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The relationship of gastroesophageal reflux with nutritional habits and mental disorders

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ABSTRACT

Gastroesophageal reflux disease (GERD) is one of the most common health problems of the upper gastrointestinal system, in which complex biopsychosocial factors play a role in its development. In addition to bad nutritional habits, it is known that psychological stress has aggravating effects on gastroesophageal reflux symptoms. Presenting the current evidence obtained from studies on this subject can be a guide for both clinicians and patients.

The role of various factors such as poor eating habits, obesity, stress, anxiety, sedentary lifestyle, sleep disorders, smoking and alcohol in the etiology of GERD is emphasized. Pharmacotherapy is considered first-line therapy for patients with GERD, but lifestyle modification, including dietary changes, is an important element in supporting the treatment of the disease. However, although lifestyle change offers a more effective, lower cost and less side-effect treatment, it is often seen to be insufficient in practice.

The results of the studies show that reflux is closely related to mental state and eating habits affect both reflux and mood. In the management of GERD, the evaluation of biopsychosocial factors together and the application of a multidisciplinary approach can make a significant contribution to increase the success of the treatment and quality of life.

1. Introduction

Gastroesophageal reflux disease (GERD) is an important health problem which occurs due to the reflux of stomach contents into the esophagus or oral cavity [1]. The global incidence of GERD has been reported as 13.98%. While it is seen at relatively higher rates (10.0–33.0%) in North America, Europe and the Middle East, it varies between 2.5% and 7.8% in East Asia, while in Turkey it is similar to western countries (10.0–20.0%) [2].

Gastroesophageal reflux (GER) can be defined as the involuntary passage of stomach contents into the esophagus, which develops physiologically during the adaptation of the stomach to foods in the postprandial period, also in healthy individuals. Temporary relaxation of the lower esophageal sphincter (LES) or the inability of the sphincter tone to adapt to changes in intra-abdominal pressure may cause reflux. Stomach contents that have escaped into the esophagus are often made up of acid, pepsin, and sometimes bile. Physiological reflux is short-lived and does not cause any symptoms. If reflux causes disturbing symptoms or esophageal injuries and negatively affects quality of life, this condition is defined as gastroesophageal reflux disease (GERD) [1,3].

The most characteristic symptom of the disease is heartburn, which occurs at least once a week. Other symptoms are chest pain not related to ischemic heart disease, effortless regurgitation, paroxysmal cough (mostly at night), sore throat, gingivitis or damage to tooth enamel. *Heliobacter pylori* gastritis, obstructive sleep apnea, obesity and hiatal hernia are risk factors for GERD [4].

GERD can cause various physiological problems (such as regurgitation of food or sour stomach contents, difficulty swallowing, laryngitis, chronic cough, burning sensation in the chest, abdominal pain)3,5,6 as well as psychosocial problems such as depression, anxiety, behavioral maladaptations and sleep disorders.7,8,9,10 These problems all contribute to the reduction of quality of life.

If the disease is not treated, it can lead to complications such as esophageal stricture, gastrointestinal bleeding, and esophageal adenocarcinoma [5]. GERD is generally classified into three subtypes: reflux esophagitis (RE), non-erosive reflux disease (NERD), and Barrett's esophagus (BE).

Treatment of the disease is usually with drugs known as proton pump inhibitors (PPIs). Long-term use of PPIs is known to associate with bone fractures, chronic or acute renal disease, pneumonia, and intestinal

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infections [1]. A significant proportion of patients, ranging from 10 to 40%, do not respond adequately to PPI treatment. This condition is known as refractory GERD (rGERD), which is not only impairs patients' quality of life, but also significantly increases healthcare costs [5]. In addition to drug therapy, behavioral changes in dietary habits and lifestyle may be helpful in preventing reflux symptoms. Suggestions for behavioral change include not going to bed right after dinner or avoiding eating late at night; not to consume mint, chocolate, spicy or acidic foods; avoiding coffee, tea, carbonated drinks and smoking; raising the head of bed by 15–20 cm are considered. Weight loss may also be helpful in obese individuals [2,6].

It is known that the relationship between systemic and psychiatric diseases is bidirectional and this situation further increases the complexity of the underlying pathophysiological processes [7]. The results of a recent meta-analysis showed a significant positive association between psychosocial disorders and GERD. GERD patients are more likely to develop psychosocial disorders than healthy people; it has also been reported that psychosocial disorders may increase the risk of GERD [8]. Studies have found that the most common psychiatric disorders associated with GERD are anxiety disorders and depression [8,11–14]. Physical and/or psychological stress associated with systemic disease may lead to the activation of the immune response system, resulting in increased local and systemic release of proinflammatory cytokines [11]. Increased levels of inflammatory mediators in the central nervous system (CNS) are potentially important contributors to the deleterious cellular and morphological adaptations that underlie the development of comorbid mental illness (Fig. 1).

Studies have found that different emotions underlie various physiological diseases experienced in the body [1,15]. In this context, it was observed that emotions such as rage-anger settled in the stomach area. It has been determined that, with the elimination of rage and anger feelings with psychotherapies, much faster recovery with medication is experienced in physiological disorders of the stomach [12,14].

The increasing effects of psychological stress on gastroesophageal reflux have been shown in various studies [8,13,16]. In a study examining the relationship of GERD with eating habits, anger level and anxiety status in hospital employees [17], Beck Anxiety Scale (BAI) scores were found to be significantly higher in those with reflux (14.74 ± 1.64 and 8.82 ± 0.58, respectively; $t = 4.2$; $p < 0.001$). In addition, the rate of those who reported that their lifestyle was stressful was higher in the group with reflux ($\chi^2 = 13.149$, $p = 0.001$). Wang et al. [12] in their study in which they compared the RE group (n = 361) consisting of individuals diagnosed with definite reflux esophagitis (RE) and the control group (n = 328) consisting of healthy individuals without heartburn, regurgitation and other gastrointestinal symptoms; drinking brewed tea, preferring acidic foods, overeating, having a short interval between dinner and sleep, and a history of anxiety, depression, constipation and hypertension have been associated with reflux.

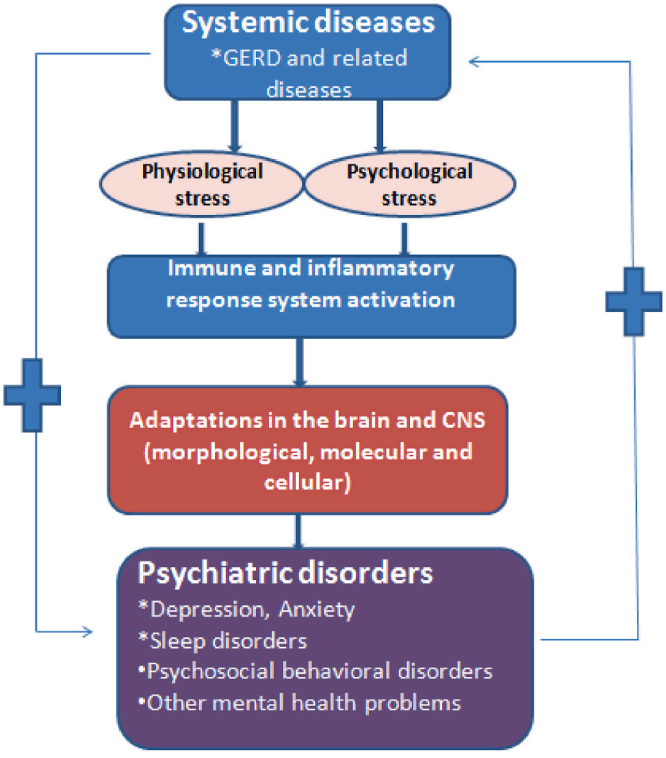

Fig. 1. The relationship of GERD as a systemic disease with psychiatric disorders.

Sleep disorders are often caused by lifestyles, wrong eating habits and/or digestive system diseases. The most important cause of sleep disturbance is awakening due to problems such as indigestion, heartburn, increased acidity, cough or respiratory distress. It is believed that there is a reciprocal relationship between reflux and sleep disorders. On the one hand, GERD symptoms cause difficulty in falling asleep, interrupted sleep, and early morning awakenings; while on the other hand, insomnia has an increasing effect on esophageal hyperalgesia [6]. Some occupations that affect sleep patterns and lifestyle habits (such as shift work occupations) may play a role in the etiology of GERD [2].

It has been suggested that reflux negatively affects the quality of life of individuals and may impair their daily activities [19]. In a study aiming to determine the main variables affecting the quality of life of GERD patients [20], it was found that their quality of life was negatively affected by increasing age and high body mass index (BMI). It was determined that none of the other demographic variables and accompanying diseases had a significant effect on the quality of life of the participants. Similar to individuals with inflammatory bowel disease, an assessment of quality of life can be an important guide for treatment, as individuals with GERD also experience a decline in their quality of life.

In this article, the relationships of GERD with food, nutritional habits, some nutritional components and mental disorders were examined.

1.1. *The relationship between reflux and diet*

Diet has an important role as an environmental factor in GERD, which is a multifactorial disease affected by both genetic predisposition and environmental factors. Obesity, smoking, alcohol and excessive caffeine consumption, fatty or fried foods, chocolate and hiatal hernia are among the factors that increase the risk of GERD [21]. Modifiable risk factors related to diet include long meal-sleep intervals, rate of eating, and quantity and temperature of food. Alcohol, chocolate and high-fat food intake reduces esophageal sphincter pressure and increases esophageal exposure to gastric fluids. In a systematic review examining the relationship between reflux disease and diet [22], it was concluded that consumption of citrus fruits, fizzy drinks, spicy and fried foods increased the risk of developing this disorder, while diets rich in vegetables, fiber, antioxidants and caffeine were not significantly associated with increased risk of dysphagia. In addition, a specific diet that plays an effective role in GERD has not been determined.

It is seen that the nutrition and lifestyle changes that form the basis of GERD treatment are generally ignored by the experts and are not applied sufficiently by the patients. Patients mostly report that nicotine, alcohol, carbonated drinks, caffeine or coffee, chocolate, onions, tomato sauce, mint, citrus fruits and their juices, fatty and spicy meals aggravate GERD-related symptoms [2]. However, the effect of avoiding these foods or the role of dietary therapy and its mode of administration is not well defined. While concerns remain about the side effects of long-term use of PPIs, patients and healthcare professionals are becoming increasingly interested in the role of diet in reflux management [23].

Obesity is considered a risk factor not only associated with GERD, but also with its complications such as reflux esophagitis, Barrett's

esophagus, and esophageal adenocarcinoma. It has been reported that this relationship is associated with central obesity triggering reflux by increasing intra-abdominal pressure and disrupting anti-reflux mechanisms [2]. However, it has been suggested that visceral adipose tissue (VAT) produces a large number of cytokines, leading to esophageal inflammation and disruption of mucosal barrier integrity, thereby sensitizing the esophageal mucosa to GERD-induced injury [24].

In their study Ahmet et al. [25] investigated the relationship between GERD and lifestyle and eating habits in a total of 2000 outpatients in Pakistan. In the study, some lifestyle factors such as less exercise time (90.9%), the habit of eating snacks in the middle of the night (78.3%), and the time between dinner and sleep less than 2 h (87.3%), were found to be highly correlated with GERD. Among lifestyle factors, it has been reported that especially lack of physical activity, smoking, insufficient sleep, late evening meals and going to bed after dinner were closely associated with GERD symptoms.

A systematic review investigating the relationship between GERD occurrence and different foods and dietary patterns found a significant relationship between adherence to high-fat diets and increased risk of GERD [22]. Consumption of large, high-fat meals was associated with increased acid exposure time in patients compared to low-fat meals, as well as accelerate the development of GERD by reducing lower esophageal sphincter (LES) pressure. This review also concluded that, contrary to what is known, consuming high-salt foods, spicy foods, smoked foods and fast foods does not significantly increase the risk of GERD. It has been reported that increased salt intake is only effective in reducing LES pressure and cannot increase the risk of GERD alone, and in Asian populations, consuming spicy foods and then going to bed after a meal are effective in increasing the risk of GERD. Vegetables (raw or cooked vegetables), dietary fiber, dairy products, and antioxidants were not significantly associated with an increased incidence of GERD. This result suggests that adherence to a Mediterranean diet (rich in vegetables, fiber and antioxidants) may play a preventive role in GERD, especially in patients with underlying disease. Furthermore, consumption of tea, coffee, chocolate and alcohol was not found to be significantly associated with the risk of developing GERD. Fizzy drinks can increase the likelihood of dysphagia reflex by altering the acidity of the gastrointestinal tract, especially the stomach, and affecting digestion. It should also be noted that these beverages contain high levels of acidity, added sugars and artificial sweeteners, and caffeine, which alter LES pressures and intraesophageal pH [23].

A study [26] examining the relationship between the DASH-style diet approach and GERD risk and symptoms in adolescents found that adolescents with the highest adherence to the DASH-style diet had a lower chance of developing GERD.

Although inconsistent results were found in some studies due to the problems arising from the method of the studies, the following suggestions can be developed in the light of the findings of the existing studies: These include reducing the portion size consumed at meals; consume less foods rich in fat, sugar and animal protein; avoiding triggers and allergens such as soda, cigarettes, alcohol, caffeine; avoiding food within 3 h of bedtime; raising the head of the bed, regular exercise and maintaining healthy eating habits such as the Mediterranean diet. Furthermore, dietary supplements such as digestive enzymes, glutamine, licorice root, magnesium, and probiotics have been suggested to alleviate the severity and frequency of symptoms [27,28].

The relationship between GERD and diet is summarized in Table 1.

Studies examining the effectiveness of certain elimination diets (soft drinks, carbonated beverages, tea, coffee, chocolate, fatty and fried foods, spices, etc.) yield conflicting results [5,12,23,29], has encouraged researchers to explore the role of macronutrients.

1.2. Effects of macronutrients

Understanding the mechanisms of action of dietary components can make an important contribution to the management of GERD, as well as understanding the pathophysiology of the disease. Carbohydrates, proteins and fats, the three main macronutrients of the human diet, have different biochemical compositions and calorie densities. These dietary components have various tasks in the body, such as generating energy and maintaining cellular metabolic activities.

Table 1
GERD and diet relationship.

Dietary components	Effect on GERD symptoms
Specific food and drinks	
Acidic foods/drinks	Irritation of the esophageal mucosa
Carbonated drinks	Increase in gastric distension/Temporary LES relaxation
Coffee	Decreased LES tone
Alcohol	Decreased LES tone and gastric motility
Chocolate	Decreased LES tone
Mint	Decreased LES tone
Spicy food	Irritation of the esophageal mucosa
Macronutrients	
Fats	Decreased LES tone and gastric motility
Carbohydrates	Decreased LES tone
Eating behaviors	
Eating late at night	Increased gastric acid production
Large meal	Increased gastric distension and transient LES relaxation
Calorie-dense meal	Increased gastric distension and transient LES relaxation

(*GERD, gastroesophageal reflux disease; LES, lower esophageal sphincter*).

1.2.1. Carbohydrates

When disaccharides and polysaccharides from carbohydrates are consumed in the diet, they are partially absorbed in the small intestine and then fermented by bacteria in the colon. It has been shown that this fermentation process can induce heartburn by inducing neurohormonal release (cholecystokinin = CCK) and lower esophageal sphincter (LES) relaxation [30]. Various studies have reported that diets high in total carbohydrates and simple sugars increase esophageal acid exposure time and the number of reflux episodes [30,31]. In contrast, a study of patients on a low-glycemic diet found a statistically significant improvement in symptoms, but the patients lost surprisingly weight over the same time period [32].

While increased intake of monosaccharides and starch was associated with increased symptoms, the opposite effects were found for fiber intake [33]. It was determined that 36 patients who previously consumed a low-fiber diet (<20 g/day) followed by psyllium three times a day had a reduction in both symptoms and mean reflux episodes [34]. Although the mechanism of fiber healing heartburn is not well known, it should be noted that excessive fiber consumption may increase reflux symptoms.

In addition, it can be thought that prebiotics taken with fibrous foods may play a role. Prebiotics contribute to the bidirectional communication between the gut and the brain by enabling the reproduction and colonization of probiotics in the gut. Products containing pre- and probiotics together are called symbiotics and have a stronger effect potential.

1.2.2. Proteins

Although there are opinions that proteins will increase LES pressure, there have not been enough studies examining the relationship between GERD and dietary proteins. In a study [35] conducted to evaluate the effect of diet on the occurrence of proximal reflux attacks in laryngopharyngeal reflux (LPR) patients, a multi-channel intraluminal impedance-pH monitoring (MII-pH) method was used. As a result of the study, it was determined that the consumption of foods with high fat and sugar content but low in protein, and acidic foods and beverages were associated with more reflux attacks in LPR patients. In another study [27] examining the effects of a diet rich in animal or vegetable protein in a group of patients with different reflux symptoms, vegetable proteins were associated with fewer reflux, especially acid reflux, and fewer symptoms in the first hour after a meal.

In a systematic review of dietary and lifestyle factors related to GERD [36], vegetarian diets were negatively correlated with GERD, while protein and fat were positively correlated. In non-erosive reflux patients (NERD), consumption of vegetables, fruits, milk and tea was negatively associated with NERD, while the relationship between egg and NERD was inconsistent. In this review, based on studies examining the relationship between reflux esophagitis (RE) and diet, it was determined that refined carbohydrate, protein, fat and energy intake were positively associated with RE.

Studies of dietary intervention also suggest that reducing the consumption of a diet rich in fat and refined sugars may have a positive effect by reducing the risk of progression of BE to adenocarcinoma [21, 22,29–31].

1.2.3. Fats

It is hypothesized that high-fat diets, especially foods rich in fat or fried, worsen GERD symptoms. Fat is the nutrient with the highest energy value, and its digestion requires the secretion of bile salts and cholecystokinin. Bile salts have esophageal irritant potential, while cholecystokinin can stimulate LES tone by neurohormonal pathways.

Study results regarding the effects of high- and low-fat diets on reflux symptoms are conflicting. It was thought that the fact that variables such as total calorie intake, BMI values, and fatty acid types (saturated, unsaturated, medium (MCT) and long (LCT) chain triglycerides) were not taken into account in these studies may have led to conflicting results [37–39].

Kubo et al. [40] investigated protein and fat as dietary factors, and lifestyle factors such as smoking and alcohol consumption (excluding beer and wine). The study included 317 individuals diagnosed with GERD and 182 individuals as the control group. According to the results of the study, while vegetarian diets, consumption of fruits, vegetables, vitamins and fiber, 3 h or more between dinner and sleep or physical exercise, the frequency of GERD was negatively correlated, while poor eating habits showed a positive correlation.

A study examining the effects of specific diets found that those following a traditional Mediterranean diet had a lower incidence of GERD symptoms [41]. It is known that the Mediterranean diet, in which refined sugars, saturated fats, red meat and processed foods are consumed less, but whole grains, legumes, vegetables and fruits, nuts, fish and olive oil are consumed more, have positive effects on both physical and mental health [42].

1.3. Effects of probiotics

Probiotics are defined as live microorganisms that have positive effects on the health of the host when consumed in sufficient quantities. A new class of probiotic microorganisms known to have positive effects on mental health through the microbiota-gut-brain axis is referred to as psychobiotics [43]. It is thought that taking psychobiotics in the composition of fermented foods or as nutritional supplements will have beneficial effects on general health as well as mental health [44].

Since it is known that there will be no physical health or vice versa without mental health, it can be predicted that pre- and probiotics will have indirect effects on reflux symptoms. Evidence suggests a link between gut dysbiosis, or an imbalance of the organisms that make up the gut microflora, and various mental illnesses, including anxiety and depression [45].

It has been accepted that probiotics benefit intestinal health by improving intestinal functions. Furthermore, it has been suggested to have a wide variety of activities, such as metabolic effects resulting from enzymatic activities, effects on the barrier function of the gut, and effects on the central nervous system and enteric immunity [46]. The effects of probiotics, especially on the lower digestive system, are better understood, and their activities in the upper gastrointestinal (GI) tract are not well known. In a systematic review examining the effects of probiotics in GERD, it was reported that probiotics have beneficial effects on some GERD symptoms (regurgitation, indigestion, heartburn and nausea, abdominal pain, and flatulence) [47].

1.4. The influence of nutrition and mood

In addition to contributing directly to the development of reflux, foods and nutritional components can indirectly affect the development or severity of reflux symptoms by affecting the mood. Because it is known that there is a reciprocal relationship between food preferences and diet and mood, and that this relationship is mediated by the gut-microbiota-brain axis [48]. It has been suggested that depression may develop as a result of the effects of changes in the gastrointestinal system microbiome caused by diet-related factors in reflux on the brain [49]. It is now better understood that the gut-brain axis plays an important role in the relationship between nutrition and psychological disorders. Accordingly, dietary interventions such as the use of pre- and probiotics for modulation of the gut microbiota have been shown to be promising in improving depressive symptoms [45].

The central nervous system (CNS) plays an important role in the conscious perception of the senses and maintaining homeostasis, as well as the control of food intake. The entire process of digestion and absorption is precisely driven by complex neuro-humoral feedback mechanisms through which the gut can sense and respond to intraluminal stimuli. These reflex pathways are distributed within the autonomic and enteric nervous system. Stimuli in the gut can also activate afferent brain pathways. Thus, when a food is consumed, sensory experiences such as satiety are induced, as well as digestive responses. These experiences are related to the hedonic dimension of sensory experience. There is a dynamic bidirectional communication mediated by neural and humoral pathways between the host and the microbiota. Both the compounds released during the digestion-absorption process of foods and the metabolites produced in the microbiota may play a role in mood [50].

Neurobiological mechanisms thought to play an important role in the comorbidity of GERD and depression are summarized below [8].

Psychological disorders can affect the perception of esophageal pain, causing patients to feel hypersensitive to internal organs. Because the neurotransmitter serotonin, which is effective in mood, is also effective in pain perception and an important part of serotonin synthesis is done by intestinal bacteria [48].

Stress disrupts the tight junctions of the esophageal epithelium, which weakens the barrier function of the esophageal mucosa.

Mental health problems such as anxiety can impair motor function of the esophagus. This may result in decreased lower esophageal sphincter pressure and esophageal motility disorders.

It has been reported that exposure to acid in patients with GERD causes faster and more brain activity compared to healthy individuals.

Mental disorders increase the perception of mucosal stimuli in the esophagus through the brain-gut axis. Thus, it makes them more susceptible to pain sensations and heartburn. In addition, the inflammation-triggering effect of chronic stress may increase the occurrence of reflux symptoms.

It has been suggested that the poor efficacy of PPI treatment in patients with GERD may also be due to psychological factors [8].

It is known that some foods and diet types have negative effects on mood, similar to their effects on the development of reflux symptoms [48]. It has been shown that a Western-style diet with high consumption of saturated fats, trans fats, processed foods and added sugar is associated with an increase in the prevalence of depression and anxiety, while a Mediterranean diet has a lower risk of depression [51]. Plenty of evidence shows that consuming well-balanced meals rich in fruit and fiber, with optimum amounts of protein and healthy fats, and relatively low levels of sugar and carbohydrates (especially those with a high glycemic index), with an overall lower amount of calories, supports physical and mental health [42,52].

In a study conducted to examine the relationship between common

mental disorders (CMD) and dietary intake among Brazilian undergraduate students, the overall prevalence of CMD was found to be 44.5%. Individuals with CMD have been reported to have a higher average intake of added sugar and saturated fat and a lower average fiber intake [53].

All processes involved in the regulation of eating behavior are managed by the brain. Changes in brain function depending on mood can affect food preferences and eating behavior. Or, changes in brain structure and function caused by diet may affect their mood [54]. Individuals with mood disorders are known to exhibit different protein, fat, and carbohydrate consumption compared to the general population [55,56]. The effects of macronutrients on mood can be summarized as follows:

Protein: Low protein consumption is associated with a significantly increased risk of depression compared to normal protein consumption. The positive effect of adequate protein intake on mood can be explained in part by its involvement in the synthesis of a number of neuropeptides and neurotransmitters in the brain and gut [48]. It has been reported that the prevalence of depression decreased significantly when the rate of calories provided from protein was increased by 10% [56].

Fat: Chronic high-fat diet has been shown to be associated with negative emotional states such as anxiety and depression in both animals and humans [54]. High-fat foods may cause temporary changes in mood, possibly through neural signals in the brain-gut axis. It is hypothesized that fats interfere with the synthesis of serotonin, an important brain chemical involved in the development of depression, and therefore a high-fat diet causes mood disorders [49]. High-fat diets can lead to dysbiosis in the intestinal epithelium, resulting in the release of inflammatory factors, which may further increase the risk of depression through changes in signaling pathways to the brain. Furthermore, it has been reported that a high omega 6/omega 3 fatty acid ratios in the blood is associated with an increased risk of suicide in depressed patients. Improvement of depression has been associated with a reduction in fat intake, but it is unclear whether a reduction in fat intake leads to improvement in depression or improvement of depression leads to improved eating habits [55–57].

Carbohydrate: Some evidence suggests that carbohydrate consumption improves mood in the short term while increasing psychological distress in the long term. Carbohydrate craving, which is generally observed in seasonal affective disorder (SAD) and unipolar depression, has been associated with fatigue, depression, paranoia, and disordered eating behaviors. In addition, sucrose consumption is higher in mood disorders than in the general population, and increased consumption of processed foods has been shown to be associated with depressive symptoms [54].

1.5. The relationship between reflux and psychic state

The etiology of GERD is multifactorial. It has been reported that mental disorders, especially anxiety and depression, are closely related to the onset and prognosis of the disease [18]. Various medical conditions and drug treatments, such as cancer, cardiovascular disease, and diabetes, can contribute to the development of depression. Psychological factors such as depression and anxiety can affect the severity of GERD symptoms by both lowering the sensory threshold in the human body and increasing esophageal stimulation [4]. GERD plays an important role in health-related quality of life by causing difficulties in daily social activities as well as in the emotional and physical well-being of affected patients.

In the cross-sectional study of Bai et al. [58] to determine the relationship between GERD and anxiety and depression in the young population, 2500 individuals between the ages of 18 and 40 years participated. The Frequency Scale for GERD Symptoms (FSSG) was used to diagnose the disease and the Hospital Anxiety and Depression Scale (HADS) was used to assess anxiety and depression. In the study, GERD was diagnosed in 401 (16%) of the participants. Anxiety (40.3%) was significantly more common in individuals with GERD compared to individuals without (19.5%), and individuals with GERD had a higher prevalence of depression.

In a study conducted to observe the relationship between laryngopharyngeal reflux disease (LPRD) and the sleep status of patients and to investigate the factors related to LPRD, it was reported that those in the reflux group consumed more tobacco, alcohol, and high-fat diet. While a high-fat diet and sleep disturbance have been identified as independent risk factors for reflux, it has been reported that sleep disturbance may cause or exacerbate anxiety and depression in patients with LPRD [9]. In another cross-sectional study, it was shown that anxiety and depression levels in individuals with GERD, especially in the non-erosive reflux disease (NERD) subtype, were significantly higher than in control groups [13].

In a cross-sectional study examining the prevalence of anxiety and depression in 258 GERD patients with and without chest pain; the frequency of anxiety and depression was found to be significantly higher in those with GERD, especially those who reported chest pain [59].

It has been shown that there is a bidirectional relationship between gastroesophageal reflux disease and depression [10]. It is important to consider both reflux symptoms and depression and anxiety in the treatment plan. Some medications to avoid in the treatment of anxiety and acid reflux are tricyclic antidepressants, benzodiazepines, and selective serotonin reuptake inhibitors (SSRIs). Tricyclic antidepressants have been proven to reduce the pressure in the lower esophageal sphincter, esophageal motility due to the use of SSRIs is impaired and may subsequently lead to acid reflux attacks. In addition, other factors such as obesity, eating habits such as excessive consumption of fried foods, smoking and alcohol consumption, and insomnia cause high stress that can contribute to the development of depression and GERD [4].

2. Conclusion

Gastroesophageal reflux is one of the most common health problems of the upper gastrointestinal system today, and complex biopsychosocial factors play a role in its etiology. Factors such as poor eating habits, stress, anxiety, sedentary lifestyle, and sleep disorders are conditions that can be controlled and changed in the prevention and treatment of GERD development. The results of the studies show that reflux are closely related to the psychological state, and that dietary habits affect both reflux and the psychic state. Various working conditions and lifestyles can affect the level of stress and anxiety, as well as nutrition, exercise, sleep patterns and some habits of individuals. It is clear that a multidisciplinary approach to the assessment and management of these psychological and lifestyle factors is required for the treatment of GERD.

In summary, it was determined that protein and fat as dietary factors and smoking, alcohol consumption and mental status as lifestyle factors were positively correlated with GERD and other types of reflux. Vegetarian diets, fruits, vegetables, vitamins, and fiber are negatively correlated with GERD and other types of reflux, while poor dietary habits are positively correlated with GERD.

GERD is a chronic digestive system disease in which multiple factors play a role. Various dietary and lifestyle factors are known to affect the occurrence of GERD. For this reason, providing individualized nutritional counseling and psychological support in addition to medical treatment in the management of the disease may contribute to reducing complications and increasing the quality of life.

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The authors declare that they have no known competing financial

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