

Pediatric and Adolescent Chest Pain: A Cross Sectional Study

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Abstract

Introduction

Chest pain is a common complaint in children and adolescents visiting the clinic. We assessed and analyzed the etiology of chest pain among children referred to a pediatric cardiology clinic in cardiac center in south west of Iran.

Materials and Methods

In a descriptive cross-sectional study, we assessed children with chest pain who visited our medical center during March 2013 to April 2014. Any case of trauma associated chest pain was excluded from this study. Data were analyzed by SPSS version 17.

Results

A total of 200 patients [107 male, 93 female; age range (3–17 years)] were enrolled into this study. ECG was taken from all patients that 6 patients had abnormal Electrocardiogram (ECG). 43 patients had chest radiograms (39.5%). Echocardiograms were performed in 130 (65%) patients. Overall, idiopathic chest pain was the most common diagnosis (51%). Other associated disorders were musculoskeletal (30%), gastrointestinal (11.5%), cardiac (4.5%), pulmonary (3%) respectively.

Conclusions

According to our data idiopathic chest pain seems to be the most common cause of chest pain in children. Careful physical examination can be helpful in diagnosis and treatment planning of children suffering of chest pain. Chest pain due to cardiac origin is rare, but it should be considered.

Keywords: Adolescents, Chest pain, Children.

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Introduction

Chest pain is a common symptom in children and adolescents. After heart murmur, chest pain is the most common cause of referral to a pediatric cardiologist(1). The majority of the conditions causing it are benign and self-limiting. Almost all diagnoses can be made with a thorough history and physical examination(2).

Although most patients and their families are concerned that chest pain indicates an underlying heart problem, fortunately, that rarely is the case. The causes of chest pain in children are classified as idiopathic, musculoskeletal, pulmonary, cardiovascular, and gastrointestinal (Table.1). Idiopathic chest pain is the most common cause of chest pain in children, accounting for 20% to 45% of all cases.

A diagnosis of idiopathic chest pain is established if no cause can be found after a thorough history, physical examination, and appropriate laboratory investigations. The evaluation of chest pain requires a thorough history and careful physical examination. Musculoskeletal pain arising from the chest wall accounts for 20% to 30% of chest pain in children and is the most common identifiable origin. Pulmonary disorders account for 6% to 20% of the causes of chest pain in children. Cardiovascular causes of chest pain are uncommon, but are potentially the most serious causes in children.

Cardiovascular disorders account for less than 5% of the causes of chest pain in children. The family history should be explored for premature forms of heart or lung disease and instances of premature death. Gastrointestinal disorders account for 2% to 10% of the causes of chest pain in children (1, 3, 4). In this study, the

psychological cause of chest pain was classified as idiopathic. Laboratory tests are unnecessary in most cases. Laboratory tests should be ordered only when indicated by the history and physical examination.

A chest roentgenogram is indicated for trauma to the chest or when pulmonary or cardiac disease is suspected. An electrocardiogram is indicated when arrhythmia, significant heart murmurs, structural heart disease, myocardial ischemia, myocarditis, or pericarditis is detected in patients. structural heart disease can be diagnosed better with an echocardiogram(5).

However, evaluation is required for every patient with chest pain, especially for those with the history and physical examination of importance. For common chest pains, reassurance and education of the patient and the parents about their benign nature is sufficient. On the other hand, chest pain on exertion, symptoms of myocardial ischemia, or abnormal cardiac examinations are more likely to be of cardiac origin, and prompt referral to a pediatric cardiologist is recommended(6). We reviewed the medical records of pediatric patients who presented with chest pain and who were evaluated in a pediatric cardiology clinic under observe by pediatric cardiologist during a 1-year period.

Since chest pain is a common chief complaint for refer to pediatrician, we assess and analyze the etiology of chest pain among children visiting a pediatric cardiology clinic in one medical center (greatest cardiac center in Khuzestan Province). We also try to found out the cardiac causes of chest pain in children and adolescents.

Table 1: Causes of chest pain in children

Idiopathic
Musculoskeletal causes: Muscle strain, direct trauma to chest wall, Painful xiphoid syndrome, Costochondritis, Tietze's syndrome, Slipping rib syndrome, Precordial catch syndrome, Epidemic pleurodynia, Herpes zoster, Adolescent breast development, Myositis.
Pulmonary causes: Bronchitis, Pneumonia, Asthma, Pleural effusion, Pneumothorax, Pulmonary embolism.
Cardiovascular causes: Structural abnormalities (aortic stenosis, subaortic stenosis, idiopathic hypertrophic subaortic stenosis, pulmonary stenosis, mitral valve prolapse, dissecting aortic aneurysm, anomalous coronary artery), Coronary arteritis, Pericarditis, Myocarditis, Arrhythmias.
Gastrointestinal causes: Esophagitis, Foreign body in esophagus, Referred pain from peptic ulceration, cholecystitis, hepatitis, subphrenic abscess, pancreatitis.
Psychogenic causes and Miscellaneous causes

Materials and Methods

The present investigation is a descriptive cross-sectional study from a leading cardiac center in Golestan Hospital, Ahvaz Jundishapur University of Medical Sciences, Southwest Iran, during March 2013 to April 2014. A total of 200 patients with chest pain were included in the study whose children and adolescents were between 3 to 17 years of age. Any case of trauma associated chest pain was excluded from this study. Demographic data including age, sex, clinical presentation, chest radiographs, Electrocardiogram (ECG), echocardiography, and final diagnosis were sorted for assessment. The electrocardiogram was taken of all patients. Chest radiograph and echocardiography at the discretion of pediatric cardiologist, the number of patients was performed. All of patients were assessed after one month to achieve accurate diagnosis. Chest radiographs were reviewed by one radiologists and one pediatric cardiologist. ECGs were reviewed by a pediatric cardiologist and echocardiography was performed by pediatric cardiologist. All of the echocardiography was done by one echocardiography equipment and one operator. Diagnoses were grouped into

idiopathic chest pain, respiratory origin, cardiac problem, gastrointestinal disorder, musculoskeletal pain. Also this study was approved by the Ethics Committee in Ahvaz Judishapur University of Medical Sciences. Data were analyzed by SPSS software version 17.

Results

In this study, of total 200 patients, 107 patients (53.5%) were male (male to female 1.15: 1). Their ages ranged from 3 to 17 years and mean age were 9.4 ± 2.8 year. ECG was taken from all patients that 6 patients (3%) had abnormal ECG (Table.2).

Chest radiographs were obtained from 43 patients (21.5%) who were abnormal in 7 cases (Table.2). In our study causes of chest pain were idiopathic (102 patients, 51%), musculoskeletal (60 patients, 30%), respiratory (12 patients, 6%), gastrointestinal (23 patients, 11.5%), cardiac (9 patients, 4.5%) respectively. Echocardiography was performed in 130 patients (65%), 9 patients (4.5%) have had heart problems. Results showed of 9 patients with heart problems, 4 patients had mitral valve prolapse, 1 patient with aortic stenosis, 2 patients with dilated

cardiomyopathy, 1 patient with hypertrophic cardiomyopathy and one patient had arrhythmia. Except for patients with mitral valve prolapse other patients with cardiac causes were admitted to the

hospital for further evaluation and treatment. Table.2 provides a list of frequencies of causes according to organ system.

Table 2: Investigation result in our patients

Laboratory test results, n (%)	Total (%)	Positive
Electrocardiography	200 (100%)	6 (3%)
Chest radiography	43 (21.5%)	7(16.2%)
Echocardiography	130 (65%)	9 (6.9%)

Table 3: Reasons to refer children who have chest pain to a cardiologist

Abnormal cardiac findings
Exertional chest pain
Exertional syncope
Chest pain with palpitations
Electrocardiographic abnormalities
Significant family history of arrhythmias, sudden death, or genetic disorders
History of cardiac surgery or interventions
Orthotopic heart transplant
History of Kawasaki disease
First-degree relatives have familial hypercholesterolemia

Table 4: Frequency of causes in children complaining of chest pain

Cause	Khalilian et al. (pediatric clinic) (%)	Chien-Heng Lin et al. (emergency department) (%)	Selbst et al. (emergency department) (%)	Rowe et al. (emergency department)(%)	Massin et al. (pediatric clinic) (%)
Idiopathic	51	61.2	50	28	15
Musculoskeletal	30	6.7	20	43	64
Respiratory	6	24.3	22	19	12
Gastrointestinal	11.5	6	4	8	4
Cardiac	4.5	2	4	2	5

Discussion

Chest pain is a frequent symptom in children, prompting them to visit the pediatric cardiology clinic(7). Chest pain accounts for approximately 0.3% to 0.6% of pediatric emergency department visits (8, 9). Chest pain in children is generally benign(10). According to previous studies; idiopathic cause is the most common diagnosis (4, 11, 12).

Cardiac disease remains an uncommon cause for chest pain in children. The mean age of children and adolescents who complain of chest pain is 12 to 14 years, but chest pain can occur in children as young as 4 years of age(3). In this study mean age of patients was lower than previous studies (9.4 ± 2.8 year). The reported male to female ratio is fairly even, ranging from 1:1 to 1.6:1(6, 7, 9) and we found that male to female ratio was 1.15:1. Results shown, 51% of patients were given a diagnosis of idiopathic chest pain, which was similar to previous studies (1, 13-15). 30% of chest pain in our study had musculoskeletal origin which showed controversy in different studies (3, 5, 12, 16). According to our findings pulmonary origin of chest pain assessed 3% that was lower than some other studies (3-5). These differences may be due to patients with respiratory problems, more refer to emergency pediatric ward instead of cardiology clinic. Lin and colleagues described 103 children who visited an emergency department in Taiwan for chest pain; chest radiographs were obtained in 98% and abnormalities were found in 28% and ECGs were obtained in 85%. Four (4.6%) showed abnormalities (12).

Selbst et al. showed from patients with chest pain that ECGs were obtained in 191/235 children that 31 cases (16%) were abnormal and echocardiogram was performed in 139/235 that 17 cases (12%) were abnormal(4).

In our study chest radiographs is performed in 21.5% that 16.2% of them were abnormal and ECGs were obtained in all patients that 3% of them was abnormal. (Table.3) shows patient's symptoms which make pediatric cardiologist visit necessary(17).

Gastesi et al. showed that the most common diagnoses were idiopathic and/or musculoskeletal chest(18). Zavaras-Angelidou et al. showed that 15% of children with chest pain, a relationship was established between chest pain and actual cardiac disease(19). Comparison of our clinical cardiology center data about frequency of causes of chest pain in children and adolescents with other studies was shown in (Table.4) (4, 8, 9, 12).

Conclusion

The most common cause of chest pain that causes a child to refer clinic is idiopathic chest pain. Careful history and physical examination can reveal important clues and save much unnecessary examinations. Although cardiac cause of chest pain is rare, it should be considered. Every patient who has chest pain needs a thorough evaluation. Usually, the history and physical examination are sufficient to diagnose the cause of the chest pain. Based on strong research evidence, musculoskeletal chest pain is the most common cause of chest pain in the pediatric population(3).

Educating and reassuring both the patient and the family about the benign nature of chest pain is of utmost importance. Based on some research evidence as well as on consensus, a cardiac cause for chest pain is more likely if the pain occurs during exertion(3). Any coexisting symptoms suggestive of myocardial ischemia or an abnormal cardiac finding should prompt immediate referral to a pediatric cardiologist.

Conflict of interests: None

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