusion, and 8 patients had mitral valve prolapse (MVP) which might explain the chest pain symptoms. The other disorders are less likely to cause chest pain. MVP might cause nonspecific symptoms which might be interpreted by the patient as chest pain or discomfort<sup>5</sup>. MVP was diagnosed in 8 (3.3%) of our patients.

It is advised to use a standardized clinical assessment and management plan (SCAMP algorithm) for assessing children with chest pain. This will reduce the use of unnecessary investigations and referrals of such patients<sup>3,4,6</sup>. It is reported that the paediatric outpatient assessment of patients with chest pain with cardiac pathology can be identified using the SCAMP algorithm<sup>6</sup>. SCAMPs currently exist to treat many different clinical conditions in a variety of clinical settings for the paediatric population including chest pain<sup>7</sup>.

Follow up of chest pain in children does not reveal an increased risk of sudden cardiac death<sup>8,9</sup>. In our cases, all of the cases contacted are having a normal lifestyle with no restriction of daily activities. Some of them are having some medical problems like bronchial asthma. There are no reported sudden cardiac deaths in any of our cases.

## Conclusions

In this study carried out in the paediatric cardiology service in PSCC-Qassim, chest pain in children was benign. Follow up reported no sudden cardiac deaths in any of our cases.

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