Implementing Lifestyle Changes and Diet- tracking APP in an Obese Male: A Case Report

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Obesity is an epidemic and a major public health concern, with 800 million obese people worldwide and 27 million in the Philippines. Several guidelines have recommended that all adults be screened for obesity and that obese patients be offered intensive, multi-component behavioral interventions. Barriers to addressing obesity include insufficient time during visits, a lack of available referral services, the perception that patients will not be willing or able to make lifestyle changes, poor reimbursement for nutrition and weight-management counseling, a reluctance to discuss weight among physicians, and uncertainty about whether interventions will have a positive impact. Lifestyle medicine interventions and smartphone diet-tracking apps may help individuals lose weight, manage chronic conditions, and understand dietary patterns.

This is a case report of a 31-year-old obese Filipino male who sought consultation at the Health and Lifestyle Institute with a complaint of 11 kg of weight gain over the past 4 years. He had previously been diagnosed with Hodgkin's lymphoma and had previously undergone chemotherapy and radiation therapy. He was currently working as a resident physician at a private institution. He considered himself physically active and was thus concerned with his gradual weight gain and the resultant decrease in body image, as well as his overall health. A detailed history and physical examination were done, as were the examinations of the six pillars of lifestyle medicine, namely, diet, exercise, sleep, stress, relationships, and substance use. The GAD 7 and PHQ 9 screening questionnaires were given. Lifestyle prescription and setting of goals were then done, and the patient was followed up at a 4-month interval. On all visits, body fat analysis using a Karada scan was done, and the results were discussed with the patient. On the second follow-up consult, the patient reported the usefulness of a diet-tracking application he found called Lifesum. The patient lost a total of 13 kg and improved his overall sense of well-being.

Key words: Obesity, lifestyle medicine, case report, Asian, male, diet-tracking application, lifesum

INTRODUCTION

Global obesity has become a major public health crisis. Over 800 million people around the world are overweight, according to UNICEF. The Philippines has a staggering 27 million obese citizens. The percentage of adults classified as overweight or obese nearly doubled between 1998 and 2019; in 1998, 20.2% were overweight or obese, while in 2019, 36.6% were obese. These alarming numbers show that the prevalence of overweight and obesity will increase if nothing is done to combat the problem. [1]

The U.S. Preventive Services Task Force (USPSTF) and PHEx (Philippine Periodic Health Examination) issued recommendations that all adults be screened for obesity,[2,3] and that obese patients be offered intensive, multicomponent behavioral interventions.[2] More than 30% of adults are overweight or obese, putting them at higher risk for cardiovascular disease, type 2 diabetes, and many forms of cancer. There is a correlation between the presence of these co-morbid conditions and increased healthcare utilization among obese patients.[4]

Many factors complicate efforts to address overweight, obesity, and the promotion of healthier diets and lifestyles. Some barriers identified by physicians include insufficient time during visits for screening and counseling, a lack of available referral services for patients, the perception that patients will not be willing or able to make lifestyle changes, poor reimbursement for nutrition and weight-management counseling, a reluctance to discuss weight among physicians who are

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themselves overweight, and uncertainty about whether interventions will have a positive impact.[4,5]

The link between excess body fat and health risks such as type 2 diabetes, hypertension, dyslipidemia, and coronary heart disease is well-established and provides the rationale for obesity management.[6,7] Although significant weight loss may be ideal, even a modest reduction in weight (5% to 10% of total body weight) can have significant health benefits.[7]

Smartphone diet-tracking apps may help individuals lose weight, manage chronic conditions, and understand dietary patterns. According to the findings of a study that compared seven different diet-tracking apps, Lifesum was found to provide the best user experience.[4,8]

METHODS

This is a case study of a 31-year-old Filipino male who has been diagnosed with obesity. On March 21, 2022, the patient was followed up after his initial visit to the institution's Health and Lifestyle Institute. The initial follow-up occurred on June 11, 2022, and the last follow-up occurred on November 15, 2022. Body fat analysis and weight were measured using the Karada Scan Body Composition Monitor HBF-375 (OMRON HEALTHCARE Co., Kyoto, Japan). Bioelectrical impedance analysis (BIA) is the foundation upon which it operates. The BIA estimates body fat and muscle mass. It calculates impedance by passing a weak electric current through the body and measuring the voltage (resistance). Lean mass travels faster than adipose tissue, which resists current. In-person interviews and consultations with the patient took place during the initial visits and subsequent consultations. Using diet-tracking software, self-monitoring was carried out.

RESULTS

Using the WHO Asia-Pacific BMI classification,[10] patient was diagnosed with obesity with a BMI of 28.15 during the initial consultation. A lifestyle prescription was given, and the patient followed up after 4 months and was noted to have lost 10.4 kg of weight and was now diagnosed as overweight with a BMI of 24.9. After a final checkup four months later, the patient had lost an additional 3.6 kg and had a BMI of 23.7. The case showed improved outcomes in weight loss when the patient incorporated a lifestyle medicine intervention and a diet-tracking app into his weight loss journey. Some research has been done on the utility and accuracy of diet-tracking apps in Caucasian populations; however, these use mostly American foods and recipes. Further research could be done to analyze the utility of diet-tracking apps for the average diet and in the management of obesity in Filipinos.

Patient Information

This case involves K. N., a 31-year-old Filipino man from Bacolod City, Negros Occidental, who presented with the chief complaint of weight gain. The patient considered himself to be physically active and was concerned with his weight gain despite this. He was previously diagnosed and treated for Hodgkin's lymphoma with 12 sessions of chemotherapy and 1 month of radiation therapy in 2014. This raised additional concerns about his general health. He has a family history of Hypertension in both parents, Diabetes in his maternal grandmother, Bronchial asthma in his paternal aunt and older sister, Pulmonary tuberculosis in his younger brother, food allergies in his paternal aunt and older sister, Breast cancer in two of his paternal aunts and grandmothers on both sides, Colorectal cancer in his paternal grandfather, and Uterine cancer in his paternal aunt.

6 Pillars

Exercise	Resistance: Arms and chest (dumbbell curls, bench press, etc.) 3-5 sets 10- 15 reps, 3 days a week, Legs, and core (sit-ups, crunches, squats, leg curls, etc.) 3-5 sets 15- 20 reps, 2 days a week. Flexibility: 5- 10 minutes stretching exercises 5 days a week Aerobic: None
Diet	Fruits- eats banana, mango, papaya, "marang", orange, pears, watermelon, dragon fruit once seasonally available 1-2 times a week if available. Vegetables- 1 cup of what is available once daily. Broccoli 1- 2 cups in a month, 1- 2 cups fresh salad greens in 1-2 months. Meat- 2 servings daily (lunch and dinner), mostly pork, processed meats (chorizo, longganisa, hotdogs, canned meat, etc.), poultry, fish, beef, and crustaceans. Grains- No rice from 2020, daily serving of white bread (2 slices loaf bread, 4-6 pieces pandesal, etc.) Nuts- 1 handful of roasted peanuts, almonds, pistachios, and mixed nuts 2-3 times a week, depending on what is available. Sweets- 1- 2 servings daily (chocolate, doughnuts, cakes, ice cream, juice, etc.), depending on what is available. Fast food- 3-5 times a week during family outings or ordering online. Water intake- 8 glasses daily, 10-12 glasses during exercises. Skips breakfast usually; likes to snack on junk foods (chips, sweets, etc.), and likes to have midnight snacks.

24-hour food recall

- Breakfast: Coffee, white sugar 2 tsp. with fresh milk, Pandesal 6 pieces
- Lunch: 3 egg French omelet with homemade okonomiyaki sauce, Porkchop with roasted potato wedges, Four seasons juice drink 1 can, 1 medium banana
- Dinner: 2 scoops whey protein, Fried fish (Lagaw) 2 medium-sized pieces, Blueberry muffin

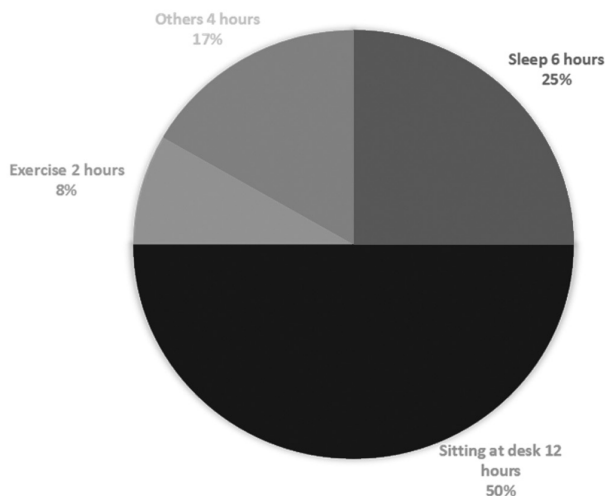|	
Sleep	Sleeps at 12 MN, wakes up at 5- 6 AM daily (5- 6 hours) Bouts of insomnia 3-4 days in 3 months
Stress	Stress - Job, family squabbles, sudden changes in scheduled activities. Relaxation- playing computer games, playing guitar, watching anime or movies, watching YouTube, exercising, meditation, or praying
Substance	Never smoked. Occasional alcoholic beverage drinker at social gatherings (1-2 bottles of light beer, Pilsen, or spirits in 1- 2 months, 1 glass of wine 1-2 times a year.) Drinks one cup of instant or brewed coffee daily Enjoys drinking energy drinks 3-4 times a week. No illicit drug use
Relationship	Eats with family when at home. Online voice/ video calls with friends and family. Online gaming with friends. Family bonding activities such as vacations, playing board games, watching movies together, and eating out.

24 HOUR ACTIVITY

Others 4 hours 17%
Sleep 6 hours 25%
Exercise 2 hours 8%
Sitting at desk 12 hours 50%

Clinical findings

Vital Signs: BP: 120/ 80 mmHg, CR: 80 bpm, RR: 20/min, Temp: 36.2ºC.

Anthropometric measurements: Height: 172 cm, Weight: 83.3 kg, BMI: 28.15 (Obese), Waist circumference: 86 cm, Hip circumference: 97 cm, Waist Hip ratio: 0.88.

General survey: Awake, Ambulatory, Conversant, not in cardiopulmonary distress.

Skin: Fair complexion, (+) Dark discoloration sternal area, (+) ~4-5 cm scar tissue anterior chest area, (-) Pallor/ Jaundice/ Bruises/ rashes/ other lesions.

HEENT: Pinkish conjunctivae, Anicteric sclerae, Pupils equally reactive to light and accommodation, (-) CLAD, non-palpable thyroid, (-) Neck vein engorgement.

Respiratory: Symmetric chest expansion, Clear breath sounds, (-) Wheeze/ rales/ crackles.

Cardiac: Adynamic precordium, PMI at 5th ICS midclavicular line, regular heart rate and rhythm, Distinct heart sounds, (-) Murmurs.

Gastrointestinal: Soft, non-tender abdomen, Tympanitic, Normoactive bowel sounds, (-) Distention/ Masses/ Lesions.

Genitourinary: (-) Bleeding/ Masses/ lesions, (-) Tenderness, (-)

Hemorrhoids, (-) Fissures/ swelling/ erythema at perianal region.

Extremities: Full ROMs, Warm to touch, (-) Masses/ lesions.

Neurologic/ Psychiatric: GCS 15, (-) Neurologic deficits, (-) Motor / sensory deficits, oriented to time, place and person, (-) feelings of worthlessness, (-) suicidal tendencies.

How difficult have these problems made it to do work, other people? NOT AT ALL.

SCORE: 3 (Mild anxiety)

SCORE: 5 (Mild depression)

Timeline

2019	Steady weight of 72-73 kg (Overweight). Conventional Filipino diet. (More details under Diet portion of the 6 pillars) Resistance exercise 2-3 hours per day 5 days a week.
Dec 2019- Feb 2021	Started new Job. Resistance exercise reduced to 1-2 hours 3 days a week. Increased appetite. Gradual weight gain.
August 2021	Weight gain until 81- 82 kg. Quit Job. Eliminated rice from diet in 2020. Resistance exercise 2-3 hours per day 5 days a week.
March 2022	Weighed in at 83.3 kg (Obese). BMI of 28.15.

Body fat analysis (KARADA SCAN)

Measurement/ Standard	Reading 1 (3/21/22)	Reading 2	Reading 3
Blood pressure (mmHg)	120/80		
Resting heart rate (bpm)	80		
Height (cm)	172		
Weight (Kg)	83.3		
Circumferences			
Waist (cm) (F=<88cm; M=102cm)	86		
Hip (cm)	97		
Waist hip ratio (F=<0.85; M=<1.0)	0.88		
Body fat analysis			
	Normal values		Actual value
	Male	Female	
Fat %	10.0- 19.9 %	20.0- 29.9 %	23.2 %
Body age	-------		44
Body mass index	18.5- 24.9		28.15
Resting metabolism	-------		1,876 kcal
Visceral fat	<10		11.5
	Subc. fat	Skel. musc	
Whole body			
Trunk			16.6
Legs			
Arms			
Skeletal muscle % (Whole body)			33.1

Diagnosis

Obesity; Sedentary lifestyle; Hodgkin's lymphoma; s/p chemoradiation therapy (2014)

Therapeutic intervention:

After discussion with the patient, he was determined to start lifestyle changes immediately. Patient was noted to be in the Preparation stage in the transtheoretical model of change stage,22 thus lifestyle changes regarding the six pillars were discussed with the patient. Changes in diet, exercise, sleep, stress, relationships, and substance use were discussed, and goals were decided upon with the patient. Lifestyle prescriptions were based on what was feasible and simplest for the patient to adhere to.

Lifestyle prescription

1. Diet
   Patient was advised not to avoid breakfast. Instead, have 1-2 slices of toasted wheat bread/ 1 piece of fruit, and limit it to 1 cup of coffee daily. Substitute white sugar with raw sugar/ muscovado 1 teaspoon in coffee.

- Increase vegetable intake to 2 servings daily. 1 cup steamed cruciferous vegetables (Broccoli, Cauliflower, etc.)/ 1 cup fresh greens/ 1 cup dark green leafy vegetables.
- Increase fruit intake to 2 servings daily. Banana, Papaya, Mango, Watermelon, Dragon fruit, orange, pear, or whatever is available.
- Decrease meat intake to 1 serving 2-3 x a week. Substitute meat intake with veggie meat in recipes.
- Increase legumes intake to 1 cup 3-4 x a week. Black beans, White beans, pinto beans, kidney beans, etc.
- Increase nuts intake to 1 handful daily. Peanuts, pistachios, cashews, etc.
- Limit oil to 1 teaspoon a day.
- Substitute refined grains with whole grains. Quinoa, Wheat, banana pancake, etc., instead of cakes, doughnuts, or other sweets.
- Minimize junk food or fast-food intake to 1-2 times a week only.
- Substitute sodas with fresh fruit smoothies. Avoid adding sugar.
- Avoid salty or sweet foods in the evening. Instead, have 1 piece of fruit.
- Increase water intake to 2-3 liters daily. Especially when exercising.

2. Exercise - Continue resistance exercises.
   - Continue flexibility exercises.
   - Add aerobic exercises for 30 minutes daily, for 5 days a week. HIIT, Cardio kickboxing.
   - Have standing or exercise breaks every 1 hour while sitting at the computer desk.
   - Advised to get a standing desk if amenable and feasible.

3. Sleep - Advised to increase sleep to at least 7 hours daily.
   - Sleep hygiene is advised. Avoid bright lights or LCD screens at least 1 hour before bed.
   - Sleep in a cool, dark, and quiet environment.

4. Stress management - Visualization and meditation techniques.
   - Gratitude journal every evening.
   - Advised doing breathing and visualization exercises for at least 30 minutes every morning when you wake up instead of checking the phone and social media.

5. Relationships - Continue to spend time with family and friends.

6. Substance use – Continue to limit coffee intake to 1 cup daily.
   - Advised to avoid or at least limit energy drinks to 1-2 x a week only.

- Continue to avoid smoking and other illicit drugs.

The patient was advised to adhere to the lifestyle prescription as much as possible, and possible barriers and strategies to mitigate them were also discussed with the patient.

The patient reported the helpfulness of a diet-tracking app he found called Lifesum, an app used for those working with a nutrition coach who needs a platform to track their food intake and wants to customize their calorie and macro targets. It has a user-friendly design and an extensive food database compared with other apps that had the highest average System Usability Scale (SUS) of 89.2 among 7 other apps which all had the potential to promote self-efficacy by helping individuals track their diet and progress towards goals.[11] The patient claims that the app helps him become more aware of his intake and his exercises which he claims to have helped his overall efforts in losing weight. Barriers he identified are difficulty in maintaining exercise and diet during family outings. Another barrier he mentioned is his cravings for sweets after meals. These obstacles were discussed with the patient, as were strategies for reducing and managing urges. The possible application of the app for diet tracking was also explored. The patient's efforts and favorable results were commended, and he was advised to maintain his new healthy habit.

1st Follow-up (7/11/22)

Measurement/ Standard	Reading 1 (3/21/22)	Reading 2 (7/11/22)	Reading 3
Blood pressure (mmHg)	120/80	119/79	
Resting heart rate (bpm)	80	90	
Height (cm)	172	172	
Weight (Kg)	83.3	73.7	
Circumferences			
Waist (cm) (F=<88cm; M=102cm)	86	83	
Hip (cm)	97	96	
Waist hip ratio (F=<0.85; M=<1.0)	0.88	0.86	
Body fat analysis			
	Normal values		Actual value
	Male	Female	
Fat %	10.0- 19.9 %	20.0- 29.9 %	18.8 % (23.2)
Body age	-------		38 (44)
Body mass index	18.5- 24.9		24.9 (28.15)
Resting metabolism	-------		1,691 kcal (1,876)
Visceral fat	<10		9 (11.5)
	Subc. fat	Skel. musc	
Whole body	13.5	34.6	13.51 (6.6)
Trunk	12.1	28.3	
Legs	17.4	51.8	
Arms	17.9	38.0	
Skeletal muscle % (Whole body)	Ave. 37%	Ave 28%	34.6 (33.1)

2nd Follow up (11/15/22)

| Measurement/ Standard	Reading 1 (3/21/22)	Reading 2 (7/11/22)	Reading 3 (11/15/22)
Blood pressure (mmHg)	120/80	119/79	120/80
Resting heart rate (bpm)	80	90	80
Height (cm)	172	172	172
Weight (Kg)	83.3	73.7	70.1
Circumferences			
Waist (cm) (F=<88cm; M=102cm)	86	83	81
Hip (cm)	97	96	91
Waist hip ratio (F=<0.85; M=<1.0)	0.88	0.86	0.89
Body fat analysis			
	Normal values		Actual value
	Male	Female	
Fat %	10.0- 19.9 %	20.0- 29.9 %	14.1 % (18.8)
Body age	-------		32 (38)
Body mass index	18.5- 24.9		23.7 (24.9)
Resting metabolism	-------		1658 kcal (1,691)
Visceral fat	<10		7.5 (9)
	Subc. fat	Skel. musc	
Whole body	13.5	34.6	
Trunk	12.1	28.3	
Legs	17.4	51.8	
Arms	17.9	38.0	
Skeletal muscle % (Whole body)	Ave. 37%	Ave 28%	

The patient's weight decreased with his BMI reclassified from Obese to slightly overweight. He reported continued use of the Diet-tracking app and his daily logs were reviewed. A sample of one of his logs is seen in the next figures:

Lifesum is a diet tracking application with both a free and a paid subscription. The free version begins with you entering personal information, including age, gender, weight, and height. You then choose your weight goals (weight loss, weight maintenance, or weight gain). Your total daily caloric allowance is then calculated as well as your macros (carbohydrates, protein, and fats in grams). After this, you will input your meals (breakfast, lunch, dinner, and snacks), as well as your water intake and exercises done for the day. There is also a tab where you can track your weight, and the app will show you a graph of

your progress. The paid version offers more options in the diet, which include high protein, vegetarian, Mediterranean, and others. The paid version also provides recipes that can be followed.

Outcome

The authors were presented with a case of a 31-year-old obese male weighing 83.3 kg with a BMI of 28.15. A lifestyle prescription was given, and the patient discovered a diet-tracking app, that he downloaded on his phone and religiously used to track his caloric intake, macros, and exercise daily. Upon the last follow-up, he was able to lose a total of 13.2 kg and ended up with a BMI of 23.7 which is barely overweight according to the WHO Asian BMI category. The patient was
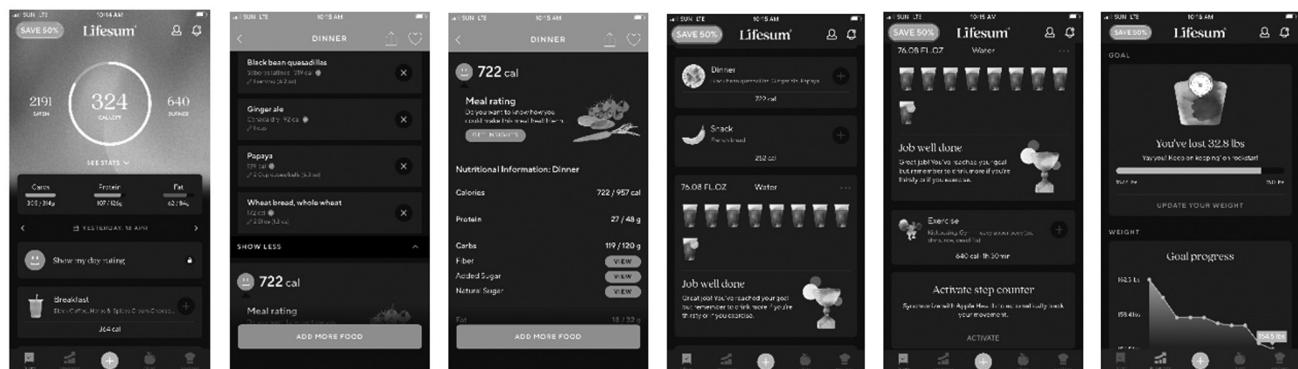
satisfied and determined to continue his lifestyle changes. He was advised to follow up after 3-6 months or anytime he feels that he is starting to fall back to his unhealthy lifestyle.

<div align="center">DISCUSSION</div>

Cases of obesity have been on the rise in the last few years. Primary care physicians have seen numerous studies indicating the risks and consequences of obesity for their patients. Despite clinical guidelines encouraging clinicians to identify and counsel obese and overweight patients, many physicians do not address the issue of weight with their patients, even those who meet the diagnostic criteria. Many factors complicate efforts to address overweight, obesity, and the promotion of healthier diets and lifestyles. Some barriers identified by physicians include insufficient time during visits for screening and counseling, lack of available referral services for patients, the perception that patients will not be willing or able to make lifestyle changes, poor reimbursement for nutrition and weight-management counseling, Reluctance to discuss weight among physicians who are themselves overweight and uncertainty about whether interventions will have a positive impact.[12,13]

National Heart, Lung and Blood Institute guidelines suggest that patients who want to lose weight reduce their caloric intake by 500 to 1,000 kcal per day to produce a weight loss of 1 to 2 lb. (0.45 to 0.90 kg) per week. The 2008 Physical Activity Guidelines for Americans recommend that adults perform at least 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity aerobic activity per week (or an equivalent combination of these). Aerobic activity should be performed for at least 10 minutes per session and spread throughout the week. For additional health benefits, adults should increase their aerobic physical activity to 300 minutes of moderate-intensity or 150 minutes of vigorous-intensity aerobic activity per week.[16] Adding physical activity to calorie restriction may result in modest improvements in weight loss. Physical activity alone, however, has not been shown to be sufficient in producing significant weight loss, except at very high-intensity levels.[17] Although significant weight loss may be ideal, even a modest reduction in weight (5% to 10% of total body weight) can have significant health benefits.[14,15] This is best achieved using a combination of dietary control and increased physical activity, resulting in a caloric deficit.[17, 20]

In recent years, a wide range of health-related apps have been developed for smartphones and tablets to help users monitor their body weight, diet, physical activity, and wellness. In 2017, the number of such health-related apps was 325,000, and the number of downloads was 3.7 billion worldwide.[18] Given the advancements in technology and the availability of these apps, there is a high chance that patients are using them or are at least aware of them. According to a study from 2021, these apps tend to underestimate total energy intake when compared to the reference method, with Lifesum having the lowest average underestimation at -2 kcal and Yazio having the highest at -5.4 kcal per item. Except for Yazio and Lifesum, which overestimated protein intake, apps tended to underestimate lipids and, to a lesser extent, carbohydrate, and fiber intake. These differences result from the user customizing the food list and the

lack of country-specific food composition databases.[19] Another 2018 study assessed the precision of nutrient calculations made by five well-known nutrition tracking programs, including MyFitnessPal, Fitbit, Lose It!, MyPlate, and Lifesum. The findings showed that the majority of the nutrients examined were consistently underestimated by the apps. Additionally, some apps may be more accurate than others when it comes to calculating energy and macronutrients in relation to the NDSR (r=073-096 vs. r=057-093).[12] In this case, it is essential to continue to monitor the patient and implement strategies for overcoming potential obstacles to sustaining a healthier lifestyle. Although the majority of studies on diet-tracking apps caution about their inaccuracies and the likelihood that they will underestimate the caloric content of food, there was a reported positive effect on the patient in this instance.

Self-monitoring, goal setting, shaping, reinforcement, and stimulus control are some behavioral modification techniques used in lifestyle medicine that have been shown to be effective in lowering binge eating episodes. The use of apps such as Lifesum has helped the patient monitor his daily intake and compare it to his physical activity, which has made his caloric deficit measurable in order to facilitate weight loss. By assisting people in altering their behavior and thought patterns around nutrition and exercise, these data demonstrated that coaching using the cognitive behavior method is an effective strategy for weight loss.[21]

Behavioral modification approaches used in lifestyle medicine that have been proven to be successful in reducing binge eating episodes include self-monitoring, goal setting, shaping, reinforcement, and stimuli management.[21] By tracking his daily caloric intake and comparing it to his physical activity applications like Lifesum, he was able to measure his caloric deficit thus has aided him in his weight loss journey. These findings showed that coaching using the cognitive behavior method is a successful method for weight loss by helping people change their behavior and thought patterns regarding nutrition and exercise. [21]

Given these findings, utilizing or using these diet-tracking applications for individuals who are overweight or obese may be advantageous. Although more research is necessary, particularly in the context of the Philippines. It may also be researched to create a diet-tracking software specifically for Filipinos that accurately predicts the caloric and nutritional composition of typical Filipino food.

Patient Perspective

The results of the Karada scan motivated me to improve my lifestyle, as I realized I should reduce my risks for the hereditary diseases for which I am at risk. After learning that a healthy diet consists primarily of whole, plant-based foods, such as fruits and vegetables, and avoiding a sedentary lifestyle, I realized why I was still gaining weight despite my regular exercise routine. I found the lifestyle coaching and recommendations very beneficial in figuring out what I should have been doing. I've been able to stick to this diet thanks in large part to the Lifesum app. This application enabled me to monitor my caloric intake and helped me become more conscious of the amount of food and exercise I consumed.

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