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IMPACT OF NUTRITION INTERVENTION ON THE GASTROESOPHAGEAL REFLUX DISEASED (GERD) PATIENTS

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ABSTRACT

Gastroesophageal reflux disease occurs when the amount of gastric juice that refluxes into the esophagus exceeds the normal limit, causing symptoms with or without associated esophageal mucosal injury. *Objectives*: To study the impact of nutrition intervention on GERD patients and to find out relation between diet and the disease. *Study design-* Intervention study; Setting and participants-100 GERD patients were selected and divided into 2 groups-experimental (50) and control (50). The pre and post intervention data with regard to anthropometry, clinical examination, biochemical estimation and dietary intake was collected using standard techniques. Collected data was then analysed statistically by applying t-test and Mcnemers test. *Result:* In experimental group, post intervention results revealed slight reduction in mean WHR of both male and female patients and significant reduction in mean BMI of female patients. While, among control group patients, mean BMI and WHR increased after a period of 90 days. Post intervention data showed significant reduction in the symptoms of GERD, in both the groups – experimental and control. Mean dietary and nutrient intake and blood hemoglobin level, were found to decreased further, post intervention.

Keywords: GERD, regurgitation, Intervention, Nutrition, WHR.

INTRODUCTION

GERD is a condition in which the stomach contents leak backwards into esophagus and can cause heartburn and other symptoms (Robbins et.al, 1989). GERD is a chronic disease that affects a large proportion of adult population. It is considered to be the fourth most common gastrointestinal disease worldwide with an estimated incidence of 6 per cent per year (Holtmann et.al, 2004). GERD is thought to affect 10 to 20 million people in the United States (Hey , 2010).

The prevalence of GERD in Asian population is reported to be lower than in western population. However, recent epidemiological studies suggest that the incidence of the disease is also increasing in Asian countries (Kumar et.al, 2010). Although precise cause of GERD remains unidentified but researches have shown that GERD can be caused by malfunctioning of lower esophageal sphincter (Yang et.al 2008). Other factors which contribute to GERD are obesity and high dietary fat intake.

Various dietary and lifestyle factors are also thought to be associated with GERD symptoms, including consumption of high calorie foods, high BMI, alcohol consumption, smoking and sedentary living. The pace of modern life is leading people to live sedentary life, to eat out more often and to adopt western life style. However, very few definitive data exist regarding the role of diet and life style in influencing on GERD symptoms. Therefore, to gain an understanding of the factors that are contributing to this worldwide problem of GERD, the present study was undertaken wherein nutrition intervention was carried out to study its impact on the health of the selected patients. Further an effort was made to find out relation between diet and the disease.

MATERIALS AND METHODS

The present study was carried out on 100 GERD patients who were selected irrespective of their sex, in the age range of 25 to 75 years. The selection of the patients was done on the basis of their endoscopy report and in consultation with the medical practitioner. A detailed interview schedule was used as a tool for collecting information from the patients.

The researches carried out over the years revealed an association between increased body weight/obesity and GERD (Ter, 2008; Anand et.al; 2010, Dent et.al, 2005; Nagoshi et.al, 2004). In the present study, data on anthropometric measurements (height, weight, waist circumference and hip circumference) of the selected patients was collected, using standard techniques. On the basis of these measurements, body mass index (BMI) and waist to hip ratio (WHR) were calculated to assess the extent of overweight or obesity among these patients.

Esophageal and extra esophageal symptoms like regurgitation, heartburn, anorexia, nausea, dysphagia, coughing and wheezing being the clinical manifestations of GERD (Mark,et.al 1999), information related to the presence of these signs and symptoms among selected patients was collected in consultation with the doctor.

The literature cited has shown that untreated GERD can cause ulceration leading to bleeding, and loss of chronic blood, which can result in an iron deficiency anemia among patients (Eisendarth et.al 2008; Kumar et.al, 2008). Therefore, biochemical estimation of blood haemoglobin level of patients falling in both experimental and control group was carried out, using cyanmethemoglobin method.

To assess the dietary intake of GERD patients, 24 hour recall of the food consumed on two consecutive days was collected and nutrient intake of the patients, of both the groups, was calculated. The obtained dietary data was compared with the reference values given by Indian dietetic association and the mean nutrient intake of the GERD patients was compared with the Recommended Dietary Allowances (RDA) given by ICMR (Gopalan et.al, 2011).

Patients falling in experimental group followed medication as well as an intervention programme, wherein the patients were counselled for diet and life style changes. On the other hand, patients in the control group followed only medication, prescribed by the doctor. The subjects in the experimental group were counselled on one to one basis by the investigator, with the help of charts, pamphlets and leaflets. These subjects were monitored from time to time for a period of 90 days, after which a follow up study was carried out. Follow up data included that of anthropometry, clinical sign and symptoms, blood hemoglobin level and dietary and nutrient intake, of the patients, which was later statistically analyzed by applying t- test and Mcnemer test. Further, a comparison was made between patients of experimental and control groups to find out the impact of nutritional intervention.

RESULTS AND DISCUSSIONS

Anthropometric data of the patients falling in experimental group revealed mean body mass index (BMI) of both male and female patients to be almost same before intervention. On the other hand, in control group, mean BMI of male patients (27.4 ± 4.0 kg/m^2) was observed to be slightly higher than their female counterparts (26.3 ± 4.0 kg/m^2). In the experimental group after counselling, the mean BMI of male patients was found to reduce by 9.4 per cent; however, the reduction was not significant at 0.05 levels. While among female patients, mean BMI reduced by almost 17 per cent and the reduction was significant. On the other hand, mean BMI of control group patients taken after 90 days was found to have increased among patients of both the sexes (Table I).

Table I-Changes in Body mass index and Waist to hip ratio of experimental and control group patients

GERD	Mean body mass index (kg/m^2) and Mean waist to hip ratio							
	Experimental group				Control group			
	Pre intervention	Post Intervention	% difference	p value	0 day	After 90 days	% difference	p value
Male (BMI)	28.5±6.6	25.8±6.3	-9.4	0.26	27.4±4.0	29.5±3.9	7.6	0.49
Female (BMI)	28±3.8	23.3±5.7	-16.7	0.04*	26.3±4.0	26.9±7.0	3.4	0.64
Male (WHR)	0.93±0.07	0.92±0.06	-1.07	0.28	0.89±6	0.90±0.6	1.12	0.98
Female (WHR)	0.95±0.05	0.93±0.06	-2.10	0.29	0.91±0.4	0.92±0.4	1.09	0.12

Figures in parentheses denote percentage, Mean ± standard deviation, *Significant at 0.05 level

The waist to hip ratio (WHR) data of experimental group patients, prior to counseling, showed mean WHR of females (0.95±0.05) to be slightly higher than their male counterparts (0.93 ± 0.07). Similar trend was also observed in control group patients. Post intervention, the patients showed slight reduction in mean waist to hip ratio, however non significant. Contrary to this in the control group slight increment was found in mean WHR of patients, of both the sexes, after a period of 90 days (Table I).

The data collected with regards to clinical signs and symptoms, prior to intervention, revealed that almost all the patients of experimental (96 per cent) and control group (98 per cent) complained of regurgitation. The percentage of patients with heart burn was higher among those from experimental group (86 per cent) than control group (64 per cent). Cough and chest pain were the next most prevalent symptoms. Further, 34 per cent of the patients in experimental group and 40 per cent in control group found to be suffering from anorexia and almost similar percentage of patients were found to have complained about nausea. Wheezing, enamel decay and dysphasia were found to be the least occurring symptoms among the patients of both the groups (Table II).

Table II-Frequency distribution of GERD patients on the basis of presence of symptoms related to GERD

	Experimental group (n=50)				Control group (n=50)			
Symptom present	Pre Intervention	Post Intervention	% difference	p value	0 day	After 90 days	% difference	p value
Regurgitation	48 (96)	4 (8)	-92	0.000*	49 (98)	21 (42)	-57	0.029*

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Heart burn	43 (86)	14 (28)	-67	0.001[*]	32 (64)	17 (34)	-47	0.040[*]
Anorexia	17 (34)	5 (10)	-71	0.036[*]	20 (40)	6 (12)	-70	0.049[*]
Nausea	18 (36)	5 (10)	-72	0.000[*]	20 (40)	5 (10)	-75	0.000[*]
Dysphagia	10 (20)	3 (6)	-70	0.000[*]	16 (32)	5 (10)	-69	0.000[*]
Cough	25 (50)	25 (50)	0	1.000	16 (32)	8 (16)	-50	0.042[*]
Wheezing	9 (18)	1 (2)	-89	0.026[*]	12 (24)	0 (0)	-100	0.000[*]
Chest pain	22 (44)	6 (12)	-73	0.031[*]	17 (34)	2 (4)	-88	0.036[*]
Enamel decay	2 (4)	2 (4)	0	1.000	2 (4)	0 (0)	-100	0.000[*]

Figures in parentheses denote percentage, * Significant at 0.05 level

Post intervention data showed significant reduction in the symptoms of GERD, in both the groups – experimental and control. The data revealed 92 per cent of the patients, falling in experimental group, could find relief from regurgitation and 67 per cent stopped complaining about burning sensation around heart. Out of 22 patients who had experienced chest pain, prior to intervention, 16 patients could find relief from the same after intervention. Further in the experimental group, results of Mcnemer test showed significant reduction in symptoms like anorexia, nausea and dysphasia. Reduction in percentage of patients suffering from wheezing, cough and enamel decay was also observed, however reduction were not significant. On the other hand, in control group, too, the reduction in symptoms was found to be significant (Table II).

The estimated mean haemoglobin level, prior to intervention showed its value among females of experimental group, to be lower than that of their male counterparts. Almost similar pattern was observed in control group, where mean hemoglobin level of female patients was found to be less than the male patients. After dietary intervention, hemoglobin level of patients reduced further, however the reduction was not significant (Table III). The reason for reduction in hemoglobin level after counselling, could be low consumption of certain foods rich in iron, vitamin C and protein. Further, the classification on the basis of haemoglobin threshold showed higher percentage of female patients (28 per cent in experimental and 22 per cent in control group) to be anemic in comparison to their male counterparts (16 per cent in experimental group and 12 per cent in control group) prior to intervention. Post intervention also, similar pattern was observed in both the groups. (Table IV).

Table III-Changes in mean blood haemoglobin level (g/dl) of experimental and control group patients

GERD patients	Mean haemoglobin level (g/dl)							
	Experimental group				Control group			
	Pre intervention	Post intervention	% difference	p value	0 day	After 90 days	% difference	p value
Male	12.3±2.5	12.1±3.7	-1.6	0.12	12.5±1.7	12.2±1.4	-2.4	0.15
Female	11.7±2.5	11.0±1.1	-5.9	0.50	11.2±1.7	10.8 ±2.6	-3.5	0.19.

Figures in parentheses denote percentage, Mean ± standard deviation, *Significant at 0.05 level

Table IV -Frequency distribution of GERD patients having iron deficiency anemia

GERD Patients	Experimental group (n=50)			Control group (n=50)		
	Pre intervention	Post intervention	% difference	At 0 day	After 90 days	% difference
Male	8(16)	9(18)	12.5	6(12)	8(16)	33.3
Female	14(28)	17(34)	21.4	11(22)	16(32)	45.4

Figures in parentheses denote percentage

The mean dietary intake data of GERD patients, belonging to both the groups, revealed intake of all the foods to be below their respective reference values. The reason attributed for the same could be inability of the patients to consume enough food due to their diseased condition and erosive esophagus. Nagoshi et.al, 2004 and Nandurkar et.al, 2006 too reported similar findings in their studies. Mean intake of green leafy vegetables, among male patients after intervention, was found to have significantly reduced (Figure ii). Among female patients, too, significant reduction in consumption of pulses, green leafy vegetables and fat was observed. These foods being fibrous in nature cause refluxogenic action and worsen the disease. In the control group, after a period of 90 days, significant increase in the mean daily consumption of other vegetables was found, however like experimental group patients, low mean intake of fruits was also seen. The reason for low dietary intake among patients could be attributed to characteristic GERD symptoms like, heartburn and regurgitation. Pulses, green leafy vegetables and cereals being fibrous and fruits being citrus could have caused irritation of GIT mucosal lining (Wang et.al, 2004, Festi et.al, 2009 and Kalenbatch et.al, 2008), thereby affecting food intake (Figure I) (Figure II).

Figure I

Mean dietary Intake of Female Patients as per cent of RDA (g)

Figure III

Mean nutrient Intake of female patients as per cent of RDA

Figure II

Mean dietary Intake of Male Patients as per cent of RDA (g)

Figure IV

Mean nutrient Intake of male patients as per cent of RDA
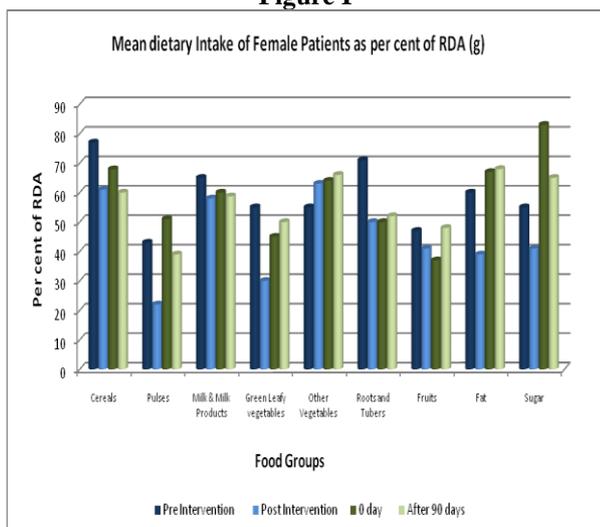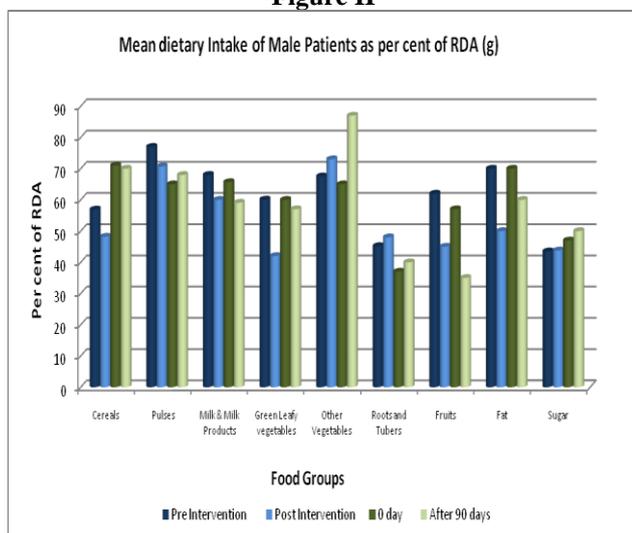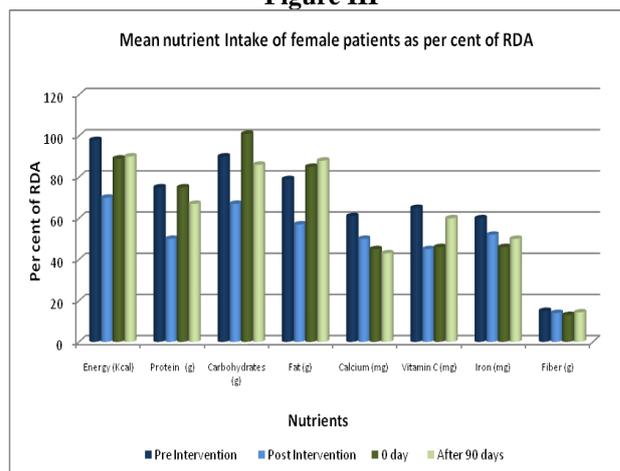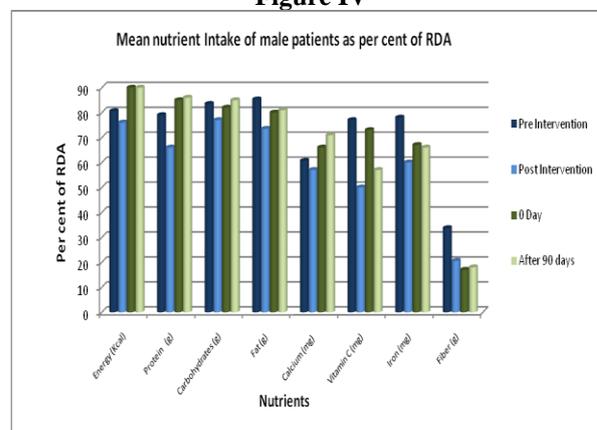
The inadequate dietary intake led to low nutrient intake among patients of both the groups. Among male patients of experimental group, the mean intake of carbohydrates, calcium and vitamin C was found to reduce significantly ($p < 0.05$ level) post dietary intervention. This could be due to low intake of green leafy vegetables and fruits by them after intervention. On the other hand, in the control group male patients, the mean calcium intake was found to increase significantly, reason being, higher intake of roots and tubers and other vegetables by them after a period of 90 days. Among female patients of experimental group, mean intake of energy, protein, carbohydrates, fat and vitamin C was found to be significantly low ($p < 0.05$ level). This could be due less consumption of pulses, green leafy vegetables and fat by experimental group female patients. On the other hand, among control group females, not much of change was observed in their nutrient intake Low nutrient intake values among patients of both the groups could be due to their inadequate dietary intake (Figure III) (Figure IV).

CONCLUSION AND RECOMMENDATIONS

The nutrition intervention resulted in reduction of mean BMI and WHR of the patients and in symptoms like regurgitation and heartburn. Slight reduction was also observed in the mean hemoglobin level of the patients, reason being avoidance of some iron, protein and vitamin C rich foods, which had refluxogenic action and caused irritation to the esophageal mucosa. Diseased condition of the patients affected their dietary and nutrient intake, which was found to be below their reference values.

REFERENCES

- Robbins, L.S., Kumar,V., & Cortan, R.S. (1989). The Gastrointestinal tract. Pathologic basis of disease (4[th]edition). W.B. Saunders International Edition. 827-828.

- Holtmann,G., Adam,B., & Webbegts, T. (2004). Pathophisiology of Gastroesophageal reflux disease. *Alimentary pharmacology & therapeutics.* 8, 24-7.

- Hye.K.J. (2010). Epidemiology of gastroesophageal reflux disease in Asia: A systematic Review. *Journal of Neurogastroenterology & Motility.* 17(1),14-27.

- Kumar, S., Sharma, S., Norboo, T., Dolma, D., Norboo, A., Stoban,T., Rohatgi, S., Munot, K., Ahuj,V., & Saraya, A. (2008). Population based study to assess prevalence and risk factors of GERD in high altitude area. *Indian Journal of Gostroenterology.*16 (2),15-18.

- Yang, H.W., Schafmayer, A., Arnold, R., Becker, H.D., & Creutzfeldt, W. (2008). The influence of coffee and caffine on gastric and acid secreation in man. *Dutch Medicine. 110*(12), 455-7.

- Eisendarth, F.B., Steinbaugh, J.T., Fromkes, J.J., Mekhjian, H.S., & Caldwell, J.H. (2008). Inhibitory effect of coffee on lower esophageal sphincter pressure. *Gastroenterology*. 79(6), 1262-6.

- Kumar, S., & Sharma, S. (2010). Population based study to assess Pathophisiology of GERD in high altitude area. *Indian Journal of Gostroenterology.*19 (6),10-17

- Ter, R.B. (2008). Gender Differences in gastroesophaseal reflux disease. *Journal of Gender Specific Medicin. 3*(2), 42-4.

- Anand, G., & Katz, P.O. (2010). Gastrosphaged reflux disease and obesity. *Gastroeterology Clinics of North America. 39*(1), 39-46.

- Dent,J., El-Serag, H.B., Wallander, M.A., & Johansson, S. (2005). Epidemiology of gastro-oesophageal reflux disease: a systematic review. *Gut*.5.4710-7.

- Nagoshi,Y., Inamori M., Iwasaki, T., Lida, H., Endo, H., Hosono, K., Ikeda, T., Fujita, K., Yoneda, M., Takahashi, H., Koide, T., Tokoro, C., Goto, A., Abe, Y., Kirikoshi, H., Kobayashi, N., Kubota, K., Saito, S., & Nakajima, A. (2004). Relationship between upper gastrointestinal symptoms and diet therapy: examination using frequency scale for the symptoms of gastroesophageal reflux disease. *Hepatol Gastroenterology.* 57:1635–1638

- Nandurkar, S., & Tally, N.J. (2006). Epidemiology and natural history of reflux disease. Baillieres best practical research. *Clinical gastroenterology*. 78,257-60.

- Wang, J.H., Juo, J.Y., Dong, L., Gong, J., & Tong, M. (2004). Epideniology of gastro esophageal reflux disease. A general population based study in Xian of northwest china. *World Journal of Gastroenterology*. 10(11), 1647-51.

- Festi, D., Scaioli, E., Baldi, F., Baldi, F., Vestito, A., Pasouj, F., Dibiase, A., & colecchia, A. (2009). Body weight, Lifestyle, Dietary Habits and Gastroesophageal reflux disease. *World Journal of Gastroenterology.* 15(14), 690-701.

- Gopalan,C., Ramashastri, B.V., & Balasubramanion, S.C. (2011). Revised updated by Narasinga B.S., Deosthale. Y.G., Pant, K.C. Nutritive value of Indian foods. National Institute of nutrition. Indian counsil of medical research hyderabad. India. 47-67.

- Kaltenbach, T., Crockett, S., & Gerson, L.B. (2008). Are life style measures effective in patients with GERD? *Archives of Internal Medicine.* 166, 965-71.