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The Use of Diet Practices, Herbs, and Supplementations for Weight Loss among Adults in Jordan: A Cross-Sectional Survey

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Abstract

Background: Obesity is a global health pandemic; several studies have indicated that people commonly seek claim diets and herbal supplementations

Aim: The study aimed to assess the prevalence of herbs and supplementation use and other weight-loss strategies among adults in Jordan.

Methods: A cross-sectional study was conducted on a sample of 689 adults (≥18 years) using a structured validated online questionnaire. Data about sociodemographic, anthropometric data, weight-loss strategies, diets, and herbs used were collected. A frequency descriptive statistic test was used to describe the sample. A *p*-value of < 0.05 was considered statistically significant.

Results: 28.9% of the participants reported the most common source of diets they followed to either by themselves or dietitians (26.0%). Also, 23.4% reported that they followed more than one diet. Almost three-quarters of participants (74.7%) reported that they think that weight-loss diets are unsafe to be decided by a dietitian. The majority of participants (83.5%) reported that they do not believe in the role of using herbs, and supplementations alone to reduce weight. The most commonly used single herb was green tea (43.1%). 38.2% of total participants think that using herbal supplements for weight reduction is safe. Slightly less than one-third of the participants suffered from side effects after using herbs.

Conclusions: The obese and overweight adults in Jordan seek different weight-reducing strategies, including the of use diet practices, herbs, and supplementations. More national studies with different designs are required. Also, strategies may be needed to increase national population awareness about different weight loss practices (cons and pros).

Keywords: herbs; supplementations; overweight; obesity; Jordan; fad diets; weight loss practices

1. Introduction

The prevalence of obesity has doubled in the last 40 years in more than 70 countries worldwide (GBD 2015 Obesity Collaborators *et al*., 2017). Moreover, almost 50% of the world's adult population is predicted to be overweight or obese by 2030 (Dobbs *et al*., 2014). Regarding morbidity and mortality, obesity is a global public health problem, attributed to 5.0% of deaths worldwide in 2014 (Tremmel *et al*., 2017). Additionally, it is associated with an elevated risk of several non-communicable diseases, such as diabetes mellitus (DM), dyslipidemia, cardiovascular disease (CVD), and cancer (Hruby and Hu, 2014).

This reflects the situation in Jordan; the rate of obesity is high and increasing. Hence, a national household survey study included 4056 adults (18–90 years) in Jordan. It was conducted in 2017 to determine the prevalence of obesity and associated factors and comorbidities. They found that the age-standardized prevalence of obesity was 60.4% among men and 75.6% among women, while approximately three-quarters of men and women were overweight or obese, as defined by BMI (Ajlouni *et al*., 2020).

Although the literature has approved those long-life modifications in diet and lifestyle as the best strategies to maintain a healthy weight in the long term, a good percentage of people are undertaking fad diets associated with alternative solutions with the hope of losing weight fast and easily (Kuchkuntla *et al*., 2018). There is a wide range of proposed fad diets over the last centuries. They can be categorized into several main groups, including low-/no-carbohydrate (a high intake of protein and/or fat is recommended such as the Atkins diet, the Dukan Diet, and the South Beach diet), high-carbohydrate/high-fiber (like the Ornish diet) and liquid formula diets or very low calories (Khawandanah and Tewfik, 2016). Although fad diets are simple to lose weight, many studies have indicated that such diets are unsustainable in the long term

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** **Abbreviations:** DM: Diabetes Mellitus; CVD: cardiovascular disease; BMI: body mass index; COVID-19: corona virus-19; EMR: Eastern Mediterranean region, CDC: center of disease control; JFDA: Jordan food and drug administration; SD: standard deviation

and can cause several adverse health side effects (Khawandanah and Tewfik, 2016)

Herbs are considered one of the most common alternative therapies for weight loss worldwide (Barnes *et al*., 2004). Many studies have investigated the efficacy and safety of medicinal plants in treating obesity, dyslipidemia, and diabetes mellitus (Hasani-Ranjbar *et al*., 2009; Hasani-Ranjbar *et al*., 2010; Lenon *et al*., 2012). Additionally, many plant and plant products have been shown to possess anti-obesity effects, including *Curcuma longa* (curcumin), *Zingiber officinale* (ginger), *Nigella sativa* (black seed), *Camellia sinensis* (black Chinese tea, green tea*)*, *Bidens odorata*, soybean, apple cider vinegar, castor oil, and flaxseeds (Hasani-Ranjbar *et al*., 2013; Eldalo *et al*., 2017; Alonso-Castro *et al*., 2019). In Jordan, herbs, and supplements are freely available in both pharmacies (registered approved products by JFDA) and herbal remedy traditional shops (unregistered products), using very high expectations propaganda regarding fast and safe weight loss. To date, there is not enough data to examine the practices of weight loss in the MENA region and Jordan in particular regarding the use of herbal supplementations, plant-based products, or fad diets; hence, the objective of the study was to assess the prevalence of weight-loss strategies and herbs and supplementation use among adults in Jordan.

2. Material and Methods

2.1. Design, Sampling, and Procedures

A cross-sectional survey was conducted from February to April 2021 in Jordan by the Herbal Dynasty Medical Center team, in Amman, Jordan. An online self-report questionnaire was carried out in a random sample among adults ≥ 18 years.

The study data collection was performed using a structured validated online questionnaire established using Google Forms and disseminated through internet routes (WhatsApp, Facebook, and Messenger). It was developed after an extensive review of related studies. The questionnaire included the study's purpose description and agreement to participate; self-reported sociodemographic and anthropometric data, including weight (kg) and height (cm); weight-loss strategies and herbs and supplementation use data. Informed consent for each participant was obtained on the first page of the survey, and the privacy and confidentiality of the respondents were strictly protected. Inclusion criteria included being of age ≥18, being a nonpregnant and nonlactating woman, and having the ability to read and write Arabic. The appropriate sample size for this study was calculated using Raosoft software (Raosoft, Inc. free online software, Seattle, WA, USA). In 2020, Jordan's total population is approximately 10 million, and about 7.09 million (64% of the total population) are adults, based on the Department of Statistics (Department of Statistics, 2020). A recent study estimated that approximately 75% (about 5.32 million) of the Jordanian population is either overweight or obese (Ajlouni *et al*., 2020). With a confidence interval of 5%, a confidence level of 95%, and a response distribution of 50%, a sample size of 385 was necessary. In our study, a larger same size was used in case patients refused to enroll in the study or did not match the inclusion criteria (pregnant and lactating women, who cannot write and read Arabic, and are less than 18 years old). Therefore, 689 participants completed the online questionnaire; among them, 477 were overweight and obese subjects.

The Department of Clinical Nutrition and Dietetics, Faculty of Science at Philadelphia University, Jordan, approved the study protocol. The World Medical Association Declaration of Helsinki regarding the ethical conduct of research involving human subjects was followed.

2.2. Reliability and Validity of the Questionnaire

The questionnaire was pre-tested for validity and reliability on a pilot sample of 30 participants, which was not included and excluded from the final sample. Cronbach's alpha (α) was used and calculated for the validity and reliability of the questionnaire (Noble and Smith, 2015). The results showed that the questionnaire had a Cronbach's α value equal to 0.715, indicating good reliability.

2.3. Self-reported Measurements

Participants reported their weight and height; their BMI was calculated and categorized as follows: underweight (<18.5 kg/m^2), normal weight (18.5 to 24.9 kg/m^2), overweight (25 to 29.9 kg/m^2), and obese (over 30 kg/m^2) (Center of Disease Control (CDC), 2020); the excess weight group included overweight and obese participants. Additionally, self-reported sociodemographic data, including sex, age, educational level, and marital status, were reported. In addition, they were asked about weight loss strategies that were followed, the name of herbs they were using for weight loss, form, usage duration, beliefs about efficiency, and by whom it was described (families or friends, media, or health care providers) and obtaining method in the past three to five years from data collection.

2.4. Statistical Analysis

Analyses were carried out using SPSS software (IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp). Frequencies, means, and standard deviation ranges were calculated using frequency descriptive statistical tests to describe the sample. The chi-square test was used to assess differences in proportions. The *p-value* of < 0.05 was considered statistically significant.

3. Results

3.1. Participant General Characteristics

A total of 689 participants responded to this questionnaire. More than four-fifths of the participants (82.7%) were female. Mean± SD of participants' BMI was 28.0±6.3 kg/m^2. Slightly more than three-quarters of the participants were 18–40 years old (77.4%). Seventy-one percent of the participants were living in middle Jordan (71%), and the majority reported having excess weight (69.1%) (Table 1).

Table 1. Demographic characteristics of participants (n=689).

Characteristic	Values[1]
BMI (kg/m^2), mean ± SD	28.0 ± 6.3
Sex	
Females	570 (82.7)
Males	119 (17.3)
Age (years)	
18-40	533 (77.4)
41-65	155 (22.5)
65 <	1 (0.1)
Living areas	
North Jordan	96 (14)
Central Jordan	489 (71)
South Jordan	104 (15)
Marital status	
Married	247 (35.8)
Single	395 (57.3)
Other[2]	47 (6.9)
Educational level	
Secondary education	105 (15.2)
College or university	493 (71.6)
Postgraduate education	91 (13.2)
Weight Categories	
Normal weight	213 (30.9)
Excess weight[3]	476 (69.1)

BMI, Body mass index
[1] Values are n (%) unless otherwise noted.
[2] others, including the divorced, widowed, engaged, and complicated relationship
[3] excess weights, a group including overweight and obese participants

3.2. Participants' Self-Image and Weight Reduction AttitBelieveieves

Table 2 shows that almost two-thirds (69.3%) of respondents reported that they think their weight is not healthy. The percentage of participants with normal weight who reported that they thought their weight was healthy was significantly higher than those with excess weight (53.3% and 5.2%, respectively; p value<0.001). Of all the participants, 16.7% reported that they believe that they had excess weight for less than a year. In comparison, 20.3% of excess weight participants reported that they were diagnosed less than a year, significantly (p value<0.001) more than the participants with a normal weight (8.5%). Moreover, (28.9%) of the participants reported the most common source of diets they followed was by themselves or by dietitians (26.0%). Normal weight participants reported that the most common source of diet they followed was themselves (27.4%), followed by dietitians (17.0%), which had a significantly lower reported percentage than participants with excess weight (29.6% vs. 30.0%, respectively; p value<0.001). Regarding the type of diets followed, 19.4% of participants did not follow any weight-reducing diet, 23.8% of total participants reported that they followed a low-calorie diet, 15.4% followed an intermittent fasting diet, and 23.4% followed more than one diet. The percentages of excess weight participants who reported following a low-calorie diet, an intermittent fasting diet, and more than one diet were higher than those of participants with normal weight, with values of 24.9% vs. 21.2%, 15.5% vs. 15.1%, and 26.0% vs. 17.5%, respectively. Almost three-quarters of participants (74.7%) reported that they thought that weight-loss diets were not safe and needed to be decided by professionals.

Table 2. Participant's self-image and weight reduction attitude beliefs.

Total (n=689)		Weight categories		*p*-value
		Normal (n=212)	Excess (n=477)	
Self-image and weight beliefs:				
Do you believe your weight is healthy?				
Yes	138 (20.0)	113 (53.3)	25 (5.2)	
No	477 (69.3)	59 (27.8)	418 (87.6)	<0.001
Maybe	74 (10.7)	40 (18.9)	34 (7.2)	
If you believe you have excess weight, for how long do you think you suffer from it?				
Less than a year	115 (16.7)	18 (8.5)	97 (20.3)	
For five years	60 (8.7)	3 (1.4)	57 (11.9)	
5-10 years	59 (8.6)	3 (1.4)	56 (11.7)	<0.001
11-15 years	12 (1.7)	1 (0.5)	11 (2.3)	
Over 15 years	24 (3.5)	0 (0.0)	24 (5.0)	
I don't think I am obese	419 (60.8)	187 (88.2)	232(48.6)	
Participants' Attitude and knowledge toward diet for weight loss:				
If you have followed a weight loss diet, who has prescribed it to you?				
I did not follow a diet	108 (15.7)	62 (29.2)	46 (9.6)	
Physician	11 (1.6)	3 (1.4)	8 (1.7)	
Dietitian	179 (26.0)	36 (17.0)	143 (30.0)	
Friend or family member	53 (7.7)	20 (9.4)	33 (6.9)	<0.001
Internet	130 (18.9)	28 (13.2)	102 (21.4)	
By myself	199 (28.9)	58 (27.4)	141 (29.6)	
All sources mentioned	8 (1.2)	0 (0.0)	1 (0.2)	
Others	1 (0.1)	5 (2.4)	3 (0.6)	
If you have followed a diet, what was it?				
I did not follow any kind of diet	134 (19.4)	66 (31.1)	68 (14.3)	
Low calories diet	164 (23.8)	45 (21.2)	119 (24.9)	
Low carbohydrates diet	54 (7.8)	7 (3.3)	47 (9.9)	
ketogenic diet	8 (1.2)	2 (0.9)	6 (1.3)	
High protein diet	19 (2.8)	7 (3.3)	12 (2.5)	<0.001
Intermittent fasting diet	106 (15.4)	32 (15.1)	74 (15.5)	
Blood type diet	2 (0.3)	1 (0.5)	1 (0.2)	
Mediterranean diet	5 (0.7)	3 (1.4)	2 (0.4)	
Others	36 (5.2)	12 (5.7)	24 (5.0)	
I followed more than one diet	161 (23.4)	37 (17.5)	124 (26.0)	
Do you think following a weight loss diet by yourself is safe, and there is no need to be prescribed by a professional?				
Yes	158 (22.9)	41 (19.3)	117 (24.5)	
No	515 (74.7)	167 (78.8)	348 (73.0)	0.267
Sometimes	16 (2.4)	4 (1.9)	12 (2.5)	

3.3. Participants' Beliefs, Knowledge, and Consumption of Herbs and Supplementations for Weight Reduction

Table 3 shows that the majority of participants (83.5%) reported that they did not believe in the role of using herbs and supplementations alone to reduce weight, while 77.9% of participants reported that they believed in the role of using herbs and supplementations along with diet and exercises for weight reduction. A total of 32.2% of participants reported that they did not use herbs for weight reduction. In an attempt to lose weight, the practice of taking 2–3 and 4–6 different herbs together was used by 23.9% and 18.7% of the participants, respectively. The most commonly used single herb was green tea (*Camellia sinensis*) (7.7%). The excess weight participants significantly had a higher percentage of using 2–3 (27.5%) and 4–6 (23.1%) different herbs together compared to normal weight participants (16.0% and 9.0%, respectively). The most common herbal advisors for the participants who used herbs for weight reduction were the internet (22.1%), themself (21.3%), and dietitians (10.9%). Only 1.7% and 0.7% of participants reported that their herbal advisors were herbalists and physicians, respectively. For normal weight participants, the most common herbal advisor was by themselves (16.0%), followed by the internet (11.3%), while for excess weight participants, it was the internet (26.8%), followed by themselves (23.7%), and dietitians (12.6%). A total of 58.6% of participants (33.5% of normal-weight participants and 69.8% of excess-weight participants) reported that they prepared herbs by mixing them with boiling water. More than half of the total participants (58.1%; 30.7% of normal-weight participants, and 70.2% of excess-weight participants) reported that they used herbs daily (one, two, or three times a day).

Table 3. Participants' beliefs and attitudes toward herbs and supplementation use for weight reduction.

Total (n=689)		Weight categories		*p*-value
		Normal (n=212)	Excess (n=477)	
Do you believe in the role of herbs alone in losing weight?				
Yes	36 (5.2)	15 (7.1)	21 (4.4)	
No	575 (83.5)	174 (82.1)	401 (84.1)	0.344
I don't Know	78 (11.3)	23 (10.8)	55 (11.5)	
Do you believe in the role of herbs in losing weight, along with diet and exercise?				
Yes	537 (77.9)	159 (75.0)	378 (79.2)	
No	77 (11.2)	25 (11.8)	52 (10.9)	0.375
I don't Know	75 (10.9)	28 (13.2)	47 (9.9)	
Have you used any of the following herbs or foods to lose weight?				
I did not use herbs	222 (32.2)	126 (59.4)	96 (20.1)	
Apple vinegar	9 (1.3)	0 (0.0)	9 (1.9)	
Senna Makki	5 (0.7)	2 (0.9)	3 (0.6)	
Green tea	53 (7.7)	15 (7.1)	38 (8.0)	
Flaxseed	8 (1.2)	1 (0.5)	7 (1.5)	
Bran	3 (0.4)	1 (0.5)	2 (0.4)	
Curcumin	2 (0.3)	0 (0.0)	2 (0.4)	
Cumin	3 (0.4)	0 (0.0)	3 (0.6)	
Green coffee	5 (0.7)	2 (0.9)	3 (0.6)	<0.001
Lemon	7 (1.0)	0 (0.0)	7 (.5)	
Honey	12 (1.7)	4 (1.9)	8 (1.7)	
Chia seed	1 (0.1)	0 (0.0)	1 (0.2)	
Ginger	11 (1.6)	4 (1.9)	7 (1.5)	
Matcha tea	5 (0.7)	3 (1.4)	2 (0.4)	
Others	10 (1.5)	1 (0.5)	9 (1.9)	
Used 2-3 herbs	165 (23.9)	34 (16.0)	131 (27.5)	
Used 4-6 herbs	129 (18.7)	19 (9.0)	110 (23.1)	
Used more than 6 herbs	39 (5.7)	0 (0.0)	39 (8.2)	
Who prescribed herbs to you?				
I did not use herbs	224 (32.5)	124 (58.5)	100 (21.0)	
Physician	5 (0.7)	1 (0.5)	4 (0.8)	
Dietitian	75 (10.9)	15 (7.1)	60 (12.6)	
herbalist	12 (1.8)	0 (0.0)	12 (2.5)	<0.001
Friends or family member	73 (10.6)	14 (6.6)	59 (12.4)	
Internet	152 (22.1)	24 (11.3)	128 (26.8)	
By myself	147 (21.3)	34 (16.0)	113 (23.7)	
All of them	1 (0.1)	0 (0.0)	1 (0.2)	
How many times per day did you take herbs for weight loss?				
I did not use herbs	221 (32.1)	124 (58.5)	97 (20.3)	
daily-Once	207 (30.0)	41 (19.3)	166 (34.8)	
Twice daily	145 (21.0)	19 (9.0)	126 (26.4)	
3 times daily	48 (7.0)	5 (2.4)	43 (9.0)	<0.001
Once a week	17 (2.5)	4 (1.9)	13 (2.7)	
Twice a week	14 (2.0)	5 (2.4)	9 (1.9)	
3 times per week	26 (3.8)	6 (2.8)	20 (4.2)	
Other	11 (1.6)	8 (3.8)	3 (0.6)	
In which form do you take the herbs?				
I did not use herbs	222 (32.2)	123 (58.0)	99 (20.8)	
Powder	33 (4.8)	10 (4.7)	23 (4.8)	
Capsules	17 (2.5)	7 (3.3)	10 (2.1)	<0.001
Boiled as a tea	404 (58.6)	71 (33.5)	333 (69.8)	
Other forms	13 (1.9)	1 (0.5)	12 (2.5)	

Table 4 shows the most commonly used type of herbs and supplementations alone or combined with other herbs reported by the participants. The reported use of green tea (*Camellia sinensis*), lemon (*Citrus*), ginger (*Zingiber officinale*), apple vinegar and cumin (*Cuminum cyminum*) by excess weight participants was significantly higher than normal-weight participants (50.9% vs. 25.5%; 41.3% vs. 14.6%; 37.7% vs. 13.7%; 25.2% vs. 3.8%, and 26.2% vs. 5.7%, respectively) with *p* value<0.001.

Table 4. The percentage of commonly used herbs for weight reduction.

Herbs	All participants (n=689)	Normal weight (n=212)	Excess weight (n=477)	*p*-value
Green tea	297 (43.1)	54 (25.5)	243 (50.9)	<0.001
Lemon	228 (33.1)	31 (14.6)	197 (41.3)	<0.001
Ginger	209 (30.3)	29 (13.7)	180 (37.7)	<0.001
Apple vinegar	128 (18.6)	8 (3.8)	120 (25.2)	<0.001
Cumin	137 (19.9)	12 (5.7)	125 (26.2)	<0.001

Note: data presenting herbs alone or combined with others

3.4. Participants Believe and Knowledge Toward Herbs and Supplementations Use Safety for Weight Reduction

As shown in Table 5, slightly more than one-third (38.2%) of all participants thought that using herbs and supplementations for weight reduction was safe. Among normal-weight participants, 34.1% do not know if herbs and supplementations for weight reduction are safe, while 33.2% of them think it is not safe, only 32.7% of normal-weight participants think using the herb for weight reduction is safe. In contrast, 40.7% of excess weight participants thought that using herbs and supplementations for weight loss was safe, 25.8% did not think that, and 33.5% did not know if it was safe. Of participants who reported using herbs and supplementations for weight loss, 6.1% reported feeling a change in their weight in the beginning and then the effect stopped, 19.4% reported that they did not feel any change in their weight, and only 14.7% reported feeling a change in their weight. Based on weight, the participant with the normal weight used herbs for weight loss and reported a weight change (9.4%) or feeling a change, in the beginning, then the effect stopped (2.8%). Slightly less than one-third (27.3%) of the total participants suffered from the side effects of herbal medicine, (62.8%) of them reported one symptom, (21.8%) reported two symptoms, and (9.6%) and (5.9%) reported three and four symptoms, respectively. The most commonly reported side effects were diarrhea (42.1%), and headache (33.7%). From the studied group, (34.7%) of participants reported that they would use herbal medications again composed of (24.5%) of normal weight and (39.2%) of excess weight. On the other hand, (20.5%) of all participants would not use herbal medications again for weight loss, composed of (25.0%) of normal weight and (18.4%) of excess weight, *p value*= 0.001). Almost half of the participants (46.0%) reported that they would recommend herbs and supplements to their friends/relatives to lose weight.

Table 5. Participants' beliefs and knowledge about the safety of herbs and supplementations use for weight loss.

	Total (n=689)	Weight categories		*p*-value
		Normal (n=212)	Excess (n=477)	
Do you think that using herbs to lose weight is safe?				
Yes	263 (38.2)	69 (32.7)	194 (40.7)	
No	193 (28.1)	70 (33.2)	123 (25.8)	0.071
I don't Know	232 (33.7)	72 (34.1)	160 (33.5)	
Did you feel that your weight changed after using the herbs?				
Did not use herbs	215 (31.2)	119 (56.1)	96 (20.1)	
Yes	101(14.7)	20 (9.4)	81 (17.0)	
No	134 (19.4)	28 (13.2)	106 (22.2)	<0.001
I don't Know	197 (28.6)	39 (18.4)	158 (33.1)	
In the beginning and then the effect stopped	42 (6.1)	6 (2.8)	36 (7.5)	
Have you experienced unpleasant symptoms or side effects during using herbs for weight loss?				
Did not use herbs	216 (31.3)	121 (57.1)	95 (19.9)	
Yes	188 (27.3)	30 (14.2)	158 (33.1)	<0.001
No	285 (41.4)	61 (28.8)	224 (47.0)	
If you experience any side effects, how many did you have it?				
Had one symptom	118 (62.8)	18 (60)	100 (63.3)	
Had two symptoms	41 (21.8)	9 (30)	32 (20.3)	0.451
Had three symptoms	18 (9.6)	1 (3.3)	17 (10.8)	
Had four symptoms	11 (5.9)	2 (6.7)	9 (5.7)	

Headache				
Yes	64 (33.7)	8 (25.0)	56 (35.4)	0.254
No	126 (66.3)	24 (75.0)	102 (64.6)	
Diarrhea				
Yes	80 (42.1)	13 (40.6)	67 (42.4)	0.852
No	110 (57.9)	19 (59.4)	91 (57.6)	
Interrupted period				
Yes	27 (14.2)	3 (9.4)	24 (15.2)	0.390
No	163 (85.8)	29 (90.6)	134 (84.8)	
Other symptoms				
Yes	11 (5.7)	2 (5.9)	9 (5.7)	0.960
No	182 (94.3)	32 (94.1)	150 (94.3)	
Are you going or intend to use the herbs again to lose weight?				
Yes	239 (34.7)	52 (24.5)	187 (39.2)	0.001
No	141 (20.5)	53 (25.0)	88 (18.4)	
I don't Know	309 (44.8)	107 (50.5)	202 (42.3)	
Will you recommend herbs and supplementations to your friends /relatives to lose weight				
Yes	317 (46.0)	92 (43.4)	225 (47.2)	0.359
No	372 (54.0)	120 (56.6)	252 (52.8)	

4. Discussion

In the Eastern Mediterranean Region (EMR), high alarming prevalence rates of obesity have been recorded in many countries due to changes in food consumption and increases in sedentary lifestyles (Rahim *et al*., 2014). Based on GBD 2015 Eastern Mediterranean Region Obesity Collaborators, the prevalence of obesity in adults increased from 15.1% in 1980 to 20.7% in 2015 (GBD 2015 Eastern Mediterranean Region Obesity Collaborators, 2018). According to our study population, 69.1% were either overweight or obese as defined by BMI; this matches the result of a recent study indicating that over three-quarters of Jordanian men or women were either overweight or obese (Ajlouni *et al*., 2020).

Weight stigma and social pressure encourage people to lose weight, which pushes people, especially obese people, to use medications, including drugs and/or herbs, to lose weight (Tomiyama *et al*., 2018). Interestingly, over 80% of the participants followed one weight loss diet or more (23.4%). Also, 55.7% of the sample followed a weight loss diet from a friend or family member, internet searching, or on their own, although 74% think that it is not safe to follow a weight loss diet without professional guidance. Physicians and herbalists have a low role in herbal prescription. This was consistent with previous studies. For example, Issa reported that the majority of Jordanian university students (70.2%) depend on homemade herbs whereas the remnant students discuss with pharmacists before using them (Issa, 2018). Moreover, excess weight Saudi participants in Taif have relied on friends (35.8%) and herbalists (31.0%) (Eldalo *et al*. 2017). Also, Mexican overweight and obese adults have rested on family/friends, and personal prescriptions (67%, and 33% respectively) (Alonso-Castro *et al.*, 2019). Obesity self-treatment was also stated in Colombia (Amariles *et al*., 2006), India (Sushama and Nandita 2012), and Brazil (Martin *et al.* 2006).

In the present findings, the excess weight participants seek to follow a low-calorie diet, intermittent fasting, and more than weight-reducing diet practice. Despite the scientific facts about fad/claim diets for weight reduction, recent data have shown that excess weight subjects seek different diets such as low carbohydrate, ketogenic, high protein, intermittent fasting, single food item, skipping food group/s, and blood grouping (Khawandanah and Tewfik, 2016; Al-Bakheit, 2019). In Jordan, Al-Bakheit (2019) found that the three most common fad diets used by excess weight subjects were the high-protein diet (31.3%), fruits and vegetable diets (21.9%), and liquid diets (18.3%) (Al-Bakheit, 2019). Accordingly, Al-Kurd and Faris (2011) found that 22% of Jordanians tend to follow weight loss fad diets (Al-Kurd and Faris, 2011).

In a national cross-sectional self-report survey, to assess the prevalence, utilization, and attitude toward herbal medicines among Jordanian adults, Abdel-Qader and colleagues (2020) found that 23.6% of study participants were using herbs for weight reduction and obesity. In our study, 67.8% of the participants used one or more herbs and supplements to lose weight. This inconsistency between the results of studies could be related to the data collection period conditions; as the data of this study were collected during the COVID-19 curfew in Jordan, there was a partial ban and prohibition of movement in the evening hours, as well as a general closure of all parks and gyms. Action plans for COVID-19 quarantine have been linked closely with obesogenic practices, especially increasing food consumption, lower physical activity, and eating patterns shifted to unhealthy eating habits (Al Hourani *et al*., 2021). This has increased the tendency of people to search for quick solutions to lose weight or maintain weight.

Internationally, several studies have investigated the prevalent use of herbal supplementation and reported that the prevalence of using herbal supplementation was 98.1% in a study in Saudi Arabia (Eldalo *et al*., 2017), 24.1% in Turkey (Bellikci Koyu *et al*., 2020), 32.3% in Iran (Eldalo *et al*., 2017), and 36% in the United States (Bertisch *et al*., 2008). A population-based study conducted in the United States showed that herbal supplementation for weight loss purposes is more prevalent among people with excess

weight (Blanck *et al*., 2007). Likewise, in the current study, almost 80% of excess weight participants used herbal supplementation compared to 40.6% of normal-weight participants.

Taking a mixture of herbal supplementation of two to more 6 products was more frequent among the study participants. Other studies have reported the same (Blanck *et al*., 2007; Bellikci Koyu *et al*., 2020). As a part of the herbal mixture, green tea was the most commonly used herbal plant for weight loss among the study population, with slightly more than 43% of all participants and 50% overweight and obese, followed by lemon and ginger. This is similar to another study from Saudi Arabia, which reported that the use of green tea was the most frequent, with 88.4% (Eldalo *et al*., 2017). Hursel *et al*. (2009) reported in their meta-analysis that green tea has a positive effect on weight loss and weight maintenance; however, the effect was modest. Moreover, Jurgens and colleagues (2012) concluded that the impact of green tea has a small, statistically, and clinically nonsignificant impact on weight loss in overweight or obese adults. However, studies have reported that lemon and lemon juice might have favorable effects on weight loss (Tejpal *et al*., 2018) and hypocholesterolemic effects (Khan *et al*., 2010). Moreover, a systematic review and meta-analysis of randomized controlled trials conducted by Maharlouei and colleagues (2018) demonstrated that ginger intake reduces body weight, waist-to-hip ratio, hip ratio, fasting glucose, and HOMA-IR and increases serum HDL cholesterol levels but does not affect insulin, BMI, triglycerides, or total and LDL cholesterol levels.

In the current study, participants mostly started using herbs based on information from the internet, themselves, friends or family members, and herbalists, but the percentage of taking herbs from health professionals (dietitians and physicians) was very low (11.6%). Similar findings have been reported elsewhere (Samojlik *et al*., 2013; Bellikci Koyu *et al*., 2020). Using herbs might lead to several health risks (Pittler *et al*., 2005). Moreover, in the current study, over (27.3%) of all participants had unpleasant symptoms; however, 46.0% of the sample recommended using herbs for weight loss for friends or relatives. Therefore, it might be vital for health professionals to check and monitor if their patients use herbs and supplements.

Only 2.5% of the sample used herbs in the form of capsules, which indicates that the majority of the sample purchases herbal supplements from herbalists or local markets but not pharmacies. To gain a good quality of the product, the whole process from harvesting to storage should be well monitored. Poor manufacturing and storage practices might result in contamination with metal residues, fungi, pesticides, parasites, or insects (Posadzki *et al*., 2012). In addition, imitation and adulteration related to the safety of herbs (Bellikci Koyu *et al*., 2020) and sibutramine intoxication have been proposed in a few case reports (Bertholee *et al*., 2013; Pamukcu Gunaydin *et al*., 2015). For such reasons, it is critical to control herbs and their selling places in Jordan.

This study has many limitations; there was a lack of anthropometric measurement standardization, as it was self-reported by online questionnaires. Medication intake, herb-medicine interactions, period of commitment or use of diet practices, herbs, or supplements (extended period…or limited…), and participant disease history were not recorded in the survey. Additionally, data collection occurred during the COVID-19 quarantine, when many behaviors and attitudes changed. Finally, accessibility in sampling was the rural adults, and those who do not have access to technology were not included.

5. Conclusion

The obese and overweight adults in Jordan seek different weight-reducing strategies, including the use of diet practices, herbals, and supplements. The current study suggests that the use of herbs and supplementations for weight loss purposes is very frequent in Jordan, especially among those with excess weight. The results also reported that the most herbs used for weight reduction is green tea, and most of the participants think using herbs is safe. It is highly recommended to train health professionals about herbs during clinical practice and their possible side effects and drug interactions. Besides, national community awareness programs are needed to educate people about safe methods of losing and maintaining weight and the possible risks and benefits of using herbal supplementations.

Ethical Approval and Consent to Participate

The study protocol of this study was approved by the Department of Clinical Nutrition and Dietetics, Faculty of Science at Philadelphia University, Jordan. The World Medical Association Declaration of Helsinki regarding the ethical conduct of research involving human subjects was followed**.**

Consent for Publication

not applicable.

Availability of Data and Material

The datasets used and/or analyzed during the current study are available through the corresponding author on reasonable request.

Competing Interest

The authors declare no conflict of interests.

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