RESEARCH





Evaluation of the relationship between worry and anxiety with the general health status of pregnant women at risk of diagnosing abnormalities

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Abstract

Background Today, the screening of fetal abnormalities during pregnancy is used as one of the components of the prenatal care worldwide, and many abnormalities are detected by ultrasound during pregnancy. On the other hand, the possibility of an abnormality in the fetus causes worry and anxiety in pregnant women. Therefore, the present study was conducted with the aim of determining the relationship between worry and anxiety with the general health status of pregnant women at risk of diagnosing fetal abnormalities.

Methods This descriptive-analytical cross-sectional study was conducted on 275 pregnant women with a gestational age of 16 to 18 weeks. They were referred by health centers, midwives, or gynecologists to determine fetal abnormalities according to the national guidelines of Iran for ultrasound scan anomalies. Pregnancy imaging was performed in Bojnurd city between April and December 2023. The data collection tools included a pregnancy-personal characteristics questionnaire, Goldberg general health standard questionnaire, Cambridge anxiety, and Spielberger anxiety scales. Data were analyzed using descriptive statistics tests, Pearson's correlation coefficient, and generalized linear models (GLM). A significance level of p < 0.05 was considered statistically.

Results The average age of the participants was 28.13 ± 6.17 years. The average total score of general health was 15.49 ± 7.14 , while the average total worry and anxiety scores were 16.81 ± 11.74 and 45.12 ± 6.06 , respectively. A positive and significant correlation was observed between general health and worry (r=0.374), as well as between general health and anxiety (r=0.160). Additionally, based on the test of generalized linear models, education (beta coefficient=-3.208 and p=0.008) and type of pregnancy (beta coefficient=-2.323 and p=0.029) were related to general health.

Conclusion The present findings demonstrate a relationship between the general health and worry and anxiety levels of pregnant women at risk of abnormality diagnosis. Pregnant women who are anxious and worried tend to have lower general health levels. Understanding this relationship between worry, anxiety, and the general health of pregnant women can provide useful information to policymakers and health planners to improve the health of expectant mothers.

Keywords General health, Worry, Anxiety, Fetal abnormality screening

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Introduction

The possibility of genetic and chromosomal disorders in the fetus can evoke significant worry and anxiety in pregnant women. Advances in medical technology have made it possible to diagnose such disorders during pregnancy through specialized non-invasive screening methods [1, 2]. As a result, screening for fetal abnormalities has become a standard component of prenatal care programs worldwide, offering the opportunity for early detection of various abnormalities [3–5].

Ultrasound screening during pregnancy plays a crucial role in detecting many fetal abnormalities [6]. For instance, first-trimester screening involves ultrasound measurement of the nuchal translucency (thickness of the liquid behind the neck) and blood tests to measure fetal hormones in the mother's blood. Abnormalities in these measurements can indicate a higher risk of chromosomal diseases in the fetus, providing valuable information for further evaluation and management [3].

In the past two decades, routine ultrasound screening during the second trimester of pregnancy has become standard practice in many countries, including Iran, even for low-risk pregnancies. This widespread use of ultrasound has contributed to the early detection of fetal abnormalities [7, 8]. According to a systematic review and meta-analysis by Daliri et al. (2018), the overall prevalence of congenital anomalies in Iran reported to be 18 per 1000 live births [9].

When most people face a serious illness, they experience fear, a lack of control, and overwhelming uncertainty about the future [10]. If the results of screening tests are suspicious, pregnant women undergo significant psychological pressure until additional tests are completed and they become aware of the fetal disease and potential abortion treatment options. Furthermore, a definitive diagnosis of a fetal abnormality can also lead to increased psychological reactions in mothers [1]. Therefore, the present study was conducted with the aim of determining the general health status, worry and anxiety of mothers at risk of diagnosing fetal abnormalities.

Understanding the psychological impact of prenatal screening can help healthcare providers' better support and manage the emotional well-being of expectant mothers during this challenging time.

Material and methods

Study design and setting

This descriptive-analytical cross-sectional study, conducted in 2023, focusing on pregnant women with a gestational age ranging from 16 to 18 weeks. The sampling method employed was accessible and purpose-based. These women were referred to pregnancy imaging centers in Bojnurd by various healthcare providers, including health centers, midwives, or gynecologists, as part of the routine screening process for assessing fetal abnormalities according to the national guidelines of Iran.

Study population and sample size

Based on similar studies [3] and considering a statistical power of 80% and a significance level of 5%, the minimum required sample size for this study was determined using appropriate statistical calculations.

$$\alpha = 0.05$$

$$1 - \beta = 0.80$$

$$\sigma = 8.49$$

$$\mu = 18.51$$

$$n = \left(\sigma \frac{Z_{1-\frac{\alpha}{2}} + Z_{1-\beta}}{\mu - \mu_0}\right)^2 = 248$$

In this study, a total of 275 pregnant women were examined, considering the possibility of a 10% non-response rate in the questionnaires due to incomplete filling.

Inclusion criteria comprised being Iranian, literate, having no history of mental illness in the past 6 months, and no adverse incidents within the previous 6 months. Exclusion criteria included unwillingness to participate at any stage of the study and encountering adverse events during the study period.

Data collection

Pregnant women were selected after explaining the research objectives and obtaining written consent. They were chosen from eligible individuals attending the Imam Reza Hospital clinic or private women's clinics for anomaly ultrasound scans.

Participants then requested to complete several questionnaires, including the pregnancy-personal characteristics questionnaire, the general health questionnaire, the Cambridge Anxiety Questionnaire, and the Spielberger Anxiety Questionnaire.

Data collection tools

The Pregnancy-personal characteristics questionnaire comprises clear and objective questions that researchers have extensively studied.

The General Health Questionnaire (GHQ) is a widely used screening tool developed by Goldberg and Hillier in 1979 to assess non-psychotic mental disorders. It consists of 28 questions and divided into four sub-scales [11]: **Physical Symptoms:** This sub-scale, comprising questions 1 to 7, assesses individuals' perceptions of their physical health, including symptoms such as fatigue and other physical complaints. The Physical Symptoms Subscale assesses general health status and physical symptoms experienced in the past month.

Anxiety Symptoms and Sleep Disorders: Questions 8 to 14 focus on anxiety symptoms and sleep disturbances, including insomnia and general feelings of anxiety. The Anxiety and Insomnia Subscale evaluates clinical signs and symptoms of severe anxiety, including pressure, anger, frustration, insomnia, and panic.

Social Functioning: Questions 15 to 21 evaluate individuals' ability to manage daily life tasks and interpersonal relationships, assessing aspects such as social functioning and coping skills. The Social Functioning Disorder Subscale examines a person's ability to perform daily tasks, make decisions, feel satisfaction, find usefulness in life, and enjoy activities.

Depression Symptoms: The final sub-scale, questions 22 to 28, examines symptoms of depression, including feelings of sadness, hopelessness, and suicidal thoughts or tendencies. Depression Subscale focuses on specific symptoms of depression, such as feelings of hopelessness, worthlessness, suicidal thoughts, and difficulties in performing tasks.

A lower overall score indicates better mental health, while a score higher than 41 suggests deterioration. Scores of 17 or higher in each subscale indicate a lack of health in that particular domain.

All items in the General Health Questionnaire (GHQ) have 4 options and there are two scoring methods for these options. The GHQ utilizes a Likert scoring method, where each of the four response options is scored as 0, 1, 2, or 3. The total score of a person ranges from 0 to 84. The GHQ provides both separate scores for each subscale and an overall score. In both scoring methods, lower scores indicate better mental health.

General Health Questionnaire (GHQ) developed by Goldberg and Hiller in 1979 to identify non-psychotic mental disorders, demonstrated a Cronbach's alpha of 0.86 in one study [11] and a reliability coefficient of 0.90 in another study [12].

The Cambridge Anxiety Questionnaire was used to assess mothers' worry. It consists of 16 questions answered on a 6-point Likert scale, with responses ranging from 0 (no worry) to 5 (extreme worry) for each question. The total score can vary from 0 to 80, with higher scores indicating greater levels of anxiety [13]. Page 3 of 8

The validity of the Persian version of the Cambridge Anxiety Questionnaire was confirmed by Yousefi in 2015 [14], while its reliability, with a Cronbach's alpha coefficient of 0.76, was confirmed by Green in 2003 [13]. Kordi et al. in 2017 also confirmed the internal consistency reliability of the Persian version, with a Cronbach's alpha coefficient of 0.90 [15].

The Spielberger Anxiety Questionnaire comprises 20 questions measuring the domain of obvious anxiety [16]. Responses are rated on a scale from 1 to 4, with options expressing states as very little, little, much, and very much. The total score ranges from 20 to 80, and the interpretation of scores is as follows: mild anxiety: 20–31, moderate to low anxiety: 32–42, moderate to high anxiety: 43–53, moderately severe anxiety: 54–64, severe anxiety: 65–75, very extreme anxiety: 76 and above. The Spielberger Anxiety Questionnaire, developed by Spielberger in 1983 and widely used in research, had its Persian version's validity confirmed by Mahram in 1993 [17]. Zaree Mobini reported a Cronbach's alpha reliability coefficient of 0.889 for this questionnaire [18].

Data analysis

Following administrative procedures, samples collected, and the gathered information was entered into SPSS software version 23 for statistical analysis. Descriptive data of the study were reported as frequency (percentage) for qualitative variables and mean (standard deviation) for normally distributed quantitative variables. The normality of the data was checked using the Kolmogorov-Smirnov test, and due to the non-normal distribution of the data (p < 0.05), non-parametric tests were used. The relationship between general health, worry, and anxiety was assessed through Spearman's correlation test, while the relationship between other variables (age, education level, occupation, number of pregnancies, number of births, history of trauma in previous pregnancies, and wanted or unwanted pregnancy) and the scores of general health, anxiety, and worry was examined using generalized linear models (GLM). A significance level of 0.05 considered for all statistical analyzes conducted in the study.

Results

Table 1 displays the pregnancy-related and personal characteristics of the study participants. The mean age of the participants was 28.13 ± 6.17 years. Most of the women had a non-university education (67.6%) and were housewives (85.1%). Additionally, 2.5% of the women had a disabled child, and 4.7% had a history of infertility.

Table 2 provides the descriptive statistics of the studied population, including the average total scores for

Variables	Scales	Mean (SD)	Frequency (%)
Age		28.13 (6.17)	
Education	Elementary		35 (12.7)
	Guidance school		55 (20)
	High school		96 (34.9)
	University		89 (32.4)
Husband's education	Illiterate		9 (3.3)
	Elementary		25 (9.1)
	Guidance school		63 (23)
	High school		93 (33.9)
	University		84 (30.7)
Job	Housewife		234 (85.1)
	Student		12 (4.4)
	Employee		29 (10.5)
Husband's job	Teacher		5 (1.8)
	Employee		34 (12.4)
	Military		10 (3.6)
	Freelance job		226 (82.2)
Birth place	Urban		195 (70.9)
	Rural		80 (29.1)
Housing	Personal		157 (57.3)
	Renal		117 (42.7)
Average monthly income	Million Tomans (Iranian currency)	9.30 (5.76)	
Disabled child	Yes		7 (2.5)
	No		268 (97.5)
Family relationship with a disabled child	Yes		8 (2.9)
	No		267 (97.1)
Family relationship with husband	Yes		40 (14.5)
	No		235 (85.5)
Number of pregnancy		2.34 (1.28)	
History of spontaneous abortion	Yes		81 (29.6)
	No		193 (70.4)
Number of abortion		0.43 (0.83)	
Type of pregnancy	Wanted		220 (80)
	Unwanted		55 (20)
Number of living children		0.88 (0.88)	
History of disease	Yes		26 (9.5)
	No		249 (90.5)
History of infertility	Yes		13 (4.7)
	No		262 (95.3)
Duration of infertility		0.39 (2.04)	
Current pregnancy with assisted reproduction methods	Yes		11 [4]
	No		264 (96)

Table 1 Pregnancy-personal characteristics of study participants

general health, worry, and anxiety. The average total score for general health was 15.49 ± 7.14 . The average total score for worry was 16.81 ± 11.74 , and the average total score for anxiety was 45.12 ± 6.06 .

Table 3 presents the Spearman's correlation analysis examining the relationship between general health and the levels of worry and anxiety among pregnant women. There is a positive and significant correlation

 Table 2
 Descriptive report of worry, anxiety and general health

 scores along with general health areas
 Image: Score s

Variables	Mean	Standard deviation	Minimum	Maximum
Physical symptoms	3.83	2.65	0	16
Symptoms of anxiety and sleep disorder	3.97	3.09	0	19
Social function	6.67	2.23	0	18
Depressive symptoms	1.01	2.23	0	21
Total general health score	15.49	7.14	1	64
Total worry score	16.81	11.74	0	52
Total anxiety score	45.12	6.06	27	66

between the score of general health and the level of worry (r = 0.374). Additionally, there is a positive and significant correlation between the score of general health and the level of anxiety (r = 0.160). There is also a significant positive correlation between the levels of anxiety and worry (r = 0.203).

Table 4 presents the analysis of the association between demographic and fertility characteristics with general health, worry, and anxiety using generalized linear models (GLM). The results indicate significant relationships between certain factors and the outcomes. Individuals with only a guidance school education, compared to those with a university education, exhibited lower levels of general health (beta coefficient = -3.208, p = 0.008). The type of pregnancy was also associated with general health, with those experiencing unwanted pregnancies showing lower levels of general health (beta coefficient = -2.323, p = 0.029). Housing status was linked to anxiety levels, with individuals living in rental housing reporting higher levels of anxiety (beta coefficient = -6.307, p < 0.001). Furthermore, the education level of the husband was associated with anxiety levels, as individuals whose husbands had lower education levels experienced higher levels of anxiety (beta coefficient = -4.663, p = 0.026).

Discussion

The findings of our study indicate a notable positive correlation between general health status and the levels of worry and anxiety among pregnant women facing the possibility of an abnormality diagnosis. Pregnant women at risk of an abnormality diagnosis tended to exhibit lower levels of general health. The significant correlation observed between general health and anxiety in pregnant women is consistent with other studies. In the qualitative study by Irani et al. (2019), the diagnosis of fetal abnormality was accompanied by strong feelings such as sadness, despair, and guilt, leading to severe and long-term psychological complications in mothers [19–21].

According to the findings of the study conducted by Jourgenson et al., parents expressed a strong desire to be informed when an abnormality was detected in the fetus, enabling them to make decisions regarding whether to continue or terminate the pregnancy, even if they were experiencing emotional distress. The study revealed that all women who opted for abortions due to fetal defects had undergone severe psychological trauma, which persisted over an extended period [22].

In a separate study, Leithner et al. observed that women exhibited significant anxiety and mental stress upon receiving a diagnosis of fetal abnormality through ultrasound. Key predictors of mental health issues in mothers included high levels of anxiety, previous experiences of fetal loss during pregnancy, and the adoption of emotionoriented coping strategies [23].

Therefore, suspicious screening results have been linked to increased mental health challenges among pregnant women. Insufficient awareness and coping skills in confronting these issues underscore the necessity of providing comprehensive health, psychological, and therapeutic services to support them [1, 2].

The findings of the study conducted by Riazi et al. highlighted the significance of informed decisionmaking in fetal abnormality screening. Women who made conscious choices to undergo screening experienced reduced levels of anxiety and worry. Consequently, healthcare professionals, including doctors and midwives, should ensure that pregnant women are well-informed about these screening tests, thereby

	Table 3	Correlation	between	general	health,	worry,	and	anxiety
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Variables	Total of general health score	Total of worry score	Total of anxiety score		
	Correlation coefficient (p value)	Correlation coefficient (p value)	Correlation coefficient (p value)		
Total of general health score	1	0.374 (< 0.001)	0.160 (0.008)		
Total of worry score	0.374 (< 0.001)	1	0.203 (0.001)		
Total of anxiety score	0.160 (0.008)	0.203 (0.001)	1		

Table 4 Relationship of demographic and clinical characteristics with general health, worry and any
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Variables	Scores	General health		Worry		Anxiety	
		beta coefficient (S.E)	р	beta coefficient (S.E)	р	beta coefficient (S.E)	р
Age		- 0.057 (0.06)	0.416	0.005 (0.114)	0.965	0.053 (0.059)	0.371
Education (reference: university)	Elementary	- 2.003 (1.39)	0.153	– 1.157 (2.33)	0.619	- 0.230 (1.19)	0.848
	Guidance school	– 3.208 (1.20)	0.008	- 2.594 (2.00)	0.195	- 1.724 (1.03)	0.095
	High school	- 0.381 (1.03)	0.712	- 1.959 (1.71)	0.254	- 1.117 (0.88)	0.207
Husband's education: (reference: university)	Illiterate	- 3.476 (2.48)	0.162	3.024 (4.09)	0.460	– 4.663 (2.09)	0.026
	Elementary	- 0.623 (1.61)	0.700	2.237 (2.65)	0.400	- 0.467 (1.36)	0.731
	Guidance school	- 1.286 (1.18)	0.277	-0.421 (1.94)	0.829	- 1.060 (0.99)	0.287
	High school	- 0.487 (1.06)	0.648	0.045 (1.75)	0.979	- 1.526 (0.89)	0.090
Job (reference: employee)	Housewife	- 1.051 (1.40)	0.453	- 2.322 (2.29)	0.312	-0.440 (1.19)	0.712
	Student	- 1.532 (2.44)	0.531	1.359 (4.00)	0.735	0.351 (2.07)	0.866
Husband's job (reference: free- lance job)	Teacher	- 3.811 (3.20)	0.235	- 5.754 (5.26)	0.275	0.703 (2.73	0.797
	Employee	- 0.787 (1.30)	0.547	- 3.669 (2.14)	0.087	– 1.156 (1.11)	0.888
	Military	1.189 (2.29)	0.604	0.555 (3.76)	0.883	0.903 (1.95)	0.644
Birth place: (reference: rural)		1.639 (0.94)	0.081	1.103 (1.55)	0.478	0.404 (0.80)	0.615
Housing status: (reference: rental)		- 0.734 (0.869)	0.361	– 6.307 (1.37)	< 0.001	0.425 (0.73)	0.564
Average monthly income		0.045 (0.074)	0.546	- 0.210 (0.12)	0.085	0.048 (0.06)	0.452
Disabled child (reference: no)		- 4.604 (2071)	0.090	- 5.079 (4.47)	0.257	- 1.739 (2.31)	0.452
Family relationship with a disabled child (reference: yes)		4.493 (2.54)	0.077	4.436 (4.19)	0.291	1.930 (2.16)	0.373
Family relationship with husband (reference: yes)		1.594 (1.21)	0.189	0.038 (2.00)	0.985	- 0.791 (1.03)	0.444
Number of pregnancy		- 0.616 (0.333)	0.064	- 0.113 (0.55)	0.838	- 0.327 (0.28)	0.250
History of abortion (reference: no)		- 1.181 (0.94)	0.209	1.463 (1.55)	0.346	- 0.684 (0.80)	0.393
Number of abortion		- 0.789 (0.515)	0.126	- 0.223 (0.85)	0.793	- 0.151 (0.43)	0.731
Type of pregnancy (reference: unwanted)		– 2.323 (1.06)	0.029	- 2.582 (1.67)	0.142	0.200 (0.91)	0.826
Number of living children		- 0.713 (0.48)	0.143	0.167 (0.80)	0.835	- 0.441 (0.41)	0.287
History of disease (reference: no)		3.412 (1.45)	0.019	4.376 (2.40)	0.068	2.242 (1.23)	0.070
History of infertility (reference: no)		1.265 (2.02)	0.532	3.270 (3.32)	0.325	2.696 (1.71)	0.115
Duration of infertility		- 0.069 (0.21)	0.743	0.284 (0.34)	0.413	0.103 (0.17)	0.567
Current pregnancy with assisted reproduction methods (reference: no)		2.617 (2.18)	0.231	0.106 (3.60)	0.977	2.617 (1.85)	0.158

maximizing satisfaction levels and minimizing anxiety and worry associated with their choices [24].

Furthermore, the findings of the current study indicated a correlation between education level and pregnancy type with overall general health. Specifically, individuals with non-university education and those with unwanted pregnancies exhibited lower levels of general health. In alignment with these results, Hemmtipour et al.'s study (2024) demonstrated a significant association between education level and mental health, wherein individuals with higher levels of education tended to have better overall general health. Moreover, individuals with a university education attained the highest scores in health literacy [25].

The findings from Jahani Shourab et al.'s study (2022) reveal a notable difference in social support between wanted and unwanted pregnancies. Specifically, wanted pregnancies tend to have higher levels of social support compared to unwanted pregnancies, with spousal support notably lower in cases of unwanted pregnancies. Consequently, it seems that women experiencing unwanted pregnancies may have lower levels of general health compared to those with desired pregnancies [26]. It's crucial to consider the limitations of this research when interpreting its results. Common challenges include non-responses from mothers to specific questions and a lack of motivation or willingness to participate for answering to the research questionnaires. Additionally, having a lower general health status in unintended pregnancies may be associated with other factors such as social support. Therefore, it is essential to assess the level of social support.

Given the correlation between the levels of anxiety, worry, and overall general health among mothers facing abnormality diagnoses, it becomes imperative to employ educational strategies aimed at enhancing mothers' awareness of diagnostic tests for fetal abnormality screening while simultaneously mitigating their anxiety and worry levels. Therefore, conducting training courses for prenatal care providers is highly recommended. These courses can equip providers with the necessary knowledge and tools to effectively support expectant mothers during such challenging circumstances.

Conclusion

The results of this study underscore the relationship between worry, anxiety, and general health status among pregnant women undergoing screening for fetal abnormalities. Pregnant women experiencing higher levels of worry and anxiety tend to have poorer general health outcomes. Understanding this relationship can offer valuable insights for policymakers and health planners aiming to improve maternal health during pregnancy, particularly through the provision of specialized mental health services for pregnant mothers.

Abbreviations

GLM Generalized linear models GHQ General Health Questionnaire

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Author contributions

M.H.B., conception and design, acquisition of data, drafting the article, revising it critically for important intellectual content. M.I., design, acquisition of data, drafting the article, revising it critically for important intellectual content. A.A.S., analysis and interpretation of data, drafting the article, revising it critically for important intellectual content. F.K., acquisition of data. R.R., data gathering and entering to SPSS software and T.F., data gathering. All authors reviewed the manuscript.

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Data availability

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate

The research collaboration between North Khorasan University of Medical Sciences and Torbat Heydarieh University of Medical Sciences received approval with project code 4010089 and ethics code IR.NKUMS.REC.1401.04 from North Khorasan University of Medical Sciences' Institutional Review Board.

Competing interests

The authors declare no competing interests.

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