

# Frequency of anxiety disorders in children and adolescents as non-cardiac chest pain

Mohammad Radvar<sup>1\*</sup>, Ali Zolfigol<sup>1</sup>, Arezou Kiani<sup>2</sup>, Ezatolah Abbasi<sup>3</sup>, Yalda Sadeghpour<sup>4</sup>

<sup>1</sup>Department of Pediatric Disease, School of Medicine, Shahid Motahari Hospital, Urmia University of Medical Sciences, Urmia, Iran

<sup>2</sup>Department of Psychiatry, School of Medicine, Razi Hospital, Urmia University of Medical Sciences, Urmia, Iran

<sup>3</sup>Department of Pediatric Neurology, Urmia University of Medical Sciences, Urmia, Iran

<sup>4</sup>Urmia University of Medical Sciences, Urmia, Iran

## Correspondence to:

Mohammad Radvar,  
Email: radvar.m@umsu.ac.ir

Received: 20 June 2019

Accepted: 4 Dec. 2019

ePublished: 13 Dec. 2019

**Keywords:** Anxiety Disorders,  
Children, Non-cardiac chest pain

## Abstract

**Introduction:** Chest pain is a common complaint among children and adolescents, in such a way that 10% of students experience chest pain attacks and are the second leading cause of referral to pediatric cardiologists. Chest pain in children (unlike adults) is rarely a sign of heart disease.

**Objectives:** Due to the high prevalence of chest pain among children and adolescents, the rarity of heart disease and its association with psychological causes were investigated.

**Patients and Methods:** In this cross-sectional study, 41 patients (18 boys and 23 females) with a mean age of 11.51 (ranging from at least 8 years old and up to 17 years old) were recruited from referrals to cardiac clinic of Motahari hospital complaining of chest pain. We evaluated the diagnosis of non-cardiac chest pain using a "How do you feel about yourself" questionnaire that was interpreted based on the Screen for Child Anxiety Related Disorders (SCARED) criteria.

**Results:** According to our study, 22 subjects (53.7%) had anxiety disorders including 10 boys (55.5%) and 12 girls (52.17%). In the study of parents with anxiety disorders, it was found that parental of 14 subjects (34.1%) had under diploma education and 6 subjects (14.6%) had diploma, and 2 subjects (4.87%) had university education.

**Conclusion:** Non-cardiac chest pain is a relatively common manifestation of cardiovascular referrals with anxiety disorders, which was significantly correlated with parental education, but had no significant relationship with gender and age of the individual.

**Citation:** Radvar M, Zolfigol A, Kiani A, Abbasi E, Sadeghpour Y. Frequency of anxiety disorders in children and adolescents as non-cardiac chest pain. J Prev Epidemiol. 2019;4(2):e22.



## Introduction

Non-cardiac chest pain is a term used to describe pain that resembles cardiac pain but the patient has no underlying heart problem and is commonly felt behind the sternum (1). Non-cardiac chest pain is a common complaint in children and adolescents, and less than 1% of children have underlying heart disease (2). In the United States, 600 000 people annually complain of chest pain; it is the second most common cause of referral to a pediatric cardiology clinic and the most common causes to emergency centers (3,4). Since pain is similar to heart disease, it is classified as non-cardiac chest pain in the absence of underlying cardiac pathology. (5).

Breast pain in children, despite the good prognosis, can be worrying for children and their parents (6,7), as positive cardiac findings in children vary from zero to six percent (8). Causes of non-cardiac chest pain include musculoskeletal, respiratory,

## Key point

Non-cardiac chest pain is a common manifestation of anxiety disorders, which has no significant relationship with gender or age of the patients.

gastrointestinal and psychogenic (9), but in most cases, up to 85% of chest pain causes cannot be diagnosed (10). Numerous observations show that chest pain often lasts about one to three years after initial assessment (11) and interferes with school and other child activities (12). It may lead to many problems such as absences from school and sleep disorders (13).

Two clinical trials in adolescents have shown that non-cardiac chest pain is associated with a high rate of anxiety and depression symptoms (14). Tunaoglu et al in 1994 interviewed 74 adolescents with complaints of chest pain. They found the majority of adolescents had psychological

demonstrations especially anxiety (15). Some studies have shown that non-cardiac chest pain is associated with emotional problems and adolescent dysfunction (16-18).

Studies show that somatic complaints such as pain have a higher rate of psychological illnesses. In fact, somatic complaints are the most common manifestation of psychological problems in pediatric patients with psychogenic chest pain responsible for 30% of chest pain causes in children (19,20). In general, Diagnostic and Statistical Manual of Mental Disorders (DSM-4) in children and adolescents are commonly associated with non-cardiac chest pain and are most commonly associated with anxiety disorders (21-24).

### Objectives

Since non-cardiac chest pain is a common complaint among children and adolescents and is most commonly associated with anxiety disorders, we conducted a descriptive study to investigate the prevalence of anxiety disorders in children and adolescents.

### Patients and Methods

#### Design and setting

This study was a descriptive study performed on 41 children and adolescents with non-cardiac chest pain admitted to cardiac clinic of Motahari hospital. In this study, the data collection tool included a demographic form including age, gender, parental education level, income level, parental occupation, and a questionnaire containing the patient's mental status.

#### Inclusion criteria

Inclusion criteria were age range of 7-18 years, written informed consent to participate in the study by the patient and the patient's parents, complete consciousness and having chest pain with problems in patient's daily life.

Children and adolescents referred to cardiac clinic of Motahari hospital with chest pain evaluated by pediatrician for cardiac disease. If there was no history of abnormal echocardiography and heart disease, the patient was enrolled in the study. We evaluated the diagnosis of non-cardiac chest pain using a "How do you feel about yourself" questionnaire that was interpreted based on the screen for child anxiety related disorders (SCARED) criteria.

There is no intervention in this study. After collecting the data, anxiety of the patients was evaluated by a pediatric psychiatrist, and their parents' education level was studied.

#### Ethical issues

The research followed the tenets of the Declaration of Helsinki. The institutional ethical committee at Urmia University of Medical Sciences approved all study protocols (IR.UMSU.REC.1392.131). Accordingly, written informed consent was taken from all participants before any intervention. This study was extracted from

the M.D. thesis of Yalda Sadeghpour at this university (Thesis#91-03-32-833).

### Statistical analysis

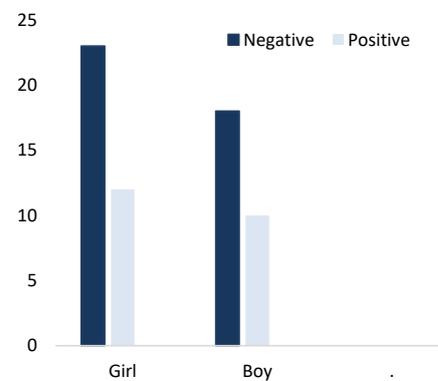
Frequency of anxiety disorders by age, gender, parents' occupation and their educational level was analyzed by using SPSS software version 18. Pearson's correlation was used to assess the correlation between two independent and outcome variables. *P* value less than 0.05 was considered significant.

### Results

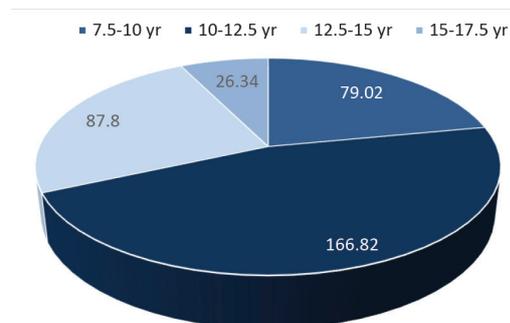
The mean age of the patients was 11.51 years (ranging from 8 to 17 years). Of the 41 patients, 22 patients were suffering from anxiety disorders (53%). **Figure 1** shows the frequency of anxiety by gender. The highest level of anxiety was in the group with the mean age of 10 years, which was the most prevalent in the study group (7 out of 22 patients or 31.81%). Regarding gender, 18 patients (43.9%) were boys and 23 patients (56.1%) were girls.

The results showed that anxiety was higher in girls than boys, but there was no significant difference between the gender of the child and the level of anxiety.

The target population in our study was mostly in the age range of 10 to 12 years. In fact, 19 patients (46.34%) were in this age group, out of which 10 (52.63%) were suffering from anxiety disorders (**Figure 2**). In the study



**Figure 1.** The frequency of anxiety by gender.



**Figure 2.** The frequency of anxiety by age.

population, 14 parents of children with anxiety (63.63%) had parents with a high school education, 6 parents had diploma (27.27%) and 2 parents had a college education (9.09%), indicating that in the low-education had higher levels of anxiety, which according to Pearson's correlation, a significant relationship between parental education level and anxiety level was seen (Table 1). According to our study, no significant relationship between the prevalence of anxiety disorder in patients with non-cardiac chest pain and the age of the patient ( $r=0.196$ ) and between the prevalence of anxiety and gender ( $r=0.034$ ) were found (Pearson's correlation coefficient). Additionally, no significant relationship between age and gender of patients with non-cardiac chest pain was detected (Table 2).

### Discussion

One of the first studies of non-cardiac chest pain is the study by Tunaoglu et al, which has shown that the majority of children with non-cardiac chest anxiety are anxious and have a significant group of other anxiety symptoms such as irritability, emotional instability, and so on (15). These symptoms disrupt the child's daily life and lead to a functional and emotional disorder that necessitates further investigation of anxiety disorders in children with chest pain (5,6).

In the study of Lee et al it has shown that psychiatric disorders, especially anxiety, cause unexplained somatic symptoms such as chest pain, a relationship that has already been established in the contexts of Tunaoglu et al (15). The results of our study were also consistent with the results of the lee et al and showed a higher prevalence of anxiety disorders in people with non-cardiac chest pain. Also in our study, of 22 patients with anxiety disorders, there were two patients with social anxiety disorder, three patients with school-based anxiety and 16 patients with social anxiety, similar to previous studies.

Our study showed that the prevalence of DSM-4 anxiety disorders in children with non-cardiac chest pain was high, which means that non-cardiac chest pain can be a manifestation of anxiety disorders in adolescents, which may be consistent with the results of Lipsitz et al (24).

**Table 1.** The frequency of anxiety disorder by parental education

Variable		Parental education			Total
		Under diploma	Diploma	College	
Anxiety disorder	Yes	14	6	2	22
	No	6	4	9	19
Total		20	10	11	41

**Table 2.** The correlation of anxiety disorder with age and gender

Variable	Correlation with anxiety disorder	P value
Age	0.196	0.110
Gender	0.034	0.417

Therefore, non-cardiac chest pain is often associated with unknown psychiatric disorders. Winterstein et al, in their study on children with non-cardiac chest pain revealed the same results about the prevalence of anxiety disorder in these patients (25). Gastrointestinal disorders are also considered as gastrointestinal syndromes, which are associated with high levels of anxiety and depression (9).

Numerous studies have shown that adolescents with other unexplained somatic pain such as headache and recurrent abdominal pain have a higher rate of depression and anxiety disorders. Non-cardiac chest pain is a persistent and common problem among children. Children with unexplained chest pain are more sensitive to pain signals, in which they are more likely to present as potentially threatening and physiologic symptoms. Anxiety can be seen in these situations. On the other hand, previous studies have shown that associating chest pain with causes such as musculoskeletal and idiopathic causes can lead to psychological problems and provides many problems that warrant a full psychological evaluation.

### Conclusion

According to our results, parental education is a factor influencing the anxiety of children and adolescents that is irrelevant to the age range of the child and adolescent. Finally, it is recommended that further studies be carried out in different age groups according to occupational status and family history of heart disease and anxiety disorders.

### Limitations of the study

This study was conducted on 41 patients which is small to generalize the obtained results. The accuracy response off the patients is another problem that we had no choice but trusts them.

### Authors' contribution

MR, AZ and AK were the principal investigators of the study. AK, MR, and YS were included in preparing the concept and design. YS and MR revised the manuscript and critically evaluated the intellectual contents. All authors participated in preparing the final draft of the manuscript, revised the manuscript and critically evaluated the intellectual contents. All authors have read and approved the content of the manuscript and confirmed the accuracy or integrity of any part of the work.

### Conflicts of interests

The authors declare that they have no competing interests.

### Ethical considerations

Ethical issues (including plagiarism, data fabrication, double publication) have been completely observed by the authors.

### Funding/support

This study was supported by deputy research of Urmia University of Medical Sciences. The research was taken from the M.D thesis of Yalda Sadeghpour at this university (Thesis#91-03-32-833).

### References

- Boon AW, Forton J. How to evaluate a child with chest pain. *Curr Paediatr.* 2004;14:64-70.

2. Gutgesell HP, Barst RJ, Humes RA, Franklin WH, Shaddy RE. Common cardiovascular problems in the young: Part I. Murmurs, chest pain, syncope and irregular rhythms. *Am Fam Physician*. 1997;56:1825-30.
3. Selbst SM, Ruddy RM, Clark BJ, Henretig FM, Santulli T. Pediatric chest pain: a prospective study. *Pediatrics*. 1988; 82:319-23.
4. Brenner JI, Ringel RE, Berman MA. Cardiologic perspectives of chest pain in childhood: a referral problem? To whom?. *Pediatr Clin North Am*. 1984;31:1241-58.
5. Thull-Freedman J. Evaluation of chest pain in the pediatric patient. *Med Clin*. 2010;94:327-47.
6. Milov DE, Kantor RJ. Chest pain in teenagers: When is it significant? *Postgrad Med*. 1990;88:145-54.
7. Zavaras-Angelidou KA, Weinhouse EL, Nelson DB. Review of 180 episodes of chest pain in 134 children. *Pediatr Emerg Care*. 1992;8:189-93.
8. Pantell RH, Goodman BW. Adolescent chest pain: a prospective study. *Pediatrics*. 1983;71:881-7.
9. Yildirim A, Karakurt C, Karademir S, Oguz D, Sungur M, Ocal B, Senocak F, Isiten N. Chest pain in children. *Int Pediatr*. 2004;19:175-9.
10. Lipsitz JD, Masia C, Apfel H, Marans Z, Gur M, Dent H, Fyer AJ. Noncardiac chest pain and psychopathology in children and adolescents. *J Psychosom Res*. 2005;59:185-8.
11. Selbst SM, Ruddy RM, Clark BJ, Henretig FM, Santulli T. Pediatric chest pain: a prospective study. *Pediatrics*. 1988; 82:319-23.
12. Laurent J, Schmidt NB, Catanzaro SJ, Joiner Jr TE, Kelley AM. Factor structure of a measure of anxiety sensitivity in children. *J Anxiety Disord*. 1998;12:307-31.
13. Cohen LL, Lemanek K, Blount RL, Dahlquist LM, Lim CS, Palermo TM, McKenna KD, Weiss KE. Evidence-based assessment of pediatric pain. *J Pediatr Psychol*. 2007;33:939-55.
14. Kashani JH, Lababidi Z, Jones RS. Depression in children and adolescents with cardiovascular symptomatology: The significance of chest pain. *J Am Acad Child Adolesc Psychiatry*. 1982;21:187-9.
15. Tunaoglu FS, Olguntürk R, Akcabay S, Oguz D, Gücüyener K, Demirsoy S. Chest pain in children referred to a cardiology clinic. *Pediatric cardiology*. 1995;16:69-72.
16. Santalahti P, Aromaa M, Sourander A, Helenius H, Piha J. Have there been changes in children's psychosomatic symptoms? A 10-year comparison from Finland. *Pediatrics*. 2005;115:e434-42.
17. Sabri MR, Ghavanini AA, Haghghat M, Imanieh MH. Chest pain in children and adolescents: epigastric tenderness as a guide to reduce unnecessary work-up. *Pediatr Cardiol*. 2003; 24:3-5.
18. Brenner JI, Ringel RE, Berman MA. Cardiologic perspectives of chest pain in childhood: a referral problem? To whom?. *Pediatr Clin North Am*. 1984;31:1241-58.
19. Campo JV, Fritsch SL. Somatization in children and adolescents. *J Can Acad Child Adolesc Psychiatry*. 1994;33:1223-35.
20. Eslick GD, Jones MP, Talley NJ. Non-cardiac chest pain: prevalence, risk factors, impact and consulting—a population-based study. *Aliment Pharmacol Ther*. 2003;17:1115-24.
21. Driscoll DJ, Glicklich LB, Gallen WJ. Chest pain in children: a prospective study. *Pediatrics*. 1976;57:648-51.
22. McDonnell CJ, White KS, Grady RM. Noncardiac chest pain in children and adolescents: a biopsychosocial conceptualization. *Child Psychiatry Hum Dev*. 2012;43:1-26.
23. Lipsitz JD, Masia-Warner C, Apfel H, Marans Z, Hellstern B, Forand N, et al. Anxiety and depressive symptoms and anxiety sensitivity in youngsters with noncardiac chest pain and benign heart murmurs. *J Pediatr Psychol*. 2004;29:607-12.
24. Lipsitz JD, Masia C, Apfel H, Marans Z, Gur M, Dent H, Fyer AJ. Noncardiac chest pain and psychopathology in children and adolescents. *J Psychosom Res*. 2005; 59:185-8.
25. Winterstein AG, Gerhard T, Shuster J, Johnson M, Zito JM, Saidi A. Cardiac safety of central nervous system stimulants in children and adolescents with attention-deficit/hyperactivity disorder. *Pediatrics*. 2007;120:e1494-501.