



Case Report

“Slow and Steady Wins the Race.” Combating Obesity and Cardiovascular Disease Through Healthy Lifestyle Behaviors: A Case Report

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Abstract

Background: Obesity is a neuroendocrine disease with a complex and multifactorial etiology and pathogenesis related to genetic, biological, psychosocial, sociocultural, economic, and environmental factors. Obesity and related cardiometabolic disorders are highly prevalent in the United Arab Emirates (UAE). One in 4 adults in the UAE are living with obesity, which poses significant individual and economic burdens. Hence, obesity and its comorbidities are a great public health concern.

Aim: This case report aims to discuss an illustrative case of a UAE resident who, in 2013, at the age of 38, suffered from a heart attack. At the time, he was morbidly obese. This case report touches upon unhealthy lifestyle behaviors of our illustrative case subject that contributed to the ontogeny of obesity and the associated adverse cardiometabolic outcomes.

Methods: PubMed, Scopus, Embase, Science Direct, Web of Science, and Pro-Quest databases were searched for relevant articles on obesity, cardiovascular disease and lifestyle behavioral modifications.

Results: This case report illustrates how lifestyle changes and adopting healthy habits can reverse obesity and restore cardiometabolic health. This case report underlines the importance of adopting healthy habits with a focus on diet, intermittent and prolonged fasting, and physical activity as potent lifestyle interventions to promote effective weight management and improve cardiometabolic health.

Conclusion: Practical, clinically meaningful personalized lifestyle interventions tailored to an individual's health goals and requirements are most effective in enacting behavioral changes for combating obesity and promoting cardiometabolic health.

Keywords: obesity, cardiovascular disease, nutrition, intermittent fasting, physical activity, lifestyle behavioral change



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1. Introduction

Obesity is a noncommunicable chronic neuroendocrine disease and a relapsing condition with a complex and multifactorial etiology and pathogenesis. Obesity is associated with an array of metabolic complications, including elevated hemoglobin A1c, insulin resistance, cellular-mitochondrial metabolic dysfunction, and metabolic syndrome (MetS), which is characterized by dyslipidemia, hypertension, hyperglycemia, hypertriglyceridemia and low serum high-density lipoprotein levels, and type 2 diabetes mellitus (T2DM), posing a significant risk for atherosclerosis and cardiovascular disease (CVD) risk and mortality [1-7].

The prevalence and severity of obesity are now considered a global pandemic and a rising global public health problem [2-5]. Obesity is estimated to be the fifth-leading risk factor for death worldwide [5]. By 2030, the number of people who are obese will be approximately 573 million individuals globally [3]. Obesity is highly prevalent in the United Arab Emirates (UAE), and its prevalence is increasing at an alarming rate [5]. One in 4 adults in the UAE live with obesity [8-10]. Projections estimate that by 2035, over 6.5 million adults in the UAE will be living with overweight or obesity, including over 4.5 million men and nearly 2 million women. By 2060, the prevalence of obesity is expected to rise to 66.48% in men and 64.21% in women if current trends continue, according to a World Obesity Federation report [10].

The economic impact of obesity in the UAE is predicted to reach almost 5% of GDP by 2035, with annual associated costs estimated at \$12 billion [10]. This includes direct healthcare costs, which are projected to rise to US\$1.9 billion by 2035, and indirect costs—such as absenteeism, presenteeism, and premature mortality—expected to reach US\$30.7 billion by 2035 [10]. The rising alarming obesity rates, along with the individual, societal, and economic burdens they impose, present significant public health and economic challenges to the UAE.

Obesity is related to genetic, biological, psychosocial, sociocultural, economic, and environmental risk factors [1-4]. In the UAE, the modern, urbanized, fast-paced, digitalized and technology-driven, luxurious sedentary lifestyle, physical inactivity, and unhealthy eating habits characterized by ultraprocessed foods (UPF) have greatly infiltrated the UAE culture [5]. Alarming, the UAE has one of the highest rates of physical inactivity globally with nearly 58% of the adult population being physically inactive [10-12]. Greater sedentary behavior is associated with increased risk of obesity and CVD, as it indirectly influences nonideal eating habits, dysfunctional, compulsive eating behaviors, and physical inactivity [11].

The objective of this case report is to illustrate how lifestyle behavior changes and adopting healthy habits can reverse obesity and restore cardiometabolic health. In addressing lifestyle modifications, this case report focuses on diet, fasting, and physical activity¹ to promote effective weight management and generate beneficial cardiometabolic outcomes.

2. Case Presentation

In 2013, Gino², a 38-year-old UAE resident, sought emergency care for chest pain and difficulty breathing. At the time, he was pre-diabetic and morbidly obese, weighing 126 kg. At the hospital, the cardiologist informed Gino that testing had revealed an elevation of heart enzymes, indicating a heart attack without coagulation. An angiography showed no significant arterial blockage. Gino was prescribed medications to manage cholesterol, blood pressure, and angina. The doctor advised Gino to adopt healthier lifestyle behaviors to reduce his risk of consecutive cardiometabolic events. Gino's long-standing unhealthy lifestyle habits, including poor nutrition, emotional overeating triggered by stress, and physical inactivity, had contributed to his disease condition.

3. Case Management

Immediately after his heart attack, Gino attempted to use calorie restriction to lose weight, but he was unable to maintain sustained weight loss due to various stressors in his life, resulting in a relapse and remittance condition of Gino over the years. By August 2014, Gino was back to his 2013 weight, wearing XXXL clothes and having a waist circumference of 48 inches. In 2016, Gino's weight ballooned to 116 kg, contributing to various physical and mental ailments and deteriorated cardiometabolic markers. Determined to conquer his obesity and restore his cardiometabolic health, Gino developed and deployed a self-care plan, depicted in Figure 1. The triad formed the foundational principles for making significant sustainable lifestyle changes amidst the multitude of daily demands and stressors in his work, at home, and in his social life.

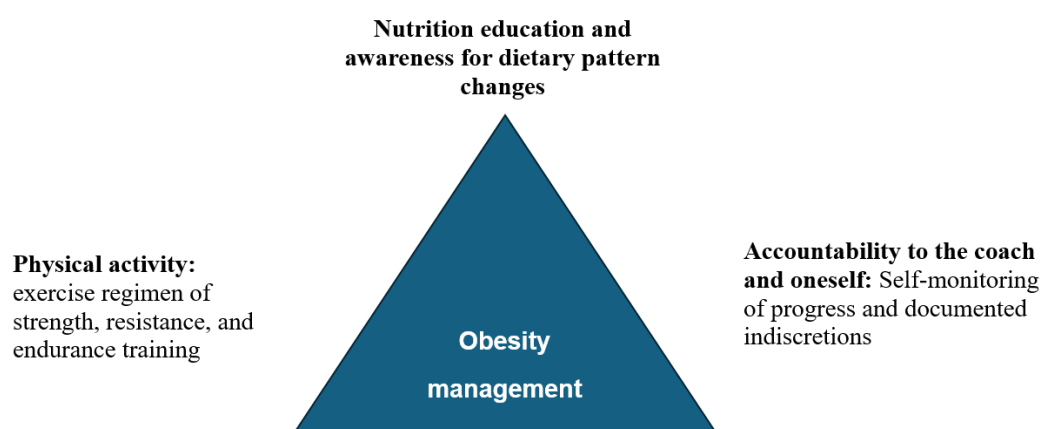


Figure 1: Gino's lifestyle behavioral modification self-care plan.

In 2017, Gino started moderate physical activity. In 2018, Gino joined a social club, engaging in community-based fitness and running events. In December 2018, he ran his first race, 5 km, at his own pace (34 minutes). In 2019, Gino decided to participate in the 30x30 Dubai fitness challenge. This

event challenges participants to exercise for 30 minutes every day for 30 days. This not only fostered social bonds but also positive relationships and social support, which empowered him to continue on his path toward enhancing exercise performance and better cardiometabolic health. Gino managed to make progress in losing weight in 2020 by starting to prepare meals at home from fresh whole foods and ingredients. However, in 2021, stressful events in his personal life resulted in a relapse into stress-induced overeating. By the end of 2021, Gino's weight was back up to 118 kg. Then, in November 2021, Gino reconnected with a nutrition and fitness coach to help him lose weight and improve his physical fitness. Simultaneously, in 2022, Gino began to educate himself on nutrition, guided by his coach and by various doctors and nutrition experts on YouTube. Gino eliminated UPF from his diet and replaced these foods with healthier wholesome organic plant and animal food sources with anti-inflammatory, lipid-regulating, weight-regulating, anti-diabetic, metabolism-supporting and cardiovascular protective benefits, which helped control his appetite, improve energy levels, and cardiometabolic health.

Gino also introduced intermittent fasting. He started with a 16-8 regimen (basically skipping breakfast, eating lunch at 12.00 pm or 1.00 pm, and dinner at 7.00 pm or 8.00 pm. Then, he shifted to a 20-4 regimen (early dinner), followed by moving to one-meal-a-day (OMAD) for a considerable period, consuming his single meal for the day anywhere between 3.00 pm and 5.00 pm. Additionally, Gino started periodic prolonged fasting for 72-96 hours. During prolonged fasting, Gino drank water, coffee (black), and green tea in abundance. He also added electrolytes before and after for hydration purposes during intense exercise, such as running sprint intervals. Gino implemented this regimen only once or twice every few weeks, not more than four or five times during the year. This enabled him to burn body fat for fuel and lose weight. Of note, the refeeding process following prolonged fasts was carefully controlled. Gino broke his fast with bone broth or chicken broth combined with a small portion of frozen vegetables. Then a couple of eggs, approximately 2 hours later, followed by a balanced meal containing protein, complex carbohydrates, and healthy fats. In conjunction with dietary pattern changes and fasting, Gino dedicated himself to a multicomponent fitness regimen. In addition to running in a group, Gino participated in weekly bootcamps, hills training plus speed sessions, and he added strength and resistance training under the guidance of a coach. The synergistic effects of a high-quality nutrient-dense diet, intermittent fasting, and a physical activity regimen culminated in increased fat burning, stabilized blood glucose, insulin sensitivity, weight loss, improvements in physical, mental, emotional strength, cognitive function, and restored cardiometabolic health. By the end of 2023, Gino had lost 21 kg, reducing his weight to 89 kg. The timeline of Gino's journey to combat obesity and CVD is depicted in Figure 2.

In 2024, Gino lost weight, built muscle mass, and won an 8-week fitness challenge, being the only person aged 50 to lose the most fat mass (4 kg) and gain the most muscle mass (2 kg). Gino no longer perceives exercise and diet solely as tools to lose weight, but rather as integral components of a healthy lifestyle. Gino's journey toward better cardiometabolic health is guided by the adage "experiment, trial-and-check, slow and steady wins the race". Gino's ongoing weight loss and fitness journey aims to sustain

cardiometabolic health, mitigate the risks of developing hereditary T2DM, and reduce the likelihood of a second CVD event. Gino's health target for 2025 is to maintain ongoing physical activity for weight management, enhanced exercise performance, and cardiometabolic health.

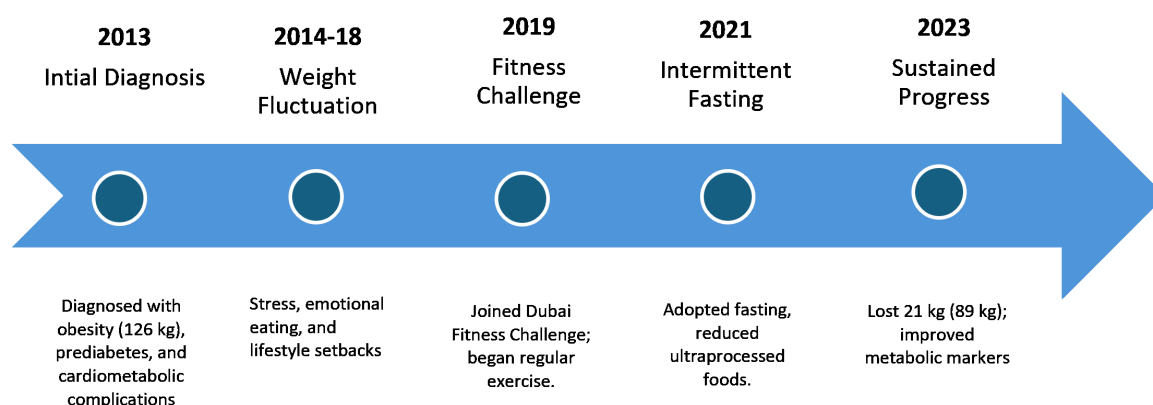


Figure 2: Timeline of Gino's journey to combat obesity and improve cardiometabolic health.

4. Discussion

The objective of this case report was to expound on lifestyle behavior changes that aided in reversing obesity and improving the cardiometabolic health of the case subject. This case study reinforces evidence linking habitual stress-induced emotional overeating of high-caloric palatable comfort UPFs- the antithesis to health, and physical inactivity to weight gain, obesity, and poor cardiovascular outcomes [6, 7, 9, 13]. Gino's case demonstrates the importance of adopting a holistic approach to health, focusing not only on weight loss but on developing lifelong sustainable healthy habits to conquer obesity and improve cardiometabolic health.

Obesity and its associated cardiometabolic disorders can be prevented and significantly reversed through lifestyle and nutrition [14]. A comprehensive approach entails lifestyle interventions that are practical and sustainable for the individual, as long-term adherence to behavior and lifestyle modifications to lose weight and maintain weight loss can be extremely difficult, an observation supported by previous research [4].

Gino's case validates previous research that has demonstrated that fasting regimens, as therapeutic adjuncts to a comprehensive lifestyle intervention that combines behavioral, dietary, and physical activity interventions, are effective weight management strategies for individuals living with obesity. Several forms of fasting have shown efficacy in this context:

- **Intermittent fasting:** An eating pattern that alternates between periods of fasting and eating on a regular schedule. Common intermittent fasting protocols include 16:8 (16 hours fasting, 8-hour

eating window) and 20:4 cycles (20 hours of fasting, 4-hour eating window), or full 24-hour fasts conducted once or multiple times per week.

- **Time-restricted eating:** A form of circadian fasting where food intake is confined to a defined window (typically ≤ 10 hours) each day, without reducing overall caloric intake. The fasting window is extended overnight, usually lasting at least 14 hours.
- **Intermittent energy restriction:** A regimen that alternates between days of very low-calorie intake and days of normal or ad libitum eating, either on consecutive or non-consecutive days.
- **Prolonged fasting:** Involves multiple consecutive days of water-only fasting, or water with added electrolytes to ensure adequate hydration. Non-caloric beverages such as black coffee and unsweetened tea may be included to support hydration and compliance.

These fasting regimens exert various physiological beneficial effects:

- Shift energy metabolism toward fat oxidation
- Improve mitochondrial efficiency by promoting autophagy and mitophagy (self-devouring cellular recycling systems that degrade and remove old, senescent and damaged cells, organelles, mitochondria and pathogens to create new, healthier, resilient, and better functioning cells and mitochondria).
- Improve glucose metabolism, insulin sensitivity, and metabolic flexibility
- Reduce oxidative stress and inflammation
- Increase cell repair and maintain cellular energy homeostasis, enhancing the immune system's functionality
- Boosts the production of human growth hormone, to activate autophagy, muscle tissue repair and preservation, and fat burning
- Improve liver and cardiovascular health [7, 15].

Furthermore, these fasting regimes have beneficial effects on cardiometabolic biomarkers, including high blood pressure, fasting blood glucose and HbA1c levels, dyslipidemia, and insulin resistance, all precursors to CVD [7, 15-17].

The case study supports existing evidence [4, 14] that exercise³, including both aerobic and resistance-type, when combined with a healthy diet, is an effective strategy for weight management and improving cardiorespiratory fitness [2, 4]. Specifically, HIIT and resistance training have the advantage of improving cellular-mitochondrial function and mitochondrial biogenesis. This process increases the body's ability to burn fat. Engaging in a variety of exercise enhances metabolic health, a concept depicted in Figure 3.

What is metabolic health?

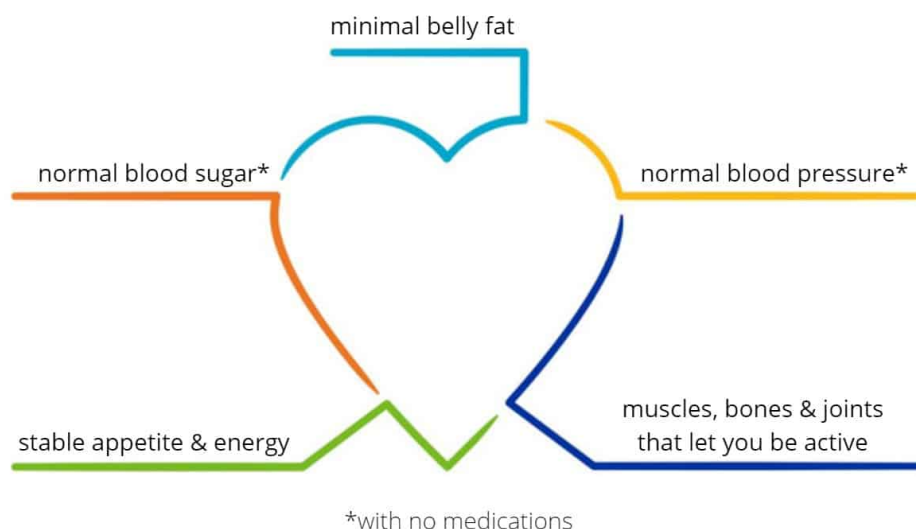


Figure 3: What is metabolic health? Adapted from ref [14].

4.1. Lifestyle intervention and prevention strategies

Optimal obesity management requires a comprehensive lifestyle intervention program that consists of changing lifestyle-related factors, encompassing dietary pattern changes and flexible fasting strategies infused with personalized therapeutic nutritional interventions; personalized exercise regimens and adherence to the physical activity plan; stimulus control, that is, meal planning, menu preparation, and rewards for appropriate behavioral patterns, all leading to weight loss or maintenance and cardiometabolic health improvements. It also incorporates behavioral therapy, including counselling emotional eaters to recognize emotional triggers that may contribute to stress-induced overeating behaviors, stress management, and relapse prevention [4, 11, 18].

This case report provides a roadmap for translating the successful lifestyle interventions enacted by Gino, into lifestyle programs for combating obesity and CVD among the UAE population.

We propose a lifestyle program called 'LEARN': Lifestyle, Exercise, Attitude, Relationships, Nutrition. LEARN is a step-by-step approach to weight loss and weight management that empowers individuals to make lifestyle changes by setting realistic, achievable goals to be achieved in the safest, most sustainable way, making informed lifestyle choices, and developing new healthy habits. LEARN entails lifestyle behavioral interventions that target changes in eating behavior; personalized nutrition that considers biological data such as genetics, age, weight, and gender, as well as nutritional status, food preferences,

allergies or intolerances, and cultural, religious, and social factors; exercise (individual and/or socialized); and ownership of lifestyle habits to achieve sustained lifestyle-related behavior change and optimal health outcomes of individuals living with obesity and/or CVD.

4.2. Implications for policy and practice

The prevalence of obesity and CVD in the UAE necessitates the implementation of national public health policies and strategies that encompass accessibility and affordability to specialized healthcare providers. Prevention and treatment of obesity and CVD require a holistic, integrative, patient-centered lifestyle approach. A personalized approach of functional medicine care requires the creation of multidisciplinary teams consisting of specialists in obesity medicine and management, functional medicine practitioners, dietitians, physical activity coaches and trainers, health educators and psychologists who can enhance health literacy and empower patients to optimize lifestyle habits through the provision of counseling, resources, and food and nutrition education. Health ambassadors and role models, such as Gino, play a key role in advocating for lifestyle changes to reverse obesity and improve cardiometabolic health.

4.3. Limitations of the study and suggestions for future research

This case study is inherently limited in its generalizability to the broader UAE population due to its focus on a single individual. Larger cohort studies are needed to validate the long-term efficacy of similar interventions to battle obesity and CVD. Nevertheless, this case study stimulates new research that can lead to new advancements in lifestyle interventions for obesity and CVD management.

5. Conclusion

Obesity and related cardiometabolic disorders are highly prevalent in the UAE posing significant public health challenges and human suffering due to associated morbidity and mortality. Obesity is a complex biological phenomenon with multifactorial causes related to metabolic and lifestyle factors, which negatively impact cardiometabolic health, quality of life, longevity, and health span—the period of life spent in good health.

Key lessons learned from the case study are that developing healthy habits and maintaining a sustainable lifestyle are challenging and involves sacrifices. Successful weight-loss progression and improved cardiometabolic health can be accomplished through continuous effort and commitment, conscious thought and action, willpower, mental resilience, patience, and perseverance. It takes a marathoner's mentality rather than a sprinter's mindset to overcome obesity and CVD, and achieve a state of good physical, mental, and social well-being throughout the lifespan. We believe this case report

provides valuable insights for researchers, policymakers, medical practitioners, and individuals suffering from obesity to enact lifestyle behavioral changes and interventions to reverse obesity and enhance cardiometabolic health.

Statement of Ethics

Ethical approval is not required for this study in accordance with local or national guidelines.

Written Informed Consent for Publication of Case

Written informed consent was obtained from the patient for publication of this case report and any accompanying clinical data.

Ethical Declaration

Not applicable.

Conflicts of Interest Statement

The authors declare that there is no conflict of interest.

Funding Sources

The study did not receive funding from any sources.

Author Contributions

RV—conceptualization, writing, original draft preparation; RV and JH analyzed the data and wrote the manuscript; RV, HS, and JH were involved in the critical revision of the manuscript; and all authors approved the final version of the manuscript.

Data Availability Statement

Data are not publicly available due to ethical reasons. Further inquiries can be directed to the corresponding author.

End Notes

¹Physical activity: Any body movement produced by skeletal muscles that results in energy.

²Gino is a fictitious name to protect the anonymity of the case subject.

³Exercise: A subcategory of physical activity that encompasses planned, structured, and repetitive movement and has as a final or intermediate objective.

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