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Effect of a Therapeutic Nutritional Educational Program on Clinical Outcomes among Patients with Functional Dyspepsia

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Abstract: **Functional dyspepsia (FD) is a chronic disorder in the upper digestive tract. FD is distressing and affects the quality of life. There are many treatment options available; therapeutic nutrition is one of these treatments. Nurses play a significant role in understanding the importance of nutrition basics and explaining the facts about healthy food choices to patients and expected to deliver healthy diet education to ensure that patients ' nutritional needs are met. Aim: This study aimed to investigate the effect of a therapeutic nutritional educational program on clinical outcomes among patients with functional dyspepsia. Methodology: A quasi-experimental research design was used. The study was carried out at the gastrointestinal outpatient clinic at Alexandria Main University Hospital. A convenient sample of forty patients was included from the previously mentioned setting. Data of the study was collected using three tools named; Tool I: Socio-demographic and clinical data of patients with functional dyspepsia. Tool II: Dietary history and dietary intake; and Tool III: Physical symptoms of functional dyspepsia. Results: Patients with functional dyspepsia who followed the nutritional educational program showed significant decrease in the severity of dyspepsia symptoms. Conclusion: The study results revealed that the clinical outcomes have been improved after the application of the therapeutic nutritional educational program. Recommendation: A Nutritional educational program should be implemented to a larger population and from different settings.**

Keywords: **functional dyspepsia, nutritional educational program, clinical outcomes.**

Operational definition of clinical outcomes: decrease in the severity of FD symptoms**.**

1. INTRODUCTION

Functional dyspepsia (FD) is the presence of persistent symptoms referable to the upper gastrointestinal tract (GIT), in the absence of a structural organic pathology that would explain these symptoms [(1)]. Structural investigations, including esophagogastroduodenoscopy (EGD), usually fail to identify an obvious organic explanation for this pain or discomfort and these patients are labeled as having (FD) [(2)].

Functional dyspepsia is one of the most common gastrointestinal disorders encountered in clinical practice [(2)]. There are two subtypes of functional dyspepsia, although these often overlap in practice, the postprandial distress syndrome which represents 70% of cases where patients have early satiety or postprandial fullness, and epigastric pain syndrome where patients suffer from ulcer-like pain or burning [(3)].

The prevalence of functional dyspepsia ranges from 5 to 11 percent worldwide [(4)]. Functional dyspepsia is highly prevalent among adult Egyptians suffering from dyspepsia symptoms [(5)]. Dyspepsia is a common indication for endoscopy in Egypt. It was reported that the prevalence of Helicobacter pylori infection in Egypt is 90%. One study

showed that the seroprevalence of Helicobacter pylori infection in Cairo is 60%, Alexandria 88%, Assiut (urban) 87% and Assiut (rural) 40 % [6].

The pathophysiology of functional dyspepsia is not well understood. However, several potential mechanisms have been suggested. These mechanisms may differ between subtypes of functional dyspepsia (postprandial distress syndrome (PDS) and epigastric pain syndrome (EPS) [7]. Postprandial distress syndrome (PDS) is characterized by meal-induced symptoms such as postprandial fullness and early satiation, while epigastric pain syndrome (EPS) refers to epigastric pain or epigastric burning that does not occur exclusively postprandially (8,9).

Recently, Rome IV classification has been reported the definition of FD determined by bothersome clinical symptoms [10,11]. In the Rome IV classification of FD patients, slight modifications were mentioned as compared to the last Rome III classification. In the new Rome IV classification, not only postprandial fullness, but also EPS symptom and early satiation should be determined as "bothersome symptoms". Moreover, Rome IV classification involves not only PDS and EPS, but also the overlap of PDS and EPS. PDS-EPS overlapped syndrome in the hospital-based population is more frequent than in the general population [12,13].

FD is important because it is not only highly prevalent but also impairs all aspects of the quality of life; extended to work performance, family relationships, and incurs a high healthcare cost worldwide [14]. Dyspepsia symptoms are common and cause considerable direct and particularly indirect costs. Direct costs caused by demands on healthcare services, or indirect, through time off work and early retirement [14]. The disease displays a periodic course, phases of slight or no symptoms alternating with periods of intensive complaints. Only 20% of patients with functional dyspepsia ever become free of symptoms in the long term [15].

Medicinal treatment is primarily recommended as a supportive measure in the symptomatic intervals. It is crucial for the physician and patient to agree on realistic treatment goals, with the emphasis on alleviation of symptoms by the systematic application of various treatment options [16]. The evidence-based medicine and non-medicine treatment of functional dyspepsia showed that proton pump inhibitors (PPI), Helicobacter pylori eradication treatment, phytotherapy, antidepressants, psychotherapy play a role in the control of FD symptoms by different levels [13,17-19].

Treatment of functional dyspepsia can be frustrating for the healthcare team and patients. This is because few treatment options have proved effective so far. While patients need continuous reassurance and support from their medical team, treatment is generally aimed at one of the presumed underlying etiologies of functional dyspepsia. Besides, current treatments for functional dyspepsia generally ignore the potential role of diet; although many patients reported that their symptoms are related to food ingestion [20].

Previous studies have made inconsistent observations concerning eating patterns in functional dyspepsia. Furthermore, none of these studies has evaluated the relationship between symptoms and eating patterns concurrently [21]. Moreover, Akhondi-Meybodi et al. findings showed that some foods can strongly increase dyspepsia symptoms. Many studies have reported that dyspepsia symptoms are associated with ingestion of some foods such as onions, peppers, fried and fatty foods, alcohol, citrus fruits, carbonated drinks, and spicy foods [16,20].

Nurses play an equally important role as that of the dietitian to ensure that the nutritional needs of the patients are met. Nurses' roles in nutritional support have been documented in the United States, United Kingdom and Australia healthcare guidance [22-24]. They have a role in assessing the diet of patients with various medical conditions. Nutritional assessment includes nutritional history, a pattern of eating, quality and quantity of food, methods of cooking, anthropometric measurements, nutritional clinical manifestations and laboratory, and diagnostic findings. After an assessment has been performed, the nurse determines the problem then plan the necessary intervention [25].

Eating a healthy diet can play a role in reducing FD patients complains and positively influence their health, and quality of life [26]. An unhealthy diet is considered a modifiable risk factor for functional dyspepsia. The symptoms of functional dyspepsia can also be improved through diet education [27]. Eating smaller regular low-fat meals is the advice offered to FD patients, as the stomach and duodenum can process these more easily (a high fat intake slows gastric emptying), and gastric distension is minimized. Moreover, avoiding fatty, fried or spicy foods, and carbonated drinks together with other general recommendations such as eating meals regularly, avoidance of excessively large meals, thorough mastication, and not rushing meals, may be of benefit for patients with functional dyspepsia [2,13]. Madisch et al. has also recommended that

the patient should note what foods he/she does not tolerate and avoid them as well as keeping a symptom diary during the diagnostic phase [13].

This study aimed to investigate the effect of a therapeutic nutritional educational program on clinical outcomes among patients with functional dyspepsia.

AIM OF THE STUDY

The aim of this study was to investigate the effect of a therapeutic nutritional educational program on clinical outcomes among patients with functional dyspepsia.

HYPOTHESIS

Patients with FD receiving the therapeutic nutritional educational program will exhibit a decrease in the severity of its symptoms**.**

2. MATERIALS AND METHOD

I-Materials

Research design

A quasi-experimental research design was used in the present study.

Setting

The study was conducted at the gastrointestinal outpatient clinic, at Alexandria Main University Hospital.

Subjects

The participants of this study were comprised of a convenient sample of **40** adult patients diagnosed as functional dyspepsia.

Inclusion criteria

(i) Age 20 years to 65 years

(ii)Diagnosis of functional dyspepsia/non-ulcer dyspepsia by fulfilling Rome-IV criteria [10,11].

(iii)Should be suffering of at least 4 or more symptoms mentioned below:

(a) Upper abdominal fullness

(b) Upper abdominal pain

(c) Belching

(d) Bloating

(e) Early satiety

(f) Nausea

(g) Vomiting

(h) Regurgitation

(i) Heartburn

(j) Loss of appetite

(iv) not suffering from chronic illnesses

Exclusion criteria

(i) Advanced chronic illness that would impair follow-up or monitoring

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(ii) Pregnancy or breast feeding

(iii) Previous surgery for ulcers

(iv) Erosive gastritis or ulcer

(v) Patients with previous history of gastroesophageal reflux

(vi) Patients with concomitant symptoms of the irritable bowel syndrome

(vii) Drug and alcohol abuse

(viii) Mental illness or dementia

Tools

Three tools were used for data collection.

Tool I: Socio-demographic and clinical data of patients with functional dyspepsia. This tool was developed by the researchers to identify characteristics of patients and the baseline clinical data, it included two parts:

Part I: **Socio-demographic data:** it included age, gender, marital status, level of education, occupation, area of residence.

Part II: **Clinical data:** it included yes or no questions related to patients' health history: chief complaint, current medications, associated diseases, smoking, and past medication history.

Tool II: Nutritional History and dietary intake. Structured interview: This tool was developed by the researchers after review of related literatures to assess patients' dietary history, and dietary intake. [28-30] It consists of two parts:

Part I: Nutritional History: It consists of three sections:

Section 1: Dietary history: it included: usual weight, recent weight change, recent history of gastrointestinal manifestations, and its' duration in weeks, food allergy, nutritional supplement, and alcohol intake.

Section 2: Self-care behavior related to food: it involved who prepares meals, usual method of cooking, type of fat and spices used in cooking, usual place for eating.

Section 3: Eating pattern: it covered number of meals and snacks per day, types of snacks, usual amount of fluid intake, food likes and dislikes, and special diet.

Moreover, it is of value to mention that food preferences, dislikes and special diet were included in the eating pattern together with self-care behaviors related to food in order to be considered in the development of a nutritional educational program provided to the patients under study.

Part II: Dietary intake: It assessed the quality of food; food that aggravated and alleviated FD symptoms.

Tool III: Physical symptoms of functional dyspepsia:

This tool was adapted from Veldhuyzen et al. [31] to score the severity of gastrointestinal symptoms of FD patients.

Functional dyspepsia symptoms include: upper abdominal fullness, upper abdominal pain, belching, bloating, early satiety, nausea, vomiting, regurgitation, heartburn, and loss of appetite. [9,30.31]

Scoring system:

3-point likert scale ranged from 1-3 (1=mild problem, 2=moderate problem, 3=severe problem) was used to score the symptoms' severity.

II: Method

- Approval from the ethical committee of faculty of Nursing, Alexandria University was obtained.
- Official permissions were obtained from the hospital administrators and heads of the outpatient departments to conduct the study after explanation of its purpose.

- Tool development, the tools I & II were developed by the researchers in Arabic language, tool III was adapted from Veldhuyzen et al. [31] and then the tools were tested for their content validity by five experts in the field of medical surgical nursing and gastroenterologist then the required modifications were introduced accordingly.

- The reliability of the tools were assessed using Cronbach-alpha coefficient statistical test (tool I-α= 0.74, tool II-α= 0.86, tool III-α= 0.89)

- A pilot study was conducted on 4 patients after obtaining their oral approvals (these four were excluded from the study subjects) to assess the clarity and applicability of the tool. The necessary modifications had been done. Two symptoms were excluded which are chest pain and anxiety.

- **Data collection:**

The study was conducted in four phases over a period of 2 weeks, where patients were met individually two days a week for two consecutive weeks. In the first week; assessment baseline data was done using tool I, II, and III. In the second week; the nutritional program was explained with all of its contents. The study's phases are as follows:

1-Assessment phase:

It was covered in two sessions at the gastrointestinal outpatient clinic, in a one-to-one manner. In the first session, the researchers explained the aim of the study, then started the initial assessment using tool I which included the basic initial data related to the socio-demographic data, and clinical data. This was followed by tool II, that covered the nutritional history and dietary intake. In the second session, the researchers used tool III which assessed the data related to physical symptoms of functional dyspepsia.

2-Planning phase:

Based on the assessment phase and review of related literature, the nutritional program was formulated. Accordingly, the program objectives, content, number of sessions and their duration, methods of teaching and expected outcomes were developed.

The program will be covered in two sessions. In the first session, the researchers discuss the program objectives, and quality of different kinds of food. In the second session, the quantity of food, ways of eating and methods of cooking will be discussed.

The sessions will be given individually and will last for 20-30 minutes. A PowerPoint presentation will be used to present the content of the program.

3-Implementation phase: The implementation of the program took place in two consecutive sessions. The presentation of the program information was through individual verbal interaction with the patients, and visual information through pictures slides using a PowerPoint presentation. This took place in the gastrointestinal outpatient clinic where each session lasted 20-30 minutes and that all was done after the follow-up with the physician. During the session, 15-20 minutes were allocated to interactive lecturing, and the rest was a communicative two-way discussion. In this discussion, the researcher highlighted what is important, helped patients make the nutritional plan their own, and lastly reinforce all what has been given.

4-Evaluation phase: The patients were reassessed using tool III after three weeks from the implementation of the nutritional educational program, to evaluate the effect of the program on the clinical outcomes, during their follow-up days.

- **Ethical consideration:** Oral approval was obtained from the patients. The anonymity, confidentiality, and privacy of responses have been asserted, voluntary participation and right to withdraw from the study were emphasized before inclusion in the study sample.

- **Statistical Analysis:** Statistical Package for Social Science (SPSS) package version 20 was used for statistical analysis. A descriptive statistical analysis for all study variables was conducted. Basic descriptive statistical analysis was carried out using frequencies, means, and standard deviation (SD). The level of significance selected for this study was P equal to or less than 0.05. A comparison between different groups regarding categorical variables was tested using the Chi-square test.

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3. RESULTS

Table (I): Percentage distribution of the studied patients according to their socio-demographic characteristics.

Table I shows the percentage distribution of the studied patients according to their socio-demographic characteristics. In relation to gender, the majority of the studied patients (77.5%) were females, their ages ranged between 20 and 65. It can be noticed that the majority (75%) were in the age group 20 - < 40 years and 40% were married. As regards the level of education, a third of them had a diploma. Concerning work status, and area of residence, almost half (45%) of the studied patients were housewives, and 60 % lived in urban areas.

Patients' socio- demographic data	No. (n=40)	%
Gender		
▪ Male	9	22.5
▪ Female	31	77.5
Age (years)		
▪ 20-	14	35
▪ 30-	16	40
▪ 40-	8	20
▪ 50- 65	2	5
Marital status		
▪ Single	14	35
▪ Married	16	40
▪ Divorced	4	10
▪ Widow	6	15
Level of education		
▪ Illiterate	10	25
▪ Primary	7	17.5
▪ Preparatory	10	25
▪ Diploma	13	32.5
Occupation		
▪ Technical work	9	22.5
▪ Manual work	7	17.5
▪ Not working	6	15
▪ Others (house wife)	18	45
Residence		
▪ Urban	24	60
▪ Rural	16	40

Table (II): Percentage distribution of the studied patients according to their clinical data.

Table II reveals percentage distribution of the studied patients according to their clinical data. Regarding patients' chief complaint, all studied patients were suffering from bloating and loss of appetite, 90% had heartburn, the majority (82.5%) of them were complaining from upper abdominal fullness, while almost half (47.5%) of them were suffering from upper abdominal pain, nausea and vomiting. Concerning current medications 90% of the studied patients were receiving a

proton pump inhibitor. The table also shows that 62.5% did not have associated diseases and almost half (47.5%) were passive smokers. In relation to studied patients' past medication history, it was observed that the majority (75%) of the studied patients were receiving non-steroidal anti-inflammatory drugs, and (55%) were administering antibiotics.

Patients clinical data	No (n=40)	%
Chief complaint*		
- Upper abdominal fullness	33	82.5
- Upper abdominal pain	19	47.5
- Belching	4	10
- Bloating	40	100
- Early satiety	9	22.5
- Nausea	19	47.5
- Vomiting	19	47.5
- Regurgitation	1	2.5
- Heartburn	36	90
- Loss of appetite	40	100
Current medication*		
- Proton pump inhibitor.	36	90
-Amoxicillin	22	55
-Vitamins	5	12.5
Associated diseases		
▪ No	25	62.5
▪ Yes	15	37.5
- Kidney stones	1	2.5
- Diabetes	6	15
- Hyper-hypertension	1	2.5
- Fatty liver	2	5
- Osteoarthritis	1	2.5
- Hepatitis C virus	3	7.5
- Hyperlipidemia	1	2.5
Smoking		
▪ Non-smoker	10	25
▪ Quitter	3	7.5
▪ Passive smoker	19	47.5
▪ Active smoker	8	20
Past medication history*		
- Non-steroidal anti-inflammatory drugs	30	75
- Antibiotics	22	55
- Vitamin/ mineral supplements	5	12.5
- H_2 receptor blockers	2	5
- Hepatoprotective	6	15
- Insulin	6	15

N.B. * There are multiple responses from patients regarding chief complains, current and past medication history

Table (III): Percentage distribution of the studied patients according to their dietary history

Table III shows the percentage distribution of the studied patients according to their dietary history. As regards the weight, 73 kg was the median weight of the studied patients, with a minimum of 48 and a maximum of 135 kg, while 90% of the studied patients reported recent weight change, 57.5% of them have reported recent weight gain. Regarding the duration of GIT manifestations, 4 weeks was the median with a minimum of 1, and a maximum of 12 weeks, and third of

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the studied patients (37.5%) have reported a recent history of GIT manifestations, where vomiting was the most reported (12.5%). The majority of the studied patients (97.5%) did not have food allergies, 12.5% did abuse alcohol and 20% were using nutritional supplements such as vitamins, minerals, and food supplements.

Dietary history		No (n=40)	%
Usual weight (kg)	Min. – Max.	48 – 135	
	Mean ± SD.	80.28 ± 22.19	
	Median	73.0	
Recent weight change	No	4	10.0
	Yes	36	90.0
	Recent decrease	13	32.5
	Recent increase	23	57.5
Recent history of GIT manifestations	No	25	62.5
	Yes	15	37.5
	Nausea	1	2.5
	Vomiting	5	12.5
	Diarrhea	2	5
	Constipation	2	5
	Anorexia	3	7.5
	Heart burn	2	5
Duration of GIT manifestations (weeks)	Min. – Max.	1 – 12	
	Mean ± SD.	4.18 ± 3.60	
	Median	4.0	
Food allergy	No	39	97.5
	Yes	1	2.5
Nutritional supplement	No	32	80
	Yes	8	20
	Vitamins	5	12.5
	Minerals	2	5
	Food supplements	1	2.5
Alcohol intake	No	35	87.5
	Yes	5	12.5

Table (IV): Percentage distribution of the studied patients according to their eating pattern

Table IV illustrates the percentage distribution of the studied patients according to their eating pattern. Three meals per day were reported by 62.5% of the studied patients, and 50% of them did not take snacks. Those who take snacks preferred sweets, and vegetables (15%, and 15% respectively). The majority of the studied patients' food preferences were white, and red meat (30%, and 27.5% respectively). Two third (67.5%) of the studied patients did not have food dislikes and the majority of them (92.5%) did not have a special diet. Moreover, the results also showed that only 7.5% have received more than 2 liters of fluids per day.

Eating pattern		No. (n=40)	%
Number of meals/ day	Two meals	12	30.0
	Three meals	25	62.5
	> three meals	3	7.5
Number of snacks/ day	No snacks	20	50.0
	One snack	14	35.0
	> one snack	6	15.0
Type of snacks*	Vegetables	6	15.0
	Fruits	5	12.5
	Chips	5	12.5
	Sweets	6	15.0
	Others	4	10.0
Usual amount of fluid	< one liter	12	30.0

intake	1-2 liters	25	62.5
	> two liters	3	7.5
Food preferences	No	10	25.0
	Yes*	30	75.0
	- Red meat	11	27.5
	- White meat	12	30
	- Vegetables	5	12.5
	- Rice/ pasta	8	20
	- Salted food	1	2.5
	- Dairy	1	2.5
Food dislikes	No	27	67.5
	Yes*	13	32.5
	- Red meat	2	5
	- White meat	1	2.5
	- Vegetables	1	2.5
	- Rice/ pasta	1	2.5
	- Salted food	1	2.5
	- Sweets	2	5
	- Dairy	2	5
	- Legumes	3	7.5
Special diet	No	37	92.5
	Yes	3	7.5
	- Diabetic diet	2	5
	- Vegetarian diet	1	2.5

N.B. * There are multiple responses from patients regarding types of snacks, food preferences and dislikes

Table (V): Percentage distribution of the studied patients according to their self-care behaviors related to food preparation and place of eating

Table V reveals the percentage distribution of the studied patients according to their self-care behaviors related to food preparation and place of eating. It was observed that more than third of the studied patients (42.5 %) prepare meals by themselves, frying was the most common method of cooking used (77.5%), and synthetic margarine was the highest used type of fat (75%).

Self- care behaviors related to food preparation and place of eating		No. (n=40)	%
Who prepares meals?	Husband/ wife	14	35
	Parents	9	22.5
	Patient him/ herself	17	42.5
Usual method of cooking*	Boiled	10	25
	Roasting	8	20
	Frying	31	77.5
	Mixed methods	14	35
Type of fat used in frying*	Butter	3	7.5
	Vegetable oils	15	37.5
	Natural margarine	6	15
	Synthetic margarine	30	75
Usual places of eating	Inside home	37	92.5
	Outside home	3	7.5

N.B. * There are multiple responses from patients regarding usual method of cooking and type of fat used in frying

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Figure 1 shows the percentage distribution of foods that aggravate and alleviate symptoms, as perceived by dyspepsia patients.

As regards food that aggravates dyspepsia symptoms, it was observed that all the studied patients had reported that sausage, and honey aggravated the dyspepsia symptoms, while the majority of them had reported that canned food, turkey cheese, chocolate, dates, bread, rice, yogurt and non-citrus food also aggravated the dyspepsia symptoms (92.5%, 80%, 90%, 95%, 80%, 75%, 98%, & 80% respectively).

On the other hand, foods that alleviated the dyspepsia symptoms as reported by the majority of the studied patients were pickles, grains, salty food, pizza, tea, and fried and fatty food (95%, 92.5%, 97.5%, 75%, 92.5%, & 95%). Watermelon, and tomato/ tomato sauce were reported by all the studied patients as food that alleviated symptoms.

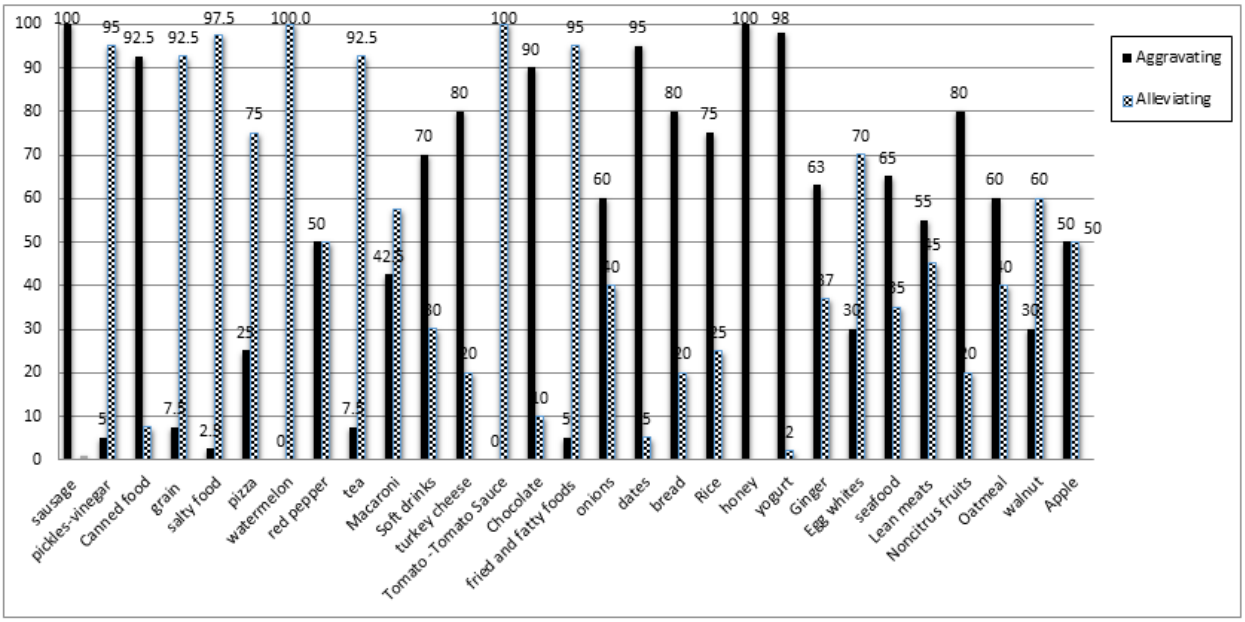

Fig. 1 Percentage distribution of foods that aggravate and alleviate symptoms as perceived by patients with functional dyspepsia.

Table (VI): Percentage distribution of the studied patients according to physical symptoms of functional dyspepsia pre and post nutritional educational program

Table VI shows the percentage distribution of the studied patients according to physical symptoms of functional dyspepsia, pre, and post the nutritional educational program education.

This table compares the severity of the physical symptoms of functional dyspepsia, pre, and post nutritional educational program. It was observed that more than two-third of the patients were suffering from severe upper abdominal fullness, and heartburn before the educational program of 69.7%, 69.5% respectively. A marked reduction in the severity was shown after the application of the nutritional educational program 12.1%, & 2.8% respectively, this difference is statistically significant (χ^2 = 26.99, 28.386 respectively) (P = 0.00000).

Regarding upper abdominal pain, nausea, and vomiting, it was observed that the majority of the patients reported that these symptoms showed great improvement after the application of the nutritional educational program, where the studied patients who reported severe symptoms before the program (79 %, 84.2%, & 89.5% respectively) have noted that these symptoms became mild (73.7%, 63.2%, & 79% respectively), and this difference is statistically significant (χ^2 = 36.59, 23.25, & 27.25, P = 0.00000).

The results revealed also that half of the studied patients were suffering from severe early satiety, and loss of appetite (55.6%, 50% respectively), before the educational nutritional program which were reported as mild by the studied patients after the application of the nutritional educational program (66.7%, 82.5% respectively), and a statistical significance was reported (χ^2 = 3.33, 96.07, P = 0.00000).

As regards bloating, more than half (52.5%) of the patients reported that they had moderate bloating before the educational program, whereas after the application of the application of the nutritional educational program, this percentage has been changed to mild, with a percentage of 90%. This difference is statistically significant (χ^2= 86.07, P = 0.00000).

Table (VI): Percentage distribution of the studied patients according to physical symptoms of functional dyspepsia pre and post nutritional program education

Physical symptoms of functional dyspepsia	Pre - educational program						Post - educational program						Significance test
	Mild		Moderate		Severe		Mild		Moderate		Severe		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
1) Upper abdominal fullness (n=33)	4	12.1	6	18.2	23	69.7	24	72.7	5	15.2	4	12.1	χ^2 = 26.99 P = 0.00000*
2) Upper abdominal pain (n= 19)	2	10.5	2	10.5	15	79	14	73.7	5	26.3	0	0	χ^2 = 36.59 P = 0.00000*
3) Belching (n=4)	0	0	1	25	3	75	4	100	0	0	0	0	χ^2 = 4.650 P = 0.008*
4) Bloating (n=40)	4	10	21	52.5	15	37.5	36	90	4	10	0	0	χ^2 86.07 P = 0.00000*
5) Early satiety (n=9)	2	22.2	2	22.2	5	55.6	6	66.7	3	33.3	0	0	χ^2 = 3.33 P = 0.003*
6) Nausea (n=19)	0	0	3	15.8	16	84.2	12	63.2	7	36.8	0	0	χ^2 = 23.25 P = 0.00000*
7) Vomiting (n=19)	1	5.3	1	5.3	17	89.5	15	79	4	21	0	0	χ^2 = 27.25 P = 0.00000*
8) Regurgitation (n=1)	0	0	1	100	0	0	1	100	0	0	0	0	χ^2 = 3.650 P = 0.004*
9) Heartburn (n=36)	3	8.3	8	22.2	25	69.5	26	72.2	9	25	1	2.8	χ^2 = 28.386 P = 0.000*
10) Loss of appetite (n=40)	2	5	18	45	20	50	33	82.5	5	12.5	2	5	χ^2 96.07 P = 0.0000*

N.B: Total number of patients changed according to the severity of symptoms.

4. DISCUSSION

Functional dyspepsia (FD) is a highly prevalent and debilitating functional gastrointestinal condition characterized by post-prandial fullness or epigastric pain or fullness in the absence of any metabolic or structural disease [(12)]. Nutrition is regarded as one of the causes of digestive disorders. As the consumption of nutrients can moderate the sensors of the upper gastrointestinal tract movement, changes in diet can probably improve the symptoms of functional dyspepsia [(27)].

The results of the present study revealed that the majority of the studied patients were females and almost half were housewives, this finding was in line with Ford et al. (2015) who reported that the majority of the patients were females, while none of the studies reported the occupation of the studied patients. [(4)] The majority were in the age group 20 - < 40 years, approximately two-third were from urban areas and a third of them had a diploma degree, these findings were in agreement with the results of Akhondi-Meybodi et al. (2015), and Carvalho et al. (2010) [(20,32)].

Filipovic' et al. (2011) reported that patients with functional dyspepsia were suffering from epigastric pain, burning, and heartburn, this was inconsistent with the findings of the present study where the majority of the studied patients reported that heartburn, upper abdominal pain, and fullness were their chief complains together with anorexia. This finding was in line also with what was reported by Akamizu et al. (2008), who explained that anorexia is associated with a variety of functional disorders, including functional dyspepsia [(33,34)].

Pinto-Sanchez et al. (2017) concluded from a systematic review that proton pump inhibitors (PPIs) were effective for the treatment of FD, independent of the dose and duration of treatment compared with placebo. This is consistent with the findings of the present study where almost all the studied patients were receiving PPIs [(35)].

The current study revealed that almost two-third of the studied patients did not suffer from any associated diseases. Jones et al and Haag et al. (2004, 2008) had reported that symptoms in functional dyspepsia had greater associations with psychological distress [36,37]. This finding was not reported by the studied patients of the present study. Furthermore, the frequencies of associated diseases that were mentioned by the studied patients were too little and diabetes was the highest among them. Osipenko et al. (2008) reported that dyspepsia symptoms may be regarded as manifestations of autonomous diabetic neuropathy and that the frequency of dyspepsia symptoms in patients with diabetes mellitus is higher than in non-diabetic patients [38].

Nwokediuko et al. (2012) reported that alcohol, smoking, and use of non-steroidal anti-inflammatory drugs were independent predictors of co-occurrence of postprandial distress syndrome and epigastric pain syndrome [39]. Moreover, Fujiwara et al (2011) findings showed that smoking and drinking habits were associated with functional dyspepsia, this supports the findings of the present study, where two-third of the studied patients were either active or passive smokers [40]. This can be explained by the fact that smoking increases gastric acid secretion and pepsinogen release, and delays gastric emptying [39].

Non-steroidal anti-inflammatory drugs (NSAIDs) are the most prescribed group of drugs in the world that is used to treat pain and inflammation. It is now known that NSAIDs significantly increase the risk of dyspepsia. Ray-Yee et al. (2015) results revealed that smoking and NSAIDs are independent predictors of both postprandial distress syndrome (PDS) and epigastric pain syndrome (EPS) [41]. This can explain the findings of the present study where the majority of the studied patients have a history of administering NSAIDs. Abd El Hafeez et al. (2019) stated that, until now, limited data are available on NSAIDs use in Egypt. Variations in the NSAIDs used in many studies could be explained by differences in the regulations on NSAIDs purchase and its availability in different countries, with the absence of restricted laws on the consumption of drugs, which encourages patients to self-treat their symptoms and signs, especially pain [42].

The findings of the present study also revealed that third of the studied patients have a recent decrease of body weight. This can be explained by the fact that half of the studied patients were suffering from severe loss of appetite, and more than third of them were suffering from severe nausea and vomiting. This finding goes in line with Moayyedi et al. (2016) who reported that all patients with FD had weight loss as a feature and did not have anxiety or depression according to the Hospital Anxiety and Depression Scale [43].

Several studies have reported that nausea, epigastric pain and vomiting were the most reported by patients with FD which lasted for 1- 3 months duration [20,31,44,45]. The findings of the present study revealed that vomiting was the most recent manifestation mentioned by the studied patients, although it was reported by a small number of patients that the duration had a median of 4 weeks duration.

Regarding food allergies, alcohol/drug abuse, and use of nutritional supplements, it was observed that the majority of the studied patients did not report food allergies or alcohol abuse, while only one had reported the use of nutritional supplements which were not prescribed by a physician, but used to supply her/him with energy, not to relieve symptoms. In contrast, Holtmann et al. (2003) reported that Artichoke leaf extract preparation (a food supplement) was significantly effective in alleviating dyspepsia symptoms and improving the disease-specific quality of life in patients with functional dyspepsia [46].

As regards eating pattern, it was observed that two-third of the studied patients had followed three meals per day and half of them used to take snacks where sweets were the most reported. Jiang et al. (2014) findings showed that the majority of the studied patients also followed three meals per day, while less than a quarter were taking midnight snacks with a preference of sweets [47]. Sugar cravings that strike after a meal may be due to serotonin, a feel-good brain chemical that's associated with an elevated mood. Eating a sugary dessert causes serotonin levels to rise in the brain, which can make you feel calmer and happier. As well, Sweets were chosen by the studied patients as they feel that they are in need of energy [48].

Hongo proposed that patients with FD who preferred spicy, fried, fatty food, fast food, and snacking were more likely to suffer from gastrointestinal symptoms [49]. Meanwhile, the findings of the present study revealed that red and white meat were preferred by almost half of the studied patients and the majority preferred frying as a method of cooking. This was in line with the findings of Jiang et al who reported that almost half of the sample preferred meat [47].

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Regarding the severity of physical symptoms of functional dyspepsia before and after application of the nutritional educational program, it was observed that the severity of symptoms has been significantly changed. As regards upper abdominal pain, vomiting, and nausea, the majority of the studied patients were suffering from severe pain, nausea and vomiting before the application of the nutritional educational program. The severity of these complains have been changed to mild regarding abdominal pain and vomiting and distributed between mild and moderate regarding nausea after the application of the nutritional educational program and these changes were statistically significant. Akhondi et al. (2015) and Filipovi et al. (2011) have reported that tea and carbonated drinks act as precipitating factors in the induction of epigastric pain, nausea and vomiting [20,33]. The findings of the present study revealed that soft drinks aggravated the dyspepsia symptoms of the patients, while tea was included in the alleviating list.

It was also observed that the studied subjects mentioned rice, bread, dates, honey, and yogurt as food aggravating symptoms, while Akhondi et al findings revealed that the same food was the most common nutrients that alleviate symptoms in dyspeptic patients [20]. Regarding rice and bread, although the studied subject included them in the aggravating food list, but they mentioned that they depend on it in their meals. It could be explained by the fact that the role of food in the development of FD symptoms is not exactly clear [1].

Although some foods, especially spicy, pickled, and high-fat foods strongly induced dyspepsia and aggravated the symptoms in dyspepsia patients [20], the findings of the present study contradicted those mentioned, and this may be due to the nature of some Egyptian peoples' culture regarding their way of eating. The studied patients reported that they usually eat foundry and fried foods, this can be explained by the fact that this type of food gave them a sense of satiety.

Madisch et al. (2018) mentioned that the extent of antral part of the stomach expansion has been found to be associated with increasing severity of symptoms of early satiation, epigastric pain, bloating, and nausea or vomiting [13]. The findings of the present study revealed that post-nutritional education, where small frequent meals were stressed, the severity of symptoms decreased, showing a statistically significant difference.

Pepper and fried food have been reported by Carvalho et al. as symptoms provoking food for patients with functional dyspepsia [32]. Moreover, findings of Hongo et al. revealed that patients who preferred fatty food, fast food, snaking, fried food, and spicy food were more likely to suffer from dyspepsia symptoms [49]. It was remarkable that the findings of the present study revealed that the studied patients had answered with yes that pickles and fried and fatty food were included in the list of foods that alleviate the symptoms. Although the results of the present study did not support the findings of Carvalho et al and Hongo et al but after the researchers explained the importance of avoiding and minimizing tea, pickles and fried and fatty food from their meals, and to replace fried by grilled/boiled food together with minimizing frying as a method of cooking, the studied patients have explained that after following the instructions, the severity of the symptoms was significantly decreased. [32,49]

The findings of the systematic review done by Duncanson et al consolidate the established reported relationship between dietary fats and functional dyspepsia symptoms [50]. This can be explained by the fact that fats could induce dyspepsia symptoms, these symptoms include slowing of gastric emptying, or hypersensitivity to gastrointestinal hormones such as cholecystokinin.

Nurses should raise their awareness concerning their role in providing nutritional support for their patients. Nutritional trainings can help nurses deliver better evidence-based care that meets patients' nutritional needs. [50]

5. CONCLUSION

Patients with functional dyspepsia who followed the nutritional educational program showed a significant decrease in the severity of dyspepsia symptoms.

6. RECOMMENDATIONS

- Continuous teaching of FD patients as regards eating patterns, and food that aggravate and alleviates symptoms plays an important role in reminding patients to continue following the instructions as it reflects a great effect on FD symptoms control.
- Further research is suggested to study all the factors affecting functional dyspepsia.

- Replication of this study should be done among a larger population and from different settings.
- Develop a booklet for FD patients to emphasize the recommended dietary regimen, and have it been available for patients in the outpatient clinic.
- A nutritional training program should be provided for nurses concerning FD.

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