

Obesity prevention and treatment: Diet, Exercise, Drug, Surgery

Abstract

Obesity is considered one of the deadliest diseases and the cause of many other diseases in humans. Our goal was to find different solutions used by people to prevent or treat obesity. Therefore, we designed a questionnaire and analyzed the collected data in SPSS software. In the community of 300 people under our investigation, 8.6% of the people did not do any of our selected methods (Diet, Exercise, Drug, Surgery) to prevent or treat obesity. The most chosen method was exercising, which included 78.6% of people. A proper diet can significantly affect weight loss if the necessary standards are considered. In our society we determined the percentage of people who are on a slimming diet according to several factors.

The exercise program should be suitable for the individual's physical conditions and high frequency. About half of the people who exercise with a coach consider laziness as the reason for their lack of success. The main reason for not reaching the desired weight in our population is psychological and motivational issues showing the importance of motivation and suitable mental conditions for sports in our country.

In addition to obese people, the consumption of slimming drugs is also seen among people with normal and low BMI. 53% of these people take medicine without a doctor's prescription, which can cause many complications. Weight loss surgery was declared as the least used method by the participants. But the remarkable issue about this method is the lack of effectiveness conclusions despite the difficulties of this method.

Keywords: BMI; Obesity; Weight loss; Exercise; Diet;

Maryam Mahdavi Afshar¹, Kimiya Shahabi², Saman Salemi², Narges Mahdavi Afshar², Nikan Shafiee², Hoori Eslami Samani², Amir hossein Maleki², Fatemeh Bakhtiyarizadeh², Reyhaneh Abdolzadeh², Parmida Latifi³, Nima Mojri⁴, Farzad Shayeghi^{5*}

¹Young Researcher and Elite Club, Tehran Medical Sciences, Islamic Azad University, Iran.

²Department of Medicine, Islamic Azad University Tehran Medical Sciences, Iran

³Paramedicine Department, Islamic Azad University, Tehran medical sciences branch, Iran

...^{5*} Corresponding Author: Medical Department, Islamic Azad University, Tehran Medical Sciences Branch, Iran. Email: farzadshayeghi@gmail.com

Introduction

The life expectancy index has rapidly grown in recent years [1]. In the same way that in the ten years from 2003 to 2013, European life expectancy increased by 2.3 years for men and 2.5 years for women [2]. Studies have shown that in the last two centuries, the highest life expectancy rate has reached from 36 years to more than 85 years; this increase in life expectancy causes the effect of chronic diseases to intensify compared to acute diseases [3]. Therefore, these chronic diseases at the Age of over 65 years cause a severe decrease in the quality of life of a person [2]. It should be noted that one of the most important causes of these diseases is overweight and obesity. Many studies show the connection between obesity and fatty liver, type 2 diabetes, and cardiovascular problems, including heart attack, etc. [4,5,6]. In addition, there is increasing scientific evidence of the relationship between being overweight and type 1 diabetes [7]. Of course, we know that the complications caused by obesity and physical diseases also include psychological and mental problems such as depression [8,9]. Obesity and related diseases bring high physical and mental costs and impose exorbitant financial costs on both the individual and the government; For example, in the United States, more than seventy billion dollars are spent annually directly and indirectly on overweight people [1]. One of the parameters used to measure obesity in people is the BMI index (mass/height square); this index is defined in four intervals:

underweight ≤ 18.5 , normal $= 24.5 - 18.5$, overweight $= 29.9 - 25$ and obese $> = 30$. This index determines the physical condition of a person and also reveals the progress and prevalence of various diseases in societies [1]. The World Health Organization (WHO) defines obesity as an abnormal or excessive accumulation of fat that causes health risks [12]. Statistics show that since 1980, the number of obese and overweight people has doubled [5]. The increase and epidemic of obesity and its root cause, compared to many other chronic diseases, cause concerns. In this study, we are trying to investigate and analyze people's coping strategies with this problem [13]. Common solutions for obesity include lifestyle changes, drug treatment, and surgery, which we will describe in detail below [6].

METHOD

Our general goal of this research was to discover and examine different solutions that different people in society choose to prevent or treat their obesity. To achieve this goal, we designed a questionnaire whose questions are classified into two main categories. The first category includes questions that collect personal information such as gender, Age, education, income level, weight, height, and job status. This information was considered as parameters and variables of the article. The second category of questions included four methods that we considered to prevent obesity or lose weight. These four

methods included having a diet, exercising, taking slimming drugs, and doing surgery.

This questionnaire was prepared in 300 pieces. Randomly and only considering the age requirement of 20 to 79 years for the respondent, from August 1 to August 10, 2022, it was broadcasted by the group members throughout the city of Tehran. After collecting the questionnaires, the information was entered into SPSS 26 software and analyzed. It should be mentioned that since we set our alpha value at 0.05 if the p-value is less than 0.05, we can say that there is a statistically significant difference between the means of our two trials. In addition, if the p-value is more than 0.05, it shows a significant relationship between the two issues.

RESULT

We examined a community of 300 people. The frequency of people who used each of our 4 methods, which include dieting, exercising, taking slimming drugs, and slimming surgery to prevent or treat obesity, is given in Table 1. According to the information obtained from this table, first of all, it should be said that 8.6% of people have not done any of the methods we want to prevent or treat obesity. Also, most of the people in our study (78.6%) had chosen to exercise, and 11.3% of the people chose surgery as a solution to treat obesity, and they caused this method to occupy the lowest percentage of people among the four mentioned methods. In addition, the frequency of each of our considered variables in these four methods is given in Table 2. In this study, 65.3% of the total population were women, 34.7% were men, and the average BMI of the entire population was 25.73.

	Exercise	Diet	Drugs	Surgery	None	Total
n	236	193	86	34	26	300
%	78.67%	64.33%	28.67%	11.33%	8.67%	100%

Table 1. The frequency of people studied in different obesity prevention and treatment methods

		Exercise		Diet		Drugs		Surgery		None
		Never done	Experienced at least once	Never done	Experienced at least once	Never done	Experienced at least once	Never done	Experienced at least once	
Gender	Woman	45 (15%)	151 (50.33%)	59 (19.67%)	137 (45.67%)	138 (46%)	58 (19.33%)	169 (56.33%)	27 (9%)	15 (5%)
	Man	19 (6.33%)	85 (28.33%)	48 (16%)	56 (18.67%)	76 (25.33%)	28 (9.33%)	97 (32.33%)	7 (2.33%)	11 (3.67%)
	Total	64 (21.33%)	236 (78.67%)	107 (35.67%)	193 (64.33%)	214 (71.33%)	86 (28.67%)	266 (88.67%)	34 (11.33%)	26 (8.67%)
Age	20-29	20 (6.67%)	83 (27.67%)	40 (13.33%)	63 (21%)	80 (26.67%)	23 (7.67%)	94 (31.33%)	9 (3%)	10 (3.33%)
	30-39	14 (4.67%)	40 (13.33%)	16 (5.33%)	38 (12.67%)	31 (10.33%)	23 (7.67%)	45 (15%)	9 (3%)	1 (0.33%)

	40-49	12 (4%)	50 (16.67%)	14 (4.67%)	48 (16%)	44 (14.67%)	18 (6%)	53 (17.67%)	9 (3%)	4 (1.33%)
	50-59	13 (4.33%)	38 (12.67%)	22 (7.33%)	29 (9.67%)	42 (14%)	9 (3%)	49 (16.33%)	2 (0.67%)	8 (2.67%)
	60-69	4 (1.33%)	18 (6%)	9 (3%)	13 (4.33%)	11 (3.67%)	11 (3.66%)	17 (5.67%)	5 (1.67%)	2 (0.67%)
	70-79	1 (0.33%)	7 (2.33%)	6 (2%)	2 (0.67%)	6 (2%)	2 (0.67%)	8 (2.67%)	0 (0%)	1 (0.33%)
	Total	64 (21.33%)	236 (78.67%)	107 (35.67%)	193 (64.33%)	214 (71.33%)	86 (28.67%)	266 (88.67%)	34 (11.33%)	26 (8.67%)
Education	Non-degree	2 (0.67%)	17 (5.67%)	11 (3.67%)	8 (2.67%)	13 (4.33%)	6 (2%)	17 (5.67%)	2 (0.67%)	1 (0.33%)
	Diploma	33 (11%)	87 (29%)	49 (16.33%)	71 (23.67%)	89 (29.67%)	31 (10.33%)	104 (34.67%)	16 (5.33%)	15 (5%)
	Bachelor's degree	17 (5.67%)	89 (29.67%)	33 (11%)	73 (24.33%)	71 (23.67%)	35 (11.67%)	93 (31%)	13 (4.33%)	8 (2.67%)
	Master's degree	8 (2.67%)	26 (8.67%)	9 (3%)	25 (8.33%)	25 (8.33%)	9 (3%)	32 (10.67%)	2 (0.67%)	1 (0.33%)
	Doctoral Degree	4 (1.33%)	17 (5.67%)	5 (1.67%)	16 (5.33%)	16 (5.33%)	5 (1.67%)	20 (6.67%)	1 (0.33%)	1 (0.33%)
	Total	64 (21.33%)	236 (78.67%)	107 (35.67%)	193 (64.33%)	214 (71.33%)	86 (28.67%)	266 (88.67%)	34 (11.33%)	26 (8.66%)
Income	None	28 (9.33%)	63 (21%)	40 (13.33%)	51 (17%)	72 (24%)	19 (6.33%)	81 (27%)	10 (3.33%)	13 (4.33%)
	Under than 4 million Tooman	11 (3.67%)	53 (17.67%)	23 (7.67%)	41 (13.67%)	46 (15.33%)	18 (6%)	54 (18%)	10 (3.33%)	4 (1.33%)
	More than 4 million Tooman	25 (8.33%)	120 (40%)	44 (14.67%)	101 (33.67%)	96 (32%)	49 (16.33%)	131 (43.67%)	14 (4.67%)	9 (3%)
	Total	64 (21.33%)	236 (78.67%)	107 (35.67%)	193 (64.33%)	214 (71.33%)	86 (28.67%)	266 (88.67%)	34 (11.33%)	26 (8.67%)
BMI	Underweight (<18.5)	2 (0.67%)	9 (3%)	6 (2%)	5 (1.67%)	7 (2.33%)	4 (1.33%)	10 (3.33%)	1 (0.33%)	1 (0.33%)

	Normal Range (18.5-24.9)	23 (7.67%)	102 (34%)	52 (17.33%)	73 (24.33%)	102 (34%)	23 (7.67%)	118 (39.33%)	7 (2.33%)	13 (4.33%)
	Overweight (25.0-29.9)	25 (8.33%)	97 (32.33%)	43 (14.33%)	79 (26.33%)	84 (28%)	38 (12.67%)	104 (34.67%)	18 (6%)	11 (3.67%)
	Obese (>30)	14 (4.67%)	28 (9.33%)	6 (2%)	36 (12%)	21 (7%)	21 (7%)	34 (11.33%)	8 (2.67%)	1 (0.33%)
	Total	64 (21.33%)	236 (78.67%)	107 (35.67%)	193 (64.33%)	214 (71.33%)	86 (28.67%)	266 (88.67%)	34 (11.33%)	26 (8.67%)
Job	Student	16 (5.33%)	54 (18%)	32 (10.67%)	38 (12.67%)	55 (18.33%)	15 (5%)	66 (22%)	4 (1.33%)	7 (2.33%)
	Employee	15 (5%)	57 (19%)	17 (5.66%)	55 (18.33%)	45 (15%)	27 (9%)	62 (20.67%)	10 (3.33%)	3 (1%)
	Self-employed	9 (3%)	44 (14.67%)	17 (5.66%)	36 (12%)	39 (13%)	14 (4.67%)	48 (16%)	5 (1.67%)	2 (0.67%)
	Retired	3 (1%)	23 (7.66%)	13 (4.33%)	13 (4.33%)	20 (6.67%)	6 (2%)	24 (8%)	2 (0.66%)	3 (1%)
	Housewife	17 (5.67%)	42 (14%)	18 (6%)	41 (13.67%)	41 (13.67%)	18 (6%)	50 (16.67%)	9 (3%)	9 (3%)
	Unemployed	4 (1.33%)	16 (5.33%)	10 (3.33%)	10 (3.33%)	14 (4.67%)	6 (2%)	16 (5.33%)	4 (1.33%)	2 (0.67%)
	Total	64 (21.33%)	236 (78.67%)	107 (35.67%)	193 (64.33%)	214 (71.33%)	86 (28.67%)	266 (88.67%)	34 (11.33%)	26 (8.67%)

Table 2. Frequency of desired variables in obesity prevention and treatment methods

In this study, there are relationships between some factors, which are given in Table 3, and some of the most important of them are as follows:

- Gender and diet (p=0.006 & r=-0.159)
- Age and people's perception of their obesity status (p=0.005 & r=-0.161)
- Age and use of slimming drugs Under the supervision of a doctor or nutritionist (p=0.000 & r=0.405)
- Education and diet (p=0.004 & r=0.165)
- Income and exercise (p=0.023 & r=0.131)
- Income and diet (p= 0.036 & r=0.121)

- Income and medication (p=0.034 & r=0.122)
- Income and complications from surgery (p=0.030 & r=-0.390)
- BMI and people's perception of their obesity status (p=0.000 & r=-0.455)
- BMI and diet (p=0.002 & r=0.178)
- BMI and slimming drugs (p=0.001 & r=0.198)
- BMI and bariatric surgery (p=0.006 & r=0.157)
- BMI and complications from dieting (p=0.008 & r=-0.191)
- Occupation and dieting under the supervision of a doctor or nutritionist (p=0.026 & r=0.161)

	Exercise	Diet	Drug	Surgery	Value1	Value2	Value3	Value4	Value5
Gender	0.347	0.006	0.628	0.067	0.069	0.497	0.078	0.701	0.611
Age	0.861	0.561	0.411	0.796	0.005	0.501	0.823	0.000	0.698
Education	0.433	0.004	0.838	0.259	0.795	0.664	0.822	0.386	0.581
Income	0.023	0.036	0.034	0.601	0.240	0.373	0.558	0.557	0.030
BMI	0.102	0.002	0.001	0.006	0.000	0.797	0.008	0.687	0.250
Job	0.857	0.831	0.607	0.098	0.414	0.026	0.636	0.593	0.490

Table 3. nonparametric correlations. Explanation: value 1= Age and people's perception of their obesity status/value 2= Going on a diet under the supervision of a doctor or nutritionist/value 3= Experiencing side effects due to dieting/value 4= Taking slimming drugs under a Doctor's or nutritionist's the opinion/value 5 = Having complications due to surgery

DISCUSSION

Diet

In this part, we will investigate the important and influential factors on the popularity of diet and the effect of diet on the body's health status according to the data collected from our surveyed society. Diet can be used for both obese people and those who want to prevent obesity. Each person receives their diet according to their goals and health status. Due to the development of media and social networks, many people prefer not to visit a doctor to give them a diet. In our studied society, which has good distribution in different aspects, such as Age, BMI, methods used to lose weight, etc. The frequency of people who dieted under the supervision of a doctor or not is given in figure 1. According to our analysis, of all the people who went on a diet, 39.6% of those who went on a voluntary diet suffered complications from the diet.

In comparison, 37.3% of those who were on a diet under the supervision of a doctor suffered complications from it. In our opinion, people should visit a relevant specialist to receive a diet according to their health status. However, although a particular type of diet may be effective for weight loss, it can have harmful effects on other organs in the body, such as the liver, pancreas, and even the heart, brain, and endocrine system. It seems that younger people prefer to get a diet, and the reason could be that the diet is more effective for losing weight in young people due to their metabolism and physical activity than in old and middle-aged ones. Of course, young people care more about their appearance, and because of the media and social networks, they think more about losing weight. In our studied society, diet is more prevalent among people under 50 years old than people over 50, so about 77%

of people who have taken a diet are under 50 years old [Table 2]. Furthermore, we will introduce proper diets according to different age ranges and their beneficial therapeutic effects:

The Mediterranean diet is considered one of the healthiest dietary patterns worldwide due to its combination of foods rich in antioxidants and anti-inflammatory nutrients. According to the studies, there is a strong relationship between high adherence to this diet and a lower incidence of various types of cancers [14].

For those who suffer from high blood pressure, especially middle-aged ones, the DASH (Dietary Approaches to Stop High Blood Pressure) diet is rich in fruits, vegetables, low-fat dairy, and low in saturated fat and cholesterol, is recommended [15].

The very low-carbohydrate ketogenic diet (VLCKD) is a dietary protocol that has been used since the 1920s as a treatment for refractory epilepsy and is now gaining popularity as a potential treatment for obesity and related metabolic disorders [16].

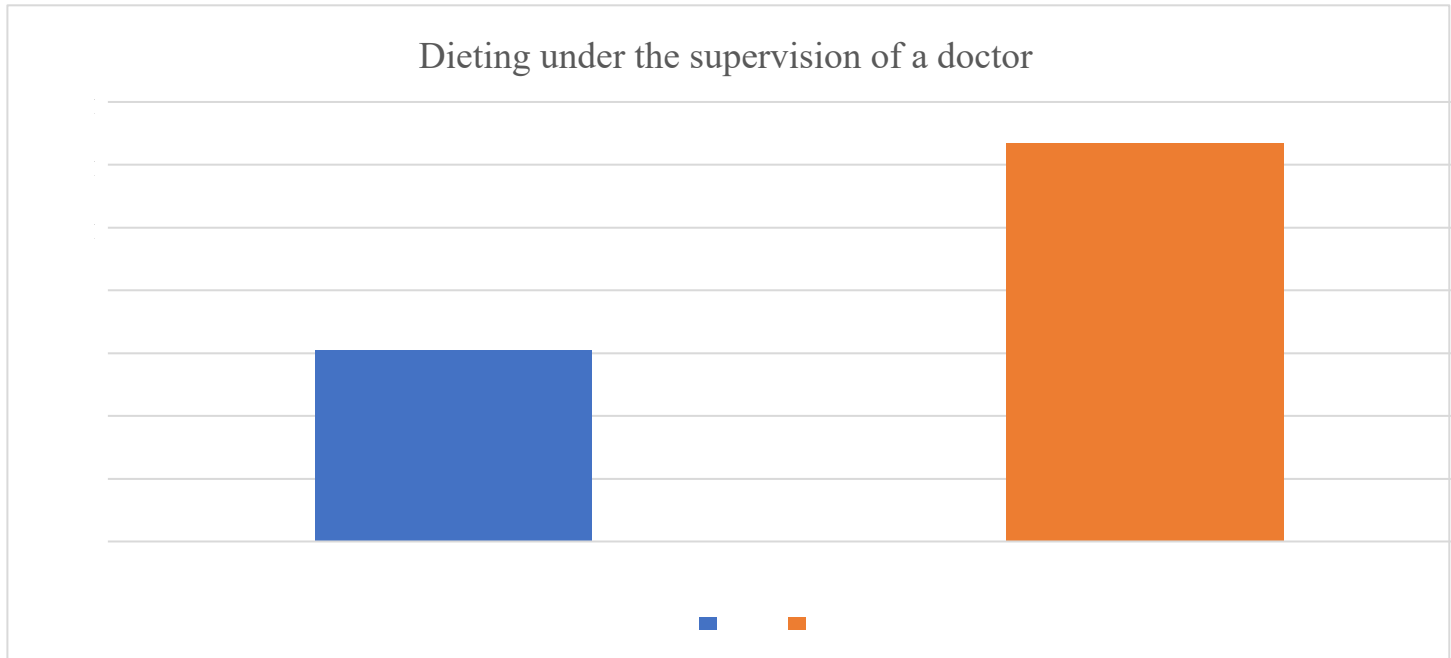
It seems that gender also significantly affects people's desire to lose weight; thus, in our collected data, about 80% of people who have been on a diet are women [Table 2]. One of the reasons could be that women are more tolerant of hunger. So, in a study conducted on Mediterranean fruit flies, females showed more resistance to starvation than male species [17].

Education is also very effective in driving people towards diets. People with higher educational qualifications prefer diet over other weight loss methods such as surgery or weight-reducing drugs. The rate of use of diets in people with bachelor's, master's, and doctorate education in our studied society is about 59%, which can indicate the impact of academic education on people's awareness and consequently the increase in the prevalence of having a specific diet [Table 2].

experienced diets feel less obese and overweight, which can indicate the effectiveness of diets.

One of the interesting correlations observed in our questionnaire data is that people who had more complaints about diets had a lower BMI, which could indicate that they follow more accessible methods that give quick results, such as weight-reducing drugs.

Finally, we strongly recommend that diet is more effective when it is taken along with other weight loss methods, which



Also, taking a suitable and efficient diet can impact people's opinions about their physical condition. According to the data collected in the questionnaire, most people who have

can be different depending on the health and physical condition of people as well as their desires.

Figure 1. Dieting under the supervision of a doctor

Exercise

Along with a slimming diet, the impact of adequate exercise can be beneficial for weight loss through increasing metabolism and burning fat. In our study, the amount of frequent exercise in people with normal or lower BMI was 45.6%, and among those with above-normal BMI, it was 28.21% [Table 2]. It's probably more challenging for people who are overweight or obese to have frequent and regular physical activity due to their physical condition. It is possible that these people can also engage in regular physical activity by designing an exercise program adapted to the person's physical state. 52.3% of those studied are under the Age of 40. and 78.31% of these people are involved in sports and physical activity. Also, the remaining 47.7% who are Over 40 years old 79% exercise, which indicates that there is no significant difference between the exercise of people under 40 and those over 40 [Table 2]. Among the people who exercise under the

supervision of a trainer, 52.3% of them consider laziness as the cause of their inability to lose weight. We believe that if the sports program of these individuals is adapted to their living conditions, the level of laziness will probably decrease, and membership in the program will increase.

Interestingly, only 9.3% of these people regard to lack of motivation as a reason for their failure. Probably the presence of a trainer next to the person can increase the motivation of the person to lose weight and do sports. Generally, among the reasons for failure in the path of weight loss, the side effects caused by each of the methods, especially in sports, make a smaller contribution to the responses of the studied population. On the other hand, the contribution of psychological factors (lack of motivation and laziness) has been raised to a greater extent as a barrier to achieving their desired weight. While in another study conducted in Spain in 2022, the major part is devoted to complications caused by exercise (Creating joint pain), which may indicate a greater need to motivate people to

lose weight in Iran. Most likely, people can be encouraged to engage in more regular and effective sports activities by raising people's awareness about obesity and its dangers and by creating a suitable platform to provide sports facilities for all members of society.

Drug

The guidelines suggest that we use drug therapy for weight loss for people with BMI>30, people with BMI>27 with comorbidities, and people who have not achieved results with lifestyle changes [19]. 86 people from our studied community have used drugs to lose weight. According to the statistics, it seems that public education and information can give people a correct understanding of being overweight and prevent the indiscriminate and incorrect use of slimming drugs. 53% of the people who took medication to lose weight took the medication without a doctor's supervision [Figure 2]. In our opinion, the prescription of weight loss drugs is not very common among doctors, As F. Squadrito et al. also pointed out in their study [20]. To solve this problem, it is better for people who need medicine to lose weight to be identified by health and treatment centers and receive the least complicated medicine with the minimum side effects according to their conditions. The

number of drugs used for weight loss among people with a bachelor's degree or less was 29.4% and among people with a master's degree or more was 25.5% [Table 2]. According to these data, it seems that the amount of drug consumption for weight loss is more common in people with less education. Among people older than 50 years who use medicine to lose weight, only 13.6% take this treatment under the supervision of a physician. Arbitrary medicine use, especially in the middle ages, may cause more complications. Consequently, these people should use other methods to lose weight first, and if necessary, they must take medicine under the supervision of a doctor. In our studied population, the amount of drug consumption among people with different occupations has been seen to be different. Among these jobs, employees had the highest amount of drug consumption, with 37.5% [Table 2]. Since these people are working, it is believed that they have turned to drugs and fast weight loss methods due to the lack of time for exercise and diet preparation. Therefore, in these cases, we can replace the use of drugs with a suitable diet and a brief but continuous and regular exercise program to lose weight.

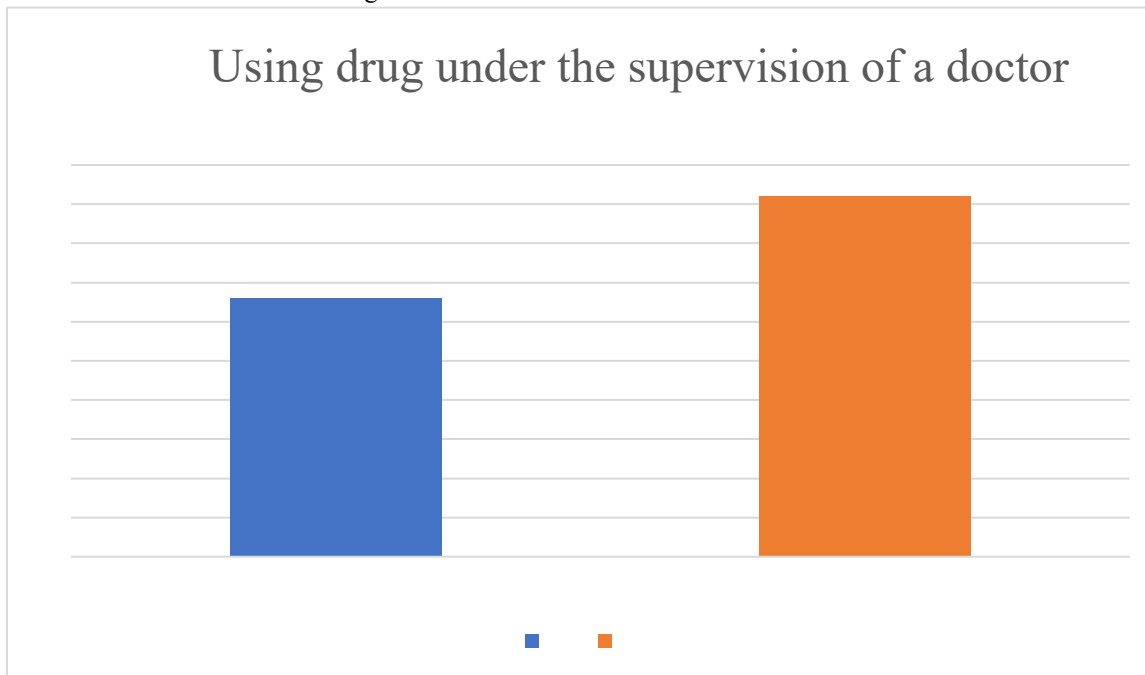


Figure 2. Using drugs under the supervision of a doctor

Surgery

All types of bariatric surgeries are known as obesity treatment methods, and these surgeries can be performed when diets, exercise, drug therapy, etc., have not helped the person lose weight, and the person usually has dangerous diseases associated with obesity. Generally, bariatric surgery is recommended by physicians as a treatment method for people with a body mass index higher than 40. In the research

conducted, approximately 11% of our study subjects chose this method to treat obesity, which was the lowest percentage among the proposed methods for obesity treatment. Also, this percentage is interesting among people who have a body mass index above 30. One of the reasons for people's reluctance to use this method is its high cost compared to other methods. Also, in another study, people who were obese and chose surgery for treatment stated that insurance coverage was one of

the reasons for their choice [21]. Another thing that was investigated in this research was the Age of the people who underwent surgery [Table 2]. Most of the people were between 20 and 50 years old, and people over 50 used this method significantly less. This significant difference can be due to the general belief of people that bariatric surgery in old Age is accompanied by severe complications and does not have the necessary efficiency. While in research conducted in Canada, people who had surgery were divided into two groups, over 65 years old and under 65 years old, and the complications and efficacy of the operation were the same in both groups [22]. One of the constant debates among the public regarding bariatric surgery is postoperative side effects and reversibility, and the possibility of weight regain. In this study, about 80% admitted that they suffered from psychological complications

and physiological problems [Figure 3]. Also, by observing people's body mass index, we conclude that about 76% of people who have undergone surgery are overweight and obese, which can be due to a lack of physical activity or non-observance of diet after surgery [Table 2]. Of course, it is essential to mention that the limitation of this research was that we did not have the BMI of the people before the operation; therefore, we cannot make a correct judgment about the possible weight gain of the people because these people may also have lost weight; But in any case, they have not returned to normal. Of course, in the interview with the people who underwent bariatric surgery, it was seen that most people were satisfied with the result of the surgery.

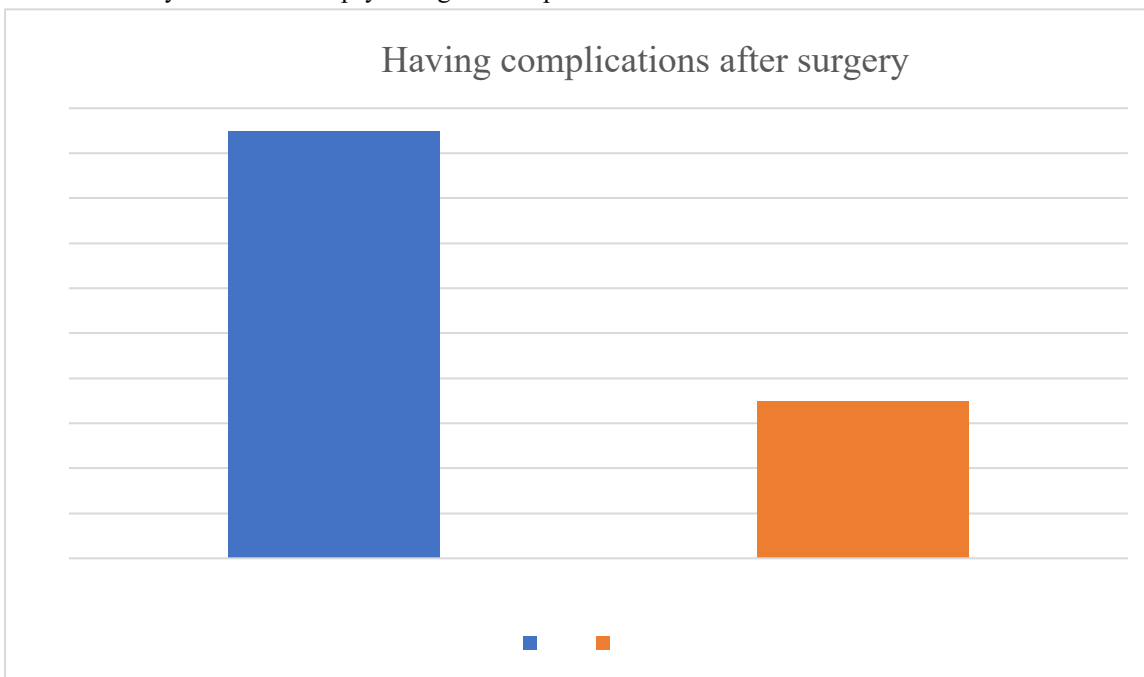


Figure 3. Having complications after surgery

According to the information we obtained from the questionnaire based on the mindset of people about their weight status, 39% of people whose BMI was less than 9.24, That is, they were in two states of normal or underweight, thought they were overweight. This statistic can indicate the psychological effects of social networks, which present unrealistic or sometimes very thin models as the ideal style.

Also, It can be caused by the wrong mindsets of people in society about the perfect weight for each person.

It should be noted that 50% of people with a BMI less than 24.9 knew that they were not overweight, and 11% did not know their weight. In the case of the last group, this lack of awareness could be due to a lack of attention and following on the person's physical condition and health.

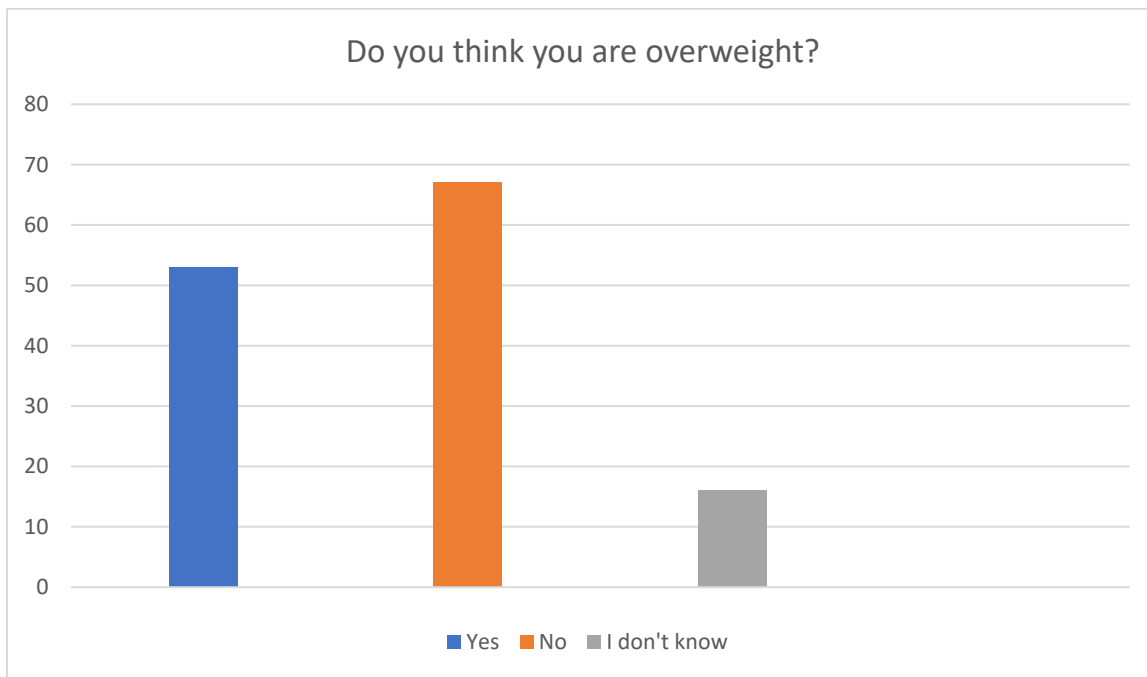


Figure 4. Underweight and Normal weight people's opinions about their weight

CONCLUSION

In general, strategies to deal with obesity are more effective in multiple ways and together, and decisions should be made regarding different coping and treatment strategies according to the individual's physical condition and BMI. Throughout this research, we observed the effect of an expert in all kinds of coping methods and saw how the presence of a nutritionist, sports coach, or giving importance to the instructions of the surgeon, in addition to the higher and more reliable effectiveness of the treatment method, sufficient motivation It is also created to complete these methods. Therefore, it is better to inform the public and refer them to the relevant specialist. Such a person can avoid the side effects of arbitrary treatments by adopting the most suitable method and reaching his ideal weight in the most convenient and best way.

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