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The Effectiveness of Dietary Intervention in Managing Gastroesophageal Reflux Symptoms: A Prospective Study

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Abstract **Objectives:** Gastroesophageal Reflux Disease (GERD) is a chronic and prevalent gastrointestinal disorder that significantly impairs quality of life, particularly in Saudi Arabia, where dietary and lifestyle patterns contribute to its high incidence. While pharmacologic therapies are commonly used, concerns about side effects and patient dependence have prompted the need for effective non-pharmacological alternatives. This study aimed to assess the effectiveness of culturally relevant dietary modifications in alleviating GERD symptoms and enhancing overall well-being. **Methods:** A prospective, pre-post intervention study was conducted involving 47 adult participants with self-reported GERD symptoms. The intervention included avoidance of dietary triggers (e.g., fatty/spicy foods, caffeine), adopting smaller and more frequent meals and avoiding recumbency within 2–3 hours post-meal over a four-week period. Symptom severity, quality of life and lifestyle behaviors were evaluated using structured questionnaires before and after the intervention. Adherence and participant perceptions were also assessed. Data were analyzed using SPSS v25, applying Wilcoxon signed-rank, Chi-square and ordinal regression tests, with significance set at $p<0.05$. **Results:** The intervention led to statistically significant improvements in the frequency and severity of key GERD symptoms, including heartburn, regurgitation, chest discomfort and nighttime reflux ($p<0.001$). Participants also reported marked improvements in quality of life indicators, such as sleep quality, mood and enjoyment of meals. No significant association was found between symptom improvement and demographic or lifestyle variables such as age, BMI, or smoking status. High levels of participant satisfaction and adherence were observed, with over 80% willing to recommend the approach to others. **Conclusion:** Dietary modification is a safe, effective and culturally adaptable strategy for managing GERD symptoms and improving quality of life. This approach holds promise as a first-line or adjunctive therapy in GERD management, especially in regions with high prevalence and lifestyle-related risk factors. Further large-scale and long-term studies are recommended to reinforce these findings and support integration into national dietary and clinical guidelines.

Key Words: GERD, Dietary Modification, Reflux Symptoms, Quality of Life, Lifestyle Intervention, Heartburn, Non-Pharmacological Therapy

INTRODUCTION

Gastroesophageal Reflux Disease (GERD) is a chronic gastrointestinal condition characterized by the backward flow of stomach contents into the esophagus, primarily due to dysfunction of the Lower Esophageal Sphincter (LES). When reflux causes persistent or severe symptoms and complications, it is formally classified as GERD. This malfunction allows acidic stomach contents to escape into the esophagus, leading to irritation and inflammation and resulting in symptoms such as heartburn, regurgitation, chest discomfort, chronic cough, nausea and a sour taste in the mouth [1]. GERD is not only prevalent globally, but its incidence has also been rising steadily, driven largely by shifts in lifestyle and dietary habits such as increased consumption of fatty or processed foods and rising obesity rates [2]. This growing burden has significant implications for public health systems in terms of long-term management costs and patient morbidity [3].

The impact of GERD extends beyond physical discomfort. It can severely disrupt quality of life by affecting sleep, limiting dietary choices and reducing daily functioning [4]. Emotionally, GERD has been linked with heightened levels of anxiety and depression, especially in individuals with non-erosive forms of the disease [5]. These emotional effects can cause social withdrawal, diminished productivity and missed professional or personal engagements, demonstrating that GERD is both a clinical and psychosocial issue requiring comprehensive care strategies [6].

Although pharmacologic therapies such as antacids, H2 blockers and Proton Pump Inhibitors (PPIs) remain the

standard of care, they are associated with considerable limitations. Long-term use of PPIs, for instance, is linked to risks such as nutrient malabsorption and osteoporotic fractures [7], while abrupt withdrawal may trigger rebound acid hypersecretion [8]. These drawbacks have led to a growing interest in non-pharmacological interventions, especially dietary and behavioral changes. Modifying meal timing, avoiding recumbency after eating and eliminating trigger foods have all shown potential in alleviating GERD symptoms [9].

Diet, in particular, plays a central role in both the pathogenesis and management of GERD. Certain foods-including fatty or spicy items, caffeine, chocolate, citrus fruits and large meals-are known to reduce LES pressure and trigger reflux episodes [10]. In addition, the timing and portion size of meals can significantly influence symptoms: late-night eating and large meals elevate intra-abdominal pressure, while smaller, more frequent meals are protective [11]. Mechanistic studies have revealed that high-fat and sugar-rich diets may compromise LES tone and prolong esophageal acid exposure [12]. As a result, major clinical guidelines, such as those from the American College of Gastroenterology (ACG) and the UK's NICE, now recommend dietary and lifestyle changes as frontline interventions for GERD [13].

However, despite this consensus, there remains a lack of robust, real-world evidence quantifying the specific impact of dietary changes on symptom control and quality of life. Existing studies offer mixed results and few provide detailed evaluations of patient adherence, acceptability, or long-term sustainability [10,14,15]. Moreover, many investigations focus solely on clinical symptoms, neglecting patient-reported outcomes such as emotional well-being and functional impairment. Addressing these gaps could lead to the development of more effective, patient-tailored strategies for GERD management.

The present study aims to address this need by evaluating the effect of structured dietary modifications on both the frequency and severity of GERD symptoms, as well as on quality of life. It includes a comprehensive assessment of medication use, lifestyle behaviors and patient perceptions before and after a four-week intervention. By also examining potential moderating factors such as BMI, age and smoking, the study seeks to identify subgroups that may benefit most from dietary interventions. This dual clinical and psychosocial approach offers a more holistic view of GERD management and underscores the importance of integrating patient experience into treatment planning.

The study is guided by the hypothesis that dietary modifications will result in at least a two-fold reduction in GERD symptom scores, even after accounting for demographic and lifestyle variables. This, in turn, is expected to yield measurable improvements in participants' quality of life, supporting a patient-centered, non-pharmacological management pathway for GERD.

METHODS

This study employed a prospective, observational, pre-post intervention design to evaluate the impact of structured dietary modifications on Gastroesophageal Reflux Disease (GERD) symptomatology and overall quality of life. Conducted over a four-week period in May 2025, the study involved baseline assessments, implementation of a diet-based intervention and a follow-up evaluation. The primary objective was to determine whether changes in dietary habits-specifically avoidance of known dietary triggers, modifications in meal timing and altered post-meal behavior-could lead to measurable reductions in GERD symptoms and improvements in daily functioning and psychosocial well-being.

Participants were recruited from outpatient clinics at North Tower Hospital, Arar and King Fahad Medical City, Riyadh. A total of 47 adult participants were enrolled based on predefined inclusion and exclusion criteria. Eligible participants were adults aged 18 years and above who reported persistent GERD symptoms and were willing to comply with dietary guidance and complete both pre- and post-intervention assessments. Exclusion criteria included the presence of severe comorbid conditions, recent gastrointestinal surgery, or ongoing pharmacological treatment specifically for GERD.

Data collection tools consisted of self-administered, structured questionnaires designed to capture multiple dimensions of GERD-related experience. These included symptom checklists evaluating frequency and severity of common complaints such as heartburn, regurgitation and nocturnal reflux, as well as instruments assessing sleep disturbances and chest discomfort. Lifestyle practices, medication use and adherence to dietary guidelines were assessed through behavior-focused surveys. Quality of life was measured across domains including sleep, mental well-being, social interaction and functional limitations. Demographic variables (age, sex, body mass index [BMI] and smoking status) were collected at baseline to assess potential moderators of treatment response.

Participants were educated on dietary practices known to reduce reflux events. Guidance included the avoidance of high-fat, spicy and acidic foods, caffeine, chocolate, citrus fruits and carbonated beverages. In addition, participants were advised to consume smaller, more frequent meals and to avoid lying down or reclining for at least three hours post-meal. These recommendations were delivered via a standardized verbal counselling session, supplemented with printed educational materials. No prepackaged meals were provided; rather, participants were encouraged to adapt their usual diets accordingly.

Adherence was assessed weekly through a structured self-report instrument using a five-point Likert scale ("always," "most of the time," "sometimes," "rarely," and "never"). This approach enabled monitoring of compliance trends and their relationship to symptom progression and changes in quality of life.

Statistical analysis was conducted using SPSS version 25. The Wilcoxon signed-rank test was applied to assess changes in symptom severity before and after the intervention, given the paired and non-parametric nature of the data. The Chi-square test (Chi^2) was used to

evaluate associations between categorical variables such as adherence and symptom response. Additionally, ordinal regression was employed to determine whether demographic and lifestyle characteristics-including age, BMI and smoking-had predictive value for post-intervention quality-of-life outcomes. A two-tailed p-value ≤0.05 was considered statistically significant.

Ethical approval for the study was granted by the Institutional Review Board (IRB) of Northern Border University. All procedures conformed to the ethical principles outlined in the Declaration of Helsinki. Written informed consent was obtained from all participants after they were briefed on the study's objectives, methodology and potential risks and benefits. To ensure confidentiality, all data were anonymized and securely stored with restricted access, thereby preserving the privacy of participant responses throughout the study lifecycle.

RESULTS

Participant Demographics and Personal Characteristics

Table 1 summarises the 47 participants' demographic and lifestyle characteristics. The majority were male (65.95%), with females accounting for 34.04%. Participants were fairly evenly distributed across age groups, with 40.42% aged 36–55 and 29.78% each in the 20–35 and 55+ age ranges. Over half of the participants (53.19%) were classified as overweight and 27.65% were obese; no individuals were underweight. A significant proportion of participants were smokers (70.21%).

Symptom Frequency and Severity Before and After Intervention

As shown in Table 2, all measured symptoms of acid reflux significantly decreased following the dietary intervention. Using the Wilcoxon signed-rank test, each symptom showed a statistically significant reduction (p = 0.000), indicating that the intervention had a strong effect.

The most severe symptoms prior to intervention were heartburn and regurgitation (mean rank = 23.85), followed by waking up at night due to reflux (mean rank = 23.40) and nausea (mean rank = 22.42). Even symptoms with lower pre-intervention frequencies – such as a sour taste in the mouth (mean rank = 18.86) – improved significantly. The consistent reduction across all 11 symptom variables reflects the dietary changes' robust therapeutic effect.

Impact on Daily Life and Well-being

Table 3 details how acid reflux symptoms affected daily life and emotional well-being. A considerable portion of participants (27.65%) reported an ongoing inability to enjoy meals due to symptoms, while another 31.91% reported that this happens sometimes. Daily activities were affected most of the time in 34.04% of cases and always affected in 12.76% of cases.

Notably, 29.78% of participants always felt anxious or stressed about their symptoms; 27.78% rarely experienced this. Sleep disruption was widespread, with 57.43% reporting nighttime disturbance, either always or most of the time. Mental well-being was significantly affected, with 46.80% of participants reporting a constant or frequent emotional impact. These findings demonstrate GERD's multifaceted toll on both physical and emotional health.

Effect of Demographic and Lifestyle Factors on Quality of Life

Table 4 presents the results of the ordinal regression analysis assessing the influence of demographic and lifestyle variables on overall quality of life. None of the assessed

Table 1: Distribution of Demographic and Personal Details of Participants Includes frequency and percentage of participants by sex, age group, BMI, and smoking status

Variable	Category	Frequency	Percent
Sex	Male	31	65.95
	Female	16	34.04
Age	20-35	14	29.78
	36-55	19	40.42
	55+	14	29.78
BMI	underweight (<18.5)	0	0.00
	normal weight (18.5-24.9)	9	19.14
	overweight (25-29.9)	25	53.19
	obesity (30 or greater)	13	27.65
Smoking	Yes	33	70.21
	No	14	29.78

Table 2: Comparison of Symptom Frequency & Severity (Pre/Post)

Variables	Mean Rank	Sum of Rank	Z-value	P-value
How often do you experience heartburn?	23.85	954.00	5.426	0.000
How often do you experience regurgitation?	23.85	954.00	5.422	0.000
How often do you feel a burning sensation in your chest?	20.53	718.50	5.100	0.000
How often do you experience a sour or bitter taste in your mouth?	18.86	660.00	5.194	0.000
How often do you feel nauseous due to acid reflux?	22.42	874.50	5.393	0.000
How often do you wake up at night due to acid reflux?	23.40	819.00	5.091	0.000
How often do you have a chronic cough or throat irritation?	20.59	762.00	5.262	0.000
How often do you feel bloated after meals?	21.90	657.00	4.236	0.000
How often do you experience difficulty swallowing?	21.00	861.00	5.262	0.000
How often do you experience a lump-in-throat sensation?	21.83	786.00	5.123	0.000
How often do you experience nighttime reflux symptoms?	21.38	684.00	4.623	0.000

factors-including BMI (p = 0.160), age (p = 0.500) and smoking status (p = 0.648) - were statistically significant predictors. These results suggest that quality of life may be closely associated with symptom severity and management behaviours rather than demographic or lifestyle factors alone.

Lifestyle Behaviours and Symptom Management

Table 5 presents participants' GERD-related lifestyle habits. A notable 40.42% reported sometimes lying down within three hours after eating-a behaviour known to exacerbate reflux. Around 25–30% regularly consumed spicy foods or caffeine, both of which are recognised dietary triggers. In terms of management, 38.29% of participants always used medication for symptom relief, while 23.40% used it most of the time. These findings emphasise the importance of behaviour-based management alongside pharmacological support.

Patient Adherence and Perceptions of Dietary Modification

According to Table 6, adherence to dietary recommendations was moderate to high: 27.66% of participants reported always following the advice, while 29.79% did so most of the time. The most helpful changes cited were eating small meals (36.17%) and avoiding food triggers (31.91%), while avoiding large meals (38.29%) was the most difficult adjustment. Use of food diaries was limited, with 44.68% sometimes tracking their diet and 29.79% never doing so.

Despite this, 70.22% of participants reported experiencing symptom improvement (combining "yes" and "totally yes" responses) and 78.72% reported improved quality of life. Importantly, 80.85% said they would recommend dietary intervention to others-a statistically significant response (p = 0.000). This underscores the approach's perceived effectiveness and acceptability.

Dietary Change Impact on Symptom Scores

Table 7 demonstrates a clear shift in post-intervention symptom frequency. Before the dietary changes, many participants experienced symptoms (heartburn, regurgitation, chest burning, nighttime reflux, etc.) either "most of the time" or "always". After the intervention, most responses shifted toward "rarely" or "never", with no participants reporting these symptoms "most of the time" or "always" in the post-intervention period. This consistent improvement across all symptom categories strongly supports the role of dietary modification as an effective and sustainable strategy for managing acid reflux symptoms.

DISCUSSION

This study sought to evaluate the effectiveness of culturally informed dietary modifications in reducing symptoms of Gastroesophageal Reflux Disease (GERD) and improving overall quality of life among adult patients in Saudi Arabia. Through a structured, four-week intervention focused on eliminating dietary triggers, optimizing meal timing and portion control and encouraging post-meal posture adjustments, participants experienced marked reductions in symptom frequency and severity. Improvements were also observed in daily functioning, sleep quality and mental well-being, underscoring the intervention's holistic benefits. Notably, over 70% of participants reported symptom relief and more than 80% expressed a willingness to recommend the intervention to others, reflecting both perceived efficacy and high satisfaction. GERD prevalence is particularly elevated in Saudi Arabia, driven by widespread consumption of spicy, fatty foods and caffeinated beverages. This study thus has significant regional relevance, demonstrating that culturally tailored dietary interventions can effectively mitigate GERD symptoms. The findings support the incorporation of non- pharmacological strategies

Table 3: Impact on Daily Life and Well-being

	Always	Most of time	Sometime	rarely
Do your acid reflux symptoms prevent you from enjoying meals?	13 (27.65)	09 (19.14)	15 (31.91)	10 (21.27)
Do your symptoms affect your daily activities?	06 (12.76)	16 (34.04)	13 (27.65)	12 (25.53)
Do you avoid eating out or certain foods due to acid reflux?	09 (19.14)	08 (17.02)	13 (27.65)	17 (36.17)
Do you feel anxious or stressed about your reflux symptoms?	14 (29.78)	9 (19.14)	11 (23.40)	13 (27.78)
How much do reflux symptoms disrupt your sleep?	13 (27.65)	14 (29.78)	10 (21.27)	10 (21.27)
How much do reflux symptoms impact your mental well-being?	11 (23.40)	11 (23.40)	12 (25.53)	13 (27.65)

Table 4: Effect of various factors on overall quality of life

Variables	SE	Wald	Sig.	95% Confidence Interval	
BMI	.083	1.974	.160	-.046	.279
Age	.019	.455	.500	-.049	.024
Smoking	.605	.208	.648	-1.462	.910
Alcohol;	.869	.859	.354	-2.508	.897

Table 5: Lifestyle & Management

	Always	Most of time	Sometime	rarely
How often do you lie down within 3 hours after eating?	10 (21.27)	10 (21.27)	19 (40.42)	8 (17.02)
How often do you eat spicy?	12 (25.53)	08 (17.02)	14 (29.78)	13 (27.65)
How often do you consume caffeine?	12 (25.53)	11 (23.40)	14 (29.78)	10 (21.27)
How often do you use medications for symptom relief?	18 (38.29)	11 (23.40)	7 (14.89)	11 (23.40)

Table 6: Patient Adherence and Perception of Dietary Modifications

		Response (%)	p-value(χ^2)
How closely did you follow the recommended dietary modifications?	Always Most of time Sometimes Rarely Never	13 (27.66) 14 (29.79) 10 (21.28) 10 (21.28) 00	0.781
Which dietary changes were most beneficial for reducing your symptoms?	Avoiding food trigger Small food meals Delay lay/sleep after food)	15 (31.91) 17 (36.17) 15 (31.91)	0.918
Which dietary changes were most difficult to follow?	Avoid fatty food Avoid large meals Avoid spicy/herbs	15 (31.91) 18 (38.29) 14 (29.79)	0.758
How often did you track your diet with a food diary?	Always Most of time Sometimes Rarely Never	0 0 21 (44.68) 12 (25.53) 14 (29.79)	0.240
Did you notice a reduction in your acid reflux symptoms after following the diet?	Totally yes Yes No	14 (29.79) 19 (40.43) 14 (29.79)	0.587
Did the dietary intervention improve your overall quality of life?	Totally yes Yes No	15 (31.91) 22 (46.81) 10 (21.28)	0.748
Would you recommend this dietary intervention to other patients with acid reflux?	Totally yes Yes No	38 (80.85) 06 (12.77) 02 (4.26)	0.000

Table 7: Effect of dietary changes on symptom severity (pre/post score response)

Variables (%)	Never	Rarely	Sometime	Most of the Time	Always
How often do you experience heartburn?	0	11(23.4)	07(14.9)	17(36.2)	12(25.5)
	16(34)	16(34)	15(32)	0	0
How often do you experience regurgitation?	0	11(23.4)	10(21.3)	11(23.4)	15(31.9)
	25(53.1)	9(19.1)	13(27.7)	0	0

Table 7: Continue

How often do you feel a burning sensation in your chest?	0	14(29.8)	9(19.1)	9(19.1)	15(31.9)
	16(34)	17(36.2)	14(29.8)	0	0
How often do you experience a sour or bitter taste in your mouth?	0	8(17)	13(27.7)	12(25.5)	14(29.8)
	13(27.7)	16(34)	18(38.3)	0	0
How often do you feel nauseous due to acid reflux?	0	16(34)	11(23.4)	11(23.4)	9(19.1)
	20(42.6)	15(31.9)	12(25.5)	0	0
	0	10(21.3)	12(25.5)	10(21.3)	15(31.9)
How often do you wake up at night due to acid reflux?	16(34)	18(38.3)	13(27.7)	0	0
How often do you have a chronic cough or throat irritation?	0	12(25.5)	12(25.5)	10(21.3)	13(27.7)
	15(31.9)	19(40.4)	13(27.7)	0	0
How often do you feel bloated after meals?	0	18(38.3)	12(25.5)	5(10.6)	12(25.5)
	16(34)	15(31.9)	16(34)	0	0
How often do you experience difficulty swallowing?	0	6(12.8)	10(21.3)	11(23.4)	20(42.6)
	16(34)	15(31.9)	16(34)	0	0
How often do you experience a lump-in-throat sensation?	0	12(25.5)	15(31.9)	11(23.4)	9(19.1)
	20(42.6)	11(23.4)	16(34)	0	0
How often do you experience nighttime reflux symptoms?	0	17(36.2)	11(23.4)	11(23.4)	8(17)
	14(29.8)	15(31.9)	18(38.3)	0	0

into routine clinical care, especially within populations characterized by high dietary risk factors.

The most substantial reductions were observed in hallmark GERD symptoms-heartburn, regurgitation, nocturnal reflux and burning chest pain-consistent with the physiological role of Lower Esophageal Sphincter (LES) dysfunction and heightened intra-abdominal pressure. These outcomes echo prior studies that identified dietary irritants such as caffeine and high-fat foods as exacerbating reflux via LES relaxation. Symptom improvements after behavioral adjustments, including delayed recumbency and reduced meal sizes, further underscore the utility of such lifestyle modifications. Gu *et al.* [12] noted similar findings, linking decreased sugar intake with reductions in acid exposure time and reflux symptoms [12], while Newberry *et al.* [11] also confirmed the benefits of diet therapy in GERD symptom control [11]. Regionally, the data align with findings highlighting GERD's link to local eating habits, such as frequent intake of carbonated drinks and spicy meals [16].

Beyond symptom reduction, participants reported enhanced psychosocial outcomes-improvements in sleep, reduced anxiety and greater ease in social eating. GERD's physical discomfort often translates into disrupted sleep and mental distress and addressing these facets contributes to

overall quality of life. These findings build on Prpić *et al.* [17], who demonstrated significant psychosocial benefits from dietary modifications in reflux patients [17] and Revicki *et al.* who established the association between symptom burden and impaired social functioning [4]. In the Saudi context, where social meals are culturally significant, GERD's impact can be socially isolating. Thus, symptom control has meaningful consequences beyond physical health, including restoring participation in family and communal gatherings.

Adherence levels were generally moderate to high, with 57.45% of participants consistently following dietary recommendations. Avoiding meals near bedtime and reducing portion sizes were the easiest to maintain, while eliminating fatty/spicy foods and maintaining food diaries posed greater challenges due to cultural habits and self-monitoring fatigue. This aligns with Chouhdry *et al.* [18], who noted difficulties in lifestyle modification adherence without systematic support [18] and Guadagnoli *et al.* [19], who linked adherence to improved symptom control and quality of life [19]. These findings point to the value of culturally sensitive counselling, dietary substitution strategies and the involvement of registered dietitians in treatment planning to bolster adherence and ensure sustained behavioral change.

Interestingly, no statistically significant associations were found between demographic or lifestyle factors (BMI, age and smoking status) and post-intervention quality-of-life outcomes. While previous research highlights these as important GERD risk factors [20], the findings here suggest that proactive dietary changes may override baseline demographic disadvantages in the short term. Alternatively, the non-significance may reflect the small sample size or limited study duration, which could obscure more nuanced effects. Nonetheless, this emphasizes the centrality of modifiable behavior in GERD management and reinforces the potential for dietary interventions to produce clinically relevant outcomes across diverse patient profiles.

In the context of Saudi Arabia, this study reinforces calls for localized GERD management strategies. The prevalence of reflux disease is rising due to urbanization, sedentary lifestyles and Western-influenced diets. Common regional triggers-including spicy dishes, heavy late-night meals and caffeine consumption-necessitate context-specific guidance. In this light, the intervention's success demonstrates the feasibility of integrating evidence-based dietary changes into local practices. Notably, recent studies have highlighted the therapeutic effects of fasting patterns, such as during Ramadan, which have been associated with symptom relief through prolonged periods of gastric rest [21]. These observations underscore the need for culturally responsive guidelines that consider both clinical and lifestyle factors.

In sum, this study contributes to a growing body of literature supporting the use of diet-focused, non-pharmacological interventions in GERD care. Its findings highlight not only symptomatic and physiological improvements but also psychosocial and quality-of-life gains. Dietary counselling, when tailored to cultural norms and supported with educational resources, holds promise as a first-line, patient-centered strategy in GERD management-especially in populations where pharmacological treatments may be poorly tolerated or insufficient alone.

Comparison with Broader Literature

The findings of this study align closely with a growing international body of evidence supporting the role of dietary modification in GERD symptom management. Globally, low-carbohydrate and high-fiber diets have demonstrated effectiveness in reducing both the frequency and severity of reflux symptoms, as well as improving esophageal motility. For instance, Gu *et al.* [12] highlighted the benefits of reducing simple sugars in decreasing acid exposure and GERD symptoms [12], while other research confirms that diets rich in fiber support improved esophageal transit and reduce heartburn frequency [22]. Additionally, studies on low-acid diets have shown clinical utility for patients with laryngopharyngeal reflux, particularly those who do not respond well to pharmacological therapy [23].

Emerging nutritional strategies, such as the inclusion of probiotics and nutraceuticals, are also gaining attention in GERD research. Tursi *et al.* [24] reported favorable outcomes in terms of symptom control and enhanced quality of life with these adjunct dietary measures [24]. Although certain cultural factors-such as meal timing and the habitual intake of high-fat and spicy foods-are specific to the Saudi context, the fundamental pathophysiology of GERD remains consistent across populations. This supports the potential generalizability of the study's findings, provided that dietary interventions are tailored to the social and cultural dynamics of target populations. Nevertheless, variations in food access, culinary practices and healthcare infrastructure must be considered when adapting global guidelines to local settings for maximal efficacy.

Strengths and Limitations of the Study

This study offers several notable strengths that contribute to the credibility and applicability of its conclusions. First, its prospective pre-post design enables a temporal association between the intervention and symptom changes, allowing stronger inferences about causality. Second, the study was embedded within real-world clinical settings in Saudi Arabia, enhancing its external validity and ensuring the findings reflect everyday clinical and dietary practices. Third, the inclusion of psychosocial parameters-such as sleep quality, mental well-being and social functionality-adds depth to the evaluation, capturing GERD's broader impact on patients' lives. Fourth, structured dietary counselling and assessment of adherence offer insights into practical implementation and patient behavior, which are often overlooked in GERD research. Finally, the use of multiple statistical tools, including ordinal regression and non-parametric tests, enhances the robustness of the analysis.

However, several limitations warrant attention. The relatively small sample size (n = 47) reduces statistical power

and limits the ability to detect subtle effects or subgroup differences, which may affect generalizability. The short duration of the intervention (four weeks) may not adequately capture the sustainability or long-term effects of dietary changes. Self-reported data introduce the risk of recall bias and social desirability bias, especially in tracking dietary adherence and symptom severity. Moreover, the absence of objective clinical measures-such as esophageal pH monitoring or endoscopic findings-limits the physiological validation of symptom improvement. These constraints underscore the need for larger, longer-duration studies with multimodal outcome measures to further validate these findings.

Clinical and Public Health Implications

The results of this study underscore the significant potential of dietary and behavioral strategies as first-line, non-pharmacological approaches to GERD management. By demonstrating marked improvements in symptom severity and patient-reported quality of life, the findings reinforce the utility of incorporating structured dietary counselling into routine clinical care for GERD. This approach is particularly relevant in the Saudi Arabian context, where the disease burden is heightened due to prevalent lifestyle and dietary patterns. As long-term pharmacotherapy for GERD poses risks such as nutrient malabsorption and rebound hyperacidity, promoting sustainable dietary changes may reduce both medication dependence and healthcare costs.

From a public health perspective, these findings support the integration of dietary education into primary care frameworks, with collaboration between general practitioners, gastroenterologists and dietitians. Such a model aligns with the Kingdom of Saudi Arabia's healthcare transformation priorities, which emphasize lifestyle-based interventions and preventive care. Moreover, promoting culturally appropriate dietary adaptations-such as modifying traditional dishes to reduce trigger components-may enhance patient adherence and intervention scalability. Broad implementation of these strategies could contribute to population-level reductions in GERD prevalence and severity, ultimately supporting healthier communities and reducing the systemic burden of chronic digestive diseases.

Recommendations for Future Research

Future research should aim to expand on the current findings through larger, multicenter Randomized Controlled Trials (RCTs) conducted within the Saudi Arabian population. These studies would help validate the effectiveness and generalizability of dietary interventions for GERD in diverse demographic groups. To better understand the sustainability of symptom relief, longer follow-up durations are essential, as they would capture long-term adherence, relapse rates and patient-reported outcomes over time. Moreover, integrating structured dietary counselling into existing GERD-care pathways-particularly within primary healthcare-could provide actionable evidence on implementation feasibility, provider acceptance and cost-effectiveness in routine clinical settings.

Additionally, future investigations should examine the influence of culturally specific practices-such as Ramadan fasting, festive dietary customs and meal timing rituals-on reflux symptoms and intervention adherence. Understanding the role of such variables could help refine dietary guidelines in ways that align more effectively with patients' real-life behavior. Research in this area may support the development of personalized, patient-centric dietary strategies that are both clinically effective and culturally acceptable, ultimately promoting sustainable GERD management across populations with diverse nutritional and lifestyle profiles.

CONCLUSIONS

This study provides compelling evidence that targeted dietary modifications can significantly reduce the frequency and severity of GERD symptoms within a short intervention window. The observed clinical improvements extended beyond physical symptoms to include marked enhancements in sleep quality, emotional well-being and daily functioning. The dietary strategy, which emphasized avoiding known trigger foods, improving meal timing and delaying recumbency, was both practical and culturally appropriate for the Saudi population. These findings position dietary intervention as a viable, non-pharmacological treatment approach that complements or even reduces the need for long-term medication use.

Importantly, the study highlights that symptom improvement is strongly correlated with dietary adherence, regardless of baseline demographic or lifestyle factors. This underscores the critical role of behavior change and patient education in driving clinical outcomes. As such, personalized dietary counselling and lifestyle coaching should be considered as first-line components of GERD treatment strategies. Incorporating these approaches into standard care pathways is aligned with Saudi Arabia's broader public health goals and offers a cost-effective, patient-friendly strategy for improving GERD-related health outcomes on a national scale. Continued research, with an emphasis on larger sample sizes and longer follow-up, will be necessary to substantiate these findings and optimize clinical implementation.

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Conflicts of Interest

The author declares no conflicts of interest related to the conduct, analysis, or publication of this study. The research was undertaken independently and free from any external influence that could bias the results or interpretations.

Ethical Statement

This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and was

approved by the Local Committee of Bioethics at Northern Border University, Arar, Saudi Arabia (Approval ID: HAP-09-A-043, 2025). Written informed consent was obtained from all participants before enrollment. All procedures followed ethical standards required by institutional and national research committees, ensuring full respect for participants' rights, privacy and welfare throughout the study.

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