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Exploring generalized anxiety disorder symptoms: key insights from a population-based study in Iran

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Abstract

Aim Generalized Anxiety Disorder (GAD) is a common mental health condition with considerable impacts on both individuals and society, associated with high healthcare costs and reduced quality of life. Linked to a range of genetic, psychological, and social factors, GAD also frequently coexists with other mental health conditions. This study investigates the socio-demographic, environmental, and psychosocial risk factors for GAD symptoms in an urban Iranian population, addressing a key research gap and guiding targeted interventions.

Method A cross-sectional study was conducted to determine the prevalence and associated factors of GAD symptoms among adults in Tehran. Using multi-stage sampling, participants completed questionnaires on socio-demographic characteristics, recent stressors, and DSM-5 criteria for GAD. Descriptive statistics identified prevalence patterns, and logistic regression models evaluated associations and adjusted for confounders ($p < 0.05$). Analyses were conducted in STATA v.14, with adjusted odds ratios and 95% confidence intervals reported.

Results Of 970 participants, 26% met criteria for GAD (CI 95%: 22%-32%). Individuals with GAD were more likely to be single, dissatisfied with life, of low socioeconomic status, and to report non-healthy status and recent stressors. In multivariable regression, significant risk factors for GAD included female gender (AOR = 1.4, $p < 0.01$), experiencing at least one recent stressful event (AOR = 1.9, $p = 0.01$), and poor health status (AOR = 2.8, $p < 0.05$).

Conclusion This study highlights the prevalence of GAD symptoms in Tehran and underscores the critical roles of policymakers and healthcare providers in addressing it. Effective management requires a multifaceted approach, including individual treatment, social integration, and community support. Future research should focus on culturally sensitive interventions and awareness campaigns to reduce stigma. Overall, the study enriches the literature on GAD in Iran and encourages collaborative efforts to enhance mental health outcomes and community well-being.

Keywords Generalized anxiety disorder, Prevalence, Risk factors, Socioeconomic factors, Psychological stress, Social determinants of health, Cross-sectional studies, Health surveys

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Introduction

Anxiety disorders, including Generalized Anxiety Disorder (GAD), are among the most prevalent mental health conditions, associated with high healthcare costs and a significant burden of illness [1]. Specifically, anxiety disorders, and GAD in particular, are more common compared to other mental health disorders [2]. GAD is defined by ongoing and recurrent anxiety, marked by persistent, excessive, uncontrollable, and intrusive thoughts. [3]. This condition is often associated with physical symptoms, sleep disruptions, and mental exhaustion. Additionally, GAD commonly coexists with other psychiatric disorders, with over 60% of patients also experiencing conditions such as major depressive disorder, substance use disorders, attention-deficit/hyperactivity disorder, and other anxiety-related disorders [4]. GAD is a chronic and recurring psychiatric condition marked by at least six months of excessive and uncontrollable anxiety and worry about various events [5]. Data from the Global Mental Health Survey show that GAD has a lifetime prevalence of 3.7% and a 12-month prevalence of 1.8%, based on diagnostic criteria from the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) [6].

The etiology of GAD can be explained by two main factors: genetic and biological factors, as well as psychological and social factors [6, 7]. Genetic and biological factors are crucial in the etiology of GAD, which is often characterized by clinical heterogeneity and comorbidity with other psychiatric disorders such as Major Depressive Disorder (MDD) [8, 9]. Neuroimaging studies reveal structural abnormalities in the amygdala, prefrontal cortex, and hippocampus, though inconsistencies in the findings suggest that clinical variability may account for these results. Genetic research highlights age-specific interactions between single-nucleotide polymorphisms (SNPs) in the norepinephrine transporter (NET) gene and the risk of developing GAD, with different genetic patterns observed in younger and older individuals [10]. Additionally, preliminary studies suggest a potential role of inflammation in GAD, as elevated levels of certain cytokines including C-reactive protein (CRP), interferon-γ (IFN-γ), and tumor necrosis factor-α (TNF-α), have been noted in individuals with the disorder, though more research is needed to confirm these findings [6].

Psychological and social factors are among the key influences in the development and manifestation of GAD, particularly in relation to personality traits and social support [6]. Psychological factors, particularly personality traits, play a significant role in the development of GAD, even in the absence of a biological predisposition. Reinforcement Sensitivity Theory (RST) has been instrumental in understanding the link between personality and mental health. Traits such as harm avoidance, neuroticism, and introversion are strongly associated with GAD, with neuroticism and harm avoidance being particularly relevant. These insights have important implications for both diagnosing and treating GAD, underscoring the need to consider personality factors in understanding the disorder's nature and progression [11]. The Behavioral Inhibition System (BIS) is a neurobiological system that regulates responses to perceived threats by increasing vigilance, inhibiting behavior, and promoting avoidance. In individuals with GAD, the BIS is particularly heightened, leading to an exaggerated sensitivity to potential risks and increased anxiety in response to uncertainty and conflict.

GAD has profound implications at both individual and societal levels [12]. Its effects extend beyond the individual, impacting not only those directly suffering from the disorder but also their families, close communities, and even the broader society. The prevalence of GAD, along with the associated diagnostic, therapeutic, and healthcare needs, can place additional economic strain on healthcare systems [13, 14]. Furthermore, GAD can indirectly challenge the economic system through reduced job performance, frequent absenteeism, withdrawal from the labor market, diminished work efficiency, and subsequent loss of income [13]. Individuals with GAD often face significant social challenges, reporting difficulties in their interactions and relationships. The negative social consequences of the disorder can lead to problems in maintaining effective communication and relationships with others, resulting in social isolation, decreased quality of life, and significantly reduced life satisfaction [15].

Significant efforts have been made to mitigate the negative effects of GAD [12]. However, advancing these initiatives requires moving beyond individual-level interventions to implement social strategies for managing the disorder. Although some studies have emphasized the importance of reducing stigma and promoting social integration for individuals with GAD [13, 15], the primary goal of such strategies should be to identify social factors and determinants related to GAD. Furthermore, given the economic and social impacts of GAD, some studies have specifically highlighted the need for continued research on the disorder, with a focus on its social dimensions and the development of innovative and protective treatments [13, 15].

Despite the significance of understanding the factors associated with Generalized Anxiety Disorder (GAD), research on these factors in Iran, particularly within urban populations such as Tehran, remains limited. This study contributes to the existing literature by utilizing the most recent diagnostic criteria (DSM-5), conducting a population-based survey in Tehran, and examining

a comprehensive range of potential risk factors, including socio-demographic, environmental, lifestyle, and psychosocial variables. Furthermore, our use of a large, representative sample and the inclusion of novel variables often overlooked in prior studies enhance the relevance and applicability of our findings. This comprehensive approach provides a more nuanced understanding of the factors associated with GAD in the general population.

The wide variation in prevalence rates of GAD across different studies suggests that risk factors for this disorder may differ significantly among populations. For example, A systematic review of reviews reported substantial variability in the prevalence of anxiety disorders generally, ranging from 3.8% to 25%. [16]. However, methodological differences, cultural influences, and changes in diagnostic criteria over time may also contribute to this variability, underscoring the need for consistent, high-quality research in this domain.

Methods

Study design

The present study was designed to determine the prevalence of generalized anxiety symptoms and its related factors among the Tehran population aged over 18 years. A cross-sectional study design was employed. The following formula was used to calculate the required sample

$$n_0 = \frac{P(1-P)\left(Z_{1\frac{\alpha}{2}}\right)^2}{\triangle^2} = \frac{1.96^2 \times 0.8 \times 0.2}{0.08^2} \simeq 96$$
$$n_{cat} = n_0 + 0.15 \times n_0 \simeq 112$$
$$n_{tot} = 9 \times n_{0cat} = 1008$$

Participants

The formula above was used to calculate the required sample size. According to the result of a previous study, the experience of at least one severe stress among this population was considered to be 80%. The confidence interval and power were 95% and 80%, respectively. The attrition rate was considered to be 15%.Proportional stratified random sampling was used to recruit participants. The city of Tehran was classified into four districts according to its developmental level: totally developed, developed, less developed, and in need of intervention. Each district was considered a strata. Next, three neighborhoods were selected from each region at random. Finally, participants were selected from different public parts of the neighborhoods where people were expected to go for their daily affairs, such as bus stops, subway stations, department stores, banks, mosques, healthcare centers, libraries, universities, campus, restaurants, and parks. The screening process was conducted with approximately 1,200 participants, of whom around 1,100 met the inclusion criteria of the study and provided informed consent for study participation. However, 1100 participants completed the study, while 130 did not respond to some questions, resulting in incomplete data.

Data collection

The data were collected using two questionnaires. The first questionnaire included socio-demographic information (e.g., age, gender, job status, marital status, and employment status), health status, and stressful events over the last 12 months. This questionnaire has been published elsewhere [17]. Stressful events consists of seven sections: individual events, family issues (for married people), financial and economic events, occupational and working events (especially for the employed), educational events (student-specific events), community events, and future-related events. Life satisfaction was assessed according to the question, "How satisfactory are these different aspects of your life?" The response categories ranged from 1 = very dissatisfying, 2 = dissatisfying, 3 = rather dissatisfying, 4 = rather satisfying, 5 = satisfying, and 6 = very satisfying. Participants were instructed to indicate the number that best represented their situation for each statement. All questions were addressed using paper and pencil. Data collection was conducted through face-to-face interviews. The interviewers assisted respondents with limited education in reading the questions, but were instructed not to view their responses. To enhance quality assurance and minimize measurement errors, data collection was conducted by ten trained psychologists who had to attend seven-hour workshops. GAD symptoms was defined as the outcome variable, and the Persian version of the GAD was employed to measure GAD, inquiring about stress symptoms and the duration of involvement (more or less than six months). The participants were classified as having generalized anxiety disorder (GAD) if they reported three or more symptoms that persisted for a duration exceeding six months. Respondents were asked to complete the survey and we assisted them when they needed any assistance.Individuals meeting the following criteria were eligible to participate in this study: (1) age of at least 18 years, (2) residency in Tehran, and (3) the ability to provide informed consent and a sufficient command of the Farsi language.

Data analysis

Descriptive and analytic analyses were used to fulfill studies aims. Data analysis was done in two steps. The first step, descriptive statistics were used to characterize the prevalence of GAD by demographics, socio–economic, drug use history, and history of high-risk behaviors in the study population. We examined the relationship between all independent variables and the GAD status using

bivariate logistic regression. To adjust the confounding variables, after checking for collinarity assumption, variables with p-value < 0.2 were included in the multiple logistic regression model. The final model included only variables with $p < 0.05$. We reported the adjusted odds ratio (aOR) point estimate and 95% confidence interval (CI 95%). We used STATA v. 14 for this analysis. In all analyses, $p < 0.05$ was considered a significant level.

Results

A total of 970 participants, 490 (50.6%) were male, and 250(25.8%) had less than diploma. The majority was employed and not married (49.5); the mean and standard deviation of the age of were 36.5 years and 13.8, respectively. The prevalence of GAD in participants was 26% (CI 95%: 22%−32%). The GAD status among different subgroups is brought in Table 1.

As compared to participants without GAD symptoms, those with GAD symptoms were more likely to be single.

Table 1 Characteristics of participants with and without GAD symptoms by demographic characteristics, socio-economic status, and stressful event

Characteristics	GAD		*P*-value
	Yes (*n* = 251)	No (*n* = 717)	
	N (%)	N (%)	
Age (year)			
20–39	165(65%)	399(55%)	
40–59	47(20%)	225(31%)	
60 +	35(15%)	79(14%)	
Age (Mean + SD)	34.9 ± 14.8	36.9 ± 13.2	0.001
Sex			
Male	112 (44%)	378 (52%)	0.001
Female	135 (56%)	335 (48%)	
Marital status			
Single or ex-married	167(66%)	449(62%)	0.3
Married	84 (34%)	268(38%)	
Employment Status			
Unemployed or not in the workforce	40 (16%)	117 (17%)	0. 7
Employed	211 (84%)	600 (83%)	
Stressful event (last 12 months)			
Yes	240 (95%)	653 (88%)	0.02
No	11 (5%)	64 (12%)	
Health Status			
Healthy	171(68%)	570(80%)	0. 01
No-healthy	80(32%)	147(20%)	
Life Satisfaction			
Yes	187(74%)	492 (68%)	0.08
NO	64(26%)	225(22%)	
Socioeconomic status (SES)	5.09 + _1.82	5.53 + 1.8	.001

(66% vs. 62%, $P = 0.3$), to be life unsatisfied (26% vs. 22%, $P = 0.01$), experienced least one stressful event over the last 12 months (95% vs. 88%, $P = 0.02$), reported non-healthy status (32% vs. 20%, $P = 0.01$), and had low SES ($P = 0.001$).

The multivariable regression model included variables with p-value < 0.2. In the final model(Table 2) after adjusting confounding variables, characteristics and behaviors that were associated with an increased risk of GAD symptoms were, sex (AOR = 1.4, $P < 0.01$), experienced least one stressful event (AOR = 1.9, $P = 0.01$), had non-healthy status. (AOR = 2.8, $P < 0.05$).Results of multiple regression indicated that females are more likely to experience GAD symptoms than men in their lifetime (OR = 1.4).

Discussion

The present study, explored the prevalence and risk factors of GAD symptoms among adults in Tehran. In our study, the Prevalence of GAD symptoms Among the participants was 26% (CI 95%: 22%−32%), which is many times above the global prevalence of 3.7% published by Ruscio and his colleagues study in 2021 [18]. In 2019, approximately 15.6% of U.S. adults experienced anxiety symptoms in the past 2 weeks, with 9.5% reporting mild symptoms, 3.4% moderate symptoms, and 2.7% severe symptoms. [19]. By 2022, the prevalence of anxiety symptoms among U.S. adults increased to 18.2% experiencing

Table 2 Multiple regression analysis and adjusted odds ratio (AOR) of factors associated with GAD symptoms

Characteristics	GAD		P-Value
	AOR	(%95 CI)	
Age (year)			
20–39	1		
40–59	1.3	(0.1–5.3)	0.3
60 +	1.4	(0.2–4.8)	
Sex			
Male	1		0.03
Female	1.4	0.8–2.31	
Stressful event (last 12 months)			
Yes	1.88	0.8–3.51	0.001
No	1		
Health status			
Healthy	1		0.02
Non-healthy	2.8	1.8- 7.4	
Life Satisfaction			
Yes	1		0.01
No	3.1	(1.4–5.3)	
Socioeconomic status (SES)	0.92	(0.85–1.02)	0. 2

any symptoms in the past 2 weeks [20].Also, the prevalence of GAD was 6.5% in Guimarães study in 2021. The lifetime prevalence of GAD in the United States and Australia was 5.7%, 6.1%, respectively [20].

In addition to, difference in study design and sampling methods, It seems that local and environmental factors are more important in GAD for instances where reported higher rates of anxiety disorders in the Iranian urban population [21]. This difference could be explained by a wide range of factors, such as cultural differences, and the features of stressors encountered in the urban municipality of Tehran.

Sex differences

Our results showed that females are more likely to experience GAD symptoms than males,which is consistent with the result of McLean, who indicated that women are at a higher risk than men to experience anxiety disorders, including GAD [22]. In the largest epidemiological survey of the female population, which focuses on gender differences in DSM-IV GAD, showed that higher prevalence of GAD in women than men [23]. This finding is in line several studies in the US, France, Canada, and Europe explained that GAD more frequently occurs among females than males [22, 24–27]. In some studies, gender and economic level were shown to be the two main factors for anxiety symptoms among participants in a different study [28], it seems that the difference between the sexes in the prevalence of GAD is due to various factors, including the association of GAD with other psychiatric disorders and its difference in both sexes. Also, high-risk behaviors and adherence to treatment and its differences in both sexes could explain this ga.

Stressful live events

In our study, we found that there is a positive association between GAD symptoms and number of stressful events. Our results indicated that having a stressful event can higher the odds of GAD symptoms. This conclusion is consistent with the findings from the study in 2023. Stressful events may cause the development of anxiety disorders by setting in motion a process similar to rumination that involves increased self-focused attention to bodily sensations and to physical and cognitive symptoms of anxiety, as well as increased thought about the causes and consequences of those symptoms [29]. There was a significant relationship between generalized anxiety disorder (GAD) among those who were quarantined during the COVID-19 outbreak and those who had not been placed in captivity [30]. Evidence presented confirming both recent and past adverse life events are risk factors of the GAD. Policies and programs should be geared towards improving the safety and health of the people [31]. Such studies need to focus on the interrelationship of the effect of stressful events on the development of GAD in different age groups.

Health status

In this study, we found an association between health status and the likelihood of developing of GAD symptoms. Rose et al. suggest that there is a correlation between heart disease and GAD, and their study result reveals that 80 percent of the patients with heart diseases have mild to severe levels of anxiety [32]. In another US-based study, results were similar, reporting that students with poor sleep were twice as likely to have symptoms of anxiety [33]. in addition, a longitudinal study revealed that people with GAD have an increased risk of developing chronic medical problems over time [29]. The association underlines how physical health may affect mental well-being during stressful times [34]. This raises the critical possibility of conducting longitudinal studies to explain the causal relationships between GAD and health status.

Life satisfaction

Our result indicated a negative association between Life Satisfaction and GAD symptoms. This finding is in line with the studies,done in 2012. Hinz's study showed that an increase in anxiety levels is followed by lowering the quality of life, especially in domains related to mental health. Furthermore, changes in life satisfaction are inversely associated with the anxiety level change [35]. Another study discussed the interdependence that exists between anxiety, including GAD, and health-related quality of life among older people: higher anxiety levels correspond with lower quality of life [36].

These studies are put together to illustrate that there is a significant correlation of GAD symptoms with the quality of life; higher states of the anxiety correlate with lower levels of quality of life across various dimensions, including dimensions of mental well-being and physical health. Improving these aspects through targeted interventions may improve outcomes in patients with GAD.

Limitations

Although our study is precious, there are certain drawbacks need to be acknowledged. The cross-sectional approach limits our ability to identify causal relationships between these factors and GAD symptoms. Future longitudinal research may help determine the sequence of these relationships. In addition, there could be bias due to the self-reported measures, though we employed the DSM-5 definition of GAD. Future studies might be helpful by including clinical interviews to determine more accurate diagnoses.

Abbreviations
GAD Generalized anxiety disorder
MDD Major depressive disorder

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Clinical trial number
Not applicable.

Authors' contributions
Study conceptualization and design were performed by F.A., H.R. and M.N. Statistical analyzing , Drafting and Writing by M.N., F.A., M.M. , N.K , G.GH and S.S, and All authors contributed to the drafting, writing, and editing of the article. All authors have read and agreed to the published version of the manuscript.

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Data availability
The raw data supporting the conclusions of this article will be made available by the authors without undue reservation.

Declarations

Ethics approval and consent to participate
This study adhered to the Declaration of Helsinki and approved by ethics committee (IR.USWR.REC.1402.039) at University of Social Welfare and Rehabilitation Sciences.All participants provided written informed consent prior to participation.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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