

Using Of Licensed and Unlicensed Anti-Obesity Medications among the University Students

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Abstract

Background: Obesity is one of the most serious problems worldwide. Using anti-obesity medications have gained growing interest among adults as a shortcut for bodyweight management practice. This study aimed to determine the prevalence, knowledge, usage determinants, intake pattern and experienced effects of anti-obesity medications, licensed and unlicensed, among university students in Jordan.

Materials and Methods: A cross-sectional study was conducted using a structured web-based questionnaire. Univariate and multivariate logistic regression analyses were used.

Results: 418 students with a mean age of 21.5 responded to the questionnaire. The prevalence of anti-obesity medication intake was 11%. The majority (67.2%) had scored poor knowledge regarding these medications. The intake patterns indicated that 78.3% of the consumers were self-administrated without prescription and 76.1% of the consumers used licensed type. Despite being perceived as useful in weight reduction, vomiting, and nausea, were very common adverse events (65.2%). Besides being obese, students with excellent knowledge demonstrated higher odds (OR=24.38 (95%CI: 8.12-73.19) and 10.48 (95%CI: 4.03-27.26), respectively) for medication consumption compared with other, $p < 0.0005$.

Conclusion: Using anti-obesity medications among university students is of concern, particularly due to using unlicensed types and the lack of clinical prescription. With the reported poor knowledge, it becomes crucial to launching awareness campaigns and tailored programs for this age group and the general population.

Keywords: anti-obesity medications; prevalence; knowledge; intake pattern; experienced effect, university students

Running title: Anti-obesity medications usage among the university students.

Introduction

Obesity has been associated with the development and progression of complications that include, for example, type 2 diabetes, osteoarthritis, and cardiovascular disease (CVD) [1]. Studies suggested that 5–10% weight reduction had a significant improvement in these diseases [2]. Therefore, it is essential for identifying effective long-term treatment strategies for overweight and obesity. Lifestyle modification is the gold standard way to tackle obesity, briefly, by decreased calorie intake and increased physical activity, which can lead to a sustainable reduction in weight by 1-2 pounds per week [3]. Such "lifelong effort" and gradual weight loss are not particularly appealing, despite being a more sustainable approach. Some people consume anti-obesity medications (AOM) for rapid weight loss, which requires little or no effort [1, 3, 4]. The high obesity rate among the adolescent has a strong relationship with the low health-related quality of lifestyle [5]. The familiar stereotype of beauty nowadays among adolescents is the kind of lean and lanky body. Therefore, many adolescents have started to try solutions rather than

lifestyle modification, such as AOM or natural herbs, to lose weight rapidly without effort [6]. Several AOM was approved for weight loss by the U.S. Food and Drug Administration (FDA) such as Orlistat, lorcaserin, naltrexone-bupropion, phentermine-topiramate, and liraglutide [7] and in Jordan, the only licensed type is Orlistat [8]. AOM are classified based on their mechanisms as; suppressing appetite, inhibiting fat absorption, or increasing energy consumption and thermogenesis [9]. The cardiometabolic profile for these medications is still not clear despite the long-term use approval [7]. These medications have registered potential adverse health impacts. Some of these medications, ephedra and phenylpropanolamine, are banned from the markets by FDA for increasing the risk of stroke and cardiac events [3]. Nevertheless, AOM are still recommended with at least one weight-associated co-morbidity, such as type 2 diabetes and CVD [1, 4]. Other products used for weight loss include dietary supplements, amino acids, and fibers [10]. The dietary supplement could affect weight through

different mechanisms by reducing the appetite or increasing resting metabolism depending on the type of supplement consumed [10]. In Jordan, a recent cross-sectional survey among male university students reported that 50% of the participants were overweight, 28% were underweight, and 11.1% were obese [11]. In 2013, a cross-sectional survey among adolescent girls aged 15 years old reported that 24.4% and 8.9% were overweight and obese [12]. An earlier study reported that overweight and obesity were 17.5% and 9.6%, respectively, among the students from eight public schools in Amman aged 15 or 16 years [13]. In 2008, Khader and colleagues found that the prevalence of obesity was 53.1% and 28.1% (for females and males, respectively), and it has increased significantly over ten years for genders aged 60 years and above [14]. It is clear that overweight and obesity is a significant public health challenge worldwide and in Jordan. Although extensive research has been carried out on obesity prevalence in Jordan, limited studies exist to investigate usage rate [15], perception, awareness, and knowledge related explicitly to the AOM [16]. The marketing and the usage rate of AOM was observed among the adults not only because the obesity increased dramatically over the last years, but also because there is irrational and widespread of AOM [6].

University students are a crucial target group to promote healthy lifestyle practices. This age group is not only passing through the transition stage but also it is an appropriate time point to create their lifelong habits. Unfortunately, there are no sufficient information available regarding the prevalence of using AOM and intake patterns either in the Middle East or in Jordan. The problem is that the spreading of the AOM market on social media and the usage rate among the students especially the females becomes common but there is no recent data available on the usage rate or on the knowledge of the students regarding AOM intake. Few studies were published regarding the knowledge and perceptions AOM among different groups [16-19]. From another hand of view, university students stand out particularly with the role of higher education in the adoption of preventive actions and plan to give others an opportunity to contribute to the community to which they belong [20]. So based on this perspective, a study of this age category acquires greater relevance when the goal is a true assessment of AOM usage in a group of young adults who are opinion-maker persons enables the provision of subsidies for future preventive measures in the population.

Thus, the present study aimed to determine the prevalence, knowledge, usage determinants, intake pattern and experienced effects of anti-obesity medications (licensed and unlicensed) among university students in Jordan by examining the usage rate (prevalence) of AOM using among the university students in Jordan; determining the knowledge level of the university students regarding AOM; determining the factors that could be associated with AOM usage and determining the intake pattern and experienced adverse events.

Materials and methods

Study design and sample size

A cross-sectional study was carried out between October 2019 and February 2020 among Jordanian students from 19 universities in Jordan (10 public and 9 private). The inclusion criteria for this study included the current university students only. The exclusion criteria were non university students such as school age group and the graduated students. The sample size was measured using the Raosoft online calculator (Raosoft) [21-23] which is explicitly designed for population surveys to calculate the sample size to meet the desired confidence level and margin of error with the consideration of the population size [22,23]. Based on the total number of students registered for the academic year 2017/2018 (320,539) [24], the calculation indicated that the minimum sample size would be 384 students to meet 95% confidence level (CI) and 5% margin of error.

Data Collection tools

A structured web-based questionnaire was used to collect the data. The questionnaire was developed by the research team after extensive summarizing of related literature [6, 16-18].

A consent statement was outlined at the beginning of the questionnaire. Participation was voluntary, with no incentives offered (convenience sample). The questionnaire was sent by the research team to 19 Jordanian universities (the main universities in Jordan) via social media, formal and non-formal sites, and student groups, such as on What's app and Facebook. The questionnaire was arranged in four parts. The first part included sociodemographic characteristics (age, gender, nationality, study year, study course, exercise frequency, and information source of the students regarding AOM). The second part included six questions regarding the student's knowledge about AOM. The intake pattern was explored by four questions in the third section. The last part included five-questions to find out the perceived experience and adverse events of AOM among the consumers. All students completed the first and second parts, and only those who consumed (or consuming) AOM answered the corresponding parts.

Reliability and Validity of the assessment tool

The Questionnaire used in this study was a Web-based questionnaire designed by the research team referring to some previous studies. Validity and reliability were tested before starting the final data collection. To confirm reliability, a pilot sample of 30 students participated in the assessment of the accuracy and consistency of the questionnaire. The pilot students were contacted two weeks later and completed the questionnaire again (pre/post-test reliability was performed). Reliability was confirmed by Cronbach's alpha analysis using a test-retest method. The questionnaire was reliable with regard to overall internal consistency and reliability which was estimated using the coefficient alpha (Cronbach's alpha= 0.8) and test-retest reliability (Pearson's $r=0.98$). The coefficient alpha result reflects good and adequate internal consistency. The results of stability coefficient indicated stronger test-retest reliability, reflecting that measurement error of the questionnaire is less likely to be attributable to changes in the individuals' responses over time. To confirm the content validity, Pharmacists and nutritionists were consulted and asked to review the questionnaire, and they were able to comment and confirmed validity. In addition, correlation test was performed to insure the validity of this questionnaire. The construct validity of a questionnaire is evaluated by estimating the association between the scale items (Correlation matrices). The correlation coefficients (r^2) range were between 0.84 and 0.62; mean of 0.73 which reflects adequate construct validity.

Statistical analysis

Study participant's characteristics, consumption patterns, and experienced effects of AOM intake were presented as descriptive data, absolute numbers, and frequencies. A chi-squared test was used to find the relationship between the student's demographics and AOM intake. The logistic regression model was carried out by a Binary logistic regression, which was used to determine the predictor determinants associated with AOM intake among university students. The mean score of the knowledge questions was calculated, and the cut point of the knowledge level was upon our results and presented as absolute numbers and frequencies. The data were analyzed using SPSS statistical software (v. 25). The significant level (p-value) in this study is <0.05 .

Ethical approval

This study was approved by the Scientific Research Ethical Committee of the Jordanian Petra University, Faculty of Pharmacy for the ethical approval (Grant number: 2Q/1/2020).

Results

Upon our results, the mean score of knowledge levels has been categorized into poor, moderate, and good knowledge among the students (≤ 40 , 40-60, and ≥ 60 , respectively), as shown in Figure 1.

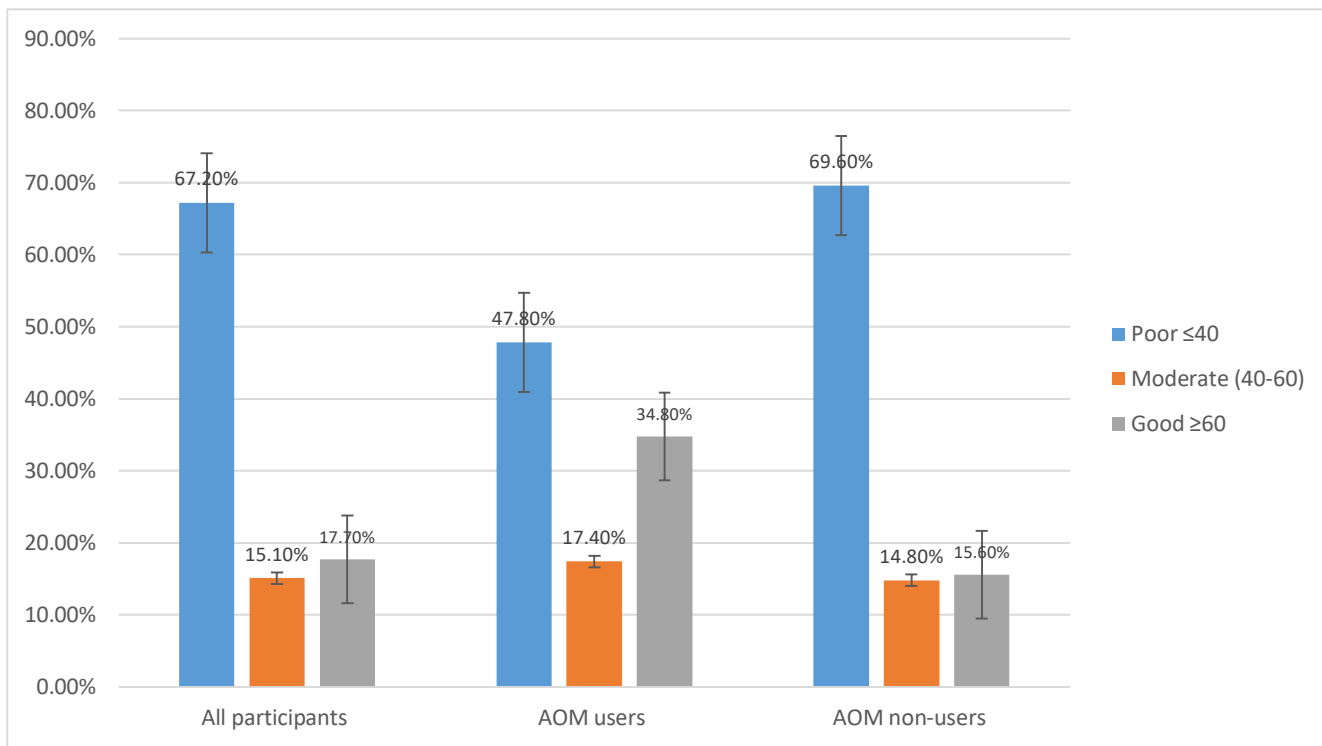


Figure 1: The knowledge level among the university students (users and non-users) regarding anti-obesity medications.

The majority of students (67.2%) had poor knowledge even non-users. The rest of the students distributed between moderate and good knowledge. Similar results were observed among the users; 47.8% have poor knowledge. However, the results indicated that there was a significant difference in the knowledge level (p=0.003) between users and nonusers as shown in Table 1.

Characteristics		All students (n=418)	Users (n=46)	Non-users (n=372)	p-value
Age		21.59±2.69	22.91±3.53	21.42±2.53	0.05
BMI	Underweight	24 (5.7)	0	24 (6.5)	≤0.001
	Normal range	289 (69.1)	14 (30.4)	275 (73.9)	
	Overweight	74 (17.7)	20 (43.5)	54 (14.5)	
	Obese	31 (7.4)	12 (26.1)	19 (5.1)	
Gender	Male	126 (30.1)	17 (37.0)	109 (29.3)	0.18
	Female	292 (69.9)	29 (63.0)	263 (70.7)	
Nationality	Jordanian	356 (85.2)	42 (91.3)	314 (84.4)	0.51
	Non- Jordanian	62 (14.8)	4 (8.7)	58 (15.6)	
Study year	Undergraduate	403 (96.4)	42 (91.3)	361 (97)	0.07
	Postgraduate	15 (3.6)	4 (8.7)	11 (3.0)	
Study course	Medical	208 (49.8)	14 (30.4)	194 (52.2)	0.004
	Non-medical	210 (50.2)	32 (69.6)	178 (47.8)	
Exercise	Never	308 (73.7)	36 (78.3)	272 (73.1)	0.13
	Daily	12 (2.9)	0	12 (3.2)	
	Weekly	31 (7.4)	6 (13.0)	25 (6.7)	
	1-3 times/week	67 (16.0)	4 (8.7)	63 (16.9)	
Information source	Family & friends	98 (23)	9 (19.6)	89 (23.9)	0.39
	*Reliable sources	67 (16)	5 (10.9)	62 (16.7)	
	Social media	253 (60.5)	32 (69.6)	221 (59.4)	
Knowledge	Poor ≤40	281 (67.2)	22 (47.8)	259 (69.6)	0.003
	Moderate (40-60)	63 (15.1)	8 (17.4)	55 (14.8)	
	Good ≥60	74 (17.7)	16 (34.8)	58 (15.6)	

Continues variables summarized as mean± SD. Categorical variables summarized as n (%). *Included health professionals such as nutritionist and physicians, and official scientific site. P-value ≤0.05

Table 1. Sociodemographic characteristics of the students in Jordanian universities, according to univariate analysis of anti-obesity medications intake

A total of 418 students aged 21.59 (SD 2.69) years old. Females were 69.9% of the sample. The majority of the students were of Jordanian nationality (85.2%). The vast majority 96.4% were undergraduate students, and 50.2% were in nonmedical courses as shown in Table 1.

This cross-sectional study shows that the prevalence of AOM usage was 11% (63% females). Among AOM consumers, 30% of the students were within the normal weight, while 43.5% were overweight, and 26.1% were obese as shown in Figure 2.

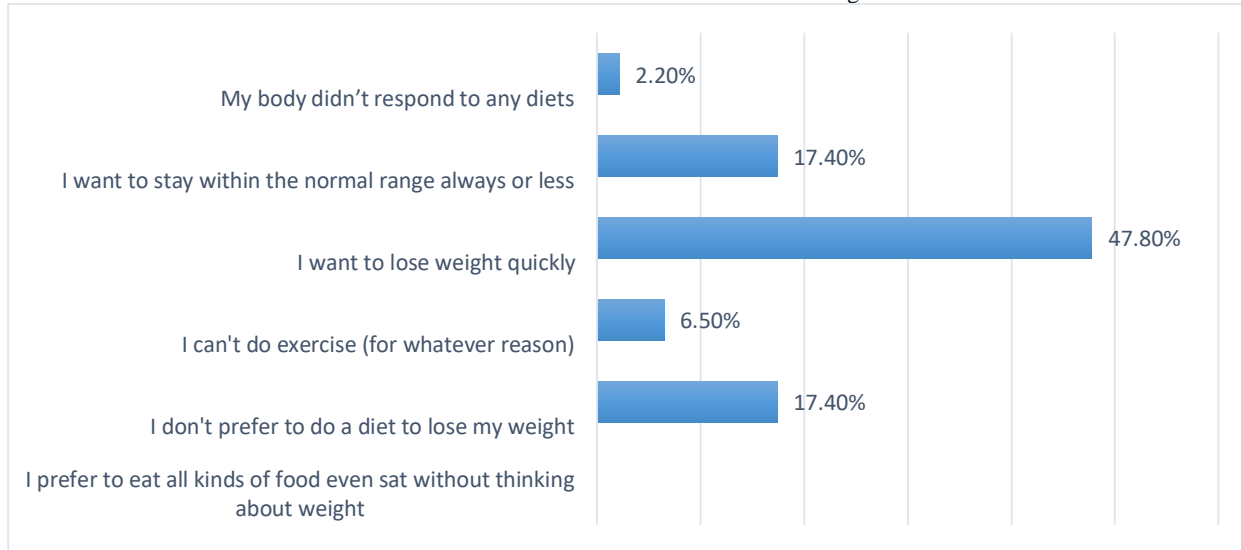


Figure 2: Reasons of using AOM among university students in Jordan, (n=46)

Approximately one-third of the consumers were students with nonmedical specialties (69.6%). Surprisingly, the majority of the AOM consumers never partake in exercise (78.3%), and more than half were not smokers (63%). For both AOM consumers and non-consumers, the primary source of information regards AOM was social media (69.6% and 59.4%, p=0.39, respectively). Chi-squared test results indicated that there

was a significant association between age, BMI, study year, smoking, knowledge level, and AOM intake (p-value ≤0.05).

Table 2, illustrates the results of backward logistic regression. The model was carried out through six steps. Variables in the first step were: Age, Gender, Nationality, Study course, Study year, BMI, Information source, Exercise, and Knowledge category.

Variable (in the final model ^a)	B	Odds Ratio (95% CI)
Age	0.16	1.17 (1.052-1.301)*
BMI category		
Obese	3.19	24.38 (8.12-73.19)*
Overweight	2.46	11.71 (4.93-27.78)*
Normal	-	-
Study course category		
Non-medical	1.67	5.32 (2.25 -12.55)*
Medical	-	-
Knowledge category		
Excellent	2.38	10.48(4.03-27.26)*
Moderate	1.33	3.79(1.29 -11.14)*
Poor	-	-

^a Variables in the first step were: age, gender, nationality, study course, study year, BMI, information source, exercise, and knowledge category.
*Statistically significant at P<0.005.

Table 2: The logistic regression model for determinants variables of anti-obesity medications based on the users and nonusers

The regression model explained 36.8% (Nagelkerke R²) of the variance in consumption AOM. The model was statistically significant $\chi^2(5) = 86.93, p < 0.0005$. It demonstrated good fitting as Hosmer and Lemeshow goodness of fit test where $\chi^2(8) = 10.43, p = 0.236$. Odds ratios for the anti-obesity medications intake based on the participant characteristics are illustrated in table 4.

Regarding using anti-obesity medications, older age was associated with an increase in the likelihood of using medications by 1.17 units when holding all other variables in the model constant. Nonmedical students were more likely than medical students to use anti-obesity medications (OR =5.32; 95%CI:2.25-12.55). For the knowledge of anti-obesity medications, students with excellent and moderate knowledge had 10.48 and 3.79 times respectively higher odds of using anti-obesity medications compare with students with poor knowledge (95% CI: 4.03 -27.26;

95%CI: 1.29 -11.14, respectively). Obese students had 24.38 times higher odds of using anti-obesity medications compare with normal body weight students (95%CI: 8.12-73.19). While overweight students had 11.71 times, higher odds of using anti-obesity medications compare with normal body weight students (95% CI: 4.93-27.78).

As shown in Table 3, the most commonly used AOM was Orlistat (76.1%) and the rest of the consumers used unlicensed types. It has been used by 76.1 % of AOM consumers. Moreover, the majority (41.3%) used AOM for a duration of one to two months, with 78.3% without prescription and 82.6% without any supervision from any health professional. Approximately half of the consumers used AOM to lose weight quickly (47.8%). A very small proportion (2.2%) used AOM because their body did not respond to any lifestyle modifications under their estimation.

*Common AOM products	N (%)
Orlistat	31 (76.1)
CLA (Conjugated linoleic acid)	3 (6.5)
L-carnitine (levocarnitine)	2 (4.3)
Dietary fibers	10 (13)
Other	
Intake duration	
Less than one month	17 (37.0)
One -two months	19 (41.3)
Two -three months	4 (8.7)
More than three months	6 (13.0)
AOM intake based on prescription?	
Yes	10 (21.7)
No	36 (78.3)
Do you have supervision from any health professionals	
Yes	8 (17.4)
No	38 (82.6)
*Multiple response possible (percent valid).	

Table 3: The most common types of anti-obesity medications (licensed and unlicensed) used among University students in Jordan and the intake duration, (n=46)

In this study, the students who used or have used AOM reported a reduction in their weight as a result of using AOM, and most of them did not note any changes in their physical activity as shown in Table 4.

Effect	Response	N (%)
Student's estimate weight while using AOM	Not changed	10 (21.7)
	Increase	2 (4.3)
	Decrease	34 (73.9)
Student's physical activity after using AOM	Not change	16 (34.8)
	Increase	21 (45.7)
	Decrease	9 (19.5)
*Experience adverse effect of AOM	No side effects	7 (15.2)
	Constipation	6 (13.0)
	Vomiting and Nausea	30 (65.2)
	Diarrhea	11 (23.9)
	Headache	22 (47.8)
	Anemia	28 (60.9)

	Hair loss	23 (50.0)
	Insomnia	12 (26.1)
	exhaustion	17 (37.0)
	Psychological effect	12 (26.1)
Student's appetite while using AOM	Not change	15 (32.6)
	Increase	8 (17.4)
	Decrease	23 (50.0)
Student's weight after stopping AOM	Not change	21 (45.7)
	Increase	22 (47.8)
	Decrease	3 (6.5)
*Multiple response possible (percent valid).		

Table 4: Experienced effect of AOM among consumers

Only 15.2% reported using AOM with no side effects. The main and most common reported adverse events were nausea and vomiting (65.2%), anemia (60.9%), hair loss (50 %), headache (47.8%), and exhaustion (37%). Decrease the appetite was reported from the majority (50%), and 32.6% did not report any change. Rebound weight gain phenomena was reported by 47.8%.

Discussion

To our knowledge, this is the first study that assessed the prevalence of AOM intake among university students in Jordan. Moreover, variables for individuals at higher risk of using AOM have been identified. In the present study not only knowledge level was assessed, but also intake patterns and experienced effects.

Accordingly, the results would be compared with the closest favorable studies and previous Jordanian study (2018) [15]. The results indicate that less than a quarter of the university students have used AOM (11%). Compared with Reem Issa study, the percentage of the AOM users increased from 5% to 11% within 2 years [15]. The sample size for this study and the previous one is very closed despite that Reem Issa sample was from one university [15].

However, it is expected that the recent development in massive marketing and promotion of such medications for weight loss, and generally, deceptive advertising could lead to use AOM. This impact would not only be anticipated in Jordan but also in other countries. Our results agree with some studies. For the instant, in Malaysia, a very small proportion (0.7%) of college students were using AOM for weight loss, while the majority follow a restricted diet [19]. Another cross-sectional showed that 6.8% of 664 students in Brazil were using or have used AOM [6]. Although the prevalence of AOM has been reported to be relatively low in these other countries, promotion of these medications by social media and other outlets could see an increase in their demand and use. From another point of view, the results of this study could affect by the social norms which lead to underestimation of AOM usage among the respondents. And this explanation could be supported by the GLOBE NEWSWIRE report which reported that there is growth in the AOM prescription between 2019 and 2025 at a Compound Annual Growth Rate of 8.41% [25].

The current study revealed that a large proportion (60.5%) of the students obtained their information regards AOM from the advertisement of social media. It is a higher proportion than results published in 2015 by Jordanian researchers, where social media at that time was the information provider for only 40% [26]. This reflects the growing effect of social media on adolescent's choices. Researchers reported that the heterogeneous market of weight loss products provides incomplete information to the public, and the deceptive advertising for these products has several negative consequences on consumers [3]. Accordingly, these

facts support the current results of the knowledge levels, which state poor knowledge regards AOM medications. A 16% received their information from a perceived reliable resource, which included health care professionals. However, some researchers revealed that 42.1% of the physicians and 33.3% of the nutritionists did not have enough information with regards to conventional medicine that used for weight management, and 30% of the obese adults did not' received any type of information regards the weight loss by using conventional medicine [16]. A cross-sectional study in Spain also concluded that personal trainers need more education programs to raise their awareness regards weight-loss strategies and the AOM effect [17]. This is important as many of their clients invest a large amount of money and trust into these personal training programs, and it is vital that these individuals are adequately trained and educated to provide evidence-based advice.

Knowledge level, age, BMI, and study course were the sociodemographic characteristics associated with AOM intake. Cawley and colleagues mentioned that better education of the individuals makes them more likely to make health-promoting decisions [3]. Therefore, medical students, older students, and higher knowledge level students may have a better awareness related to these medications, the components of these medications, mechanism of work and effect. On the other hand, students with normal BMI have less desirability to use these medications. Gender was not one of the final intake determinants; this supports another cross-sectional where no difference was observed between the student's age and gender for AOM consumers and non-consumers [6]. Nevertheless, the percentage of AOM females' consumers was more than half. The higher intake among females could be explained by sex differences, which support thinness culture among females more than males, and beauty concepts in low BMI. Such a pattern had been reported in many studies [6,27,28]. In contrast, Cawley and colleagues also mentioned that exposure to deceptive advertising is associated with a higher probability of men more than women to consuming weight reduction products [3].

Orlistat was the most common type among university students, as this study showed. Further, the results indicated that around one-third of the consumer used unlicensed types. This point is very crucial point in this research due to the adverse reactions that could results from unlicensed medication over time [29]. In recent years, many novel therapies were growing and developed as alternative and supportive treatment of obesity [29], but at the same time, a number of AOM has been withdrawn from the market after approval because of adverse reaction [30]. To date, the FDA requested withdrawal of the lorcaserin from the market on February 13, 2020, based on the result of a safety clinical trial that showed an increased occurrence of cancer [31].

Orlistat is one of the approved medications by the FDA for weight loss. In Jordan, individuals can get it. Therefore, it is very accessible for consumers. Besides, the cost of the Orlistat is acceptable compared with other methods such as surgeries or even the health professionals' visits. The current results indicated that more than one-third of the students using AOM without prescription, self-medication, and more than two-third without any supervision from health professionals. Similarly, 17.8% of the students in Brazil used AOM without prescription [19]. The students could avoid asking for a prescription of such medications because of the perception that using anti-obesity products are unhealthy methods to lose weight. On the other hand, health professionals avoid prescribing AOM as the first-line therapy for obesity [19]. In another word, taking AOM without a prescription ignored the side effect and the risk factors that could result from these medications.

The main reason to use AOM was the desire to lose weight in little time without effort. This pattern can be confirmed by another finding in the present study, where 78.3% of the consumers had never done an exercise for weight management. Quick win as a driver for AOM consumption seems to be widely accepted by researchers [3,6,32].

Almost 74% of AOM consumer reported that AOM was effective for weight reduction. Such a result was not unexpected. A systematic review and meta-analysis reported that the approved AOM significantly reduced weight for 20% to 54% obese individuals by around 10% of their weight [4]. Other systematic reviews and meta-analyses of randomized controlled trials concluded that many types of AOM reduce weight effectively [33]. Orlistat, in particular, was used by almost 76% of AOM consumers in the present study. Its impact on reducing body weight by 2.20 kg/m² (95% CI: 1.57 to 2.83) has been documented in the literature [33]. A recent systematic review and meta-analysis of 31 randomized controlled trials reported that the efficiency of AOM appears to be in following ascending orders: Orlistat, phentermine plus topiramate, lorcaserin, naltrexone plus bupropion and liraglutide compared to the placebo [1]. Orlistat has a higher potential efficiency in weight reduction. These results ensure similar results of older systematic review and meta-analysis of 28 randomized clinical trials [4]. In Jordan, minimal research investigated AOM related issues. A study reported that more than half of pharmacists believed complementary and alternative medicine could be used effectively to control weight [16]. Another study reported that 37.5% of university students believed that conventional medicine of weight loss is beneficial for weight management. However, almost 82% prefer herbal remedies [15].

Approximately 85% of AOM consumers reported adverse events. It is widely agreed that the adverse effects of AOM should be explained to the consumers to avoid consequences, as they have a well-documented profile of adverse effects [33]. However, adverse events vary based on the type of AOM, duration of use, and different patterns of intake [34]. Most types lead to headaches, diarrhea, nausea, insomnia, dry mouth, and some types that cause contraindication symptoms such as Contrave that cause constipation [34]. Recently, the most common adverse effects for AOM were reported as gastrointestinal (G.I.) side effects in addition to increased heart rate, creatinine, mood, and sleep disorders, oxalate stone formation, dry mouth, dizziness and insomnia, and increased blood pressure [1]. It is worthy to note that (47.8%) had reported rebound weight gain; a phenomenon that has also been reported and observed by other researchers [1, 4]. Moreover, some studies reported that Orlistat causes macrocytic anemia and thrombocytopenia [35, 36]. It is also reported that Orlistat does not affect appetite in a direct way [9]. Such collective literature can explicitly provide a rationale to adverse event profile reported in the present study.

The results of this study demonstrate that AOM is consumed among a proportion of university students and are easily accessible in Jordan without prescription and supervision. With a growing trend in rapid weight loss, there is a need to invest in appropriate evidence-based, health

promotion education programs from professionals, like dietitians, who can advise on safe weight loss approaches under clinical supervision. University students, in particular, would certainly benefit from increasing the awareness and knowledge of AOM and advice on sustainable weight management. Also, regulatory agencies and pharmacists should take into consideration to provide sufficient knowledge before selling these medications. Finally, more research into the effectiveness, safety dose in clinical populations of adolescents are required to examine the dose-effect of AOM as a safe alternative strategy for weight management. Moreover, currently, with the COVID-19 pandemic and quarantine, most people reported an increase in body BMI and a reduction in the physical activity level. In addition, the AOM marketing increase among different age groups especially the young adults. Therefore, more research is recommended during the pandemic related AOM intake, and more awareness programs are recommended to avoid the adverse reactions or wrong use for any unlicensed products.

To our knowledge, this study is the first study that examined the prevalence of AOM intake, knowledge level toward the typical weight loss medications, intake patterns, and experienced effect among student's universities in Jordan. The data collected from most universities in Jordan. The self-report questionnaire is a useful tool to understand the prevalence of disorders, behavior, some habits, and to assess the individual experiences [36]. In this study, the use of the online questionnaire provided quick circulation of the questionnaire with minimum effort and costs. However, a limitation of this tool is that using the self-reported questionnaire could affect the response of the students. They may not answer truthfully, social desirability bias, and the response bias may influence the results, especially because using AOM among females is one of the sensitive issues. Therefore, social desirability bias and response bias have affected the results. Moreover, the cross-sectional design cannot show a cause-effect association, controlling the confounders and it is susceptible to many types of the bias such as respondent bias and recall bias. Finally, study did not adjust the University of the Study Participants in the analysis. Overall, the finding of this research, more tailored research could be designed to handle specific issues related to AOM.

Conclusion

The results of the present study reported a low prevalence of AOM intake among university students in Jordan. The knowledge level was poor. Age, BMI, study course, knowledge level were predictor factors associated with AOM intake. Prescribing of unlicensed without clinical supervision threaten the health status of the consumers and this suggesting that some consumers are poorly tolerated or poorly efficacious. Targeted health promotion interventions are warranted to provide evidence-based guidance on safe and sustainable weight loss practices.

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Author Contributions

Nour Elshahoryi design the study, collect and analyze the data, and writing the manuscript. Hiba Al-Sayyed contributed to designing the study and writing the manuscript. All authors read and approved the final manuscript.

Conflicts of Interest

The authors declare that they have no conflict of interest.

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