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An Exploratory Study on the Knowledge, Attitudes, and Practices of Weight Gain Products in Aden, Yemen

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Abstract: Background: Weight-gaining (WG) products, including herbal and medicinal supplements, are widely available without prescription. This study aimed to investigate the knowledge, attitudes, practices, and side effects of WG products among the population of Aden, Yemen. Methods: A cross-sectional study involving 186 participants was conducted over four months between May and August 2022. A self-developed survey assessed the knowledge, attitude, practice (KAP), and side effects of WG products. Results: The results showed that 69.9% of the participants were female, with the majority having an underweight or normal body mass index. Notably, 60.2% of the participants lacked knowledge about pharmaceutical WG products, while 68.8% claimed to be familiar with herbal WG products. Despite good knowledge and attitude toward weight gain, participants' practice levels were poor, with 81.2% experiencing side effects, primarily heart-related symptoms, stomach upset, and rapid weight loss.



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Conclusion: This study highlights the need for education and awareness regarding the safe use of WG products, particularly among the population in Aden, Yemen. These findings emphasize the importance of improving knowledge and practice levels to mitigate the risks associated with WG products.

Keywords: attitude, knowledge, practice, side-effects, and weight-gaining products.

也門亞丁地區對增重產品的認識、態度和實踐的探索性研究

摘要：背景：增重 (WG) 產品，包括草藥和藥用補充劑，不需處方即可廣泛取得。本研究旨在調查也門首都亞丁人口對增重產品的認識、態度、習慣及副作用。方法：在 2022 年 5 月至 8 月間的四個月內，進行了一項有 186 名參與者參與的橫斷面研究。一項自行開發的調查評估了 WG 產品的知識、態度、實踐 (KAP) 和副作用。結果：結果顯示 69.9% 的參與者為女性，大多數人的體重指數偏低或正常。值得注意的是，60.2% 的參與者對藥用 WG 產品缺乏認識，而 68.8% 的參與者則聲稱熟悉草本 WG 產品。儘管參與者對增重有良好的認識和態度，但他們的實踐程度卻很差，81.2% 的人曾經有副作用，主要是心臟相關症狀、胃部不適和體重快速下降。結論：本研究突顯出有必要針對 WG 產品的安全使用進行教育與認知，尤其是在也門首都亞丁的人口中。這些發現強調改善知識與實務水平以降低 WG 產品相關風險的重要性。

关键词：態度、知識、實踐、副作用和增重產品。

1. Introduction

Use of medicines from natural sources is a predominant experience in Yemen, as in most South Asian countries [1]. Unlike practice in developed nations, Yemen does not have a practical framework for herbal pharmacovigilance or sufficient legislation governing manufacturing, standardization, quality control, and usage. Children and adolescents in Yemen frequently use weight-gaining (WG) products, either pharmaceuticals or natural remedies. In several nations, natural medications, particularly those classified as plant-based supplements, have increased significantly over the past few years [2]. Herbal medicines have been used for several purposes, such as to preserve well-being or as medicines in different conditions, including addiction therapy, sexual performance-enhancing, bodybuilding, sports performance enhancement, and obesity treatment [3,4]. The herbs are sold in the 'Attarah' shops (where spices and herbs are sold) or street vendors without any official authority controlling the process. Consequently, it is possible to obtain inferior, inaccurate, or contaminated herbs that may have lethal toxicity or adverse effects. According to a study, 65 and 80 percent of people in developing countries use herbs to treat illnesses due to poverty and lack of access to allopathic medications, respectively [5]. Not only herbal products but also

medicines can be obtained by the public over the counter without a prescription, and can be purchased online through various websites, online shopping platforms, and social media.

Owing to the community's growing dependence on herbal medicine, many traditional medicine and herbal companies have been prompted to produce herbal medicines. The government has difficulty regulating the quality and availability of this product because of the numerous traditional medicine industries. This tendency motivates producers to engage in fraud by boosting product sales, including incorporating pharmaceutical ingredients into herbal medicines, so that the desired attributes may be easily obtained [6].

However, knowledge can impact health-related behaviors when arbitrated by attitudes, beliefs, self-efficacy, and a compelling call to action[7]. Herbal therapies are often thought to be safer than current medical treatments, as they have no adverse effects. Consequently, herbal medicines are used for health-related problems that are not significant, such as WG, low appetite, and digestive difficulties. Many of these herbal remedies are fast, simple, and safe. In light of these notions, several businesses have offered various herbal treatments and encouraged consumers to use these products. Although most of these items seem harmless, their short- and long-term implications on customers' overall health remain uncertain. Despite the

significant increase in herbal remedies, studies on their adverse effects have not been widely conducted. This may be because of the lack of strict control over these treatments. Moreover, misuse of herbal drugs has been linked to fatalities. This is the biggest obstacle to the use of herbs, leading to an unsafe herbal market [8]. There are many studies on the use of weight loss products or health supplements; however, no study has focused solely on WG products.

There is an increasing consumption of WG herbal products among Yemeni people, which may contain potentially toxic ingredients that lead to several health problems and other diseases during long-term usage. There have been no studies on its use or side effects; therefore, knowledge, attitude, and practice (KAP) among users and reporting of side effects are necessary. Reporting these side effects may increase awareness of the hazards of using these products and reduce their use.

In recent years, several publications have documented the KAP and side effects of dietary supplements or weight loss products owing to the increasing prevalence rate of obesity globally. There have been no studies on the KAP and side effects of WG products in Yemen, and evidence in low- and middle-income countries is scarce. Thus, this study aimed to explore the knowledge, attitudes, practices, and side effects of weight gain products in Aden, Yemen. This study will help provide insights into how to prevent the dangers of using WG products. More importantly, the analysis can assist the government with information when formulating policies to curb harmful and irrational practices and the use of WG products.

2. Methodology

2.1. Study design

This questionnaire-based cross-sectional study was conducted over four months between May and August 2022. The survey was developed to assess KAP and side effects of WG products.

2.2. Study population and sample size

The study population comprised WG product users who visited pharmacies, clinics, and herbal shops. The respondents were chosen conveniently because of the difficulty of having a sampling frame in a poor resource setting. They all resided in Aden City and had different sex, age, and educational levels.

2.3. Inclusion and exclusion criteria

Consumers who visited pharmacies and herbal shops were included in the study, as well as those who suffered from any side effects and received a consultation from the pharmacies or visited medical clinics. The children were excluded from the survey.

2.4. Study tool development

A questionnaire was constructed to suit the research objectives. This consists of three parts. The first part involved participants' sociodemographic characteristics. The second part includes the KAP for the WG products. The third part focuses on the side effects of the WG products.

2.5. Data collection procedure

The study distributed 500 questionnaires and the authors evaluated the returned questionnaires. Potential participants were conveniently approached by pharmacies, clinics, and herbal shops. The study included participants who were willing to participate and were informed of the confidentiality of the information provided and their use for research purposes only.

2.6. Data analysis procedure

The data were entered into Microsoft Excel and analyzed using IBM SPSS Statistics (version 24). Descriptive statistics (i.e., frequency (%) and mean (SD)) were used to determine the most common side effects of WG products and related KAP parameters.

3. Result and Discussion

This study aimed to explore the KAPs of WG product users and their side effects. The participants reported reasonable knowledge of and attitudes toward weight gain, although these were not reflected in their practice levels. WG products are commercially and widely available without prescriptions and can be obtained from Alatar shops, online websites, social media, or even pharmacies with no control.

3.1. Socio-demographic factors

The total number of participants was 186; most respondents were between the ages of 21 and 25 years (55.3%).

Most participants were female (n=129, 69.9%), single (n=129, 69.9%), and had a high level of education (n=132, 70.9%). The body mass index for most was underweight (18.5 kg/m², n=83, 44.6%), and normal weight (18.5 to 24.9 kg/m², n=84, 45.7%). The results indicated that most single girls tended to gain weight because it is popularly desired for a girl to be chubby. Table 1 presents the results.

Table 1 Socio-demographic data of participants (compiled by the authors)

Variables	n=185 (%)
Age group (years)	
(16-20)	28 (15.1)
(21-25)	103 (55.3)
Above 25	55 (29.6)
Sex	
Male	56 (30.1)

Female	129 (69.9)
Marital status	
Single	129 (69.9)
Married	52 (28.0)
Other	5 (2.7)
Education	
Illiterate	5 (2.7)
Primary school	8 (4.3)
Secondary school	41 (22.0)
University	132 (70.9)
Employment Status	
not working	100 (53.76)
self-employment	35 (18.8)
Government sector	18 (9.7)
Private sector	11 (5.9)
other	22 (11.8)
BMI	
Underweight under (18.5 kg/m ²)	83 (44.6)
Normal weight (18.5 to 24.9kg/m ²)	84 (45.7)
Overweight (25 to 29.9kg/m ²)	14 (6.7)
Obesity (30kg/m ² or more)	3 (1.7)

It is expected that more educated females would be more conscious of the health risks of these products; however, in this study, most of the participants were university graduates or had a secondary school level. This means that they still use these products even after knowing the related side effects, only because they want to gain weight to be more attractive. They used WG products extensively regardless of age, educational level, or marital status.

3.2. Knowledge, attitude, and practice of participants (KAP) toward WG products

This study explored users' KAP levels and the most reported side effects of WG products. It tends to bring out the harmful effects of this practice and the relevant attitudes of those practicing the habit. Most contributors used local mixtures (herbal) (n=161, 86.5%), and only a few used brands (imported pharmaceuticals) (n=25, 13.4%). Most of them bought these products from Herb and Honey shops (n=97, 52.2%), followed by Al Attar Stores (n=38, 20.4%), and pharmacies (n=33, 17.7%). Most of them spent 1-3 months (n=87, 46.8%) on these weight management products, then by 3-6 months (n=29, 15.6%), and approximately 18 (9.7%) used them one year ago. This indicates that they continued using these products for more than one year.

The results are presented in Table 2.

Table 2 Information about weight management products (compiled by the authors)

Information about weight management products	n=185 (%)
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1 Have you used WG products before?	
Yes	185 (99.5)
No	1(0.53)
2 What are the products used?	
Local mixtures (herbal)	161(86.5)
Brand (imported pharmaceuticals)	25(13.4)
3 What is the cost of the product?	5000-6000 YR(4.3-5.2\$)
4 Where do you usually purchase these products?	
Pharmacy	33(17.7)
Herb and honey shops	97(52.2)
Al Attar Stores	38(20.4)
Others	14(7.5)
5 How much roughly did you spend a month on these weight management products?	
Less than a month	14(7.5)
1-3 months	87(46.8)
3-6 months	29(15.6)
6-12 months	12(6.5)
More than 12 months	16 (8.6)
More than 24 months	18 (9.7)
I don't know how long	10 (5.4)

Around 112 (60.2%) participants did not know what pharmaceutical WG products contained; in contrast, about 128 (68.8%) participants claimed that they knew what herbal WG products were. Most participants knew that these products could have potential health effects (n=115, 61.8%), indicating that they had a reasonable level of knowledge. Most respondents were advised by their friends to use these products (n=66, 35.5%), and 62 (33.3%) knew about them from the internet. The results are presented in Table 3.

Table 3 knowledge of WG products (compiled by the authors)

KAP	Yes	No
Knowledge		
1 Do you know what pharmaceutical WG products contain?	74 (39.8)	112 (60.2)
2 Do you know what Herbal WG products are?	128(68.8)	58 (31.2)
3 Do you know that these products could have potential health effects?	115 (61.8)	71 (38.17)
4 How do you know about WG products?		
Healthcare professionals	15 (8.06)	-
Internet	62 (33.3)	-
Product information leaflets	18 (9.67)	-
Signs poster in an educational institute	9 (4.83)	-
Friends and relatives	66(35.48)	-
TV or journal advertisements	14 (7.5)	-
Other	2 (1.07)	-

Considering the participants' attitudes, about 127 (68.3%) knew that using WG products was not always safe. Approximately 73 (39.2%) participants thought that taking a drug, food, or drink with the WG products might interact with each other. The results revealed that the participants had a reasonable attitude toward the safety and interaction of these products.

The results are presented in Table 4.

Table 4 Attitudes of the participants toward WG products (compiled by the authors)

Attitude	Yes	No	Don't Know
1 Do you think the use of WG products is always safe?	23(12.36)	127 (68.27)	36 (19.35)
2 Do you think that taking a drug, food, or drink with the WG products might interact with each other?	73 (39.2)	53 (28.5)	60(32.25)

More than half (n=99, 53.2%) of the contributors had used WG products from 1 to <3 months, followed by 3 to <6 months. The response to the question about getting professional medical help when taking WG products was approximately 37 (19.9%), and most did not receive medical assistance (n=147, 79.0%). Nearly 25 (13.4%) did not know the cause of their low weight, 76 (40.9%) attributed it to genetic causes, and the remaining 85 (45.7%) attributed it to other reasons. This question indicated low awareness of individual health problems. Approximately 52 (28.0%) of them had a low weight for less than five years, followed by a nearly equal distribution of percentage: 30 (16.1%) for 5–9 years, 29 (15.6%) for 10–14 years, 29 (15.6%) for 15–19 years, 28 (15.1%) for 20–24 years, and only 12 (6.5%) suffered from low weight for ≥ 25 years. Some individuals suffer from low weight for long periods, which may be due to real health problems that require medical intervention (Table 5).

Table 5 Participants' practices regarding WG products (compiled by the authors)

Practice	Yes
1 How long have you used WG products?	
1 to <3	99 (53.2)
3 to <6	42 (22.6)
6 to <9	11 (5.9)
9 to <12	7 (3.8)
≥ 12	24 (12.9)
Don't remember	3 (1.6)
Professional medical help when taking WG products?	
2 Yes	37 (19.9)
3 No	147 (79.0)
4 What is the cause of low weight?	
Genetics	76(40.9)
Others (pl specify: __)	85 (45.7)
Don't Know	25 (13.4)
5 Duration of low weight?	
<5 Years	52 (28.0)
5–9 Years	30 (16.1)
10–14 Years	29 (15.6)
15–19 Years	29 (15.6)
20–24 Years	28 (15.1)
≥ 25 Years	12 (6.5)
Don't Know	6 (3.2)
6 Frequency of herbal or other WG product use	
Once daily	74 (39.8)
Twice daily	79 (42.5)

Three times/day	20 (10.8)
Once weekly	6 (3.2)
Whenever needed	7 (3.8)
7 Reasons for consuming WG products	
Gain weight	157 (84.4)
Maintain good health (Ensure adequate nutrition and fill nutrition gap)	36 (19.35)
Treat minor illnesses	8 (4.3)
Meet increased energy demands of the body	56 (30.1)
Prophylaxis to prevent diseases	25 (13.4)
8 Follow a high-calorie diet plan to gain weight.	
Yes	56 (30.1)
No	130 (69.9)
9 Are you suffering from any illness that leads to weight loss?	
Yes	46 (24.7)
No	140 (75.3)
10 Regular medicine intake?	
Yes	31 (16.6)
No	155 (83.3)

Most participants used WG products twice daily (n=79, 42.5%), followed by 74 (39.8%) once daily. Most participants used them to gain weight (n=157, 84.4%), followed by using them to increase the energy demands of the body (n=56, 30.1%), maintain good health (ensure adequate nutrition and fill the nutrition gap) (n=36, 19.4%), and about 25 (13.4%) for prophylaxis to prevent diseases. Most of the users (n=130, 69.9%) did not follow a high-calorie diet plan to gain weight, which indicated the desire of users to gain weight quickly by using these products, which may be harmful, instead of following a healthy diet, which may have slower WG results in comparison to WG products. In addition, most users did not suffer from any illness that led to weight loss (n=140, 75.4%) (see Table 5). The results reveal that the leading cause is becoming more attractive according to public and social norms. Fortunately, most of them (n=155, 83.3%) did not use other medicines regularly, because using WG products that may contain pharmaceuticals with other medicines could lead to drug-drug interactions.

There are a few lists of products and supplements suitable for gaining weight, such as protein supplements, creatine, fish oil, weight gainers (calorie-dense supplements), branched-chain amino acids, herbal weight gainers, and fast carbohydrate supplements (Kumar, 2022). However, these products have both advantages and disadvantages. For example, according to Samal and Samal (2017), protein supplements should be considered processed materials [9]. Usually, they do not contain other essential nutrients that are required to sustain a healthy lifestyle. The authors suggest that the necessary protein intake should be obtained from natural food sources. Further, protein supplementation should be performed only if sufficient protein is unavailable in the regular diet. According to the Mayo Clinic (2023), creatinine can be unsafe for individuals with pre-existing kidney diseases [10].

There is an increasing risk of adulterating herbal products with active pharmaceutical agents to make their products more effective, because there is no control over selling these products and analyzing their contents.

Much money is spent on these products compared to the low income of the individual.

The content of the most commonly used WG products is listed in Table 6.

Most of the WG products used did not contain labels.

Table 6 Names and contents of the most used WG products (compiled by the authors)

Products Name	n=186 (%)	Contents
Al-Malika mixture	3 (1.6)	No label
Al-Barham mixture	5 (2.7)	Honey/Royal Jelly/Pollen/Propolis/Oliban/ Nigella seeds/Other herbs
Alwana mixture	50 (26.9)	Honey/Royal Jelly/ Pollen/ Ginseng/Nuts /Herbs for fattening.
Al-Sultan mixture	1 (0.5)	No label
Al-Madak mixture	2 (1.1)	No label
Ginseng Capsule	11(5.9)	Angelica/Chuanxiong/Cordyceps/ Polygonum multiflorum/Gecko/Cinnamon/Morinda officinalis/Pilose antler/Eucommia ulmoides/Ginseng/Gastrodia elata/Atractylodes macrocephala/Beiqiyam/Rehmannia glutinosa/Medlar/Anemarrhena/Yunling/Acid proof jujube kernel and licorice.
Chinese honey mixture	1 (0.5)	Licorice root/Grapes seeds/Cinnamon bark.
Nuts & honey mixture	7 (3.8)	Honey/Nuts/Pollen.
Amber mix	29 (15.6)	Mountain honey/Royal Jelly/Nuts/Marine amber.
Body building mixture	10 (5.4)	No label
Chocolate mixture	11(5.9)	chocolate/ Ginseng /Earth almond /Wheat germ /Soybeans/ other normal.
Blue flower	1(0.5)	Honey/herbs.
Butterfly mix	1(0.5)	No label
Spirulina	1(0.5)	Spirulina platensis

Wadi	3(1.6)	No label
Hadramout mix		
Suhail's mixture	3(1.6)	Excellent natural honey/Royal Jelly/Bee pollen/Nigella seed/Powder of ginseng/High-quality nuts/Herbs for WG.
Cyproheptadine	1(0.5)	Cyproheptadine HCL
Dexamethasone with Cyproheptadine	6 (3.2)	Cyproheptadine HCL/Dexamethasone
Baash mix	3(1.6)	Honey/Ginseng/Pollen/Royal Jelly.
Noman mixture	7(3.8)	No label
Zahra mix	2 (1.1)	Peanut/Ginseng/wheat germ/Anise/Other herbs.
Fitness and fattening capsules	2(1.1)	No label
American fattening	1(0.5)	No label
Mariam fattening	2(1.1)	No label
Al-Ahlam mix	1(0.5)	Honey/Earth almond/Amla/Ginseng/Pollen/Nuts/Sesame seed paste
Bet Alhylal	1(0.5)	Earth almond/ Sesame seed/pollen/Nuts/ Carbohydrates.
Ginseng honey	1(0.5)	Honey/Ginseng
Wahat	1(0.5)	No label
Shefaak	1(0.5)	No label
Modern mix	1(0.5)	No label
Fish oil pills	1(0.5)	Fish oil/Wheat germ oil
Food Supplements	1(0.5)	Multivitamin
The secret mixture	1(0.5)	No label
The magic mixture for fattening	1(0.5)	Types of honey/Bowder of ginseng/Royal Jelly/Pollen/Nigella seeds/herbs.
Kings Mix	1(0.5)	No label
Don't Declare the type of used products	13 (7.0)	

3.3. Side-effects related to the use of WG products

The unexpected side effects of illegally sold herbal medicines are increasing. Thus, there is an urgent need to raise public awareness of the possible health risks of using counterfeit herbal products that are claimed to be natural and safe. Most herbal medications are blends of several active ingredients and interactions are more

likely to occur because many compounds are present. These interactions may be attributed to the direct pharmacological effects of the herbs or their tendency to induce or inhibit liver enzymes. In any event, there is a need for increased caution and expert interventions aimed at reducing the interactions caused by therapeutic herbs [11]. The highest percentage of side effects was heart-related symptoms (n=185, 99.5%), followed by stomach upset (n=89, 47.8%), rapid weight loss after discontinuing use (n=83, 44.6%) and nausea and vomiting (n=52, 28.0%); the percentages of other side-effects were more or less distributed equally as shown in Table 7.

Table 7 Patient's experience with herbal medication

Patient's experience with herbal medication	N=186(%)
1 Suffering from side effects	
Yes	151 (81.2)
No	35(18.8)
2 Informing physicians about side effects	
Yes	53 (28.5)
No	133(71.5)
3 Doctor's opinion regarding side effects	
Agree to use	28 (15.1)
Disagree to use	88(47.3)
Don't care	70 (37.6)
4 Positive results of herbal medication	
Yes	120(64.5)
No	66(35.5)
5 You will repeat using herbals again	
Yes	78(41.9)
No	108 (58.1)
6 Specification of side effects (can be more than one)	
Stomach Upset	89 (47.8)
Nausea, vomiting	52 (28.0)
Headache	28 (15.1)
Allergy	24 (12.9)
Excessive WG	34 (18.3)
Rapid weight loss after stopping the use	83 (44.6)
Increased risk of diabetics	4 (2.2)
Liver damage	6 (3.2)
Kidney damage	18 (9.7)
Increased facial hair	7 (3.8)
Mood disorders	33 (17.7)
Mood swings	29 (15.6)
Stopped menstrual cycle	14 (7.5)
Breast development (in males)	8 (4.3)
Dehydration	30 (16.1)
Heart diseases	185 (99.5)
High blood pressure	12 (6.5)
Diarrhea	25 (13.4)
Constipation	30 (16.1)

Considering the users' experience with herbal products for WG, this percentage was high. About 151 (81.2%) patients experienced side effects, and 35 (18.8%) did not. The results revealed the safety of these

products in terms of individual health. In addition, most of the participants did not inform their physicians (n=133, 71.5%) and even disagreed with physicians to continue the use of these products (n=88, 47.3%); the users had a low awareness about the potential risks of these products on human health in the short and long term. Approximately 120 (64.5%) users had a positive outcome when using herbal products. However, 108 patients (58.1%) did not repeat their use. The most commonly used WG products are listed in table 6.

Some of the reported side effects correspond to dexamethasone, such as elevation of blood pressure, gastric upset, and ulceration. Rapid weight loss after stopping use may be related to sodium and water retention [12].

Other side effects, such as cardiovascular diseases, mood disorders, and headaches, are associated with the use of Cyproheptadine [13]. In addition, the reported side effects could be due to impurities from other pharmaceuticals or the interaction of the herbs present in these products. A documented case to a clinic in Yemen about a young woman about 33 years old suffering from pain and difficulty in moving her shoulders and hips. After investigation and radiography, the diagnosis of avascular necrosis due to the use of WG products for an extended period was made. A study in Iran indicated the exact diagnosis of avascular necrosis of the femoral head in 20.9% of patients with a history of using unapproved WG supplements [14].

The highest percentage of side effects was heart-related symptoms (n=185, 99.5%), followed by stomach upset (n=89, 47.8%), rapid weight loss after discontinuing use (n=83, 44.6%), and nausea and vomiting (n=52, 28.0%); the percentages of other side effects were more or less distributed equally.

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Studies have shown that weight gain attempts are common among the general population in the UK, the US, and Canada, particularly among boys and young men [15].

The use of specific diets or modifying food intake are commonly reported methods for weight gain. Ganson et al. (2022) found that muscularity-oriented eating behaviors were the main reason for the association between weight gain attempts and diet modification efforts. These behaviors may potentially undermine health, especially when using potentially detrimental dietary practices. Individuals tend to use herbal weight gain drugs without knowing their actual ingredients. Saberi et al. (2018) discovered cyproheptadine, dexamethasone, sildenafil, tramadol, caffeine, and acetaminophen as herbal weight gain drugs in Tehran

herb shops [16]. The analyzed dosage forms contained cyproheptadine and dexamethasone at concentrations higher than the therapeutic doses. This can easily predispose users to life-threatening conditions.

4. Conclusion

The study concluded that most respondents used WG products, regardless of age, income, education, or marital status. The participants reported good knowledge of and attitudes toward weight gain, although these were not reflected in their practice levels. The lack of pharmaceutical knowledge, safety, and use of WG products directly contributes to poor practice levels. Some of the participants experienced side effects such as heart-related symptoms, stomach upset, rapid weight loss after discontinuing use, nausea, vomiting, and reported cases of avascular necrosis from a clinic. The current study will serve as a reference for future studies in Yemen and other countries since studies related to the KAPs and side effects of WG products are scarce.

4.1. Study limitations

The limitations of our study include the use of a convenience sample, which might not represent the entire community. The relatively small sample size in this cross-sectional study might also affect the generalizability of the findings. Another possible limitation is social desirability bias. However, the strength of this work is that the survey provides insight into a topic that is essential but rarely studied in a poor resource setting.

4.2. Study recommendations

Finally, the following points are recommended for health promotion programs and for improving future research projects:

1- The data collection to study the related side effects of WG products should be carried out periodically. A retrospective cross-sectional study to analyze the most common side effects of these products should be performed over a longer period, extending for several years. Obtain a more transparent relationship between the use of these products and the prevalence of some diseases in the city.

2- Increase public awareness and knowledge about the health risks of continuous use without medical supervision.

3- Health education programs should target users through various media options, including leaflets, televisions, and radio. Educating the public on the risks of using these products is imperative to mitigate the side effects of their use.

4- The sales and marketing of WG products must be controlled, which could be done by imposing fines and penalties on the marketers of such products.

5- Advise those who want to gain weight to follow a balanced diet directed by a nutritionist.

6- This is quite problematic, and the challenges

require key health policymakers and officials to prevent dispensing of these medicines without a prescription.

7- Not to purchase any fattening product that does not carry the necessary information label in both Arabic and English, such as the ingredients of the product, its effectiveness, its safety and use, and its precautions, in addition to the name and address of the manufacturer and the country of origin.

8- Do not buy herbal products through the Internet, television, or other media because they are inferior and unlicensed and have been proven to contain prohibited medicinal ingredients, heavy metals, microorganisms, or weeds that are not allowed to be used.

9- Do not purchase any herbal product or medicine unless it is confirmed that it is licensed by the official health regulatory authorities in Yemen because the product may be granted a license in other countries that differ from the licensing systems and safety requirements followed in the country.

Declarations

Author Contributions

Conceptualization, W.F.B.; methodology, W.F.B. and E.S.O.B.; software, M.I.M.I.; validation, M.I.M.I.; formal analysis, M.I.M.I.; investigation, W.F.B. and E.S.O.B.; resources, E.S.O.B.; data curation, E.S.O.B.; writing—original draft preparation, W.F.B.; writing—review and editing, W.F.B.; visualization, E.S.O.B.; supervision, W.F.B.; project administration, W.F.B.. All authors have read and agreed to the published version of the manuscript.

Data Availability Statement

The data presented in this study are available on request from the corresponding author.

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Institutional Review Board Statement

Rigorous ethical guidelines were adhered to throughout the study to ensure participant privacy and data confidentiality in compliance with institutional and national research standards.

Informed Consent Statement

Participation in the study was voluntary, and informed consent was obtained from all participants prior to their involvement.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this manuscript. In addition, ethical issues, including plagiarism, informed

consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies, have been completely observed by the authors.

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References

- [1] HEHMEYER I., SCHÖNIG H., REGOURD A. Herbal medicine in Yemen. *Islamic history and civilization*, 2012, v. 96.
- [2] BEHNOOD-ROD A., et al. Complementary and alternative medicine use among Iranian patients attending general urban outpatient clinics *Complementary Therapies in clinical practice*, 2018, 30:58-63. <https://doi.org/10.1016/j.ctcp.2017.12.008>
- [3] KHAZAN M., HEDAYATI M., ASKARI S., AZIZI F. Adulteration of products sold as Chinese Herbal medicines for weight loss with thyroid hormones and PCP. *Journal of Herbal Medicine*, 2013, 3(1): 39-43. <https://doi.org/10.1016/j.hermed.2012.11.003>
- [4] ROCHA T., AMARAL J.S., OLIVEIRA M. B., PP. Adulteration of dietary supplements by illegal addition of synthetic drugs: A review. *Comprehensive Reviews in Food Science and Food Safety*, 2016; 15.1:43-62. <https://doi.org/10.1111/1541-4337.12173>
- [5] AKERELE O. WHO guidelines for the assessment of herbal medicines. 1992.
- [6] TRIYASMONO Liling., SAFITRI R., NI'MAH M., Validasi Metode Dan Analisis Penetapan Kadar Sibutramin HCl Pada Jamu Pelangsing Dengan KCKT Fase Terbalik. *Jurnal Pharmascience*, 2015, 2.1:50-57. <http://dx.doi.org/10.20527/jps.v2i1.5813>
- [7] GREEN L., KREUTER M. Pre-procedure model. Health promotion planning: an educational approach. 3rd ed. Mountain View (CA): Mayfield Publishing Company, 1999, 32-43.
- [8] ABAHUSSAIN N. A., ABAHUSSAIN E. A., AL-OUMI F. M. Pharmacists' attitudes and awareness towards the use and safety of herbs in Kuwait. *Pharmacy Practice (Internet)*, 2007, 5.3:125-129.
- [9] SAMAL J., Rabindra K., SAMAL I. R. Protein supplements: pros and cons. *Journal of Dietary Supplements*, 2018, 15.3:365-371. <https://doi.org/10.1080/19390211.2017.1353567>
- [10] Mayo Clinic (2023). Creatine: Overview. <https://www.mayoclinic.org/drugs-supplements-creatine/art-20347591>
- [11] IZZO A.. Interactions between herbs and conventional drugs: An overview of the clinical data. *Medical Principles and Practice*, 2012, 21.5:404-428. <https://doi.org/10.1159/000334488>
- [12] Tripathi, K. D. (2013). *Essentials of medical pharmacology*. JP Medical Ltd.
- [13] Merck & Co., Inc. Product Information. Decadron (Dexamethasone). West Point, PA: Merck & Co, Inc, 2001.

- [14] MORTAZAVI S.M. J et al. Unapproved weight gain supplement as a cause of avascular necrosis: a cautionary report. *Archives of Bone and Joint Surgery*, 2019, 7.6:561.
- [15] GANSON KT, NAGATA JM, VANDERLEE L, RODGERS RF, LAVENDER JM, HAZZARD VM, MURRAY SB, CUNNINGHAM M, HAMMOND D. Weight gain attempts and diet modification efforts among adults in five countries: A cross-sectional study. *Nutr J*. 2022 May 13;21(1):30. doi: 10.1186/s12937-022-00784-y.
- [16] SABERI N, AKHGARI M, BAHMANABADI L, BAZMI E, MOUSAVI Z. Determination of synthetic pharmaceutical adulterants in herbal weight gain supplements sold in herbshops, Tehran, Iran. *Daru*. 2018 Dec; 26(2):117-127. doi: 10.1007/s40199-018-0216-2.

參考文獻

- [1] HEHMEYER I., SCHÖNIG H., REGOURD A. Herbal medicine in Yemen. *Islamic history and civilization*, 2012, v. 96.
- [2] BEHNOOD-ROD A., et al. Complementary and alternative medicine use among Iranian patients attending general urban outpatient clinics *Complementary Therapies in clinical practice*, 2018, 30:58-63. <https://doi.org/10.1016/j.ctcp.2017.12.008>
- [3] KHAZAN M., HEDAYATI M., ASKARI S., AZIZI F. 甲狀腺激素和五氯苯酚攪雜作為中藥減肥藥銷售的產品
• *Journal of Herbal Medicine*, 2013, 3(1) : 39-43. <https://doi.org/10.1016/j.hermed.2012.11.003>
- [4] ROCHA T., AMARAL J.S., OLIVIRA M. B., PP. 非法添加合成藥物攪雜食物補充品 : A review. *Comprehensive Reviews in Food Science and Food Safety*, 2016; 15.1:43-62. <https://doi.org/10.1111/1541-4337.12173>
- [5] AKERELE O. WHO 草藥評估指南。1992.
- [6] TRIYASMONO Liling., SAFITRI R., NI'MAH M., Validasi Metode Dan Analisis Penetapan Kadar Sibutramin HCl Pada Jamu Pelangsing Dengan KCKT Fase Terbalik. *Jurnal Pharmascience*, 2015, 2.1:50-57. <http://dx.doi.org/10.20527/jps.v2i1.5813>
- [7] GREEN L., KREUTER M. Pre-procedure model. 健康促進規劃：一種教育方法。第3版。Mountain View (CA) : Mayfield Publishing Company, 1999, 32-43.
- [8] ABAHUSSAIN N. A., ABAHUSSAIN E. A., AL-OUMI F. M. Pharmacists' attitudes and awareness towards the use and safety of herbs in Kuwait. 藥劑實務 (網際網路), 2007, 5.3 : 125-129.
- [9] SAMAL J., Rabindra K., SAMAL I. R. 蛋白質補充劑：利弊。 *Journal of Dietary Supplements*, 2018, 15.3:365-371. <https://doi.org/10.1080/19390211.2017.1353567>
- [10] Mayo Clinic (2023). 肌酸：概述。 <https://www.mayoclinic.org/drugs-supplements-creatine/art-20347591>
- [11] IZZO A. 草藥與傳統藥物之間的交互作用：臨床數據概述。 *Medical Principles and Practice*, 2012, 21.5:404-428. <https://doi.org/10.1159/000334488>
- [12] Tripathi, K. D. (2013). 《醫學藥理精要》。JP Medical Ltd. (2013).
- [13] Merck & Co. 產品資訊。Decadron (Dexamethasone). 西點, 賓夕法尼亞州 : Merck & Co, Inc, 2001.

- [14] MORTAZAVI S.M. J 等人. 未經批准的增重補充劑是導致血管性壞死的原因：一份警示性報告。Archives of Bone and Joint Surgery, 2019, 7.6:561.
- [15] GANSON KT, NAGATA JM, VANDERLEE L, RODGERS RF, LAVENDER JM, HAZZARD VM, MURRAY SB, CUNNINGHAM M, HAMMOND D. 五個國家成年人的體重增加嘗試和飲食調整努力：一項橫切面研究。Nutr J. 2022 年 5 月 13 日 ; 21(1):30。DOI: 10.1186/s12937-022-00784-y。
- [16] SABERI N, AKHGARI M, BAHMANABADI L, BAZMI E, MOUSAVI Z. Determination of synthetic pharmaceutical adulterants in herbal weight gain supplements sold in herbshops, Tehran, Iran. Daru. 22018 Dec; 26(2):117-127. doi: 10.1007/s40199-018-0216-2.

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