Consumption Pattern of Anti-obesity Drugs among Alexandria University Students Following Diet Regimen

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ABSTRACT

Objectives: Toassess the consumptionpattern of anti-obesity drugsamong Alexandria University students following a diet regimen. **Design:** A cross-sectional study. **Setting:** Different four facultiesAlexandria University; 2 practical (Faculty of Medicine and Faculty of Pharmacy), and 2 theoretical (Faculty of Commerce and Faculty of Arts). **Participants:** A sample of 245 undergraduate students of the 4 facultieswith body mass index more than 25kg/m2 and following diet regimen during the academic year 2019 – 2020. **Variables Measured:** Data about the pattern of anti-obesity drug usage includedname of the anti-obesity drug used, dose, prescription, duration of usage and side effects were collected. **Results:** Consumption of anti-obesity drugs was reported by 25.3% of Alexandria University overweight and obese students following diet regimen. A high proportion of anti-obesity drugs were used without indication and prescription. Students explored floating, gases and fats within feces as some side effects. **Conclusion:** The most common type of diet was low carbohydrate diet among faculty students users of anti-obesity drugs, Students' source of information about diet, physicians were on top, media was the second choice for information, about quarter of the studied sample were using one or more anti-obesity drug, high number of students showed a decrease in body weight upon using the drug.

Keywords: Anti-Obesity Drugs, Diet, Prescription, BMI, Weight Loss.

INTRODUCTION

In 2016, more than 1.9 billion adults were overweight. Of these, over 650 million were obese. For children and adolescents aged 5-19 years, over 340 million were overweight or obese [1], In Egypt, obesity has reached an alarming level, where 61-70% of Egyptian adults are overweight and obese [2]. According to Egypt Demographic Health Survey (2014), more than one-third

of subjects aged 5-19 years were overweight or obese. Obesity was more prevalent in women aged 15-49 years; 48% were obese and 37% were overweight [3].

In2011, about 2.74 million patients used anti-obesity drugs in the United States, predominantly Phentermine.   The use of prescription Orlistat and Sibutramine was relatively uncommon. The majority of drug users (85%) were female [4]. A study in Egypt showed that 31.3% of females consumed anti-obesity drugs [5].

Therefore, the present study was designed to assess the use of anti-obesity drugs among university students following a weight reduction regimen in Alexandria to investigate the consumption pattern of anti-obesity drugs i.e., type, duration of use, frequency, and source of recommendation among.

METHODS

Study Design

A Cross-sectional approach was used, including undergraduate studentsfrom different 4 faculties; 2 practical faculties (Faculty of Medicine and Faculty of Pharmacy), and 2 theoretical faculties (Faculty of Commerce and Faculty of Arts). Students with body mass index (BMI) of more than 25kg/m2 and following diet regimen from both sexes were included.

Sample Size

A study in Egypt showed that anti-obesity drugs were used by 31.3% of females [5]. Using precision 6%, the minimum required sample size was 229 students at 95% confidence interval. The sample was increased to 245 students. The sample size was calculated using Epi-Info7 software. Eligible students according to inclusion criteria that accepted to participate in this study were selected randomly. Stratification was based on the different types of faculties in Alexandria University. Two hundred and forty-five students from both sexes were equally allocated to selected faculties at random. Data was collected from students during the academic year 2019-2020.

Interviewing Questionnaire

A pre-designed structured interview questionnaire was used to collect data about socioeconomic characteristics, medical history, pattern of following dietary regimen (type of diet, source of information, prescription, reason and weight change from diet regimen) and pattern of anti-obesity drugs use (name of the anti-obesity drug used, dose, prescription, duration of usage and side effects).

Anthropometric Measurements

Weight and height were measured for each subject. Body mass index (BMI) was calculated according to the following equation:

Body mass index (BMI) $=$(Weight (Kg))/(Height (m^2))

A student is considered obese when BMI $\geq$30kg/m^2, and overweight when BMI=25-29.9kg/m^2 [6].

Statistical Analysis

Data was collected, revised, coded, and statistically analyzed using the Statistical Package for Social Science (IBM SPSS) software package version 20.Data management was conducted in the statistics laboratory of Biostatistics Department, High Institute of Public Health [7].

RESULTS

The mean age of the studied sample was 20±1.43 years. According to the type of faculty, the percentage of students from theoretical and practical faculties was almost equal 50.6% and 49.4% respectively.

Figure (1) shows that 25.3 % of Alexandria University overweight and obese student use anti-obesity drugs.
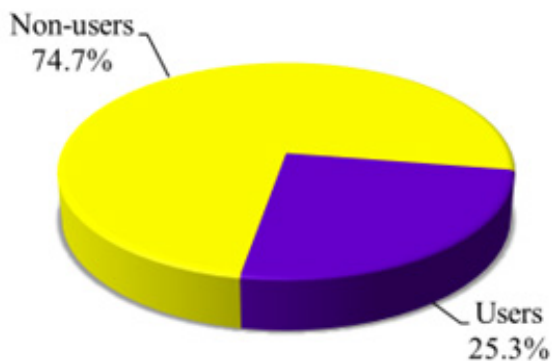
Figure 1. Distribution of the studied sample according to usage of anti-obesity drug.

Table 1 shows distribution of the studied groups of users and non-users of anti-obesity drugs according to medical history. Half of diabetic studied students and 23.1% of hypertensive ones were users of anti-obesity drugs. More than one fifth of students who suffered from obesity during their childhood were users of anti-obesity drugs (23.1%), Blood lipid analysis was not done for 76.8% of non usres, only 31.2 % of non-users do Blood lipid analysis, 65.0% of non-users there lipid analysis results were normal while only 7% of users were with normal blood lipid, use of Dyslipidemia medication among users was 80% and 20% among non-users, 80.1% of female students of non-users were not suffering from Menstrual disorders while 28.6% were suffering from users.

Table 1. Distribution of the studied sample (users, non-users of anti-obesity drugs) according to medical history

Medical history	Non users		Users		Test of Sig.	p
	No.	%	No.	%		
chronic diseases	**(n =183)**		**(n =62)**			
No	161	75.9	51	24.1	0.906	^{MC}p=0.194
Diabetes	3	50	3	50		
Hypertension	10	76.9	3	23.1		
Others**	9	64.3	5	35.7		
Medicine used continuously						
No	169	76.8	51	23.2	5.147	χ^2=0.023
Yes**	14	56.0	11	44.0		
Obesity in childhood						
No	133	73.9	47	26.1	0.233	χ^2=0.630
Yes	50	76.9	15	23.1		
Blood lipid analysis						
No	139	76.8	42	23.2	1.619	χ^2=0.242
Yes	44	68.8	20	31.2		
Result of blood lipid analysis	**(n = 44)**		**(n = 20)**			
Normal	13	65.0	7	35.0	0.19	χ^2=0.773
Above average	31	70.5	13	29.5		
Dyslipidemia medication	**(n = 7)**		**(n = 57)**			
No	42	79.2	11	20.8	14.019	χ^2=0.001*
Yes (Atorvastatin)	2	20	8	80		
Menstrual disorders	**(n = 170)**		**(n = 49)**			
No	125	80.1	31	19.9	1.956	χ^2=0.162
Yes	45	71.4	18	28.6		
Usage of drugs for menstrual disorders	**(n = 170)**		**(n = 49)**			
No	164	80.4	40	19.6	13.125	χ^2=0.001*
Yes	6	40.0	9	60.0		

χ^2: Chi square test, MC: Monte Carlo, FE: Fisher Exact, p: p value for comparing between the studied groups

*Statistically significant at $p \leq 0.05$

**Others: peptic ulcer, rheumatoid, H. pylori, asthma, irritable bowel syndrome, hypothyroidism, polycystic ovary

***Yes:Concor, captopril, pepzole, rheumatoid drugs, insulin, Lasix, metformin, eltroxin, penicillin, corticosteroids

Table 2 illustrates diet regimens of the studied sample. The most common type of diet was low carbohydrate diet (33.9% among users of anti-obesity drugs) followed by Low-fat, low-carbohydrate (22.6% among users), high protein diet 36.1% among non-users, while in users was 19.4%, which was statistically significant. Regarding students' source of information about diet, physicians were on top of the list, media was the second choice for information, followed by pharmacists. Diet regimens were mostly prescribed by physicians followed by unprofessional sources (others). It also reveals that 95.6%, 96.8% of the students from both groups reason to start a diet regimen are weight reduction. Regarding the students' weight loss from diet regimen using anti-obesity drugs were 75.8%.

Table 2. Distribution of the Studied Sample (Non-users, Users of anti-obesity drugs) According to Diet Regimen (n = 245)

Diet	Non-Users		Users		χ^2	p
	No.	%	No.	%		
Type of diet						
Low-carbohydrate	67	36.6	21	33.9	0.151	0.697
Low-fat,ow-carbohydrate	24	13.1	14	22.6	3.166	0.075
High-fat	19	10.4	7	11.3	0.040	0.841
High protein	66	36.1	12	19.4	5.959	0.015*
Very Low Carb	32	17.5	11	17.7	0.002	0.964
Balanced	8	4.4	2	3.2	0.155	0.694
The source of information about diet						
Physicians	95	51.9	24	38.7	3.232	0.72
Pharmacists	28	15.3	12	19.4	0.557	0.455
Media	39	21.3	20	32.3	3.035	0.081
Friend	12	6.6	8	12.9	2.488	0.115
Others**	14	7.7	0	0.0	5.031	0.025
Diet prescription						
Physicians	107	58.5	32	51.6	1.203	0.273
Pharmacists	30	16.4	14	28.6	0.887	0.346
Others**	46	25.1	16	25.8	0.011	0.916
Reason for following a diet regimen						
Weight loss	175	95.6	60	96.8	0.155	0.742
Health issue	9	4.9	2	3.2	0.309	0.578
Body image	3	1.6	1	1.6	0.000	0.989
Weight changes from diet regimen						
Decrease	1	100.0	47	75.8	FE=2.819	1.000
Increase	0	0.0	1	1.6		
No change	0	0.0	14	22.6		

**Others: Relatives, myself, gym trainer, T.V, Internet, friend, media

p: p-value for comparing the studied groups*: Statistically significant at $p \leq 0.05$

Table 3 and figure 2 show the distribution of the studied sample according to anthropometric measurements. Body weight status of the studied sample indicates that 56.5% of users students of ant-obesity drugs were obese and 43.5% of them were overweight with significant difference between the groups of users and non-users.

Table 3. Distribution of the studied sample (users and non-users of anti-obesity drugs) according to anthropometric measurements and body weight status

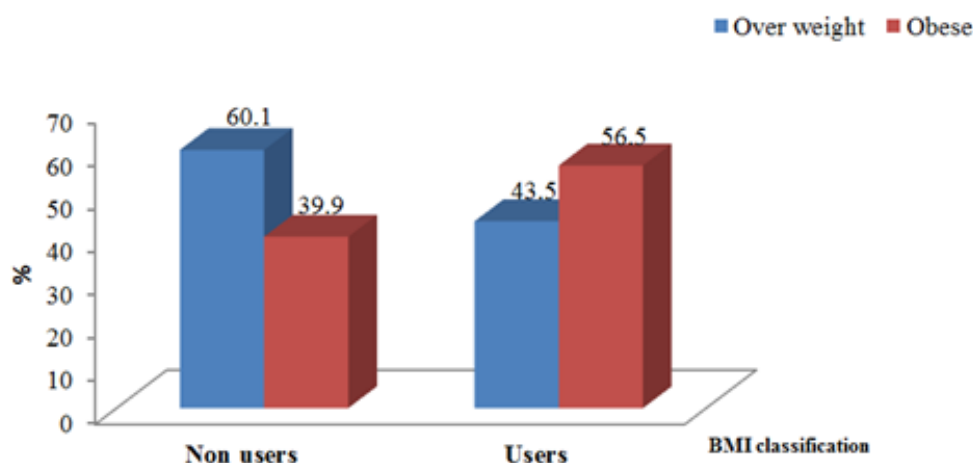| Measurements and weight status	Non-users (n=187)		Users (n=62)		Test of Sig.	P
Weight (kg)	81.327± 11.664		86.539 ± 15.793		2.765	0.006
Height (cm)	164.598± 7.753		165.403 ± 7.002		0.723	0.470
BMI (kg/m²)	29.826 ±3.879		31.5197 ± 4.88464		2.775	0.006*
Weight status	**No**	**%**	**No**	**%**	χ^2 = 5.153	
Overweight	110	60.1	27	43.5		0.023*
Obese	73	39.9	35	56.5		

Figure 2. Distribution of the studied sample according to body measurements by usage of anti-obesity drug.

Table 4 and figure 3 show the distribution of students according to pattern of anti-obesity drugs usage. Regarding the use of anti-obesity drugs, about quarter of the studied sample were using one or more anti-obesity drug (25.3%) with higher prevalence in males than females (43.8% to 22.5%). The most used anti-obesity drugs were 'Orlistat' (46.8%), metformin (21%), chromium picolinate (16.1%) with higher percentage in females, and some other drugs (25.8%) like harva, apple lite, green tea tablets, Top Ging and via ananas, also shows that the mean duration for using the anti-obesity drug was 20.21±21.20 weeks. About third of the university students (33.9%) were still using the medication especially males (64.3%) compared to 25% of females. Half of the university students used the drug once daily with higher percent in female students (58.3%) compared to males. Among 245 university students, anti-obesity drugs were basically prescribed by physicians (56.5%) followed by some other unprofessional sources (24.2%) like relatives, gym trainers, media...etc., and 19.4% were prescribed by pharmacists with higher percent among males.

Table 4. Distribution of the studied sample according to pattern of anti-obesity drugs usage by sex

Use of anti-obesity drugs	Male (n=32)		Female (n=213)		Test of Sig.	P
	No.	%	No.	%		
Usage of anti-obesity drug						
Non-users	18	56.3	165	77.5	χ^2=6.624*	0.010*
Users	14	43.8	48	22.5		
Name of the anti-obesity drug	(n = 14)		(n = 48)			
Orlistat	10	71.4	19	39.6	χ^2=4.415*	0.036*
Others**	2	14.3	14	29.2	χ^2=1.254	FEp=0.322
Metformin	1	7.1	12	25.0	χ^2=2.086	FEp=0.264
Chromium Picolinate	1	7.1	9	18.8	χ^2=1.079	0.431
Chitosan	2	14.3	4	8.3	χ^2=0.439	0.610
Duration of anti-obesity drug use(weeks)						
Mean ± SD.	10.71 ± 11.89		22.98 ± 22.57		U= 247.0	0.131
Still using the medication	(n = 14)		(n = 48)			
No	5	35.7	36	75.0	χ^2=7.468	FEp=0.010
Yes	9	64.3	12	25.0		
Dosage used						
Once daily	3	21.4	28	58.3	χ^2=8.382*	MCp=0.010*
Twice daily	4	28.6	13	27.1		
3 times daily	7	50.0	7	14.6		
Drug prescription						
physicians	7	50	28	58.3		MCp=0.247
Pharmacists	5	35.7	7	14.6	χ^2=3.094	
Others***	2	14.3	13	27.1		

**Others: Natural max, Harva, Apple lite, Harva-apple lite, Green coffee, Top ging, Via ananas, Green tea tab

***Others: Relatives, themselves, gym trainer, T.V, Internet, friend, media

p: p-value for comparing the studied group *: Statistically significant at p ≤ 0.05

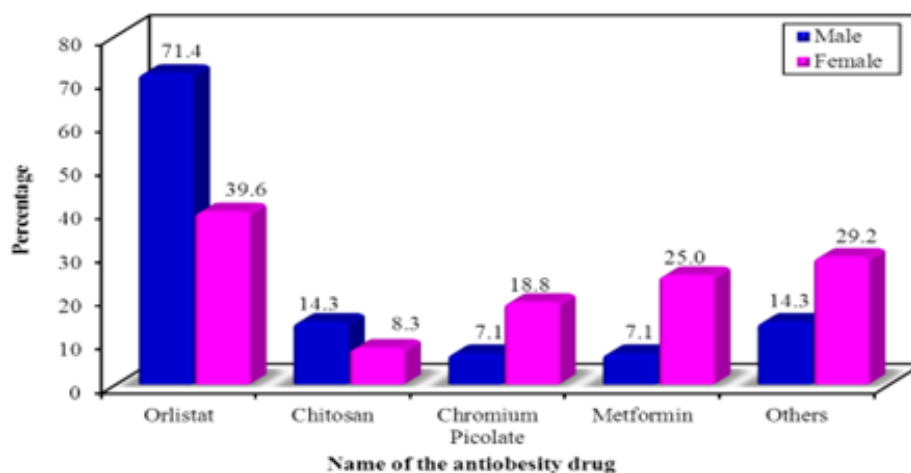χ: Chi square test; FE: Fisher Exact; MC: Monte Carlo; U: Mann Whitney test

Figure 3. Distribution of the studied sample according to pattern of anti-obesity drugs usage by sex.

Table 5 and figures 4 & 5 show that the most frequent side effect was floating and gases (46.8%) with statistically significant difference between males (71.4%) and females (39.4%); followed by fats within feces (27.4%) with statistically significant difference between males (57.1%) and females (18.8%). Regarding weight change with drug use (75.8%) of the 62 students showed a decrease in body weight upon using the drug with higher percentage among females than males (83.3% to 50%), 22.6% of students had no weight change with higher percent in males (50%) than females (14.6%) and only 1.6% had increase in weight.

Table 5. Distribution of the studied sample according to side effects of anti-obesity drugs usage

Use of anti-obesity drugs	Male (n =14)		Female (n =48)		Test of Sig.	p
	No.	%	No.	%		
Side effects #						
Floating and gases	10	71.4	19	39.6	χ^2=4.415*	0.036*
Fats within feces	8	57.1	9	18.8	χ^2=8.028*	FEp=0.005*
Loss of appetite	1	7.1	9	18.8	χ^2=1.079	FEp=0.431
Headaches	1	7.1	8	16.7	χ^2=0.792	FEp=0.670
Sleep disorders	0	0.0	6	12.5	χ^2=1.938	FEp=0.322
Dry mouth	0	0.0	6	12.5	χ^2=1.938	FEp=0.322
Diarrhea	0	0.0	5	10.4	χ^2=1.586	FEp=0.579
Constipation, nausea, depression and mood swings	0	0.0	4	8.3	χ^2=1.247	FEp=0.566
Jerking	0	0.0	3	6.3	χ^2=0.919	FEp=1.000
Weight change with drug use						
Increase	0	0.0	1	2.1	χ^2=7.257*	MCp= 0.021*
Decrease	7	50.0	40	83.3		
No change	7	50.0	7	14.6		
Weight loss (kg)	4.64 ± 4.01		6.46 ± 6.73		U= 140.50	0.932
The period in which the weight lost (weeks)	3.71 ± 2.36		8.78 ± 12.23		U= 113.50	0.389

χ^2: Chi square test; MC: Monte Carlo; FE: Fisher Exact; U: Mann Whitney test

p: p value for comparing between the studied group

*: Statistically significant at $p \leq 0.05$
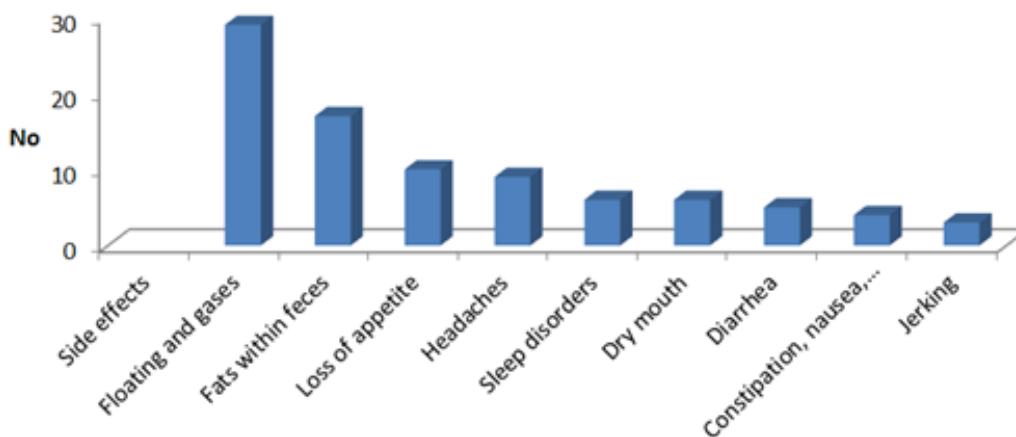
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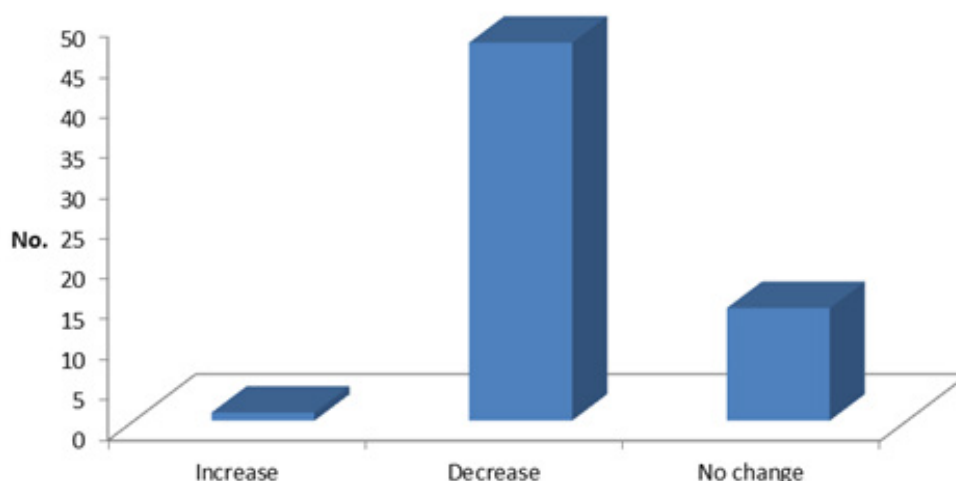

Figure 4. Side effects of Anti-obesity Drugs.

Figure 5. Weight Change with Drug use.

DISCUSSION

In this study, the consumption of anti-obesity drugs is 25.3% of students following diet regimen. This is considerably higher than the rate reported by a study in Brazil 2011 indicating that 6.8% of college students were using or have used drugs for weight loss [7]. On the other hand, the percent is found to be lower than a study done in Egypt showed that 31.3% of adult females with BMI>25 took anti-obesity medicines while following other regimens to lose weight; 19.9% of the adult females consume anti-obesity drugs while dieting and the other 11.4% of females while dieting and exercising [5]. The present study revealed that among university students, about quarter of the studied sample were using one or more anti-obesity drug (25.3%) with higher prevalence in males than females (43.8% to 22.5%). This is considered abnormal as the consumption in females is usually higher [8,9], it may be due to the lower level of overall general knowledge among male students and the higher percent of males that exercise at gym as their gym trainer were their source of information and anti-obesity drugs.

In this study, the most used drug was Orlistat; almost the half (46.8 %) between male students particularly (71.4 %) to (39.6 %) in females. Metformin was used by (21%) with higher percent in females (25%). Chromium picolinate and chitosan, which are considered nutritional food supplements, were used by (16.1%) and (9.7 %). Herbal medicines and appetite suppressants were used by a small percent, although herbal treatments are becoming popular everyday as a complementary or alternative medicine [10].

Physicians were basically the source of drug prescription .This is compatible with the findings of a Finnish study that showed that health professionals was the source of information for older subjects [11]. A reasonable percent of university students took the drug directly from the pharmacist preferred to save the cost of the physician's visit. However, pharmacists play a remarkable role in counseling patients about prescription and non-prescription drugs like in Singapore (57.7%) [12].

Other studies showed a number of similar adverse effects, as insomnia, depression and gastrointestinal problems which diverse upon the drug consumed.

On the other hand, weight loss among the studied sample as a result of undergoing a diet regimen alone was of high percent (73.5%) semi similar to weight loss percentage from diet and drug usage, especially among the female students, male students showed semi equal percentages of decrease or no change in weight from diet regimen as the highest percent, which indicating that using drug was not needed in most cases of the students [13].

Medical education is thought to be the most academically and emotionally difficult educational program. The time and emotional commitments medical students must dedicate over whelming time and emotions to their training programs, this pressure leads to a passive influence on students' psychological health [14,15].

Efforts done to diminish the socioeconomic and psychosocial incidence of obesity in adulthood should concentrate on prevention of its presence from childhood [16,17].

Some limitations of the study could be addressed. As many students are ashamed of their body weight and a lot of refuse to measure weight especially female students, they were afraid of their peers look.

CONCLUSION

The most common type of diet was low carbohydrate diet among faculty students users of anti-obesity drugs, followed by Low-fat, low-carbohydrate diets, Students' source of information about diet, physicians were on top, media was the second choice for information, followed by pharmacists, about quarter of the studied sample were using one or more anti-obesity drug with higher prevalence in males than females, high number of students showed a decrease in body weight upon using the drug with higher percentage among females than males.

ETHICAL CONSIDERATIONS

Approval was obtained from the Ethics Committee of the High Institute of Public Health for conducting the research. A verbal consent was taken from all study participants after explaining the purpose and benefits of the research.

AUTHOR CONTRIBUTION

Dina H Selim: Conceptualization, methodology, supervision, writing, review, and editing.

Mai Gamal Badr: Writing original draft, data curation, and methodology.

Dalia Ibrahim Tayel: Conceptualization, supervision, methodology, review, and editing.

STATEMENTS & DECLARATIONS

The authors have no relevant financial or non-financial interests to disclose.

CONSENT TO PARTICIPANT

Informed consent was obtained from all individual participants included in the study.

CONFLICT OF INTEREST

The authors declare no competing interests.

NON-FINANCIAL INTEREST

Author Mai Gamal participated in this study as part of the master's degree of Public Health Sciences in (Nutrition) supervised at HIPH, Alexandria University, Egypt.

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