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Original Article:
Eating Disorders, Body Dissatisfaction, and Health-promoting Lifestyle: Comparing Coeliac Patients With Healthy People

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Abstract

Introduction: Celiac disease is associated with body, eating concerns, and life style problems. This study was performed with the purpose of comparing components of eating attitude, body dissatisfaction, and health promoting life style in celiac patients and with those in healthy people.

Materials and Methods: The method of the research is descriptive-causal comparative. The statistical population includes all 18-80 year-old celiac patients and healthy people from West Azerbaijan Province in 2016. Forty celiac patients were selected from those referred to the gastrointestinal clinic; 40 healthy people who were matched with respect to demographic characteristics were selected through availability sampling. They answered the Eating Attitude Test (EAT-26), the Body Image Concern Inventory (BICI), and the Health-promoting Life Style Profile (HPLP) questionnaires.

Results: The results of multivariate analysis of variance showed that the means of eating attitude (F=27.64) and body dissatisfaction (F=10.48) in celiac patients are significantly higher than those in healthy people. Also, the mean of healthy life style (F=18.89) in celiac patients is lower than that of healthy people.

Conclusion: Eating disorder symptoms and body dissatisfaction in celiac patient are significantly more than those in healthy people; moreover, health promoting life style in celiac patient is more insufficient than that of healthy people. Therefore, it is essential to pay more attention to the psychological status of these patients.

Keywords: Celiac disease, Eating disorder, Body dissatisfaction, Healthy life style

Introduction

Coeliac is a chronic immune system-related disease which is sensitive to gluten (a protein found in wheat, barley, and rye). This disease is characterized by mucosal lesions in small intestine which disturbs the absorption of food in affected intestine [1].

Coeliac is diagnosed in early childhood with symptoms such as diarrhea and malnutrition [2]. However, approximately 50% of adult patients do not report symptoms of diarrhea [3]. However, they report other symptoms such as weight loss, nutritional disorder [4], iron deficiency anemia, folic acid deficiency anemia, lack of calcium, vitamin D, and vitamin K [3, 4]. In addition, several extra-intestinal symptoms have been identified for coeliac disease [5]. The evidence confirms that there is a relation-

ship between coeliac disease and mental disorders such as depression, anxiety, chronic fatigue [6-8], obsessive-compulsive disorder [9], and eating disorders [10-15].

Eating disorder is a syndrome in which eating behaviors are disturbed. Affected individuals suffer from extreme anxiety about their body shape and weight [16]. Bulimia nervosa and anorexia nervosa are the most important eating disorders [17]. Several case-report studies have showed that eating disorders emerge along with oeliac disease [10-12]. Arigo et al. showed that the eating disorders are significantly higher in adolescents with coeliac [13]. They showed that women with coeliac have more body dissatisfactions, depression symptoms, and perceived stress than healthy ones [13]. Passananti et al. showed that altered eating behaviors are more common in untreated coeliac patients in comparison to healthy people [14]. The findings revealed that coeliac patients suffer from body dissatisfaction and concerns about their physical appearance [14].

Today, studies have confirmed the relationship between lifestyle and behavior management in chronic diseases. Recently, the incidence of infectious diseases has declined and has been replaced with chronic illnesses. Therefore, the origin of these diseases such as lifestyle and behavior of people should be investigated [18]. Lifestyle is the normal daily activities which are accepted by individuals; these activities impact the health of individuals, their life-quality, and also prevention of illnesses [19]. The healthy lifestyle is a multi-dimensional model which is created based on individuals' own perceptions and actions; it sustains and strengthens their health and self-actualization, reflects their desire to achieve excellence, and leads to desirable well-being level, individual development, and creative life.

It has six dimensions: interpersonal relationships, accountability in health, spiritual growth and self-actualization, stress management, nutrition, and physical activity [20, 21]. These behaviors directly affect the promotion of health and the prevention of diseases [22].

Many studies have shown that chronic diseases are associated with various dimensions of healthy lifestyle . For example, the accountable individuals take prescribed drugs according to instructions and do clinical examinations based on proposed programs [23]. It has been shown that religion and spirituality impact the physical and psychological health of people at different ages [24, 25]. Many studies have reported that there is a relationship between nutrition and disease. For example, the imbalance in consumption of fatty acids, vegetables, and fruits seems to be associated with incidence of coeliac disease [26]. Physical activity has been considered to be an important environmental factor in prevention and improvement of chronic diseases [27-30]. The close relationship between personal relationships and functioning of immune system is one of the main findings of neuropsychiatric immune research [31, 32]. Many pieces evidences of showed that annoying interpersonal relationship is associated with the incidence of chronic inflammation [33-35]. Research also showed that anxiety has harmful effects on physical and mental health [36-38]. There is ample evidence that daily stressors are associated with incidence of inflammation and impact body immune system [39-41]. These highlight the necessity of stress management. Hence, all lifestyle dimensions are likely to be associated with incidence of coeliac disease.

In general, coeliac disease seems to be associated with eating disorders and body dissatisfaction. Due to ambiguities and mixed results, new research is warranted. Considering that the dimensions of healthy lifestyle are likely to be the underlying causes of health, promotion of health and disease prevention are directly associated with these behaviors. This has remained underrepresented. To fill this gap, the present study aims to compare the patients with coeliac and healthy people in terms of eating disorders, body dissatisfaction, and healthy lifestyle .

Materials and Methods

This was a descriptive causal-comparative study. The population consisted of all patients with coeliac and healthy people in Western Azerbaijan province. Using convenience sampling method, 40 patients with coeliac were selected. The control group was selected from among patients' companions; their age, gender, marital status, education level, and occupation were matched with those of the experimental group. The research tools included Health-promoting Lifestyle Profile (HPLP), Binge Eating Scale (BES), and Body Image Concern Inventory (BICI). After removal of incomplete questionnaires, the data of 74 questionnaires (37 coeliac patient and 37 healthy) were analyzed using SPSS v. 16 software.

Instruments

The following research tools were used to collect data:

Health-promoting Lifestyle Profile (HPLP): Walker et al. questionnaire was used to assess healthy lifestyle. This questionnaire consists of 48 questions and six subscales including health responsibility, physical activity (exercise), nutrition, self-actualization (spiritual growth),

interpersonal support, and psychological pressure management; it uses a four-point scale (1=never, 4=always). The high scores in this questionnaire indicate higher levels of healthy lifestyle. Walker et al. confirmed the validity of this questionnaire based on exploratory factor analysis; its reliability was determined to be 0.86 for health responsibility, 0.85 for exercise, 0.80 for nutrition, 0.86 for spiritual development (self-actualization), 0.87 for interpersonal support, 0.79 for stress management, and 0.94 for total questionnaire [42]. In Iran, Mohammadi Zeidi et al. evaluated the validity and reliability of this questionnaire; the cronbach's alpha was determined to be 0.64 for self-actualization, 0.86 for health Responsibility, 0.75 for interpersonal support, 0.91 for stress management, 0.79 for exercise, 0.81 for nutrition, and 0.82 for total questionnaire [43].

Eating Attitudes Questionnaire (EAT): Developed by Garner et al., the EAT-26 questionnaire [44] has been widely used as a self-assessment screening tool to investigate the abnormal eating attitudes and behaviors and contains 26 questions. The EAT-26 items are graded according to Likert scale. The answers to questions 1 to 26 are weighted from 1 to 3. Accordingly, in questions 1 to 25, "always, almost always, and often" are scored 2, 3, and 1, respectively; the next options have zero point. In question 26, "sometimes, rarely, and never" options are scored 1, 2, and 3, respectively; the next options have zero point. Therefore, the EAT-26 scores may range from zero to 78; the cut-off point 20 and above indicates the likelihood of the existence of an eating disorder [45]. The efficacy of this questionnaire in identifying bulimia nervosa and anorexia nervosa is confirmed [46]. In Iran, the validity and reliability of this scale is reported to be optimal [47].

Body Image Concern (BIC): It was developed in 2005 [48]. In Iran, Mohammadi and Sajadinejad evaluated its psychometric properties. It includes 19 items and is a self-report questionnaire. The five-point Likert scale (1=never, 5=always) is used to answer the questions. Therefore, the range of scores is between 19 and 95; the higher the score, the greater the body dissatisfaction. This tool has optimal validity and reliability. The internal consistency of this tool was investigated and the Cronbach's alpha coefficient was determined to be 0.93. The correlation coefficient between questions and total score ranged from 0.32 to 0.73 and the mean of correlation was determined to be 0.62. The convergent validity of this scale was calculated by computing its correlation with obsessive-compulsory questionnaire and eating disorder questionnaire to be 0.62 and 0.40, respectively. In Iran, the validity of questionnaire was evaluated by 209 high school students in Shiraz using duplication and internal consistency method; it was determined to be 0.66 and 0.84, respectively [49].

Result

In both the treatment and the control groups, 32.4% were men (n=12) and 67.6% were women (n=25). The mean and standard deviation of age in treatment and control groups was 39.72±13.57 with a range of 21-80 years old and 40.59±12.64 with a range of 18-70 years old, respectively. The duration of diagnosis had a mean of 3.25 and standard deviation of 2.81 in range of 1-11. In the treatment group, the education level was 32.4% under diploma, 32.4% diploma, 29.7% associate and bachelor, and 2.7% higher than bachelor. In the control group, the education level was 24.3% under diploma, 32.4% diploma, 29.7% associate and bachelor, and 13.5% higher than bachelor. The mean and standard deviation of attitudes toward eating, body dissatisfaction, health-promoting style, and its components in the treatment and the control groups are provided in Table 1.

In order to prevent multicollinearity effect, the life-promoting lifestyle components were analyzed separately from total score. Therefore, the scores of attitudes toward eating, body dissatisfaction, and healthy lifestyle were compared between the two groups on the one hand, and the scores of healthy lifestyle components were compared on the other hand. Shapiro-Wilk, Levene, and Box tests were used before using Multivariate Analysis of Variance (MANOVA) to observe its assumptions. In Shapiro-Wilk test, the statistic of all variables was in range (0.94-0.97) and the significance level was in range (0.05-0.12); thus, the variables were normally distributed. The results of Levene test for eating attitude (P=0.62, F=0.00), body dissatisfaction (P=0.62, F=0.24), and healthy lifestyle (P=0.90, F=0.015) showed that the condition of equality of intergroup variances is observed. The Box test results (P=0.811, F=0.49, BOX=3.15) were not significant; therefore, the condition of homogeneity of variance/ covariance matrices is confirmed. The significance of Bartlett test (X^2=284.784, df=35, sig=0.0001) indicates that there is a sufficient correlation between dependent variables, so the multivariate test may be used.

The results of Wilks Lambda test in multivariate analysis of variance showed that the effect of group on attitude toward eating, body dissatisfaction, and healthy lifestyle is significant (P<0.001, $F_{(6, 58)}$=12.99, Wilks Lambda=0.61). The results show that the difference between two groups is significant; the difference is 39% and this means that 39% of variance in difference between two

Table 1. Mean±SD of attitude toward eating, body dissatisfaction, healthy lifestyle, and its components in treatment and control groups

Variables	Mean±SD	
	Patients	Healthy People
Attitude to eating	16.25±5.38	9.24±5.36
Body dissatisfaction	40.81±10.33	32.57±10.18
Healthy lifestyle	101.69±12.42	114.70±11.71
Spiritual growth	19.34±4.44	23.91±4.24
Health responsibility	30.59±6.06	30.18±4.98
Interpersonal relations	17.94±3.34	20.33±3.37
Stress management	9.84±1.48	11.4896±1.54
Exercise	8.87±2.07	11.39±2.45
Nutrition	15.09±2.08	17.39±2.30

Table 2. Results of ANOVA test to determine the difference between groups in terms of studied variables

Variables	MS	F	Sig.	Eta2
Attitude to eating	797.79	27.64	0.000	0.31
Body dissatisfaction	1102.20	10.48	0.002	0.14
Healthy lifestyle	2749.60	18.89	0.000	0.23

groups is due to interaction of dependent variables. The above test allowed the use of multiple variance analysis.

The results of multivariate analysis of variance showed that the mean scores of eating attitude (F=27.64) and body dissatisfaction (F=10.48) are significantly higher in patients than healthy people and the healthy lifestyle (F=18.89) is significantly lower in patients than healthy people (Table 2).

The Multivariate Analysis of Variance (MANOVA) assumptions were first analyzed to examine the differences between two groups in terms of healthy lifestyle components. The results of Levene's test for spiritual growth (P=0.92, F=0.009), health responsibility (P=0.23, F=1.50), interpersonal relations (P=0.67, F=0.18), stress management (P=0.59, F=0.29), exercise (P=0.34, F=0.89), and nutrition (P=0.63, F=0.23) components showed that the condition of equality of intergroup variances is observed. The Box test (P=0.58,

Table 3. Results of ANOVA test to determine the difference between groups in studied variables

Variables	MS	F	Sig.	Eta2
Spiritual growth	338.61	17.99	0.000	0.22
Health responsibility	2.75	0.90	0.76	0.001
Interpersonal relations	93.25	8.28	0.005	0.12
Stress management	43.75	19.08	0.000	0.23
Exercise	103.08	19.95	0.000	0.24
Nutrition	85.96	17.78	0.000	0.22

F=0.91, BOX=21.25) was not significant; thus, the condition of homogeneity of variance/ covariance matrices is confirmed. The significance level of Bartlett test (X^2=284.784, df=35, sig=0.0001) indicates that there is a correlation between dependent variables, so the multivariate test may be used.

The results of Wilks Lambda test in multivariate analysis of variance showed that the effect of group on thecomponents of healthy life style are significant (P=0.001, $F_{(6, 58)}$=10.18, Wilks Lambda=490). The results show that the difference between the two groups in dependent variables is significant; the difference is 51% and this means that 51% of variance in difference between two groups is due to interactions of dependent variables. This test allowed the use of mu The results of multivariate analysis of variance showed that the mean of spiritual growth (F=17.99), interpersonal relations (F=8.28), stress management (F=19.08), exercise (F=19.95), and nutrition (F=17.78) scores was significantly lower in patients than healthy people. However, there was no significant difference between the two groups in terms of health responsibility component (F=0.90) (Table 3).

Discussion

This study was conducted to compare patients with coeliac and healthy people in terms of eating disorders, body dissatisfaction, and healthy lifestyle . The findings showed that there is a significant difference between two healthy and patient groups in terms of the studied variables; the patients with coeliac had higher scores in attitudes toward eating and body dissatisfaction and lower scores in healthy lifestyle than healthy people.

The findings showed that the eating behavior of coeliac patients is disturbed and significantly different from those of the control group. Also, the body dissatisfaction was significantly higher in coeliac patients than control group. These findings are consistent with previous studies [10-15]. Probably, a number of concurrent factors explain the increased disordered eating behavior in untreated coeliac patients. First, the changed mental status in coeliac patients (such as association of emotional and sleep disturbances with coeliac disease) may be an already known reason [7, 50]. Second, the increased incidence of eating disorders may be related to food; high carbohydrate intake is associated with gastrointestinal symptoms which are observed in coeliac patients compared to healthy people [50]. Therefore, the gastrointestinal symptoms may cause the change of eating habits among coeliac patients [51]. Arigo et al. refers to the important role of anxiety in incidence of digestive diseases. These patients may be very anxious and fearful of gastrointestinal symptoms associated with food intake in the past. This may lead to their dislike of a variety of unfamiliar foods [14].

It has also been assumed that the hormones and other mediators play an important role in changing eating behaviors [52]. On the other hand, it is shown that people on the diet control is twice more likely to have an eating disorder than control group [53]. These people and also those with digestive disorders are more likely to be at risk of disturbed eating behaviors because of the ongoing control of food intake [54]. On the other hand, the disturbed eating behaviors and consequent anxiety may cause an imbalance in the immune system. Marcos suggests that the immune system changes with disturbed nutritional behaviors such as eating disorders [55].

This study showed that the body dissatisfaction was significantly higher in coeliac patients than healthy people; this is consistent with the findings of previous studies [13-15]. Depression and anxiety are common among coeliac patients and this may be the cause of their body dissatisfaction. Also, most coeliac patients have normal or high BMI and a significant number of them are overweight [56, 57]; these may be the cause of their high body dissatisfaction.

For various reasons, the body dissatisfaction and body dissatisfaction are related to biological processes such as increased systemic inflammation. The research has also shown that body dissatisfaction is very high in inflammatory conditions caused by obesity [58-60].

Body dissatisfaction causes stress and physiological responses [61]. Several studies have pointed out that the stressors are associated with impaired immune function and inflammation [39-41]. Therefore, the dissatisfaction may trigger the activation of psychological factors and this is the risk factor of many common diseases.

In addition, body dissatisfaction has been shown to be an important and significant predictor of inflammation which leads to an increase in inflammatory biomarkers, c-reactive protein(CRP) and Tumor necrosis factor (TNF-α). After controlling for the effects of obesity, gender, age, sleep duration, smoking status, and alcohol consumption, this relationship was still significant; this indicates that there is a direct physiological correlation between body dissatisfaction and inflammation [62].

The mean scores of healthy lifestyle s were significantly lower in coeliac patients than healthy group. This is

consistent with findings of Kheirjoo et al. and Vahedi et al.; they also showed that the scores of chronic patients are significantly lower than healthy people [63, 64].

In all healthy lifestyle dimensions (except health responsibility), the mean scores of coeliac patients were lower than healthy people. The reasons for the difference between two groups in terms of lifestyle dimensions are discussed below.

The mean of spiritual growth dimension was significantly different in the two groups; this was consistent with finding of Kheirjoo et al. [63], and inconsistent with that of Vahedi et al. [64].

Spirituality may prevent diseases with various mechanisms. The social networks, spiritual support, and psychological and physiological mechanisms are among the most important mechanisms [65].

According to Baldacchino and Draper [66], spiritual actions may increase self-improvement. Also, religion and spirituality may be used to cope with physical diseases [67]. The sense of satisfaction which results from spiritual actions positively impacts brain mechanisms, neuropeptide messenger, and body systems and organs such as cardiovascular system, immunity, and so forth. These, then, prevent diseases, increase disease tolerance, and lead to faster recovery.

The mean of healthy lifestyle scores was not significantly different in the two groups; this is inconsistent with finding of Kheirjoo et al. and consistent with that of Vahedi et al. [63, 64].

One of the reasons that the health responsibility score of healthy people was not higher than that in the coeliac patients is that if one does not understand his/her health problems, he/she will not try to promote his health. Therefore, the healthy people do not consider health control as essential to have a healthy life [68]. The mean score of nutrition and physical activity was significantly higher in healthy people; this is consistent with findings of previous studies [63, 64].

It is shown that there is a relationship between nutrition and inappropriate diet and coeliac disease [26]. It can be said that healthy eating habits prevent many chronic diseases. There is convincing evidence that the increased consumption of fruits and vegetables decreases the risk of high blood pressure, coronary heart disease, heart stroke, and incidence of type 2 diabetes and also prevents the incidence of asthma, chronic obstructive pulmonary disease, and rheumatoid arthritis [69]. However, it should be noted that the disturbed eating behaviors in coeliac patients may lead to inappropriate eating habits.

The effect of physical activity on health is also considered as an important factor and has been shown to contribute to the prevention and improvement of cancer, cardiovascular disease, diabetes, and chronic inflammatory diseases [27-30].

On the other hand, the health situation of people affects the frequency of their participation in health-promoting behaviors [70]. The undesirable physical and mental health affects the participation of individuals in physical activities and reduces their physical activity level [71].

The mean score of interpersonal relationships was higher in healthy people than that in patients; this is inconsistent with findings of previous studies [63, 64].

It is possible that the emotional disorders which are associated with coeliac disease affect and weaken the interpersonal relations of these patients. On the other hand, it may be that the poor interpersonal relationships be the underlying cause of this disease. The supportive relationships may significantly improve health-promoting behaviors, while communication problems may lead to harmful behaviors such as less physical activity, sleep disturbances, unhealthy diet, and increased use of alcohol and other drugs [72]. Finally, the mean of stress management was significantly higher in healthy people than that in the patient group; this is consistent with finings of previous studies [63, 64].

Due to depression and anxiety associated with coeliac disease, the patients may not be adequately motivated to manage stress. On the other hand, the poor stress management and tolerance of various stressors may have contributed to development of disease. Several studies have pointed to the relationship between stressors and disturbed immune function and inflammation [39-41], as well as the harmful effects of anxiety on mental-physical health [36-38]. It can be said that the reduction of stress through proper and effective methods may prevent multiple diseases. According to research, stress management techniques enable people to better deal with stressful situations, gain more control over their physical and mental condition, and thereby improve their health [73]. Today, the positive effect of psychological interventions on improvement of chronic physical diseases has been confirmed [73].

Conclusion

These findings revealed that patients with coeliac had higher scores in attitudes toward eating and body dissatisfaction and lower scores in healthy lifestyle than healthy people. Thus, it is suggested that in addition to medical treatment, these patients be provided with psychological services to improve their mental health and healthy lifestyle . Certainly, more research, including longitudinal research, is needed to clarify whether poor lifestyle and eating disorder symptoms underlie celiac disease or cause celiac disease.

Ethical Considerations

Compliance with ethical guidelines

All ethical principles are considered in this article. The participants were informed of the purpose of the research and its implementation stages. They were also assured about the confidentiality of their information and were free to leave the study whenever they wished, and if desired, the research results would be available to them. A written consent has been obtained from the subjects. principles of the Helsinki Convention was also observed.

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Authors' contributions

All authors equally contributed to preparing this article.

Conflict of interest

The authors declared that they have no conflict of interest.

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