International Journal of Advanced Community Medicine

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Effect of dietary counseling on patients with chronic obstructive pulmonary disease admitted to a tertiary care hospital, Middle Delta, Egypt

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Abstract
Objectives: is to assess the impact of dietary advice on malnourished patients with COPD.
Methods: an intervention study conducted at the chest hospital of Tanta university. One hundred patients with stable COPD were chosen.
Patients received dietary counseling once a week for 6 months based on specific nutritional guidelines for patients with COPD.
Results: After 6 months of the intervention, the mean difference of COPD assessment test (CAT) improved from (19.47±5.759) preintervention to (12.98±5.635) postintervention, both had moderate respiratory impairment as measured by CAT score and the mean difference of Modified Research council (MRC) dyspnea scale improved from (2.70±.689) preintervention to (1.99±.772) postintervention, both had mild score on (MRC) dyspnea scale, with significant difference p (<0.001).
Health-related quality of life (HRQOL) increased from 4% preintervention to 30% postintervention with significant difference. p= (0.002).
Subjective Global Assessment scores (SGA) improved where there was enhancement and shift in malnutrition from 77% (52%SGA B, 25%SGA C), to only 55% (43% SGA B, 12% SGA C). (*p*<0.001).
Conclusion: Dietary counseling has a great impact on malnourished COPD patients. It improves nutritional status, resulting in increased functional lung capacity and, as a result, HRQOL.

Keywords: Dietary counseling, chronic obstructive, pulmonary disease patients

Introduction
Chronic obstructive pulmonary disease (COPD) refers to a group of lung diseases that include chronic bronchitis, emphysema, and refractory (irreversible) asthma. (Nguyen *et al*. 2015) [19].
Recently, the prevalence of COPD in Egypt has been reported to be 10%, which is similar to the global prevalence. (Nguyen *et al*. 2019) [17] COPD is ranked as the fifth leading cause of chronic disability. It is considered as the fourth leading cause of mortality in the United States. (Nguyen *et al*. 2019) [17] Patients with COPD usually suffer from malnutrition, with losing weight developing a long time, and it is being associated with ill health. (Hoong *et al*. 2017) [13].
Many issues can cause malnutrition in COPD patients, including a higher metabolism due to increased respiratory work, chronic inflammation, medications, recurrent infections, and oral or teeth problems, which can lead to reduced dietary intake. (Hoong *et al*. 2017, Günay *et al*., 2013) [13, 10].
Nutrition interventions have been found to improve functional capacity, and quality of life in COPD patients. (Günay *et al*. 2013, Baldwin *et al*. 2011) [10, 2] However, there is a scarcity of studies from low- and middle-income economies addressing the effect of dietary counseling interventions on COPD, with the majority of studies coming from high-income countries. As a result, we conducted this study to test the influence of dietary counseling on improving malnourished COPD patients.

Materials and Methods
Study Characteristics: This 6-month prospective intervention study was carried out at the chest department of Tanta University. The study population included patients over the age of 18 with stable COPD who were admitted to the chest wards in Tanta university hospital.

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All stable COPD patients admitted to Tanta university chest hospital over 6 months duration, (100) patients with stable COPD were chosen.

Patients were instructed to follow COPD dietary guidelines for 6 months through dietary counselling sessions. They were given dietary advice once a week for six months, based on specially developed written dietary recommendations for patients with COPD. (GOLD. 2017) [9].

Study inclusion criteria: Patients over the age of 18 with a clinical diagnosis of stable COPD according to guidelines of the Global Initiative for Chronic Obstructive Lung Disease without acute exacerbation in the previous week were eligible for the study. (Gold. 2017) [9].

Exclusion criteria: Included patients who were experiencing an acute exacerbation, who were receiving systemic steroids, or who had any other chronic illness affecting their nutritional status, such as tuberculosis, lung cancer, or any other malignancy.

Nutrition Intervention Sessions: All participants received dietary counseling and dietary leaflets according to the recent nutritional guidelines of BABEN. (Baben. 2016) [3] They received individual dietary counseling once a week for 6 months at the Chest department of Tanta university according to their length of stay. All participants were given a leaflet with tips on nourishing drinks and snacks. Following hospital discharge, follow-up meetings were held in the Chest department of Tanta university each week at regular times confirmed by telephone. During the follow-up period, participants were offered continuous support and feedback at each session. Messages were constructed for each patient according to approach relied on the Health Belief Model. (Nguyen *et al*. 2015, Nguyen *et al*. 2019, Baldwin *et al*. 2011) [19, 17, 2].

Study Tools
Tool 1: Tool 1 consisted of a predesigned questionnaire used for data collection that included the following: socio demographic data: age, residence, sex, marital status, level of education, occupation, telephone number, and smoking status.
We assessed the participants' nutritional status using the following methods:

Tool 1: Nutritional Screening by Subjective Global Assessment: The Subjective Global Assessment (SGA) (Canadian Malnutrition Task Force 2021) [4] is a simple bedside method for identifying those who would benefit from nutrition care and diagnosing malnutrition. A clinical evaluation is performed after taking a history of recent intake, weight change, and gastrointestinal symptoms. Patients were categorized into 3 categories "well-nourished (SGA-A), mild/moderately malnourished (SGA-B), or severely malnourished (SGA-C)".

Tool (2): Assessing health related quality of life and functional assessment using:
1) The COPD assessment test (CAT test) Questionnaire is used to assess respiratory health status. Each question is divided into 5 categories ranging from (0-5) /0 indicates total absence, 1 indicates very mild, 2   indicates mild, 3 indicates moderate, 4 indicates severe, and 5 indicates. Very sever condition. (CAT Development Steering Group. 2018) [5].
▪ Score>5 upper limit of normal

▪ Score5-10 low impairment to respiratory function
▪ Score10-20 moderate impairment to respiratory function
▪ Score>20 sever impairment to respiratory function
▪ Score30-40 very sever impairment to respiratory function
2) Dyspnea was evaluated using the Medical Research Council (MRC) dyspnea scale, a 5-point scale on which a score of (1-normal) indicates that physical activity is not limited by dyspnea and a score of (2-mild), (3,4-moderate), or (5-severe) indicates that the patient is too dyspnea to leave the house. (Medical Research Council. 1986) [15].
3) Combined COPD testing for assessment to HRQoL: (Gold 2017) [9].
▪ CAT<10, MRC (0-1) good HRQoL
▪ CAT>=10, MRC>=2 poor HRQoL
4) Outcome measures included the following:
▪ SGA
▪ CAT SCORE
▪ MRC DYSPNEA SCALE
▪ HRQOL

Sample Size and Statistical Analysis: We took all the patients over a six-month period and followed them for another six months. Resulting in a total of 100 patients.
We used the paired - sample t for quantitative data and the chi-square test for qualitative data to compare differences in before and after the intervention.
SPSS version 21.0 (IBM Corporation, Armonk, NY, USA) was used for all statistical analyses, p values were calculated using two-sided tests, and statistical significance was defined at p equals 0.05.

Results
Table 1 highlights the socio demographic characteristics of the 100 participants enrolled in the study with a mean age of 53.14±11.67 years, 99% was male and 51% from rural residence, 50% had secondary education, 34% were manual workers, with average duration of occupation 31 years, 51% of them had enough income, 96% were married with mean children number 3.
Table 2 shows the associated medical conditions and smoking status of the patients being studied, where 64% of them had a past history of chronic disease or operation, 39% had a positive family history of allergy/asthma,73% admitted to the hospital with COPD acute attacks more than two times, mean number of exacerbations 3.93±1.75 times, with average length of stay 8.43±3.88 days. About three quarters were current smokers (77%), cigarette smoking (74.7%) and heavy smokers (89%). with mean duration (32) years also average number of cigarettes per day were (33). Nearly half of them (50%) were dealing with animals and had pets in their home.
Table 3 revealed the effect of dietary counseling regarding SGA, CAT, MRC DYSPNEA, and HRQOL, where, in terms of the influence of dietary counseling, 44 of the 100 individuals enhanced their nutritional status or SGA score, a significant association was detected among group (p<0.001). Where there was enhancement and shift in malnutrition from 77% (52%SGA B (mild/moderate malnutrition), 25%SGA C (severe malnutrition)), to only 55% (43% SGA B, 12% SGA C).
Regarding MRC Dyspnea Scale, there is improvement and shift in SCORE from 31% mild degree to 39%, from 56% moderate score to 48%, from 9% sever to 7%. Also, increase in normal score from 4% up to 6%*.*

Regarding CAT SCORE, there is improvement and shift in SCORE from 48% moderate score to 56%, from 42% sever to 30% only, also shift to mild condition from 4% to 10%.

The mean difference of COPD assessment test (CAT) improved from (19.47±5.759) preintervention to (12.98±5.635) postintervention, both had moderate respiratory impairment as measured by CAT score and the mean difference of Modified Research council (MRC) dyspnea scale improved from (2.70±.689) preintervention to (1.99±.772) postintervention, both had mild score on (MRC) dyspnea scale, with significant difference p (<0.001). There was also improvement in HRQOL from 4% pre intervention to 30% postintervention. There was significant difference in the group under study between pre, and post intervention, p-value (<0.001 for all except HRQoL (p-value=0.002).

Table 1: Baseline Sociodemographic characteristic of COPD patients (N=100)

Variable	Number of participant (220) (100%)	
	Frequency	percent
Age		
30-	42	19.1
40-	65	29.5
50-	49	22.3
60-	43	19.5
70-78	21	9.5
Age (Mean±SD) Range (25-78)	50.73±12.388	
Sex		
Male	218	99.1
Female	2	0.9
Residencez		
Urban	138	62.7
Rural	82	37.3
Patient education		
Illiterate	104	47.3
Read & Write.	9	4.1
Secondary	97	44.1
University & Higher	10	4.5
Patient occupation		
Manual	90	40.9
Technical	31	14.1
Employee	48	21.8
Private Work	37	16.8
Professional	7	3.2
Unemployed	7	3.2
Duration of occupation (Mean± SD)	30.45±11.06	
Family income per month		
Not Enough	51	23.2
Enough	125	56.9
Enough and saving	44	20.0
Marital status		
Single	7	3.2
Married	205	93.2
Widow	8	3.6
Number of children (Mean±SD)		3.15±1.34

Abbreviation: n (number), and SD (standard deviation)/ 30-** means (30 up to 40) the same for the subsequent values

Table 2: Medical history and smoking status of the studied patients (N = 100)

Variable	Number of participant (220)(100%)	
	Frequency	percent
History of chronic diseases (DM, HTN, Hepatic, Renal)		
Yes	137	62.3
No	83	37.7
Family history of allergy/asthma		
Yes	107	48.6
No	113	51.4
Admission Status		
1st time	13	5.9
2nd time	24	10.9
More than two times	183	83.2
Number of exacerbations (Mean±SD)	3,87±1.392	
Length of stay (Mean±SD)	8.48±2.940	
Smoking status		
Current Smoker	189	85.9
Ex-Smoker	22	10.0
Nonsmoker	9	4.1
Type of smoking		
Cigarette	166	78.7

Shisha	14	6.6
Both	31	14.7
Duration of smoking in years (Mean±SD)	31.29±10.9	
Number of cigarettes per day (Mean±SD)	31.40±9.548	
Dealing with animals(buffalo-cow-sheep-goat):		
Yes	125	56.8
No	95	43.2
Do you have pets at home(cat-dog)		
Yes	111	50.5
No	109	49.5

Table 3: Effect of dietary counseling on SGA, CAT SCORE, MRC Dyspnea Scale:

Item	Pre intervention N %		Post intervention N %		Significance test p-value
Subjective global assessment					
SGA A	23	23	45	45	Chi -square
SGA B	52	52	43	43	
SGA C	25	25	12	12	P= 0.03*
MRC dyspnea scale					
Normal	4	4	6	6	
Mild	31	31	39	39	Chi-square
Moderate	56	56	48	48	P= 0.02*
Severe	9	9	7	7	
COPD assessment test (CAT)					
Mild	4	4	10	10	
Moderate	48	48	56	56	Chi-square
Sever	42	42	30	30	
Very Severe	6	6	4	4	P= 0.017*
HRQOL					
Poor	96	96	70	70	Chi-square
Good	4	4	30	30	P= 0.002*
Subjective Global Assessment: (mean ±SD)	2.02±.69		1.48±.50		Paired t test *p< 0.001**
MRC dyspnea scale: (mean ±SD)	2.70±.68		1.99±.77		Paired t test *p< 0.001**
COPD assessment test: (mean ±SD)	19.47±5.75		12.98±5.63		Paired t test *p< 0.001**

Abbreviation: SD (standard deviation)/ ** significant/ SGA (Subjective global assessment)/ MRC dyspnea scale (modified research council dyspnea scale)/ HRQoL (health related quality of life)/CAT (COPD assessment test)

Discussion

Dietary counseling improved malnourished COPD patients' nutritional status, functional outcomes, and quality of life by increasing energy and protein intake, changing eating habits, preventing weight loss, promoting weight gain, and improving nutritional status, functional outcomes, and quality of life. The current study revealed after dietary counseling, there were improvement in nutritional status and decrease in malnutrition from three quarter (SGA B, SGAC) to nearly one-half percentage (SGA B, SGAC). Mean difference of CAT assessment test, MRC dyspnea showed improved score from pre to post intervention. Our findings are consistent with those of Nguyen *et al*., who investigated the effectiveness of individualized nutritional counseling in treating malnourished outpatients with COPD in a low- & middle-income country (Vietnam). They found that planned nutrition advice had great effect in managing malnourished persons in underdeveloped nations without fortifying food or utilizing oral nutrition supplementation (Nguyen *et al*. 2020) [18].

Our results are also in line with those of *Weekes et al.,* who discovered nutrition counseling to be beneficial, however, the intervention group received both dietary advice and a supply of milk powder over a 6-month period. (Weekes *et al*. 2009) [23].

Yet our findings contradict those reported by Parsons *et al*., 2017 [20] who compared the efficacy of ONS versus dietary advice in treating patients suffering from malnutrition in care homes in England. Those authors noted that after three months of the intervention, those who received dietary advice, did not show any improvement in nutritional status, inversely they reduced their energy and protein intake. This could be due to the fact that the dietary advice in that study was provided through a written resource that supported the consumption of energy-rich foods rather than being individually tailored. (Parsons *et al*. 2017) [17].

In a similar study done by Gupta *et al*. in India and Cochrane Review in the United Kingdom, no significant changes in nutritional status, lung function, or HRQOL were detected over time or between groups (intervention and control groups). (Gupta *et al*. 2014, Cochrane Review. 2004) [11, 6].

These previous findings might be attributed to the fact that the counseling messages did not mention why participants needed to improve their nutrient intake, or the adverse effects of reducing them and effect of weight loss on their health status. (Andersson *et al*. 2014, Rosenstock *et al*. 1988, Vermeeren. 2004, Efthimiou *et al*. 2004) [1, 21, 22, 8].

Also, *Hallin et al*. 2006 [12] did not found any improvement in nutritional status of their studied patients*, they* suggested

that chronic inflammation increase cytokine resulted in increased levels of leptin. These elevated leptin levels could result in a reduction in food intake and therefore poor response to nutritional support. "A cytokine–leptin theory" (Hallin et al. 2006) [12].

In our study there were significant relationship between malnourished patient and MRC dyspnea scale, CAT score and HRQOL, similarly Gunya et al. 2013 [10] in Turkey, demonstrated low pulmonary functions, MRC dyspnea scale among patients who were moderately and severely malnourished compared with well-nourished patients. Gupta B et al. 2010 [11] in India, described a significant relationship between poorer nourishment states and loss in pulmonary function test (PFT) results (especially in FEV1) in COPD patients. Yuceege et al 2013 [24] in Turkey, stated that pulmonary functions were lower in the SGA-malnutrition group compared with the SGA-normal nutrition group low body weight and long smoking history were associated with greater impairment in HRQoL score. Research has indicated that a four-point improvement in HRQoL score can contribute to a change in clinical outcomes. (Nguyen et al. 2019) [17].

Our participants had their HRQOL markedly impaired across all levels of malnutrition and COPD severity. Monsó et al. 1998 [16] in Germany, in their study on 47 COPD patients they found no association between HRQoL and nutritional status. Similarly, Monsó et al. 1998 [16] in Germany, in their study on 47 COPD patients they found no association between HRQoL and nutritional status while in a study by Cömert et al. 2011 [7] in Turkey, Gunya et al. 2013 [10] in Turkey, Nguyen et al. 2019 in Vietnam reported a significant correlation between HRQoL and nutritional status this may be due to variation in instrument used to measure nutritional status and HRQoL.

Declaration

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