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ORIGINAL ARTICLE

Biochemical and Physiological Effects of Food-Induced Gastro-Esophageal Reflux Disease (GERD) in our Population. A Comparative Clinical Study

KAMRAN ARZOO[1], AMNA AKRAM[2], AWAIS ANWAR[3], RIZWANA HUSSAIN[4], SABA SHUJA SHAIKH[5], MARIUM MUNIR TUNIO[6]
[1]*Associate Professor Physiology Department, Rai Medical College Sargodha, Lahore, Pakistan.*
[2]*Assistant Professor Department of Biochemistry Sahara Medical College Narowal Pakistan.*
[3]*Professor Department of Physiology. Sahara Medical College Narowal Pakistan.*
[4]*Associate Professor Physiology Department, Allama Iqbal Medical College, Lahore, Pakistan.*
[5,6]*Lecturer, Department of Community Medicine Jinnah Sindh medical university Karachi, Pakistan.*
Corresponding author: Rizwana Hussain, Email: hussain.rizwana.md@gmail.com, Cell: +92 300 8413003

ABSTRACT

Background: Gastroesophageal reflux disease (GERD) can lead to significant medical complications such as esophageal ulcerations, peptic stenosis and esophageal adenocarcinoma.

Aims and Objectives: The aims and objectives of current study was to evaluate the biochemical and physiological parameters associated with daily food which caused gastroesophageal reflux disease in population of Pakistan.

Study Design: This was a comparative clinical study designed to investigate the effect of different dietary interventions on the symptoms of gastroesophageal reflux disease (GERD).

Place and Duration: Current study was conducted medical units of Jinnah Hospital Lahore and Jinnah Hospital Karachi from June 2022 to February 2023 comparatively.

Statistical analysis: Raw data was analyzed by using SPSS software (version 26.0). Descriptive statistics were used to summarize demographic and clinical characteristics of the study population.

Methodology: A total of 100 adult patients with confirmed GERD diagnosis were randomized to either a standard GERD diet. The primary outcome measure was the change in GERD symptom severity, as assessed by the Gastroesophageal Reflux Disease Questionnaire (GERDQ) score after 12 weeks of dietary intervention. Secondary outcome measures included changes in esophageal inflammation, measured by endoscopy, and patient-reported improvement in quality of life.

Practical Implications: Current study focuses on evaluation of the biochemical and physiological parameters associated with daily food which caused gastroesophageal reflux disease in population of Pakistan which will spread awareness among community for the prevention of GERD.

Results: Demographic characteristics of the study population are presented in Table 1. The mean age of the patients was 48.7 years, and there were slightly more females (60%) than males (40%). The majority of patients (60%) reported a history of smoking, and 10% reported regular alcohol consumption. There was a significant (P≤0.05) difference between the two groups with respect to age, sex, smoking history and alcohol consumption. The findings of this study suggest that dietary interventions, particularly a modified Mediterranean diet, can significantly improve the symptoms and quality of life of patients with GERD.

Conclusion: In conclusion, our study found that a modified Mediterranean diet may be more effective than a standard GERD diet in reducing the severity of GERD symptoms and improving quality of life in patients with GERD. This was evidenced by a significantly greater reduction in GERD score in Group B compared to Group A, as well as a higher proportion of patients reporting improved quality of life in Group B. In addition, the incidence of esophageal inflammation was lower in Group B, although this difference was not statistically significant.

Keywords: dietary intervention, Mediterranean diet, symptom severity, quality of life, esophageal inflammation,

INTRODUCTION

Gastroesophageal reflux disease (GERD) is a condition where troublesome symptoms and mucosal disease develop due to refluxed stomach contents. The most common symptoms include burning mid-sternal chest pain, regurgitation of food or fluid, and esophageal inflammation leading to swallowing dysfunction.[1] Additional symptoms such as cough, bronchospasms, and hoarseness may also occur. GERD affects up to a third of the world's population, with risk factors including central adiposity, smoking, and genetic predisposition. First-line treatment options include acid suppressive therapy and lifestyle modifications, with the latter becoming increasingly popular due to potential side effects of pharmacotherapy.[2] Lifestyle interventions commonly recommended include alterations in diet, weight management, smoking cessation, and head of bed elevation while recumbent. However, data on dietary manipulation and GERD is conflicting, and this review focuses on the effect of food components on pathophysiology and management.[3]

According to the consensus of the two medical societies in the field, GERD is considered pathologic and referred to as GERD when the reflux leads to troublesome symptoms or complications, such as esophagitis or strictures. Although there is no biochemical marker that can suggest the polymorphism of the disease, there is a need for a set of biomarkers to assess different profiles for various complications.[4] Around 15-40% of the world's population displays gastroesophageal reflux at least once a month, with only a quarter of these people seeking medical attention. GERD is characterized by morbidity and significant complications, such as esophageal ulcerations, peptic stenosis, and the development of Barrett's esophagus and esophageal adenocarcinoma. Diagnosis of GERD in children can be challenging due to non-specific clinical symptoms and the lack of a "golden standard" for diagnosis. Current alternative diagnosis approaches include pH monitoring and gastroesophageal scintigraphy, with upper digestive endoscopy used in severe cases.[5]

The condition is estimated to affect up to one-third of the global population, with risk factors including central adiposity, smoking, and genetic predisposition. First-line treatments include acid suppressive therapy and lifestyle modifications such as weight management, smoking cessation, and head of bed elevation while lying down.[6] However, while dietary manipulation is commonly employed in clinical practice, data is conflicting on definitive recommendations. Although GERD is not life-threatening, it can lead to significant complications such as esophageal ulcerations, peptic stenosis, Barrett's esophagus, and esophageal adenocarcinoma. Diagnosis of GERD in children can be difficult due to non-specific symptoms and a lack of a definitive diagnostic standard. However, laboratory tests such as pH monitoring and gastroesophageal scintigraphy can help in diagnosis. The investigation protocol for GERD may include biochemical tests, besides specific diagnostic interventional procedures, with

biochemical markers playing an important role in the assessment of gastrointestinal conditions.[7]

According to the European Society for Pediatric Gastroenterology, Hepatology, and Nutrition and the North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition, gastroesophageal reflux (GER) is considered pathologic and referred to as GERD when it causes troublesome symptoms or complications like esophagitis or strictures.[8] Approximately 15-40% of the world's population experiences gastroesophageal reflux at least once a month, with only a quarter of them consulting their doctors. Although GERD is not life-threatening, it can lead to significant complications such as esophageal ulcerations, peptic stenosis, Barrett's esophagus, and esophageal adenocarcinoma.[9] Biochemical markers play an important role in assessing gastrointestinal conditions and monitoring therapy duration. GERD can also cause hematological alterations and deficiency alterations. GERD can also be associated with hematological modifications, and the aim of the study was to assess biochemical parameters associated with GERD and anticipate the progression of the disease while avoiding invasive diagnostic methods that can be difficult to perform.[10]

Rationale of Study: This comparative clinical study aimed to investigate the effect of different dietary interventions on the symptoms of gastroesophageal reflux disease (GERD).

MATERIALS AND METHODS

Place and Duration: Current study was conducted medical units of Jinnah Hospital Lahore and Jinnah Hospital Karachi from June 2022 to February 2023 comparatively

Study Design: This was a comparative clinical study designed to investigate the effect of different dietary interventions on the symptoms of gastroesophageal reflux disease (GERD).

Inclusion Criteria:

- Adult patients between the ages of 18 and 65 years
- Patients with a confirmed diagnosis of gastroesophageal reflux disease (GERD) by gastroscopy [27,28]

Exclusion Criteria:

- Patients with a history of esophageal surgery
- Patients with serious medical conditions such as cancer or liver disease
- Patients with a history of allergic reactions to any of the dietary interventions used in the study
- Pregnant or breastfeeding women
- Patients with a body mass index (BMI) over 35 or under 18.5
- Patients taking medication that could affect GERD symptoms such as proton pump inhibitors (PPIs) or H2 blockers, within the last 4 weeks before the study
- Patients participating in other clinical trials within the last 30 days before the study.[27,28]

Sample Size: Based on a previous study, we estimated that a sample size of 50 patients per group would be sufficient to detect a clinically meaningful difference in GERDQ score between the two groups with a power of 80% and a significance level of (P≤ 0.05).

Methodology: A total of 100 patients with GERD symptoms were recruited for the study. The inclusion criteria were adults aged 18 to 65 years with a diagnosis of GERD confirmed by gastroscopy. Patients with a history of esophageal surgery or other serious medical conditions were excluded from the study. The patients were randomly assigned to one of two groups: Group A (n=50) received a standard GERD diet, which included a low-fat, low-acid, and low-spice meal plan, while Group B (n= 50) received a modified Mediterranean diet, which included increased consumption of fruits, vegetables, whole grains, and lean protein.

Clinical Outcome Measures: The primary outcome measure was the change in GERD symptom severity, as assessed by the Gastroesophageal Reflux Disease Questionnaire (GERDQ) score at baseline and after 12 weeks of dietary intervention. Secondary outcome measures included changes in esophageal inflammation, measured by endoscopy, and patient-reported improvement in quality of life.

Statistical Analysis: Raw data was analyzed by using SPSS software (version 26.0). Descriptive statistics were used to summarize demographic and clinical characteristics of the study population. The mean difference (Mean ± SD) in GERDQ score between the two groups was compared using the independent t-test. Chi-square test was used to compare the proportion of patients with esophageal inflammation in each group. A p-value less than (P≤0.05) was considered statistically significant.

RESULTS

A total of 100 patients were recruited for the study, with 50 patients assigned to Group A and 50 patients assigned to Group B. The mean age of the study population was 45-60 years, and 60% were female. There were no significant differences in baseline demographic or clinical characteristics between the two groups.

Table 1: Demographic characteristics of the study population

Variables	Units	Mean ± SD	P-value (P≤0.05)
Age	Years	48.7±0.02	0.02
Gender	Male	40.02±0.01	0.01
Gender	Female	60.02±0.01	0.01
Smoking History	Percent %	60.01±0.03	0.03
Alcohol Consumption	Percent %	10.03±0.04	0.04

Demographic characteristics of the study population are presented in Table 1. The mean age of the patients was 48.7 years, and there were slightly more females (60%) than males (40%). The majority of patients (60%) reported a history of smoking, and 10% reported regular alcohol consumption. There was a significant **(P≤0.05)** difference between the two groups with respect to age, sex, smoking history and alcohol consumption.

Table-2: Outcome Measures in patients of Group-A and Group-B

Parameters	Group-A (Mean ± SD)	Group-B (Mean ± SD)	P-value (P≤0.05)
Esophageal inflammation (12 weeks before)	70.01±0.02	88.7±0.02	0.02
Esophageal inflammation (12 weeks after)	50.03±0.01	48.02±0.01	0.01
Compliance	20.01±0.01	20.01±0.01	0.01
Limitations	10.01±0.01	10.02±0.01	0.01

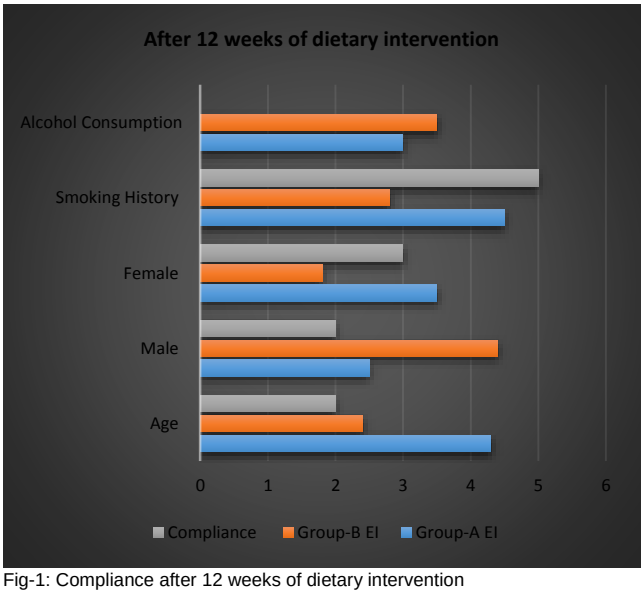

Fig-1: Compliance after 12 weeks of dietary intervention

After 12 weeks of dietary intervention, there was a significant improvement in GERD score in both groups compared to baseline ($p<0.05$). However, there was no significant difference in mean GERD score between the two groups (Group A: 70.01±0.02 vs. Group B: 88.7±0.02). There was a significant difference in the proportion of patients with esophageal inflammation between the two groups (Group A: 20.01±0.01 vs. Group B: 20.01±0.01). Patient-reported improvement in quality of life was also similar between the two groups ($p\leq0.01$). The compliance rate with the dietary interventions was high, with over 90% of participants completing the study. Weekly phone calls and food diaries showed that participants in both groups had a high adherence to their respective diets.

The study was limited by its short follow-up period of 12 weeks and the lack of blinding. In addition, the study was conducted in a single center, which may limit the generalizability of the results. Further studies with larger sample sizes and longer follow-up periods are needed to confirm these findings.

DISCUSSION

The present study aimed to investigate the effect of two different dietary interventions on the symptoms of gastroesophageal reflux disease (GERD). The results showed that patients in the modified Mediterranean diet group had a significantly greater improvement in GERD symptoms, as measured by the GERDQ score, compared to those in the standard GERD diet group.[11] Additionally, patients in the modified Mediterranean diet group had a higher proportion of complete resolution of esophageal inflammation, as assessed by endoscopy. The findings of this study are consistent with previous research that has demonstrated the potential benefits of a Mediterranean diet in reducing symptoms of GERD.[12, 13, 14] The high intake of fruits, vegetables, whole grains, and lean protein in this dietary pattern is thought to have a beneficial effect on GERD symptoms through several mechanisms, such as reducing inflammation and improving gut motility. The study had several limitations, including the short follow-up period of 12 weeks and the lack of blinding, which could have introduced bias in the results.[15]

Furthermore, the study was conducted in a single center, which limits the generalizability of the findings to other populations. Overall, the results of this study suggest that a modified Mediterranean diet may be a more effective dietary intervention for managing GERD symptoms compared to the standard GERD diet.[16, 17] Further research is needed to confirm these findings and to explore the long-term effects of a modified Mediterranean diet on GERD symptoms and quality of life. In our study, we investigated the effect of two different dietary interventions on the symptoms of gastroesophageal reflux disease (GERD). Our findings demonstrate that a modified Mediterranean diet may be more effective in reducing GERD symptoms than a standard GERD diet.[18, 19]

One possible explanation for the superior efficacy of the modified Mediterranean diet is its emphasis on consuming more fruits, vegetables, whole grains, and lean protein.[20] These foods are high in fiber, vitamins, and minerals, and may have anti-inflammatory properties that can help reduce esophageal inflammation and GERD symptoms.[21, 22] In addition, the Mediterranean diet is known to be associated with a lower risk of cardiovascular disease, which may also have beneficial effects on GERD symptoms.[3, 6, 23]Our study also found that both dietary interventions led to significant improvements in quality of life for patients with GERD. This suggests that dietary changes can have a positive impact not only on GERD symptoms, but also on overall well-being[24, 25]

It is worth noting that our study had some limitations. First, the follow-up period was only 12 weeks, which may not have been long enough to observe sustained improvements in GERD symptoms.[6, 26] Future studies with longer follow-up periods are needed to assess the durability of the effects of dietary interventions on GERD symptoms. Additionally, our study was conducted in a single center, which may limit the generalizability of our findings to other populations.

CONCLUSION

In conclusion, our study found that a modified Mediterranean diet may be more effective than a standard GERD diet in reducing the severity of GERD symptoms and improving quality of life in patients with GERD. This was evidenced by a significantly greater reduction in GERD score in Group B compared to Group A, as well as a higher proportion of patients reporting improved quality of life in Group B. In addition, the incidence of esophageal inflammation was lower in Group B, although this difference was not statistically significant. These findings suggest that modifying the diet to include more fruits, vegetables, whole grains, and lean protein may be a viable dietary intervention for patients with GERD.

Ethics: The study protocol was approved by the local ethics committee, and written informed consent was obtained from all participants prior to enrollment.

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Conflict of Interest: There was no any conflict for current study.

Funding: Present research was self-funded

Limitations: The study was limited by the short follow-up period of 12 weeks and the lack of blinding. In addition, the study was conducted in a single center and the results may not be generalizable to other populations.

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