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ORIGINAL ARTICLE

Relationship between anxiety and quality of life in the presence of other factors in adult celiac patients; a nationwide study

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ABSTRACT

Aim: This study aimed to detect relationships among quality of life (QoL) and anxiety and demographic factors in patients with celiac disease (CD).

Background: CD is a type of autoimmune small intestine diseases caused by gluten ingestion. In Iran, the prevalence of CD is considered to be 1% in the general population. As physical problems and behavioral disorders of CD can lead to a reduction in QoL.

Methods: This cross-sectional study was performed on 533 patients with Celiac Disease from 9 cities of Iran. Data collected were analyzed by SPSS version 22. Quality of life and anxiety respectively evaluated by (GHQ-28) and SAS questionnaires. Predictors of quality of life (sex, age, age of diagnosis, city of life, education level, family history of celiac, occupation and anxiety) were tested by multiple linear regression.

Results: Our results showed a significant relationship between poor quality of life and anxiety (correlation= -0.143, P=0.001). The mean of the quality of life index in celiac diseases was 126.2±30.4 and women had a lower quality of life than men (P=0.003) importantly in emotions and worries scores. There was no significant difference between male and female in terms of anxiety level.

Conclusion: According to the results, both quality of life and anxiety correlated together and women seem to suffer more than men from celiac disease. Therefore, greater attention to women who have celiac disease are suggested.

Keywords: Celiac disease, Anxiety, Quality of life, Iran.

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Introduction

Celiac disease (CD) is a systemic autoimmune disorder, which is characterized by chronic inflammation of the small intestine. This chronic disease can present with a variety of symptoms. Some of the clinical features of celiac disease include iron deficiency, anorexia, weight loss, short stature, bone pain, diarrhea, nausea and vomiting, abdominal pain, recurrent oral aphthous, unexplained elevated liver enzymes, frequent miscarriages, and infertility (1). Generally, in Iran, the prevalence of celiac disease is considered to be 1% (2, 3); that is similar to that of the American and European populations. The prevalence of

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CD in Iran is more common in the central and western areas. There are different reasons for the high prevalence of CD in these regions of Iran; High population density in the capital city, wrong eating habits, different ethnicities, and easy access to advanced medical centers for diagnosing, and high consumption of wheat in western areas (4).

As there is no definitive treatment for celiac disease; a lifelong gluten-free diet (GFD) is the only known treatment to control the symptoms of CD. However, there are some restrictions in daily life including cost and inaccessible GFD products (5, 6) Complications of celiac disease have made life intolerable for these patients and they suffer from mental problems such as anxiety. Anxiety and depression in CD patients are higher than healthy people (7) and prior studies confirmed that behavioral disorders can lead to reduced quality of life (8).

Quality of life (QoL) is one of the most important indicators in the psychological and physical aspects of individuals. The World Health Organization (WHO) interprets the quality of life as a concept of the individual's perception of his position in life, taking into account the cultural conditions and social value system in which he lives, and this understanding of the main goals and perceptions of the individual Life finds out. Quality of life has a wide range that includes various aspects such as physical health, mental health, social status, work status, and livelihoods. Measuring the quality of life, especially in chronic diseases, is very important (9).

To our knowledge for the first time in Iran, quality of life measured by CDQ to examine how the other predictor variables affect the QoL of celiac patients. Previous studies just investigated anxiety and the effect of gluten-free diet in these patients. We use multiple linear regression method to detect relationships among QoL and anxiety and demographic factors.

Methods

Participants

This was a cross-sectional study and the sample consisted of 533 patients who have celiac disease from nine cities across different parts of Iran (Tehran, Shahrekord, Sari, Ilam, Zahedan, Hamedan, Mashhad, Gorgan, Gonabad, Tabriz) admitted to the outpatient clinics of each city during two weeks in the months of October and February from 2016 to 2018.

Main outcome measures and questionnaire

The first purpose of this study was to determine the quality of life of Iranian patients with celiac disease; since QoL (dependent variable) was a latent variable, we evaluated the QoL index by a general health questionnaire (GHQ-28) that included 28 questions for the validity and reliability of the Persian version questionnaire for Iranian Celiac patients (P-CDQ) confirmed (10). In this questionnaire (CDQ), four subscales appropriated to related items: Emotion (items 2, 3, 6, 10, 14, 16, 21); Social (items 4, 9, 15, 18, 20, 22, 23); Worries (items 7, 12, 24, 25, 26, 27, 28); Gastrointestinal (items 1, 5, 8, 11, 13, 17, 19) and patients with a high score had a better condition of QoL. The means for each subscale calculated after the questionnaires completed then it was compared between the genders.

Second, anxiety index score (AIs) was calculated by the Zung Self-Rating Anxiety Scale (SAS); the questionnaire contained 20 questions, five enquired about affective symptoms and fifteen enquired about somatic symptoms. AIs was calculated that score of each question indicated from 1 to 4 scale (a little part of the time, some part of the time, a good part of the time, most of the time). The anxiety levels are defined as follows: 20-44 Normal, 45-59 Mild to Moderate, 60-74 Severe, 75-80 Extreme (11).

We recorded age, age at the time of diagnosis of celiac, gender, marital status (married, single), family history of CD (yes, no), education level (under diploma, diploma, academic), city of life (city, village) name of city and geographies orientations of location, and occupation (student, employee, business, housewife, jobless), next duration of celiac disease for each patient calculated (≤1year, >1year).

Statistical analysis

In this study we used SPSS 22 to analyze data. Univariate analysis was performed to explore the relationship between the total QoL score and AIs. Then the linear regression method was used to analyze these data. Some variables that were not significant removed. Finally, following multiple linear regression model was used:

$E(Y) = b0 + b1gender + b2\ anxiety + b3\ Job + b4\ location$ [Y indicates QOL]

For comparison of two groups, we used the independent t-test. X^2 chi-square was used to comparison of demographic factors. Analysis of variance (ANOVA) was used to investigate differences among over two groups and the significance level assumed at 0.05 for all analyses.

Results

The study population included 533 participants who were 16-83 years old, and the mean age of them was 36±10.7 years (253 [47.5%] less than 35 years old), 344 of patients were female (64.5%), family history of CD (16.9% positive) and the average of duration of CD was 2.2±2.2 years. Other descriptive statistics are shown in Table 1. In our study the mean of anxiety index was 40.08 (median score = 39). Anxiety levels evaluated by SAS questionnaire: 70.1% of patients had a normal level of anxiety, 26.6% had a mild to moderate level of anxiety, and 3.3% had severe level of anxiety. Table 2 shows a summary of independent

Table 1. Distribution of demographic factors according to gender.

Variables		Male (n, %)	Female (n, %)	Total (n, %)	P-value
Age (years)	≤35	76, 40.2	177, 51.5	253, 47.5	0.01
	>35	113, 59.8	167, 48.5	280, 52.5	
Marital status	Single	107, 56.9	168, 49.1	275, 51.6	0.08
	Married	81, 43.1	174, 50.9	255, 48.4	
Family history of Celiac disease	Yes	28 , 14.8	62, 18.1	90, 16.9	0.33
	No	161, 85.2	281, 81.9	442, 83	
Duration of disease (years)	≤1	74, 39.4	162, 47.4	236, 44.5	0.07
	>1	114, 60.6	180, 52.6	294, 55.5	
Residential location	Urban	150, 81.1	291, 85.8	441, 84.2	0.15
	Rural	35, 18.9	48, 14.2	83, 15.8	
Occupation	Students	57, 30.2	73, 21.3	130, 24.4	<0.0001
	Employee	30, 15.9	53, 15.4	83, 15.6	
	Business	73, 38.6	53, 15.4	126, 23.6	
	Housewives	12, 6.3	100, 29.1	112, 21	
	Jobless	17, 9	65, 18.9	82, 15.4	
Educational level	Under Diploma	88, 47.3	153, 45.5	241, 46.2	0.87
	Diploma	38, 20.4	67, 19.9	105, 20.1	
	Academic	60, 32.3	116, 34.5	176, 33.7	

Table 2. The mean of Quality of Life of Celiac Patients in this study with demographic factors.

variable		QOL (Mean ± SD)	P- value
Gender	Male	131.6 ± 28.8	0.002
	Female	123.2 ± 30.8	
Age (year)	≤ 35	122.2 ± 30.8	0.004
	>35	129.8 ± 29.5	
Married	Yes	123.9 ± 29.6	0.09
	No	128.3 ± 30.9	
Family history of CD	Yes	125.4± 33.7	0.79
	No	126.4 ± 29.6	
Educational level	under diploma	127.4 ± 30.2	0.11
	diploma	120.5 ± 27.7	
	academic	127.3 ± 31.9	
Occupation	Students	132.3 ± 27.5	0.01
	Employee	129.8 ± 26.1	
	Business	125.9 ± 31.3	
	Housewives	120.7 ± 30.7	
	Jobless	120.7± 34.8	
Duration of disease (years)	≤1	123.1 ± 29.7	0.03
	>1	128.8 ± 30.8	
Residential location	Urban	127.1± 29.9	0.05
	Rural	120.3± 31.6	

variables and their relationships to QoL.

According to our findings, the total average of quality of life was 126.23±30.4 (range: 38, 196), as well as the mean of the components of QoL was calculated separately; the smallest one concerned with worries (26.9±9.4) and the largest one was GI (35.2±8.5). The average of QoL in women was significantly lower compared to men (P=0.003). Importantly emotion and worries scores of QoL were lower in women respectively P<0.0001 and P=0.004. We found that patient age was related to gastrointestinal (GI) symptoms; namely, the GI score will increase by aging (p<0.0001) as well patients older than 35 years (n=280) had a higher mean of emotion (p=0.006). The results are shown in Table 3.

Associations between QoL as an independent variable and anxiety as dependent variable were evaluated by using linear regression analyses. The results of stepwise multiple regression showed anxiety, gender, location of life (city or village) and type of occupation could predict the quality of life. The duration of disease, and educational levels did not affect the quality of life (Table 4). Patients who lived in the village had a few worries score rather than urban patients (P=0.03) with 24.9±9.96. It may be caused by the population of rural patients was low (n=83) or they have a lower average of age (P=0.019); also their duration of CD was low (P=0.017).

The effect of gender on each quality of life scale questions was studied by the Mann-Whitney test. For eleven questions that remark at Table 5 women had significantly lower mean scores. Similarly, the effect of gender on each anxiety scale questions showed that women more getting upset or feeling panicky compared to men (P=0.009) but the other questions did not show a significant difference.

Discussion

The main of this study was to explore the effects of anxiety and other predictors on quality of life. This study determines the relationship between quality of life in patients who are diagnosed with celiac disease and its related factors. QoL was assessed by the 4 item which include Emotion, Social, Worries, Gastrointestinal; the average of total QoL was 126.23 and we realized that women's quality of life was lower in all four subscales: emotion, social, worries and GI scores compared men particularly in worries and emotion subscales.

As mentioned earlier, the prevalence of the celiac disease in Iran was considered to be 1%. There are different percentages for the prevalence of the celiac disease in different countries. Differences in the prevalence, between developed and developing countries, maybe due to ideal health status, better servicing, and more advanced medical equipment in developed countries. The observed difference between the prevalence of serological tests and a biopsy method is often due to a lack of proper and accurate use of biopsy for the diagnosis of celiac disease in the developing countries (12).

There is some evidence that CD women are exposed

Table 3. Comparison of Components of QoL in CD patients by Gender and age.

	Gender (Mean±SD)			Age (Mean±SD)		
	Male	Female	P-value	<35	>35	P-value
Emotion	32.12±8.6	27.69±10.0	<0.0001	28±9.8	30.3±9.6	0.006
Social	35.20±8.6	34.50±9.2	0.392	34.0±9.1	35.3±8.8	0.086
Worries	28.58±9.9	26.12±9.1	0.004	26.3±9.6	27.5±9.3	0.125
Gastrointestinal	35.74±8.2	34.92±8.6	0.293	33.8±8.8	36.4±8.0	< 0.0001
Total QoL	131.66±28.8	123.25±30.8	0.003	122.28±30.8	129.8±29.5	0.004

Table 4. Multiple linear regression. The relationship among anxiety, gender of patients, location and occupation.

Variables	Unstandardized Coefficients		Standardized Coefficients	t	P- value
	b	SE (b)	β		
(Constant)	154.87				
anxiety	-0.30	0.11	-0.11	-2.60	0.009
gender	-7.35	2.70	-0.11	-2.71	0.007
city of life	-7.58	3.54	-0.09	-2.13	0.033
student	8.23	3.03	0.12	2.71	0.007

under more anxiety. As well as, for some reasons female with CD on a GFD have a higher level of anxiety (13, 14). Prior researches stated that CD females had a higher level of anxiety compared to male patients (15, 16); we decided to investigate this statement in our study. Despite this, we did not observe

Table 5. Mean scores (± SD) of the general health questionnaire (GHQ-28) in CD patients divided by gender

	Questions	CD (women)	CD (men)	P-value
Emotion subscale	Q2. How often during the last two weeks did you feel physically exhausted or fatigued?	3.59±1.85	4.34±1.84	<0.0001
	Q3. How often during the last two weeks have you felt frustrated, impatient or restless?	3.77±1.89	4.46±1.89	<0.0001
	Q6. How often during the last two weeks have your bowel movements been loose?	4.01±1.75	4.41±1.69	0.010
	Q10. How often during the last two weeks did you feel depressed or discouraged?	4.15±2.06	4.69±1.95	0.003
	Q14. How often during the last two weeks have you felt relaxed and free of tension?	3.88±1.64	4.32±1.77	0.004
	Q16. How much of the time during the last two weeks have you felt tearful or upset?	4.13±2.07	5.40±1.66	<0.0001
	Q21. How satisfied, happy or pleased have you been with your personal life you during the last two weeks?	4.17±2.04	4.50±1.81	0.057
Social subscale	Q4. How many times during the last two weeks did you refuse or avoid an invitation for dinner with friends or relatives due to your celiac disease?	4.83±2.10	4.99±2.03	0.411
	Q9. Did you encounter any difficulties with recreational activities or sports due to your celiac disease during the last two weeks?	4.89±2.06	5.16±1.85	0.117
	Q15. How many times during the last two weeks did you feel isolated from or excluded by others due to your celiac disease?	5.02±2.01	5.26±1.88	0.176
	Q18. To what extent did your celiac disease restrict your sexual activity during the last two weeks?	5.20±2.04	5.0±2.06	0.281
	Q20. How many times during the last two weeks did you feel that important people such as members of your family or friends showed a lack of understanding for your celiac disease?	4.81±2.01	5.19±1.93	0.037
	Q22. How many times during the last two weeks did you feel that colleagues or superiors showed a lack of understanding for your celiac disease?	4.75±2.10	4.66±2.09	0.622
	Q23. How many times during the last two weeks did you feel limited in your professional training or career by your celiac disease?	5±1.88	4.95±1.85	0.755
Worries subscale	Q7. How many times during the last two weeks were you concerned that your children could inherit or may have inherited your celiac disease?	3.52±2.30	3.98±2.22	0.026
	Q12. People with celiac disease often have worries and fears related to their disease. How many times during the last two weeks did you worry about or were afraid of getting cancer as a result of your celiac disease?	4.24±2.14	4.37±2.07	0.519
	Q24. How many times during the last two weeks did you feel burdened by the expenses and time required obtaining gluten-free food?	2.44±1.75	3.02±2.13	0.002
	Q25. How many times during the last two weeks did you feel burdened by problems with your health or pension insurance provider regarding meeting the costs of gluten-free food or other celiac therapies?	3.17±2.19	3.42±2.18	0.203
	Q26. How many times during the last two weeks did you experience lack of expertise regarding celiac disease from your doctors?	4.63±2.26	5.02±2.23	0.056
	Q27. How many times during the last two weeks did you worry that your celiac disease was diagnosed too late?	4.04±2.19	4.50±2.12	0.020
	Q28. How many times during the last two weeks did you suffer from fear of medical examinations in relation to your celiac disease, e.g. blood withdrawal or enteroscopy?	4.09±2.23	4.29±2.29	0.333
Gastrointestinal subscale	Q1. How many times during the past two weeks was your life affected by a sudden urge to visit a bathroom for a bowel movement?	5.04±1.79	4.93±1.70	0.506
	Q5. How often during the last two weeks have your bowel movements been loose?	5.19±1.74	4.95±1.64	0.110
	Q8. How many times during the last two weeks have you been troubled by cramps in your abdomen?	4.65±1.92	4.91±1.79	0.118
	Q11. How many times during the last two weeks did you suffer from bloating or flatulence?	4.13±1.89	4.62±1.97	0.005
	Q13. How many times during the last two weeks were you affected by a feeling of incomplete bowel evacuation?	4.79±1.91	4.97±1.69	0.277
	Q17. How many times during the last two weeks did you suffer from repeated belching?	5.49±1.77	5.45±1.75	0.781
	Q19. How many times during the last two weeks did you suffer from nausea or retching?	5.63±1.61	5.91±1.42	0.038

a significant difference between anxiety and gender (P=0.7). As well, our results confirmed the anxiety index not related to age (P=0.8). Two studies have shown no relationship between the anxiety in CD patients and demographic variables such as gender and age (17, 18). An Iranian study showed a higher incidence of psychological problems like anxiety and somatic symptoms in women CD patients; although, the duration of treatment with a GFD did not noticeably influence the presence of anxiety symptoms (19). Other studies reported a lower level of psychological and QoL well-being in female CD patients, it might be explained by general gender differences (20, 21). Some researchers revealed a lower quality of life in women, too (22).

A similar study performed in Italy claimed that the mean score of QoL was 154.5 (23); however, it seems patients with celiac have a better QoL but, it must be concerned that study was performed in a small province while the current study is comprehensive because conducted on 533 patients all over Iran.

We acknowledge some limitation in our study. Duration of treatment with a gluten-free diet (GFD) not intended. Patients who did not have a definite diagnosis or without any symptoms were not included in this survey. In addition to socioeconomic risk factors like income not evaluated.

Conclusion

In conclusion, epidemiologic studies reveal that different psychiatric disorders including schizophrenia, bipolar, depressive, anxiety, eating, autism, and ADHD spectrum disorders have been reported by coeliac patients (24). The relationship between behavioral disorders and quality of life in diseases has attracted interest among researchers in recent years. Naturally, in celiac that has no definitive treatment, it could have an important role. According to the evidence seems that CD women are more vulnerable compared to CD men nevertheless a few studies have focused on women's quality of life. We have shown that anxiety and patient gender have the most effect on quality of life. Furthermore, women with celiac disease have a lower quality of life in all relevant aspects. Therefore, receiving accurate and exact information about the CD and its dietary management is essential. Timely support is especially important for those who are newly diagnosed. Awareness of celiac disease needs improvement, and follow-up with a physician and a dietitian is essential for all patients with celiac disease. Finally, implementing nursing care, medical and psychological considerations of this category should be given more attention.

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Conflict of interests

All authors declare that they have no conflict of interest.

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