



The Effects of Intermittent Fasting on Weight Loss for Overweight and Obese Men and Woman in Saudi Arabia

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Abstract

There was a growing prevalence of obesity in Saudi Arabia during the last two decades. Therefore, many types of diets had spread for weight loss. The intermittent fasting diet has gained great popularity among Arabs due to ease of following, and there is no limit to any nutrients. This study was designed to investigate the effect of intermittent fasting diet on body weight in overweight and obese adults in Saudi Arabia. The sample was between 18-40 years old. The questionnaire was about personal information, general information about intermittent fasting diet, types of diet, and the intermittent fasting diet to identify people's knowledge around the positive impact of the intermittent fasting diet on weight loss. Results showed that 321 out of the participants had physical activity, and there were no changes in their usual dietary patterns. Also, the results showed that participants were aware of the intermittent fasting diet, and most of them aware of its effectiveness in weight reduction. Almost half of the participants followed other types of diets to weight loss such as ketogenic diet. The results revealed that 146 participants of 340 were following the intermittent fasting diet, most of whom received the benefit after following the diet (weight loss), but there were some side effects such as headaches and hair loss. In conclusion, intermittent fasting diet was prevalent among Arabs because of their habituation towards it. It was found useful and effective in weight loss. There is a need for food education intervention for those who follow the diet, should not only follow the diet but be attentive to the basic elements that the body needs.

Keywords: Intermittent fasting; weight loss; Saudi Arabia.

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1. Introduction

Obesity is an epidemic disease and it is risk factor could cause death. It is associated with many diseases including diabetes, osteoporosis, hypertension and sleep apnea [1]. Obesity with increasing age may cause longer disability [2]. This will increase the consequences of obesity and become a significant burden on individuals and government [3]. Adaption of unhealthy diets in many societies is likely to become one of the causes of increasing obesity [4,5]. The role of body mass index (BMI) was considered very important and has a high priority in health organizations [6]. There is a link between obesity and many diseases, and the first to realize this association is the Greek physician Hippocrates. As pointed out that sudden death occurs dramatically in people who suffer from obesity than lean people (Chadwick). Obesity has become a growing phenomenon throughout the world, as it is a dangerous problem for health, especially in developed countries. Furthermore, it is enough to qualify as a source of concern [7,8]. The prevalence of obesity rate for adults increased from 22% in the year 1990-1993 to 36% in 2005 Saudi Arabia. They have expectations of an increased prevalence of obesity around 12% in 1992 to 41% by 2022 in men, while in women from 21% to 78% [9]. According to the World Health Organization (WHO) obesity or weight gain was identified as an increase of abnormal or increase fat accumulation in the body causing harm to health [10]. The most known easy method to measure obesity is calculating BMI, defined as the weight in kilogram on the height in meters squared. This is an indicator for comparison, and it is not used to calculate fat. If the BMI is between 25 and 30 it is considered overweight but if more than 30 is classified as obese and that is for adults. In childhood, age and gender play a very important role, if the percentage is between 85 and 95 it is classed as overweight while if greater than 95 it is classed as obese [11,12]. Despite knowing that risk of obesity but supportive medications are not consumed due to it is side effects. For example, sibutramine shows side effects including increased heart rate and elevated blood pressure [13,14].

There is also an orlistat cause gastrointestinal side effects that require vitamins dissolved in fat [15]. With the spread obesity epidemic, needs to the search for effective diets for calorie reduction and weight loss. The fasting was a safe and effective approach that enhance weight loss in the short-term, without any concern for weight maintenance in the long-term, as portrayed in popular media. Fasting has recently been generalized through "intermittent fasting diet".

The idea was simple, making it easy to follow without counting calories every day. This was an approach to enhance weight loss. In general, such interventions should be acceptable, achieve nutritional requirements, enhance fat loss, it has a wide public health advantage. To achieve maintenance and weight loss, may be an option of intermittent fasting diet or alternate day fasting diet. There are several types of fasting methods one of them is Intermittent Fasting. That can lead to different health benefits. Different from other diets, it is a whole meal not to reduce the calories of each meal. The main reason was helpful to fat loss and associated with health benefits [16]. Intermittent fasting focuses on skipping one meal or more for a specific period of time instead of focusing on caloric restriction [17]. On the other hand, now many people are re-discovering this diet. It revolves around the timing of food intake and can have some benefits in the long-term. This study was designed to investigate the effect of intermittent fasting diet on body weight in overweight and obese adults in Saudi Arabia

2. Materials and methods

2.1. Design

A self-administered online questionnaire was used for data collection. First, it was distributed among some students for a pilot study. It was also sent to a panel consisting of assistant professors and researchers in the same field to obtain their feedback and suggestions for modification. The questionnaire was uploaded online, and the link was sent via social networking sites. Each participant was asked to complete personal questions, these data included general information on age, gender, educational level, personal and family medical history. The questionnaire also included questions for daily habits that affect health and weight and physical activity. This section involved questions about the participant's physical activity about whether he is exercising or not. The types and how many minutes it takes to exercise. The next questions were about dietary habits in the previous 6 days. There were several questions to learn about their dietary habits, in case the dietary habits during the previous 6 days have differed significantly from habitual routine (because they may have been on holiday or may have temporarily changed work routine). Examples of some questions that included in the questionnaire, how many main meals they normally ate per day, and what foods do they usually eat. And also, the questionnaire measured the general public's knowledge of the intermittent fasting diet, which includes several broad questions about the concept of the diet. This section began with a question about whether they knew the diet of intermittent fasting or not, does this diet come with pros or cons, and why people follow the diet or the main benefit of following it, how many of time than expected and appropriate to achieve the benefit and conclude this section with participants' question if they follow any type of diets to lose their weight or not. The questionnaire was collected information about diet types, and the final section details of the intermittent fasting diet which included the weight that was reduced in the first week of their diet experience in an open question. How long have they used the diet, divided into three time periods: 2-4 weeks, one to two months, or more than two months. Following this question, asked participants if they continued this diet to the end of the period or not. The last question that was mentioned in this part was whether they had any of these side effects: dizziness, vertigo, headache, eating disorders or others. Measurements (weight and height) were taken to calculate BMI (kg/m²). Participants were divided by obesity parameters which were defined as, underweight (BMI < 18.5); normal weight (BMI 18.5 to < 24.9); overweight (BMI 25 to < 29.9) and obese (BMI > 30) [11,12]. The 24-recall tool was selected to identify the daily intake of all foods. The participants were asked using an open-ended question about food and beverages were consumed over the last 24 hours.

2.2. Statistical Analyses

Statistical analysis was performed using SPSS version 20 (Chicago, IL, USA). One-way analysis of variance (ANOVA) were used to determine the difference in variables within and between groups, respectively. Also, the Kruskal–Wallis test was applied for each variable that did not distribute normal. Results of all analyses were reported as the mean \pm standard deviation (SD). In all statistical procedures, P-values <0.05 were considered statistically significant.

3. Results and Discussion

3.1. Demographic data

Among the 340 participants in this study, women were higher than men, by 90% and men were 10%. The sample was between 18-40 years old. About 44.2% between the ages of 10-25 years, 41.7% between 26-35 years, and between 36-40 years, by 14%. In this study, there were differences between participants in terms of education level. The majority had completed the primary and middle school level, 24% of people who completed the high school, and 66% completed the university, and postgraduate by 9%. The majority of participants (71.3%) were at university level, so most of them were not employed. In contrast, 28.7% of respondents were employees. Among participants, 264 had no disease in their health history. On the other hand, there were 61 participants with different medical histories.

3.2. Physical activity

Modern life has led to the ease of practice physical activity, by providing private places for walking and cycling. In 2019, the goal of the Ministry of Health was to practice walking every day for everyone. Where encourages people to walk 30-60 minutes for five days by challenging them to do that. In the current study, this type of physical activity was performed by most participants, and the duration of 30-60 minutes of physical activity was appropriate for most respondents. Out of the total 321 participants, 66.4% of them, at a high level of physical activity, that reflected participants' awareness of the importance of physical activity on public health as a weight loss or lifestyle. On the other hand, 33.6% of the participants in low-level of physical activity, that may be lazy, discouraged or may be unaware of the importance of physical activity. This result was in agreement with a study by authors in [18] the need for encouraging to promote the health of individuals in Saudi Arabia to be more fitness and physically active. Another study in Saudi Arabia showed that physical inactivity was 96% of the Saudi population. It was found that men's inactivity by 94% compared with women by 98% [19]. A decrease in physical activity that a risk factor for obesity and must be basic concerns for everyone. Moreover, there were differences between the participants in terms of the type of physical activity. The types of physical activity like the walk was by 71%. 23.5% choose weightlifting, and others were between the swim and yoga. 48.4% of participants their physical activity was about 30-60 minutes, and 34.1% of them was less than 30 minutes, a low percentage was (17.5%) of participants who did more than 60 minutes of physical activity.

3.3. Dietary habits

The majority of the participants (48.6%) ate three to four meals per day. 41.7% of the participants ate between 1-2 meals per day, 9% of them ate between 5-6 meals per day, other participants ate more than 6 meals a day. Breakfast was the main meal for most participants' day. There was a link between eating breakfast with a reduced risk of obese or overweight [20]. The frequency of daily breakfast consumption was 44.9%, because the participants considered it to be the most important meal of their day. Moreover, the main meal of the other participants was lunch, by 39.3%. the main meal of the other participants was dinner was 13.7%, and a low percentage of participants were about (2.1%) who ate the snacks. At the end of this section was asked about

dietary habits during the previous 6 days. 57% of participants changed their eating habits in the previous 6 days. In contrast, 43% of the participants did not change their diet significantly in their daily routines, that people take eating patterns as the basis of their dietary habits for much of their lives, so there was not much difference in their eating patterns.

3.4. General information about intermittent fasting diet

Obesity is an epidemic disease and the most significant causes of death. Associated with many diseases including diabetes, osteoporosis, hypertension [1]. Types of diet had spread widely, leading to major changes in the lifestyle of people, whether to get rid of obesity or to treat some diseases that are a concern and a negative impact on human health. The results of the second section indicate the extent to which people are aware of the intermittent fasting diet. The general information about intermittent fasting diet among the participants was good. The results showed that 77.6% of participants had knowledge of the intermittent fasting diet. In contrast, 22.4% of respondents did not have enough knowledge about the intermittent fasting diet. In this study, the participants' belief about the effect of the intermittent fasting diet on positive or negative were found the majority of participants (95.6%) thought that the intermittent fasting diet was more benefits than its negative side and there were no side effects to continuing in this diet. On the other hand, a few groups of participants (4.4%) thought that the disadvantages of the intermittent fasting diet overwhelmed its benefits. The intermittent fasting diet came back recently, so most participants aware of what intermittent fasting diet and its effectiveness in weight loss. Of the total 321 respondents, 79.8% thought that the benefit of used the intermittent fasting diet was to lose weight, 10.3% thought that its benefits were to fill the appetite, and 10% who thought that the intermittent fasting diet for treating diseases. The participants know that the duration of this diet not less than 2 weeks, for a satisfactory result. 44.5% of the respondents answered that the appropriate duration from one to two months, and the proportion of other participants who predicted that the appropriate duration to use this diet from two to three weeks were 34.6%. 20.9% of participants were answered that the effective duration is more than two months. There were 73.8% of the participants who followed different types of diet for different reasons, it may be due to overweight, obesity or treatment for a specific disease. Moreover, 26.2% of the participants who had not tired any diet in their lives, may did not need weight loss or fear of sudden weight loss and return to the same weight of the previous. Fasting can cause a reduction in blood glucose, causing some symptoms such as dizziness and vertigo. It is also not suitable for those who take medications for heart disease or high blood pressure [21]. There are other side effects of this diet, including feeling cold and hunger, irritability, low energy, and can cause eating disorders. It is also dangerous for women of child-bearing age because of their need to consume enough amounts of nutrients. The intermittent fasting diet it is not recommended for pregnant and nursing women due to their needs for energy and nutrients for the fetus and breast milk [22].

3.5. Information about diet types

The results related to four types of food diets (intermittent fasting diet, ketogenic diet, vegetarian diet, and Atkins diet). About 47.3% followed the intermittent fasting diet, the intermittent fasting diet is widely spread for easy use, as it is a derivative of traditional fasting [23]. 27% followed the ketogenic diet, and it is coming

second in terms of people following it, because it is a high amount of fat, moderate protein, and low carbohydrate. Therefore, it is very strict in weight loss and energy [24]. 15.2% their diet was vegetarian diet, while remaining 10.5% followed the Atkins diet. There are differences among all participants about the duration of the diet. Approximately 40.1% followed the diet from two to four weeks, and 25.3% from one to two months, while 34.6% exercised the diet for more than two months. When the person follows any type of diet, should receive a result or benefit during or after dieting. As results, the next question asked was whether they had received the benefit or not. The results showed three-quarters of the sample by 89.9% received the benefit after their diet, while the remaining of the sample by 10.1% did not receive the benefit or a clear result. After that, their answers were collected about the weight lost during their diet. The results presented about 42.6% lost more than 6 kg, it is the largest proportion due to most of them followed the diet correctly, and for a good period of more than two months (8 weeks). 16.9% lost from 4 to 6 kg, and 30.8% lost between 2 to 4 kg, while a simple group by 9.7% the diet did not affect on their weight. This section concludes with a question related to the following section, about whether their diet is intermittent fasting diet or not. If the participant's answer is yes, then they will move to the next section, in the case of the answer (no), the questionnaire is sent from the participant. Around 61.6% responded with yes, while the other participants approximately 38.4% they answered no.

3.6. Details of the intermittent fasting diet

The first question in this section was about the weight they lost in the first week of dieting, and there were different answers from about 146 participants. Of all the participants, the highest number of people, those who lost 1-2 kg in the first week (87 participants). Given to the researcher Curt Pedersen, fasting from 16 to 20 hours, it can help lose weight by 2-3 pounds (0.91-1.36 kg) of fat every week [25]. Then 25 participants lost 3-4 kg, 14 participants 5-6 kg, 13 participants lost less than 1 kg and 4 participants higher than 6 kg. While three participants did not write the weight lost during the first week. The total was 148.05 and the average was 3.15 kg. The period during which the diet is used is very important so there is a clear result, the next question was how long they used the diet. The results also showed the participants differed in the period during which they practiced the intermittent fasting diet, with 39.7% using the diet two to four weeks. While 27.4% from one to two months, and 32.9% used the diet for more than two months. Recent studies showed that 6% (5 kg) of weight loss was achieved by an obese group (BMI = 30 - 39.9 kg/m) within 8-12 weeks after the following the intermittent fasting diet [26,27,28]. The presence of individual differences among people explains the presence of different side effects from one person to another during dieting. The results showed a large proportion of the participants did not have any side effects of approximately 58.9%, while, 22.6% had dizziness as a side effect, 15.8% had headaches, 6.8% had vertigo, and 3.4% had eating disorders. The other participants by 4.2% choose other side effects, such as hair loss, hypoglycemia, menstrual disorders, and skin allergies. The author in [29] has made clear that there are some side effects which could occur during following the intermittent fasting diet, such as feeling cold and hungry, irritability, low energy, and can cause eating disorders.

3.7. Anthropometric measurement

The previous weights of the participants that were before the intermittent fasting diet, which was between 54

and 190 kg, and the average for all weights of participants was 85.14 kg. Furthermore, record their current weights which they obtained after following the intermittent fasting diet was between 49 to 180 kg and the average 74.02 kg. The difference between the previous weights and the current weights which were 11.12 kg. Participants were also asked to register their heights, until BMI was calculated and view the difference before and after following the intermittent fasting diet. The results clarified the heights ranged from 149 cm to 190 cm, and the average heights of all participants were 161.73 cm. BMI was calculated, defined as the weight in kilogram on the height in meters squared. The average of BMI1 was (32.6 kg/m²) and the average of BMI2 was (28.2 kg/m²). Therefore, the difference and the positive effect of the intermittent fasting diet on weight reduction were observed. Table (1) shows the mean of all anthropometric measurements.

Table 1: Mean, Standard deviation (SD) for all anthropometric measurements for participants

Anthropometric measurement	Mean ± SD
Previous weights (kg)	85.14 ± 6.2
Current weights (kg)	11.12 ± 3.1
Heights (cm)	161.73 ± 11.9
BMI1 (kg/m ²)	32.6 ± 1.2
BMI2 (kg/m ²)	28.2 ± 5.2

3.8. Assessment of dietary intake

Participants were asked about their consumption of dietary intake on the open day during following the intermittent fasting diet. 88 out of 146 participants followed a specific diet. The mean was calculated for both macronutrients and micronutrients. The participants ate a moderate amount of carbohydrates, protein, fat. The levels of other nutrients such as calcium, vitamin D and fiber was inadequate, this decrease leads to the risk of osteoporosis, which maybe was a risk factor for obesity. The mean dietary of potassium, sodium and cholesterol intakes were high. Table (2) represents the mean of macronutrients and micronutrients for 88 participants. It was found that cholesterol, sodium, and potassium were the most commonly consumed nutrients in their dietary intake. Fiber and vitamin D were the two most nutrients that have not been properly consumed. Respondents' meals were analyzed by the Spark People program, to determine if the participants consumed healthy or unhealthy foods through the day, also to calculate the mean of the macronutrients (carbohydrate, protein, fats, cholesterol and fiber) and micronutrients (vitamins A, D, C, sodium, potassium, calcium and iron) and many other elements. Also, to know the levels of each element if that was high or low. 58 of the participants did not mention their consumption of food but that sample was depended on the calculation of daily calories. There are a number of limitations to be considered in the present study. An important one is the relatively small number of participants examined because of the study protocol's time constraints. Therefore, this is not a representative sample of the whole population and cannot be used to generalize the population. Second, a self-administered online questionnaire was used for data collection. Consequently, the responders have measured themselves as well as the time of day at which measurements were taken may have also affected results as it may have differed from the time participants typically record their own weight. Finally, the sample was predominantly composed of woman volunteers that have limited racial diversity.

Table 2: Mean, Standard deviation (SD) for daily intake of macronutrients and micronutrients for participants

Nutrient	Mean \pm SD
Carbohydrate (g/d)	56.43 \pm 13.3
Protein (g/d)	36.13 \pm 6.9
Fats (g/d)	22.59 \pm 5.01
Cholesterol (mg/d)	160.49 \pm 22.8
Fiber (g/d)	6.63 \pm 2.9
Vitamin A (μ g/d)	30.82 \pm 11.5
Vitamin D (mg/d)	3.28 \pm 1.4
Vitamin C (mg/d)	35.45 \pm 9.2
Sodium (g/d)	635.66 \pm 101.2
Potassium (g/d)	684.05 \pm 97.3
Calcium (mg/d)	18.25 \pm 2.1
Iron (mg/d)	24.69 \pm 7.9

4. Conclusion

In conclusion, many previous studies suggested that the intermittent fasting diet could be more effective in weight loss and has other beneficial effects such as glucose regulation and neuronal resistance. In the current study, just focused on the effectiveness of intermittent fasting diet on weight loss. The findings showed intermittent fasting diet was prevalent among Arabs because of their habituation towards it. It was found to be useful and effective in weight loss in people of normal weight and people with obesity.

5. Recommendations

There is a need for food education intervention for those who follow the diet, should not only follow the diet but be attentive to the basic elements that the body needs. Promote physical activity to reduce the incidence of inactivity, that is a concern and a negative impact on human health, such as what the Ministry of Health did in this year (2019) to challenge people and encourage them to walk for half an hour for 5 days. People that lose more than 1 kilogram a week is not good for their health. It is best to lose 10% of body weight within a month. When implementing any diet, a person should take instructions from reliable sources. Read more about the types of intermittent fasting diet and the difference between them in weight loss to know the appropriate type for each person.

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