

## Case Report

# Nutrition Therapy Management in a Client with Obesity Grade III and Gastroesophageal Reflux Disease (GERD)

## *Manajemen Terapi Gizi pada Klien dengan Obesitas Tingkat III dan Gastroesophageal Reflux Disease (GERD): Sebuah Laporan Kasus*

**Fathiya Andara<sup>1</sup>, Etika Ratna Noer<sup>1</sup>**

<sup>1</sup>Department of Nutritional Science, Diponegoro University, Semarang, Indonesia

\* Email corresponding author: Fathiyandaraa@gmail.com

**Abstract:** Obesity and gastroesophageal reflux disease (GERD) are interrelated conditions that can exacerbate each other, requiring comprehensive and individualized nutritional management. This case report aims to describe the implementation of targeted nutrition therapy in a client with Obesity Grade III and a history of GERD through an approach focused on moderate energy deficit, balanced macronutrient composition, and gradual physical activity improvement. The 14-day intervention included daily monitoring to assess dietary changes, nutritional status, and digestive symptoms. The results demonstrated improved dietary patterns, weight reduction, and enhanced digestive comfort, highlighting the strong relationship between nutritional regulation and GERD symptom control. This case underscores that consistent lifestyle modification, through dietary adjustment and increased physical activity can positively impact nutritional status and quality of life. Such individualized nutrition approaches may serve as practical and evidence-based strategies in managing obesity with comorbid GERD

**Key words:** calorie deficit, GERD, obesity, personalized nutrition therapy

## 1. INTRODUCTION

Obesity and gastroesophageal reflux disease (GERD) are not merely minor health issues but serious conditions that can lead to severe complications and premature mortality(1). Obesity has now reached epidemic proportions, with the global prevalence of adult obesity having nearly tripled between 1990 and 2022, and is projected to increase significantly by 2040 if no effective interventions are implemented, contributing to more than 3.7 million deaths annually, primarily due to cardiovascular disease, type 2 diabetes, and cancer (2). GERD affects approximately 20% of the global population, with higher prevalence among obese individuals due to increased intra-abdominal pressure and impaired lower esophageal sphincter (LES) function (3). The combination of obesity and GERD worsens the clinical condition by reducing quality of life and elevating the risk of esophagitis, Barrett's esophagus, and esophageal adenocarcinoma(1). Therefore, an integrated management approach is crucial, particularly through targeted clinical nutrition interventions.

Determinant factors contributing to obesity include excessive energy intake, high consumption of saturated fat and simple sugars, low physical activity, stress, and genetic predisposition(4). Obesity, in turn, contributes to GERD development through increased visceral fat accumulation, which elevates intra-abdominal pressure and promotes gastric acid reflux into the esophagus (1). Furthermore, irregular eating habits, late-night snacking, and frequent consumption of fatty, spicy foods, caffeine,

alcohol, and smoking are major triggers of GERD symptoms(5). Consequently, obesity and GERD are closely interconnected and share overlapping determinants, making lifestyle and dietary modification the cornerstone of both prevention and management.

Numerous studies have demonstrated that nutritional therapy is effective in reducing body weight while simultaneously improving GERD symptoms. Individualized caloric deficit interventions have been shown to significantly reduce body weight and reflux symptoms within six months (6). Other strategies include portion control, reduced snacking frequency, and proper meal timing, particularly avoiding late-night eating(7). Increased dietary fiber intake has also been shown to lower GERD risk by improving gastrointestinal motility and promoting satiety, which supports weight loss. Regular physical activity plays an essential role as well; individuals engaging in moderate-to-vigorous aerobic exercise demonstrate significant reductions in GERD symptom frequency and severity(8). Therefore, combining a calorie-deficient diet, higher fiber intake, and regular physical activity represents a comprehensive and promising approach for managing obesity while alleviating GERD symptoms.

Based on this rationale and supporting evidence, this case study was conducted to document the implementation of a calorie-deficient, balanced-diet intervention in a client with Obesity Grade III and GERD. The objective is to evaluate changes in anthropometric parameters and clinical symptoms following individualized nutritional therapy.

## **2. METHODS**

This study employed a descriptive case study design with a nutrition intervention approach conducted over 14 days in a client with Obesity Grade III and a history of gastroesophageal reflux disease (GERD). The intervention took place through a hybrid system, both on-site at the Department of Nutritional Science, Diponegoro University, and remotely via WhatsApp, with daily dietary progress documented using Google Sheets from September 8–21, 2025.

Data collection was conducted three times: before the intervention, after 7 days, and after 14 days. Primary data included anthropometric measurements, biochemical tests, clinical physical examinations, dietary intake, and physical activity levels. Anthropometric data were measured using a Bioelectrical Impedance Analysis (BIA)-based Body Composition Analyzer (InBody) to assess body weight, height, body mass index (BMI), fat mass, muscle mass, waist circumference, and protein levels. Biochemical parameters included a non-fasting blood glucose test measured using a glucometer and disposable lancets. The Clinical assessment consisted of interviews evaluating symptoms such as nausea, abdominal pain, and muscle soreness, as well as measurements of blood pressure and heart rate using a sphygmomanometer.

Dietary assessment was performed using a 24-hour dietary recall and Semi-Quantitative Food Frequency Questionnaire (SQ-FFQ) targeting a normal intake range of 80–110% of individual energy requirements. Physical activity was monitored through smartwatch tracking and the client's daily activity logs. Data analysis was performed by comparing changes in anthropometric, biochemical, clinical, and dietary parameters across three assessment points (baseline, day 7, and day 14).

The nutrition intervention implemented a calorie-deficient diet providing 1,700 kcal/day (approximately 500 kcal below estimated requirements), with macronutrient

distribution of 1 g protein/kg body weight (80 g/day), 25% of energy from fat (48 g/day), and 56% from carbohydrates (240 g/day), along with 25 g of dietary fiber per day. Physical activity goals included gradually increasing daily steps from a baseline of 6,000 to 10,000 steps, with structured exercise such as swimming or home workouts, at least three times per week. To support adherence, the authors developed a personalized booklet summarizing the client's assessment results and intervention plan, designed to facilitate understanding and improve dietary compliance during the intervention period.

### 3. RESULTS

#### Case Description

The subject was a 30-year-old female diagnosed with gastroesophageal reflux disease (GERD) and Obesity Grade III, presenting with a BMI of 49.7 kg/m<sup>2</sup>. Anthropometric measurements indicated a body weight of 124.1 kg and a height of 158 cm, confirming morbid obesity associated with elevated risks of metabolic and musculoskeletal complications. The client also frequently reported pain in the knees and hips, particularly after long working hours, which was likely related to excess body weight and mechanical strain on weight-bearing joints.

The client worked as a kitchen staff member, with 12-hour rotating shifts that involved prolonged standing and exposure to a fast-paced, high-temperature work environment. This demanding schedule contributed to irregular mealtimes, limited rest, and high fatigue levels. Additionally, she attended evening German language courses twice a week, further reducing opportunities for adequate recovery or leisure activities. Based on lifestyle anamnesis, her average daily step count was approximately 5,000 steps, indicating a sedentary level of physical activity. She reported not engaging in regular structured exercise outside work.

Allergy history revealed hypersensitivity to cow's milk and seafood (except fish), which required consideration in dietary planning to avoid adverse reactions and gastrointestinal discomfort. The client's daily eating habits were irregular, typically consisting of only one main meal per day, with the most energy derived from high-fat, low-fiber snacks such as fried foods, pastries, and processed fast foods. These unhealthy patterns, combined with environmental and occupational factors, likely contributed to energy imbalance and aggravated both obesity and GERD symptoms. The combination of erratic eating behavior, shift-based work demands, and musculoskeletal discomfort underscores the importance of a personalized nutrition approach that addresses both metabolic and lifestyle-related challenges.

#### Assessment, Monitoring, and Evaluation

The summary of the client's daily nutrient intake showed a meaningful improvement following the 14-day intervention. Total energy intake decreased from 1,621 kcal (94.5% of daily needs) to 1,400 kcal (82%), reflecting successful caloric control consistent with weight reduction goals for Obesity Grade III.

**Table 1. Average Daily Nutrient Intake & Physical Activity Before and After Intervention**

<b>Nutrient Intake</b>		
Parameter	Before Intervention	After Intervention
Energy (kcal)	1621 (94,5%)	1400 (82%)
Protein (gr)	43 (54%)	70 (87%)
Fat (gr)	56,8 (120%)	39 (83%)
Carbohydrates (gr)	223 (93%)	190 (80%)
Fiber (gr)	4,3 (17%)	19(76%)
<b>Physical Activity</b>		
Daily Steps	4000	8500
Exercise Duration (min/week)	38	105

Protein intake increased substantially from 43 g (54% of requirement) to 70 g (87%), reflecting an improvement in dietary quality and a higher protein contribution to total daily energy intake, which is important for maintaining lean body mass during energy deficit. Conversely, fat intake decreased markedly from 56.8 g (120%) to 39 g (83%), demonstrating a reduction in the consumption of fried and processed foods high in saturated fats.

Carbohydrate intake remained relatively stable at around 223 g but decreased proportionally to total energy intake (from 93% to 72%), suggesting improved macronutrient balance and potential benefits for glycemic control and satiety. Fiber intake increased significantly from 4.3 g (17%) to 19 g (76%), indicating a higher consumption of fruits, vegetables, and complex fiber sources, which may improve gastrointestinal function and postprandial glucose regulation.

In parallel, the client’s physical activity increased considerably. Average daily steps rose from 4,000 to 8,500, marking a shift from a sedentary to a moderately active lifestyle. The weekly exercise duration increased from 38 minutes to 105 minutes, consisting of swimming twice per week, 45-minute Zumba sessions, and home-based workouts. This combination of aerobic and strength exercises supported cardiovascular fitness and metabolic efficiency during the caloric deficit period.

**Table 2. Anthropometric and Biochemical Changes**

Parameter	Baseline	Day 7	Day 14
<b>Anthropometric</b>			
Weight (kg)	124,1	123,2	120,9
Body Mass Index (BMI) (kg/m <sup>2</sup> )	49,7	49,4	48,4
Mid-Upper Arm Circumference (cm)	47,3	43,5	43
Waist Circumference (cm)	112,1	104	104
Body Fat Mass (kg)	66	65,7	63,9
Muscle Mass (kg)	32,2	31,6	31
Visceral Fat Level	21	19	19
Protein (kg)	11,4	11,1	11
<b>Biochemical</b>			
Non-fasting blood glucose test (mg/dL)	125	94	96

Anthropometric results indicated significant improvements in nutritional status after the intervention. Body weight decreased by 3.2 kg from 124.1 kg to 120.9 kg, corresponding to a BMI reduction of 1.3 kg/m<sup>2</sup> (from 49.7 to 48.4). Although the client remained within the Obesity Grade III category, these results reflected a positive response to the dietary and physical activity program.

The mid-upper arm circumference decreased by 4.3 cm (from 47.3 to 43 cm), suggesting a reduction in peripheral adipose tissue. Waist circumference decreased by 8.1 cm (from 112.1 to 104 cm) and remained stable thereafter, indicating a decrease in visceral fat, which is a key predictor of cardiometabolic risk. Body composition analysis showed a total fat mass reduction of 2.1 kg (from 66.0 to 63.9 kg), indicating successful fat loss. A slight decrease in skeletal muscle mass (-1.2 kg) and total body protein (- 0.4 kg) was observed, possibly due to early-phase energy restriction before achieving optimal protein intake. The visceral fat level decreased from 21 to 19, supporting the finding of central fat reduction.

Biochemical results revealed notable improvement in glucose metabolism, with random blood glucose dropping from 125 mg/dL to 94 mg/dL and stabilizing at 96 mg/dL by day 14, remaining within the normal physiological range (70–140 mg/dL). This improvement was likely influenced by weight reduction, increased physical activity, and higher dietary fiber intake, enhancing insulin sensitivity and carbohydrate metabolism. Overall, the combination of a moderate energy deficit, increased protein and fiber intake, and greater physical activity resulted in measurable improvements in body composition, metabolic control, and clinical symptoms in this client with obesity and GERD.

**Table 3. Client's Clinical Findings**

Parameter	1 <sup>st</sup> meeting	2 <sup>nd</sup> meeting	3 <sup>rd</sup> Meeting
Gastrointestinal	Nauseous	-	-
Muskoskeletal	Knee and back pain	Knee pain	Knee pain
Heart Rate (x/min)	81	72	80
Blood Presure (mmHg)	111/87	116/85	118/72

During the first visit, the client reported nausea and pain in the knee and lower back areas. Her heart rate was recorded at 81 beats per minute, with a blood pressure of 111/87 mmHg. At the second visit, gastrointestinal symptoms had resolved, while musculoskeletal discomfort was reduced to knee pain only. The heart rate decreased to 72 beats per minute, and blood pressure slightly increased to 116/85 mmHg. At the third visit, the client still experienced mild knee pain but no gastrointestinal symptoms. Her heart rate rose again to 80 beats per minute, with a blood pressure of 118/72 mmHg. Overall, the clinical findings showed improvement in gastrointestinal symptoms and a reduction in musculoskeletal discomfort, although knee pain persisted until the final visit. Hemodynamic parameters (blood pressure and heart rate) remained within normal ranges throughout the intervention period.

#### 4. DISCUSSION

This case highlights how an individualized nutrition intervention combining moderate caloric restriction and progressive physical activity can yield meaningful physiological

and behavioral improvements in a client with obesity grade III and gastroesophageal reflux disease (GERD). A 3.2 kg weight reduction over 14 days indicates a positive metabolic response and effective adherence to the nutrition and lifestyle modification plan. The 8.1 cm reduction in waist circumference reflects a decrease in visceral adiposity, which contributes to a lower risk of metabolic syndrome. This aligns with findings by Borges et al. (2018), which reported that reductions in abdominal fat, even without large decreases in total body weight, significantly reduce cardiometabolic risk(9). A balanced macronutrient distribution, especially adequate protein and fiber, was pivotal in achieving optimal outcomes. Protein intake increased from 43 g to 70 g/day, aligning with recommendations that highlight protein's role in enhancing satiety and preserving lean mass during caloric restriction (10). High-protein diets also help promote weight loss while maintaining lean body mass in individuals with obesity(11) Additionally, a marked improvement in fiber intake, from 4.3 g to 19 g/day. Higher fiber intake has been associated with better glycemic control and reduced GERD risk by improving gastric emptying and lowering intra-abdominal pressure(12). This is in line with the American Heart Association's recommendations (AHA, 2021), which suggest consuming at least 25–30 g of fiber daily to improve glucose metabolism, lipid profiles, and gastrointestinal benefits (13).

Improvements in GERD symptoms were likely driven by reductions in visceral adiposity and improved meal patterns. Studies have shown that central obesity increases intra-abdominal pressure and exacerbates reflux (5). Regular meal timing and avoidance of high-fat meals, as applied in this intervention, help reduce gastric acid exposure and support esophageal motility (14). These behavioral adjustments thus have direct physiological benefits beyond weight reduction. Importantly, the client's overall dietary behavior improved substantially. Before the intervention, the client reported consuming only one main meal per day, accompanied by high-fat, low-fiber snacks. After the intervention, the eating pattern evolved into three balanced main meals and two healthy snacks (fruit and vegetables), consumed at more regular intervals. This behavioral shift contributed to greater dietary consistency, improved glycemic control, and a reduction in gastrointestinal discomfort previously experienced by the client (14).

Physical activity also improved markedly from 4,000 to 8,500 steps per day, with weekly exercise duration increasing from 38 to 105 minutes, indicating adherence to the *World Health Organization's Physical Activity Guidelines for Adults* (WHO, 2020), which recommend at least 150 minutes of moderate-intensity aerobic activity per week. Physical activity is a key component of obesity management, enhancing energy expenditure, insulin sensitivity, and fat oxidation. These findings align with Jakicic et al. (2024) that  $\geq 150$  minutes of weekly exercise can significantly improve body composition and reduce visceral fat even in the absence of major weight loss(15).

By the second visit, the disappearance of nausea suggested a positive gastrointestinal adaptation to the new dietary pattern, while the reduction of musculoskeletal pain to only the knees reflected decreased mechanical load following initial weight loss and

improved muscle tone (16). However, the persistence of knee pain until the end of the intervention indicated that the client's body weight still imposed excessive pressure on the joints. Messier et al. (2018) reported that obesity increases axial loading on the knee joints by up to 3–6 times one's body weight, predisposing individuals to chronic pain and osteoarthritis. Therefore, in subsequent phases, additional interventions such as progressive resistance training are recommended to strengthen the quadriceps and enhance joint stability, thus minimizing long-term mechanical stress. Hemodynamic parameters, including heart rate and blood pressure, remained stable throughout the monitoring period. The decrease in heart rate observed during the second visit may reflect improved cardiovascular efficiency resulting from enhanced aerobic capacity. As noted by Jakicic et al. (2019), consistent physical activity can lower resting heart rate as a marker of better cardiovascular fitness. Meanwhile, the client's blood pressure remained within normal limits, suggesting that the low-energy diet combined with increased physical activity did not negatively affect cardiovascular function (17).

Despite these encouraging results, some limitations should be acknowledged. The reduction of 1.2 kg in muscle mass observed during the intervention period was likely due to a substantial energy deficit in the early phase, coupled with increased physical activity before adequate protein intake was achieved. This aligns with Verreijen et al. (2017), who reported that energy restriction without sufficient protein intake leads to losses in fat-free mass, whereas high-protein diets combined with resistance exercise effectively preserve lean body mass (18). Loss of muscle mass may negatively impact basal metabolism and long-term weight maintenance; hence, the client should maintain consistent protein intake alongside regular strength training.

## 5. CONCLUSION

A 500kcal energy-deficient diet with balanced macronutrient distribution and progressively increased physical activity proved effective in improving the nutritional status and body composition of a client with Obesity Grade III and GERD. Beyond measurable reductions in body weight and waist circumference, this intervention led to qualitative improvements in dietary behavior, meal regularity, and overall physical engagement. These outcomes demonstrate that even short-term, individualized nutrition interventions can elicit meaningful physiological and behavioral changes when supported by continuous monitoring and client-centered counseling. The findings highlight the importance of integrating moderate caloric restriction with adequate protein and fiber intake, combined with regular aerobic and resistance-based physical activity, as a holistic strategy to address both obesity and GERD. Such an approach emphasizes that sustainable weight management is not solely about caloric reduction but also about improving food quality, eating patterns, and lifestyle adherence. Future interventions should extend the duration and integrate structured resistance training to preserve lean mass and metabolic health. Broader implementation of this personalized model could guide practical, evidence-based strategies for obesity management in both clinical and community settings.

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