PJN
ISSN 1680-5194
ansinet.com/pjn

PAKISTAN JOURNAL OF NUTRITION

Science Alert
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http://ansinet.com

OPEN ACCESS Pakistan Journal of Nutrition

ISSN 1680-5194
DOI: 10.3923/pjn.2021.135.140

Review Article
Actualizing Sustainable Development Goal Using Meal Replacement Diet to Improve Health Status

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Abstract

Overweight and obesity has become a global challenge in recent times. This has forced many people to seek ways to reduce excess weight along with a strategy for maintaining a healthy body weight. Presently, the growing trend in overall obesity has been observed in many advanced countries. Obesity develops due to excess build-up of fat in the tissues and fat cells. Medical weight loss remedies using gastric bypass and liposuction have not been successful in maintaining ideal body weight after such surgeries for a longer time. This study aimed to draw attention to the use of substitute meals, which are calorie-regulated weight control plans. Meal replacement diets (MRD) have received more interest and attention around the world. More trials will be done to evaluate various meal replacement diets as successful remedies for weight loss over a long duration. MRDs in the form of liquids, shakes, powders, or bars have been found convenient to replace normal meals, and consequently maintain an ideal weight. Balanced and adequate nutrients in meal replacement diets help in weight loss and weight maintenance.

Key words: Meal, obesity, over-weight, body mass index, diabetes, cancer

Citation: N.L. Onuoha, N.N. Uchegbu, I.F. Asogwa and N.F. Amulu, 2021. Actualizing sustainable development goal using meal replacement diet to improve health status. Pak. J. Nutr., 20: 135-140.

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Competing Interest: The authors have declared that no competing interest exists.

Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

All over the world, the challenges and complications directly and indirectly linked to overweight and obesity are underestimated, even though it caused more death than infectious diseases in recent times. Previous studies on this subject have discussed only the dangers and challenges associated with the overweight and obesity. However, these studies have not provided sufficient information about latest research on how to handle these challenges of overweight and obesity using indigenous materials. There is limited information on how to produce meal replacement diets from local food staples and the kind of life style one needs to adopt. To address the gaps identified above, this study has been initiated to provide necessary information about average body weight, overweight, obesity and extreme obesity. Attention is drawn to the several approaches that have been adopted in the past, which are now known to be riddled with many complications. This study is most valuable as it suggests the processes of producing alternative diets from indigenous raw materials that can replace the costly commercially imported ones. It is vital to give attention to this because research has shown that overweight and obesity are severe conditions that are fast eating deep into the fabric of the global community. For instance, 1 out of every 7 persons in the world from age 20 years and above is obese. This figure is soaring at an alarming rate to the point that almost 40-50% of people in the world may be obese by 2025 if no drastic effort is made towards averting this menace.

THE CONCEPT OF OVERWEIGHT AND OBESITY

Obesity is the excessive accumulation of body fat. Fat cells take up excessive fat when an imbalance exists between energy intake and energy expenditure[1]. Overweight and obesity are complex metabolic disorders, and they harm human health. Foods and staple components that may lead to overweight and obesity may include refined sugar, soft drinks, cakes, biscuits, ice cream, yogurt, pastries, fatty foods, other fatty and processed food components.

Body Mass Index (BMI) is determined by dividing an individual's weight expressed in kilogram (kg) by the height measured in meters squared (m^2). Using this formula, one can effectively compute the ideal weight range. Most times, people become overweight and obese unknowingly. This therefore requires that individuals should develop the culture of periodically checking their weight to avoid being victims of overweight and obesity. The Body Mass Index (BMI) is a value that can guide an individual to maintain standard weight.

According to Samaras and Elrick[2], the expected average weight of a person is one that falls between 18.5-24.9 kg/m^2. On the other hand, overweight occurs when the weight is 20% above the average weight or when a person attains a body mass index (BMI) between 25-29.9 kg/m^2, whereas, an individual is said to be obese when the BMI ranges from 30-35 kg/m^2 . Finally, a BMI of >35 kg/m^2, is considered as severe obese. The global index indicates that over 1.4 billion adults aged 20 years and above fall within this range, more than 0.2 billion men and about 0.3 billion women have a BMI of 30 kg/m^2 and above[2].

The above statistics are alarming and increases the risk of deadly diseases associated with overweight and obesity. These deadly diseases include cardiovascular diseases, high blood pressure, stroke, gall bladder stone, infertility, menstrual complications and diabetes[3]. This finding is corroborated by Kathryn *et al.*[4]. Poirier[5] further confirmed that overweight and obesity lead to deadly diseases and even death if not controlled. Obesity is directly linked to type-2 diabetes[6]. A previous study demonstrated that an increase in BMI of 1 kg/m^2, may increase the risk of type-2 diabetes by 25%[7].

Research conducted by Finer[8] showed that an increase in blood pressure is directly proportional to increase in weight. Anderson *et al.*[9] reported that high blood pressure is more likely to occur in people with BMI greater than 25 kg/m^2 than those with BMI less than 25 kg/m^2 . For every 10% rise in body weight may increase blood pressure by 6/4 mmHg. Furthermore, it has been observed that about 33% of obese adults are hypertensive.

Studies have shown that obesity has an important role in thrombosis, cardiomyopathy (deterioration in the myocardium) and heart attacks because it leads to structural and functional changes in the heart. Obesity increases the risk of stroke, high cholesterol, asthma, sleep disorders, liver disease, arthritis, and mood and mental health disorders. There is an increasing trend of overweight and obesity in Nigeria. Obesity is often associated with economic damage because obese individuals are less productive economically.

STRATEGIES FOR WEIGHT LOSS

To escape the harmful effects of obesity and overweight, people (especially people at risk lines) must constantly seek to lose weight through different strategies[10]. There are many ways to achieve weight loss, these involve using medications that can promote weight loss, in conjunction with eating (moderately) healthier and natural foods and exercising more[11]. Although, the use of certain drugs and supplements may reduce appetite, which may result in weight reduction

because fat absorption is blocked, one must be circumspect because unintended weight loss may lead to cachexia[12]. Furthermore, newer appetite-suppressing medications may have side effects like headache, nausea, insomnia, high blood pressure, nervousness, blurred vision. Such drugs may even negatively interact with certain other drugs[13].

The Barbaric surgical approach has been applied on some individuals with extreme cases of obesity. This involves gastric bypass, a procedure that is effective in curbing food intake since it reduces the size of the stomach. However, just like other surgical methods, it has also risk factors. Accordingly, the advice of Medical Experts is highly recommended. Virtual gastric band is another procedure which is closely related to gastric-bypass. This procedure hypnotizes the brain to assume that the stomach is smaller than its actual size[14]. Here, human psychology is applied in excess weight control. Research works to discover the efficacy and safety of this method are in progress.

It must be noted that though many dietary supplements are available, not all are efficient for weight reduction[15]. Nutritionists are concerned with deliberate weight loss methods, which involve reducing excess weight through reducing calorie intake[16]. Nutritional treatment of obesity focuses on behavior modifications such as eating less using portion-controlled, safe and satisfying meal replacement diets and increasing physical activity levels[17-19]. Three to five servings of fruits and vegetables should be taken daily as they are known to be rich source of Phytochemical[20]. Samaras and Elrick[2] recommended that people should reduce the intake of high-calorie-processed foods, saturated fats and sugar and increase the intake of fiber-rich foods and physical activity to reduce weight. Fruits and vegetables are found to be highly nutritious as they are rich sources of vitamins and minerals while containing low calories according to an *in vivo* study on the effect of *Solanum aethiopicum* fruit on some biochemical parameters using rats[21]. In recent years, attention has shifted towards the use of substitute diets in controlling excess weight[22]. It has been found that nutritional interventions intended to moderate energy intake (weight management therapy), are usually more effective than medication for weight loss[22,23].

Therefore, more and more popular intervention methods, (involving the use of portion-controlled meal replacement diets for weight management therapy) abound in recent times[24]. Meal replacement diets can also be used to substitute breakfast, lunch, or dinner in the treatment of obesity. Moreover, these are considered as safe since the meals are prepared from natural resources[16]. Substitute diets used to treat obesity are usually prepared with grains, cereals and legumes depending on interest. Some of the grains used are soybean, sorghum, millet, wheat and sometimes skim milk are added to produce substitute diets[25].

MEANING OF MEAL REPLACEMENT DIETS (MRDs)

The expression "meal replacement" is not definite in most Food and Drug Administration Regulations, but it usually refers to a packaged food that has controlled calorie content. It may be in liquid, powder, or bar form to substitute regular meals[26].

Meal replacement diet is a ready-to-eat meal formulated by mixing processed soybean protein isolate, malted sorghum dextrin, skimmed milk powder, vitamins, cocoa powder, sweetener and vanilla flavors. It is usually in powdered form and reconstituted with water at room temperature and taken four times daily at 4 hrs intervals. Though it has yielded positive results in Nigeria, Meal Replacement Diets are made from imported exotic brands, which are highly expensive for the Nigerian populace[25,27].

INGREDIENTS USED TO PRODUCE MEAL REPLACEMENT DIETS

Cereals and legumes play an essential role in the diets of many people in Africa and Asia. These are the primary sources of proteins, calories, vitamins and minerals[28]. Legumes and cereals which abound in the tropics have been shown to complement each other nutritionally when mixed in meal[29]. A combination of legumes and cereals makes an adequate diet because cereals are deficient in lysine but have sufficient amounts of Sulphur-containing -amino acids that are lacking in legumes.

On the other hand, Legumes contain high levels of protein and essential amino acids such as methionine, lysine and tryptophan[30]. Legumes are included in various Meal Replacement Diets due to their high protein, ability to reduce weight and a micronutrient content as it is rich in some biochemical parameters[31]. The use of locally sourced legumes has been found to be safe and healthy as a previous study[32] showed no negative effect on rat hematology, hepatic and renal function.

Generally, legumes such as cowpea, pea, kidney beans, pigeon peas, bambara groundnut, among others, contain about 17-25% protein, except soybean, which contains 40% protein and are good sources of phosphorus and iron[30]. Sorghum is considered a good source of essential carbohydrates, protein, vitamins, mineral elements and dietary fiber[30].

NEED FOR INDUSTRIAL PRODUCTION OF ALTERNATE MEALS USING INDIGENOUS RAW MATERIALS

There has been an alarming increase in obesity. Ogden *et al*.[3] reported that globally overweight has doubled among men and tripled among women within the last 40 years. According to a previous study, 18% of men and 20% of women worldwide might be obese by 2025 if the present eating feeding trends continue. It further showed that by 2025, 43% of women and 45% of men in the United States might be obese and this is going to be a severe problem if not controlled efficiently[33]. In reality, obesity has rapidly become an international epidemic[34]. Non- communicable illnesses due to being overweight are the leading causes of death in Nigeria than communicable illnesses[6].

Use of some appetite-suppressing drugs and pills to treat obesity may lead to several health hazards. Supplementary diets are available in the forms of pills, tablets and capsules. The use of convenient alternative diets in the form of ready to-drink powders and shakes is an innovation in the treatment of obesity. Some of these food materials include indigenous fruits and vegetables that contain phytochemical that may help in weight reduction. Studies have shown that the inclusion of such phytochemical-rich fruits and vegetables into foods would significantly boost their phytochemical and antioxidant content[35]. Also Uchegbu and Ishiwu[32] have reported that replacing wheat based crackers with crackers made from sprouted pigeon pea, unripe plantain and brewers' spent grain could go a long way in managing obesity because of its high dietary fiber and protein content.

Indigenous plant resources might be helpful in treating obesity. These plant resources are in abundance in Nigeria but are poorly utilized. There are many indigenous food raw materials that are cheap and can be utilized to produce diets to treat overweight and obesity.

An ideal substitute diet should contain adequate vitamins, proteins and energy that can help reduce weight in safety, quick and effective proportion. It should also be able to prevent hunger pants often associated with dieting. Recent research findings have shown that consumption of low calorie and balanced nutritional diet is the most effective and safe method to hinder weight gain[36].

Obesity has become an epidemic worldwide; therefore, it is immensely crucial to overcome this problem through a process of safe, life-long weight management programs[34]. Little attention has been given to weight management programs, even though there have been severe consequences of excess weight[1]. Studies have proven that even children and adolescents tend to become obese. In the developed nations where the epidemic is the highest, the implementation of public fitness program has become difficult due to busy lifestyles[1]. More studies should be done to assess ways of improving weight loss. Factors leading to obesity should be emphasized. Techniques to prevent malnutrition occurring from weight-loss program should be given attention[6]. In reality, obesity became an international epidemic, which is not limited to developed countries[35].

People are constantly looking for methods to make their lifestyles less complex. To this end, increased enjoyment time, less energy expenditure, extended reliance on ready-to-eat meals and elevated portion sizes are usually implicated[22]. Nutritional interventions using portion-controlled meal replacement diets are highly recommended. The calorie difference between the substitute meal and the meal that could have been typically eaten enables weight reduction[35]. The good thing about meal replacements is that they are appetizing, convenient and controlled portions. Evidence on their efficacy at regulating weight gain and sustaining weight loss is ubiquitous[16]. For weight loss to be achieved, low-calorie and low-fat diets can be used for twelve months[36]. Further research on this subject may also be considered to make these innovative approaches easier to apply.

CONCLUSION

Having established obesity as a worldwide issue, attention should be given to weight management programs. An ideal substitute diet that contains adequate vitamins, proteins and energy that can help reduce weight safely and effectively is highly recommended. It should also be able to prevent food cravings that are associated with dieting. The use of convenient meal replacement diets in the form of ready-to-drink powders and shakes is a welcomed innovation in the treatment of overweight and obesity. Meal replacement diet made from indigenous raw materials like legumes, cereals are rich in phytochemicals that may help in weight reduction. Further research on this subject may also be considered to make these innovative approaches easier to apply.

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