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Original Article

Relationship between Anxiety Disorders and Anthropometric Indices, Risk Factors, and Symptoms of Cardiovascular Disorder in Children and Adolescents

Nastaran Ahmadi[1], Mohammad Hadi Farahzadi[2], Mohammad Reza Mohammadi[3], Seyed-Ali Mostafavi[3], Sedigheh Saadat Moeeini[4], Najmeh Shahvazian[1], Fatemeh Saghafi[5], Sina Negintaji[6], Reza Bidaki[2,7]*

Abstract

Objective: Anxiety is an unpleasant feeling characterized by symptoms of tachycardia, sweating, and stress. The exact relationship between anxiety and cardiovascular disorder is not well distinguished. The aim of the present study was to evaluate the relationship between anxiety disorders and anthropometric indices and risk factors, including fasting blood sugar (FBS), hyperlipidemia, and hypertension, according to the results, FBS low-density lipoprotein (LDL) and symptoms of cardiovascular disorder in children and adolescents aged 6 to 18 years.
Method: In this community-based study, multistage cluster sampling method was used. We randomly selected 1174 children and adolescents who referred to Afshar hospital in Yazd, then, 167 blocks were randomly collected by each cluster head. Each cluster consisted of 6 cases, including three cases of each gender in different age groups (6-9, 10-14, and 15-18 years). The clinical psychologists instructed the participants to complete the Persian version of Kiddie-Schedule for Affective Disorders and Schizophrenia - Present and Lifetime version (K-SADS-PL). In addition, cardiovascular risk factors were determined for participants and demographic data were obtained from the participants.
Results: A total of 1035 children and adolescents participated in this study. The results showed that 228 of the participants (22.2%) suffered from anxiety disorder. There was an indirect significant correlation between anxiety disorder and the symptoms of heart palpitation, shortness of breath, and chest pain. There was no statistically significant relationship between the different types of anxiety disorders and FBS, hyperlipidemia, and hypertension. According to the results, FBS and LDL are a predictor for anxiety disorders.
Conclusion: There was a statistically significant association between anxiety in children and adolescents and some risk factors of cardiovascular disorder. Also, this study introduces some cardiovascular predictors of anxiety. However, further studies are needed in this regard.

Key words: *Adolescent; Anxiety Disorders; Cardiovascular Disorder; Child; Risk Factors*

1. Yazd Cardiovascular Research Center, Shahid Sadoughi University of Medical Sciences, Yazd, Iran.
2. Research Center of Addiction and Behavioral Sciences, Shahid Sadoughi University of Medical Sciences, Yazd, Iran.
3. Psychiatry and Psychology Research Center, Tehran University of Medical Sciences, Tehran, Iran.
4. Department of Neuroscience, School of Advanced Technologies in Medicine, Tehran University of Medical Sciences, Tehran, Iran.
5. Department of Clinical Pharmacy, Faculty of Pharmacy and Pharmaceutical Sciences Research Center, Shahid Sadoughi University of Medical Sciences, Yazd, Iran.
6. School of Pharmacy, Student Research Committee, Shahid Sadoughi University of Medical Sciences, Yazd, Iran.
7. Diabetes Research Center, Shahid Sadoughi University of Medical Sciences, Yazd, Iran.

***Corresponding Author:**
Address: Research Center of Addiction and Behavioral Sciences, Shahid Sadoughi University of Medical Sciences, Yazd, Iran, Postal Code: 8916978477.
Tel: 98-35 32632005, Fax: 98-35 32633555, Email: reza_bidaki@yahoo.com

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Anxiety is an unpleasant feeling that often occurs with symptoms such as dizziness, excessive sweating, high blood pressure, pupil dilation, restlessness, tremor, stomach disorders, and endometrial hyperplasia. Anxiety is an unpleasant status and emotion that is expressed with worry, concern, and excessive nervousness. Marx and Lader found that 6% to 27% of psychiatric patients who need treatment are anxious (1). The severity of anxiety is different in individuals. Mild anxiety refers to a level of normal excitement in individuals, but moderate and severe anxiety can have adverse health effects, thus, anxiety can cause serious health problems (2). The prevalence of anxiety disorders is 17.7% worldwide. The lifelong prevalence of anxiety disorders is 30.5% for females and 19.2% for males. Generalized anxiety disorders involve a group of anxiety disorders originating in early childhood that can remain until adulthood, if not treated properly (3).

Some of mortalities caused by acquired diseases throughout the world are due to cardiovascular disorder and this ratio will augment to 73% by 2020. Researchers have tried to identify cardiovascular health risk factors and reduce them (4).

Recognizing the association between anxiety and cardiovascular disorders is difficult. It is not well known whether anxiety disorders will increase blood pressure and lipid profile. There are different beliefs in these regards, but researches have shown that anxiety plays a role in many cardiovascular disorders. However, the association between anxiety disorders and cardiovascular disorders is not well known yet (5, 6). Nowadays, controversy exists in the association between anxiety and risk of cardiovascular disorders, some studies have recently shown that anxiety raises the risk of cardiovascular disorders and death (7, 8), while other studies have not confirmed this association or proved reverse results (9-11). Previous studies showed different results in this field. Here is a list of some of the study's results: anxiety can increase the risk of cardiovascular disorder and cardiac death 26% and 48%, respectively (12). Anxiety related-states, depression, anger, and hostility can interact synergistically with cardiovascular disorder. The physiological pathways that could explain the impact of psychosocial risk factors on the cardiovascular system are not always evident. The implications of poor emotion regulation strategies, higher levels of anxiety or depression, and psychophysiological deregulation seem to be the most relevant in prevention and treatment, with a significant impact on morbidity and mortality in anxious as well as in cardiovascular disorder patients (13). Anxiety as students' psychiatric disorder is seen with higher prevalence in girls compared to boys (14). Diagnosis and treatment are important aspects of anxiety due to the role of anxiety in developing some behaviors, such as obesity and eating disorders, which are associated with some of the most threatening human diseases (15, 16). Also, anxiety may cause high blood pressure and tachycardia and overeating in students (17). Childhood obesity and its side effects, such as diabetes, hypertension, depression, and fatty liver, are epidemics in most countries. The relationship between obesity and children psychology issues have been assessed in many studies. The results have shown a high rate of depression and anxiety in patients group (18). Eating pattern is affected by stress. Uncontrollable stress changes eating patterns by developing a psychological response that reduces appetite (19). The association between depression, anxiety, and body mass index (BMI) in high school students in Qazvin showed that depression has increased BMI compared to anxiety (20). Some studies have shown that anxiety has had a reverse effect on appetite (21).

The relationship between five psychiatric disorders, attention deficit hyperactivity disorder (ADHD), autism spectrum disorders, anxiety disorders, depression, and bipolar disorders, and cardiovascular risks were evaluated previously. The results indicated that children and adolescents with psychiatric disorders are more likely to develop cardiovascular risk factors because these risk factors affect both mental health and cognitive function (1).

Stress is associated with decreased insulin sensitivity in adults; however, few studies have evaluated this relationship in children. Shomaker et al showed that stress is associated with increased fasting insulin and decreased insulin sensitivity in adolescents aged 8-12 years (22). Some studies have examined the relationship between serum cholesterol levels with anxiety, impulsivity, suicide and depression. Correlation between elevated cholesterol levels and suicide has been proved before. However, there was no relationship between cholesterol levels, impulsivity, depression, and anxiety (23). Another study showed that mental disorders increased metabolic syndrome, waist-hip ratio, central and visceral obesity, and X syndrome (24). In another study on 575 persons (309 girls and 266 boys) aged 10–15 years, results indicated that subjects with a high level of anxiety traits were shorter (25). The prevalence of psychiatric disorders in over 15-years-old individuals in Yazd province through the traditional scoring method demonstrated that 26.7% of the study population was highly prone to psychiatric disorders (32.1% of females and 21.4% of males) (26). The aim of this study was to evaluate the relationship between anxiety disorders and anthropometric indices, risk factors, and symptoms of cardiovascular diseases in children and adolescents aged 6 to 18 years.

Materials and Methods

Study Design

This was an analytical cross-sectional study that used the data set of Iranian Children and Adolescents Psychiatric Disorder (IRCAP) Survey in Yazd province.

An epidemiological survey was done by the principal investigator to investigate the epidemiology of psychological problems in children and adolescents aged 6 to 18 years and to determine the association of anxiety and risk factors of cardiovascular disorders. The principal investigator and his colleagues reported the test-retest reliability and the interrater reliability of the Persian version of K-SADS and found the sensitivity and specificity of the Persian version to be high (27). The main format of this protocol was adapted from Yazd health study protocol (28).

Sampling

In a community-based study, 167 clusters of children and adolescents aged 6-18 years were selected from Yazd province by multistage cluster sampling method (cluster and stratified random sampling). Each cluster consisted of 6 cases, with 3 cases of each gender in different age groups (6- 9 years, 10-14 years, and 15-18 years). Accordingly, 1176 children and adolescents were selected. The clusters were selected randomly according to the postal code.

Inclusion and Exclusion Criteria

The inclusion criteria were as follow: Being an Iranian citizen (people who resided at least 1 year in Yazd could participate in the project), and age range of 6 to18 years. Children and adolescents with severe medical illnesses were excluded.

Data Collection

Trained clinical psychologists referred to the children's home and after obtaining the consent forms interviewed the participants according to the Persian version of Kiddie-SADS Present and Lifetime Version (K-SADS-PL). The time required to complete the K-SADS-PL was about 30 to 40 minutes. Information about anxiety disorders in the K-SADS-PL has been used in this study. In addition, demographic data and risk factors of cardiovascular disease, height, weight, waist circumference, blood lipid profile, blood pressure (BP), BMI, and fasting blood sugar were measured accurately under standard conditions. Blood sample was gathered from unique laboratory examination. In the current study, 4 evaluators evaluated 25 similar samples, and the reliability between the evaluators was determined to be 0.86. All patients or their parents signed an informed consent form prior to participation in the study. Blood sample was taken in a laboratory at Afshar hospital in Yazd. By these performed blood samples, it was possible to identify various diseases such as dyslipidemia or diabetes and help patients to start their treatment.

Study Tools

The process was started by measuring participants' systolic and diastolic blood pressure. BP was measured 3 times as follows:

1. 15 to 20 minutes after arrival
2. After blood sampling
3. 20 minutes after the second time

Blood pressure was measured from the right hand in a proper sitting position using an automatic digital blood pressure device (Automatic Blood Pressure Monitor, Model M3 Comfort, Omron Co. Osaka, Japan). All measurements were accomplish in standard situations and with calibrated instruments the samples were sent to the laboratory for analysis.

In addition, trained nurses measured anthropometric indices, including weight, height (WH), body mass index (BMI), and waist circumference. A calibrated digital scale was used to estimate weight of the participants while they were in light clothing. Participant's height was measured by a standard wall-height-gauge while participants were standing without shoes in standard position. Waist circumference was measured using a non-stretchable tape measure at the smallest circumference between the lowest rib and the iliac crest up minimal clothing at the end of exhalation.

Fasting blood sugar measurement: Fasting blood sugar was measured for all participants by obtaining a venous blood sample from each participant. The sample analysis was executed in laboratory.

Lipid plasma measurement: Lipid plasma was measured for all participants by obtaining a venous blood sample. The samples were sent to the laboratory for further analysis. A biochemical autoanalyzer, model BT 3000 (Italy), and PARS Azmoon Kits (Pars Azmoon Kit, Pars Azmoon Inc., Tehran, Iran) were used to assess fasting blood glucose and triglyceride.

Scales

«Kiddie-SADS-Present and Lifetime Version» K-SADS-PL:

A semi-structured interview was used to assess and measure psychiatric disorders among children and adolescents. This questionnaire was written by Kaufman et al and based on DSM IV. It examines different mental disorders, including depression disorders and mania, hypomania, psychotic disorders, anxiety disorders, disruptive behavioral disorders, and substance abuse, tic disorders, eating disorders, and elimination disorders (29). The reliability and validity of the Persian version of this scale were gained by Ghanizadeh et al. They reported the test-retest reliability of 0.56-0.81 to diagnose different psychiatric disorders, and the interrater reliability was at the level of 0.69 (30).

Ethics

Parental consent was obtained for participants younger than 15 years old, for those between 15 to 18 years of age, an informed consent form for their care giver and verbal assent was used. Information about children, adolescents, and their families was held confidential. If children or adolescents were diagnosed with a psychiatric disorder, the child and adolescent psychiatrist who collaborated on the project treated them out of charge. This study has been supported by the national institute for medical research development (NIMAD) (the ethics code of IR.NIMAD.REC.1395.001).

Analysis

The extracted data were entered into SPSS version 16. To determine the frequency of anxiety disorders and risk factors of cardiovascular disorder in children and adolescents, we used descriptive analysis, prevalence rates, and their 95% confidence interval. A P- value < 0.05 was considered statistically significant. We used 1-way ANOVA to test the significant differences of the disorders according to gender and age situation.

In the present study, Pearson correlation test was used to analyze the relationship between anxiety disorders and risk factors of cardiovascular disorder in children and adolescents. Furthermore, logistic regression was used to control the confounding variables.

Results

Eventually, the data on 1035 children and adolescents were analyzed. According to Table 1, a total of 228 participants (22.2%) had anxiety disorders. The most prevalent recognized disorders were separation anxiety disorder (8.7%) and generalized anxiety (8.6%), respectively. However, panic disorder (0.0%) and posttraumatic stress disorder (PTSD) (0.09%) were the least recognized disorders.

Table 2 shows the association of different types of anxiety disorders with anthropometric indices (weight, height, waist circumference, and hip circumference), cardiovascular risk factors (triglyceride, cholesterol, LDL, HDL, hypertension, and fasting blood sugar), and symptoms of cardiovascular disorder, heart palpitations, shortness of breath, and chest pain. Based on Table 2, there was an association between anxiety disorders and symptoms of heart palpitations, shortness of breath, and chest pain.

Those children and adolescents with generalized anxiety disorder (GAD) had significantly higher height and waist circumference compared to those without GAD. While children and adolescents with separation anxiety disorder (SAD) had significantly lower weight and height compared to those without SAD (Table 2). There was no significant association between different types of anxiety disorders and hypertension, fasting blood sugar, triglyceride, cholesterol, and LDL. HDL was significantly lower in children and adolescents with agoraphobia compared to their normal peers (Table 2).

Children and adolescents with any types of anxiety disorders significantly experienced higher rates of feeling the heartbeat, short of breath, and chest pain (Table 2). Social phobia and GAD were associated with significant increase of feeling the heart palpitation. Social phobia, GAD, and SAD were associated with significant increase of feeling shortness of breath. Agoraphobia was associated with significant increase of HDL (Table 2). Table 3 shows some of the predictive risk factors of anxiety disorders.

Univariate Analysis

Based on Table 3, FBS and LDL were predictive risk factors of anxiety disorders. Predictive risk factors of SAD were weight, cholesterol, and LDL. Also, major predictive risk factors for GAD were height, hip circumference, and waist. Also, FBS was a predictive risk factor for obsessive-compulsive disorder (OCD).

Multivariate Analysis

FBS and LDL were predictive factors of anxiety disorders; FBS was a predictive risk factor of SAD; and height was a predictive factor of GAD.

Table 1. Prevalence of Anxiety Disorders in the Population Study

Psychiatric Disorders		Number	Percent	Confidence Interval Min	Confidence Interval Max
Anxiety Disorders	Separation Anxiety Disorder	90	8.7	7.16	10.62
	Social Phobia	63	6.1	4.8	7.7
	Specific Phobias	26	2.5	1.72	3.67
	Agoraphobia	22	2.1	1.42	3.22
	Generalized Anxiety Disorder	88	8.6	7.01	10.44
	Obsessive Compulsive Disorder	64	6.2	4.91	7.88
	Post-Traumatic Stress Disorder	9	0.9	0.46	1.65
	Total Anxiety Disorders	228	22.2	19.76	24.84

Table 2. Relationship between Anxiety Disorders and Anthropometric Indices, Risk Factors and Symptoms of Cardiovascular Diseases

Disorders	Yes/No	Weight (kg)	Height (cm)	Waist (cm)	Hip circumference (cm)	Fasting blood sugar (mg/dL)	Triglyceride (mg/dL)	Cholesterol (mg/dL)	LDL (Low-density lipoprotein) (mg/dL)	HDL (high-density lipoprotein) (mg/dL)	Hypertention (mmhg)	Feeling the heartbeat	Feeling short of breath	Chest pain
Anxiety Disorders	No	44.24 ±20.69	145.81 ±20.53	70.08±14.49	82.15±16.25	88.28±9.14	89.34±42.56	159.94±51.68	100.02±22.76	42.22±13.29	24.3%	2.5%	2.4%	4.5%
	Yes	43.38 ±19.79 P:0.580	145.9± 19.35 P:0.952	69.9±13.84 P:0.868	82.24±15.57 P:0.939	88.77±10.03 P:0.524	181.9 ± 95.99 P:0.412	157.71±49.51 P:0.598	97.81±23.55 P:0.246	39.26±10.47 P:0.005	19.3% P:0.125	7% 0.001	7% P:0.001	8.8% P:0.004
Separation Anxiety Disorder	No	44.6± 20.6	146.32±20.35	70.30±14.43	82.51±16.19	88.4±39.56	102.44 ±92.39	158.93±48.92	99.53±23.31	41.98±14.02	23.7%	3.2%	2.8%	4.6%
	Yes	38.29± 18.23 P:0.003	140.83±18.49 P:0.014	67.21±13.19 P:0.052	78.61±14.61 P:0.029	88.17±7.51 P:0.814	79.35± 31.7 P:0.255	163.35±66.95 P:0.461	98.74±19.33 P:0.734	38.6±9.45 P:0.035	18.4% P:0.68	6.7% P:0.086	10% P:0.001	10% P:0.025
Social Phobia	No	43.95± 20.4	145.75±20.27	69.97±14.26	82.05±16.02	88.5±19.43	100.33 ±91.36	159.48±52.26	99.5±23.02	41.76±13.88	23.2%	3.2%	3%	5%
	Yes	45.1± 21.86 P:0.678	146.8± 20.09 P:0.701	70.7±215.7 P:0.704	83.53±17.44 P:0.502	86.79±8.18 P:0.218	86.08±35.83 P:0.717	157.98±26.41 P:0.844	98.69±21.63 P:0.812	39.75±9.41 P:0.324	23.3% P:0.218	7.9% P:0.047	9.5% P:0.001	6.3% P:0.552
Specific Phobia	No	44.04± 20.52	145.74±20.29	70.05±14.38	82.19±16.14	88.35±9.4	99.01 ± 91.45	159.31±51.72	99.4±23.14	41.78±13.76	23.1%	3.4%	3.2%	4.8%
	Yes	43.82± 19.11 P:0.955	149.46±18.58 P:0.355	69.23±13.18 P:0.774	81.08±14.27 P:0.729	90.29±8.19 P:0.317	78.13±25.33 P:0.511	161.79±20.30 P:0.815	101.13±14.87 P:0.588	37.08±8.63 P:0.097	26.9% P:0.445	7.7% P:0.229	11.5% P:0.055	15.8% P:0.038
Agoraphobia	No	44.08± 20.51	145.82±20.31	70.06±14.36	82.22±16.13	88.33±9.39	98.78 ± 91.31	159.3±51.59	99.39±23.09	41.79±13.75	23.1%	3.4%	3.2%	4.8%
	Yes	42.03± 19.28 P:0.642	146.55±17.65 P:0.867	68.68±13.89 P:0.657	79.5±14.36 P:0.434	91.15±8.18 P:0.185	80.80±25.96 P:0.635	162.8±22.1 P:0.762	101.55±15.27 P:0.678	35.6±6.75 P:0.001	27.3% P:0.504	9.1% P:0.178	13.6% P:0.036	18.2% P:0.021
Generalized Anxiety Disorder	No	43.52± 20.54	145.23±20.49	69.61±14.36	81.67±16.2	88.45±9.38	102.31 ± 91.12	159.95±52.73	99.55±22.96	41.92±14.05	23.6%	2.85	2.9%	4.5%
	Yes	49.75± 19.15 P:0.007	152.80±15.768 p≤0.001	74.65±13.52 P:0.002	87.55±13.97 p≤0.001	87.96±9.22 P:0.668	89.72±33.67 P:0.906	154.67±32.67 P:0.393	98.91±23.1 P:0.817	39.45±9.04 P:0.036	18.6% P:0.356	11.4% P:0.001	9.1% P:0.002	11.4% P:0.005
Obsessive Compulsive Disorder	No	43.92± 20.58	145.61±20.23	69.97±14.43	82.06±16.14	88.18±8.95	88.45±41.69	159.8±52.67	99.76±22.84	41.57±12.72	23.9%	3.2%	2.9%	5%
	Yes	45.94± 18.79 P:0.459	149.46±20.46 P:0.153	70.88±12.91 P:0.634	83.75±15.18 P:0.431	90.98±13.49 P:0.3	330.89 ± 124.56 P:0.414	154.23±22.72 P:0.429	95.6±24.19 P:0.187	43.92±20.58 P:0.437	14.3% P:0.32	7.8% P:0.053	10.9% P:0.001	6.3% P:0.559
Post-Traumatic Stress Disorder	No	44.04± 20.52	145.79±20.27	70.04±14.37	82.16±16.12	88.44±9.38	98.03 ± 91.01	159.3±51.05	99.3±22.52	41.69±13.69	23.1%	3.4%	3.4%	5.1%
	Yes	43.84± 15.37 P:0.977	150.67±17.24 P:0.472	69.11±12.28 P:0.847	82.11±13.86 P:0.993	85.13±7.14 P:0.320	94.13±43.02 P:0.928	167.5±53.27 P:0.652	113.88±48.79 P:0.427	35.88±7.03 P:0.231	33.3% P:0.613	11.% P:0.211	0 P:1	0 P:1

Table 3. Relationship between Anxiety Disorders and Anthropometric Indices, Risk Factors and Symptoms of Cardiovascular Diseases (Regression Analysis)

		UNIVARIATE			Multivariate		
Disorders	**Risk Factors**	**OR**	**95% CI**	**P-Value**	**OR**	**95% CI**	**P-Value**
Anxiety Disorders	weight	0.998	1.005 – 0.991	0.58	0.998	1.005 – 0.991	0.58
	Height	1	1.008 – 0.993	0.952	1	1.008 – 0.993	0.952
	Waist	0.999	1.01 – 0.989	0.868	0.999	1.01 – 0.989	0.868
	Hip circumference	1	1.01 – 0.991	0.939	1	1.01 – 0.991	0.939
	FBS	1.008	1.012 – 1.004	0.001≥	1.008	1.012 – 1.004	0.001≥
	Triglyceride	1.002	1.004 - 1	0.11	1.002	1.004 - 1	0.11
	Cholesterol	1.002	0.100 – 1.001	0.009	1.002	0.100 – 1.001	0.009
	LDL	1.005	1.008 – 1.001	0.006	1.005	1.008 – 1.001	0.006
	HDL	1.006	1.013 – 0.999	0.119	1.006	1.013 – 0.999	0.119
Separation Anxiety Disorder	weight	0.983	0.995 – 0.971	0.006	0.953	1.003 – 0.905	0.065
	Height	0.987	0.997 – 0.976	0.015	1.003	1.029 – 0.978	0.798
	Waist	0.984	1 – 0.968	0.053	1.024	1.075 – 0.975	0.344
	Hip circumference	0.985	0.998 – 0.971	0.030	1.018	1.07 – 0.968	0.487
	FBS	1.01	1.018 – 1.004	0.003	1.024	1.04 – 1.008	0.003
	Triglyceride	1	1.002 – 0.998	0.813	0.994	1.001 – 0.986	0.091
	Cholesterol	1.004	1.006 – 1.001	0.004	1.003	1.007 -0.999	0.098
	LDL	1.007	1.012 – 1.002	0.006	1	1.012 – 0.989	0.984
	HDL	1.007	1.017 – 0.997	0.146	0.969	0.992 – 0.947	0.009
Social Phobia	weight	1.003	1.016 – 0.990	0.677	0.985	1.038 – 0.934	0.568
	Height	1.003	1.016 – 0.989	0.70	0.995	1.023 – 0.967	0.721
	Waist	1.004	1.022 – 0.985	0.703	0.994	1.051 – 0.939	0.824
	Hip circumference	1.006	1.022 – 0.989	0.502	1.036	1.097 – 0.978	0.231
	FBS	0.999	1.006 – 0.993	0.816	1.005	1.024 – 0.986	0.616
	Triglyceride	0.999	1.003 – 0.995	0.746	0.998	1.006 – 0.990	0.638
	Cholesterol	1	1.003 – 0.997	0.932	1	1.007 – 0.994	0.911
	LDL	1	1.005 – 0.994	0.939	1.001	1.017 – 0.986	0.878
	HDL	0.997	1.009 – 0.985	0.601	0.993	1.018 – 0.968	0.574
Specific Phobia	weight	0.999	1.019 – 0.981	0.955	0.981	– 0.909	0.63
	Height	1.009	1.029 – 0.99	0.355	1.043	1.091 – 0.998	0.061
	Waist	0.996	1.024 – 0.969	0.774	1.003	1.088 – 0.925	0.936
	Hip circumference	0.996	1.020 – 0.972	0.729	0.973	1.028 – 0.921	0.326
	FBS	1.016	1.031 – 1.001	0.042	1.032	1.062 – 1.004	0.026
	Triglyceride	1	1.004 – 0.997	0.871	0.989	1.003 – 0.976	0.129
	Cholesterol	1.003	1.006 - 1	0.071	1.003	1.01 – 0.995	0.474
	LDL	1.01	1.02 - 1	0.55	1.009	1.029 – 0.99	0.366
	HDL	1.006	1.024 – 0.988	0.521	0.952	0.997 – 0.909	0.036
Agoraphobia	weight	0.995	1.017 – 0.974	0.641	0.976	1.06 – 0.898	0.562
	Height	1.002	1.023 – 0.981	0.867	1.033	1.084 – 0.985	0.182
	Waist	0.993	1.024 – 0.963	0.656	1.019	1.111 – 0.935	0.663
	Hip circumference	0.989	1.016 – 0.963	0.433	0.968	1.022 – 0.917	0.238
	FBS	1.015	1.031 – 0.999	0.069	1.04	1.073 – 1.009	0.012
	Triglyceride	1	1.004 – 0.997	0.83	0.991	1.005 – 0.977	0.206

Generalized Anxiety Disorder	Cholesterol	1.003	1.007 – 0.999	0.11	1.004	1.012 – 0.995	0.398
	LDL	1.009	1.02 – 0.998	0.097	1.007	1.029 – 0.985	0.547
	HDL	1.002	1.021 – 0.983	0.86	0.929	0.98 – 0.881	0.007
	weight	1.014	1.024 – 1.004	0.008	0.941	0.988 – 0.896	0.015
	Height	1.02	1.031 – 1.008	0.001	1.034	1.061 – 1.008	0.01
	Waist	1.023	1.037 – 1.008	0.002	1.042	1.093 – 0.995	0.083
	Hip circumference	1.023	1.037 – 1.009	0.001	1.033	1.084 – 0.983	0.199
	FBS	1.007	1.014 – 1.001	0.028	1.011	1.026 – 0.995	0.177
	Triglyceride	1.001	1.002 – 0.999	0.411	1	1.004 – 0.995	0.821
Obsessive Compulsive Disorder	Cholesterol	1.002	1.004 – 0.999	0.137	0.997	1.007 – 0.987	0.57
	LDL	1.005	1.01 - 1	0.042	1.005	1.021 – 0.989	0.543
	HDL	1.006	1.016 – 0.996	0.267	0.993	1.012 – 0.973	0.459
	weight	1.005	1.017 – 0.992	0.459	0.995	1.046 – 0.947	0.841
	Height	1.01	1.023 – 0.996	0.154	1.017	1.047 – 0.989	0.237
	Waist	1.004	1.022 – 0.987	0.634	0.988	1.045 – 0.935	0.678
	Hip circumference	1.007	1.023 – 0.99	0.43	1.005	1.057 – 0.955	0.849
	FBS	1.013	1.022 – 1.004	0.005	1.022	1.04 – 1.004	0.019
	Triglyceride	1.002	1.006 – 0.999	0.134	1.001	1.003 – 0.999	0.383
Post-Traumatic Stress Disorder	Cholesterol	1.002	1.005 - 1	0.101	0.999	1.008 – 0.99	0.771
	LDL	1.005	1.011 – 0.999	0.095	0.997	1.013 – 0.981	0.68
	HDL	1.011	1.023 – 0.998	0.088	0.991	1.015 – 0.967	0.451
	weight	1	1.032 – 0.968	0.977	0.935	1.082 – 0.809	0.368
	Height	1.012	1.047 – 0.979	0.474	1.074	1.162 – 0.993	0.076
	Waist	0.995	1.043 – 0.95	0.848	0.996	1.144 – 0.867	0.954
	Hip circumference	1	1.041 – 0.96	0.993	0.999	1.133 – 0.882	0.993
	FBS	1.007	1.027 – 0.987	0.516	0.985	1.033 – 0.94	0.542
	Triglyceride	1.001	1.004 – 0.997	0.664	1.003	1.012 – 0.994	0.549
	Cholesterol	1.003	1.008 – 0.998	0.28	0.993	1.034 – 0.954	0.745
	LDL	1.015	1.034 – 0.997	0.109	1.044	1.096 – 0.995	0.081
	HDL	1.001	1.031 – 0.971	0.965	0.955	1.037 – 0.88	0.273

Discussion

Based on the results, 228 children and adolescents (22.2%) had an anxiety disorder. However, the prevalence of anxiety disorders was 17.7% worldwide (3) and the total prevalence of psychiatric disorders was reported to be 26.7% for individuals older than 15 years (26). Therefore, the prevalence of anxiety disorders was high in children and adolescents. Anxiety has heterogeneity in various regions. Most studies have used SCL-90 for evaluation. Self-report studies have many advantages; however, self-reported data are subject to problems of reliability and validity which may lead to different results.

In comparison with Chalmers study (31), the results revealed a significant association between anxiety disorders, feeling palpitation, shortness of breath, and chest pain. These results are in accordance with the Zhang study (17).

Common anxiety related signs and symptoms include chest discomfort and breathing problems. However, further studies are needed to examine more closely the links between anxiety disorders and cardiovascular disorder. The present study showed that FBS, cholesterol, and LDL can be predictive factors of anxiety disorders.

Anxiety disorders can elevate the risk of cardiovascular disorder (32). In our study, the presence of some anxiety disorders was concomitant with some risk factors of cardiovascular disorder. Health-related behaviors may explain part of the relation between anxiety disorders and cardiovascular disorder. There was no significant relationship between different types of anxiety disorders and fasting blood sugar, cholesterol, triglyceride, hypertension, and LDL. Despite the study that found no association between cholesterol and anxiety, anxiety and stress can increase the production of cortisol that can result in the production of bad cholesterol (LDL).

Anxious persons or patients intend to have more dietary fatty intake, accelerated energy intake, sedentary lifestyle, and less physical activity and exercise (33).

The prevalence of abdominal obesity among children younger than 10 years was higher (20.1%). This index is equivalent to the waist circumference. It can cause distortion and worry about body image and even cause avoidance from social positions. Therefore, it may induce anxiety and stress. Anxious patients have a higher risk of hypertension than no anxious (34). Negative psychological conditions are commonly expressed among patients with cardiovascular disorder. Also, hypertensive patients are more anxious.

GAD is associated with a higher level of BP in hypertensive patients and also with a declined circadian rhythm of BP (35).

A study determined the association between anxiety disorders and heart rate variability (HRV) (31). HRV represents a complex association between sympathetic and parasympathetic branches of the autonomic nervous system (ANS) and their effects on cardiac function. Lower HRV is a predictive risk factor of heart disease and cardiac arrest (36). There is a lot of evidence that shows some brain regions are involved in processing threatening information, including hypothalamic–pituitary– adrenal (HPA) axis and ANS. The sympathetic branch of ANS (SNS) is activated with threat and anxiety and increases blood pressure and greater release of the catecholamines, including norepinephrine and epinephrine (37, 38). Hyperactivity in autonomic response patterns can increase the expression of anxiety symptoms, the interception of body signals, and central-periphery interactions (39).

Arousal is associated with an accelerated risk of hypertension and a proinflammatory condition and development of coronary heart disease. Anxiety disorders have an aerosol condition, especially about panic disorder, ASD, and PTSD. Therefore, they are prone to cerebrovascular disease (40).

Although few studies have evaluated these relations, further investigations are needed to determine the association between anxiety and cardiovascular risk factors.

Limitation

This survey is a part of large study that considered 5 of Iran's urban population that may not be representative of the total population of the five provinces. Lack of rural population and the method of referring to participants, were the main limitations because the response rate accelerated by referring to children's home.

Conclusion

As results, there was an association between anxiety in children and adolescents and some cardiovascular risk factors. Also, this study introduces some cardiovascular predictors of anxiety. However, further surveys are needed in this field.

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Conflict of Interest

None.

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