

The Perceptions of Overweight and Obese Individuals Regarding Weight-Loss Dietary Supplement Advertisements: A Pilot Cross-Sectional Survey

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ABSTRACT

Introduction: The negative health consequences of overweight and obesity underscore the importance of weight loss in mitigating these issues. Weight-loss dietary supplements (DS) are highly sought-after by overweight or obese individuals, with widespread advertisements promoting their use. This study aimed to investigate the perceptions of overweight and obese individuals regarding weight-loss DS advertisements.

Methods: Over a six-week period from 5th April to 17th May 2023, an online pilot cross-sectional study was conducted targeting overweight and obese individuals in Malaysia. The study utilized a convenience sampling method to recruit participants.

Results: Of the 146 participants, most were female (82.9%), 53.4% were overweight, and 46.6% were obese. Most respondents believed that weight-loss DS advertisements often contained exaggerated, unverified, and misleading information. Nearly 90% acknowledged that exaggerated advertisement claims might influence consumers, and about 85% believed that people are influenced to buy frequently advertised weight-loss DS. Despite these perceptions, about 40% reported purchasing a weight-loss DS after seeing such a product in an advertisement, while less than 50% of those who purchased weight-loss DS sought information from healthcare professionals.

Conclusion: The study found that almost 40% of the respondents had purchased a weight-loss DS after seeing such products being advertised. Individuals with higher income, married people, and older respondents appeared more likely to purchase a weight-loss DS. These findings underscore the necessity for stricter regulatory frameworks and comprehensive consumer education initiatives to protect consumers from misleading information and unethical marketing tactics within the weight-loss DS industry. Implementing targeted public health interventions could further safeguard consumers from the risks associated with exaggerated product claims.

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INTRODUCTION

Classifications of overweight and obesity are based on the body mass index (BMI), with overweight defined as a BMI of 25 kg/m² or higher and obesity as a BMI of 30 kg/m² or higher (1). According to the World Health Organization (WHO), in 2016, over 1.9 billion individuals aged 18 and over were overweight, accounting for 39% of

the global adult population. The incidence of obesity has tripled since 1975, affecting approximately 650 million adults, which equates to nearly 13% of the world's adult population (2). Malaysia has witnessed a rise in adult obesity, which increased from 4.4% in 1996 to 17.7% in 2015 (3). The prevalence of overweight adults in Malaysia also increased from 29.4% in 2011 to 30% in 2015. Furthermore, obesity affected 15.1% and 17.7% of the Malaysian adult population in the same two years (4), with more recent data from 2019 showing a further increase to 19.7% (5).

Several factors, including lifestyle choices, dietary habits, sedentary behavior, genetic predisposition, and environmental influences, have been identified as contributors to the prevalence of overweight and obesity (6, 7). Cultural and social normative factors, as well as eating and exercise behaviors, can also influence the prevalence of these conditions (6, 8), which can lead to serious health outcomes such as cardiovascular diseases, diabetes, certain cancers, and musculoskeletal disorders (9-11). In Malaysia, these conditions are particularly prevalent, with diabetes and cardiovascular diseases now being among the leading causes of mortality. Furthermore, the management of these diseases imposes substantial economic burdens on the healthcare system (1). Of growing concern is the increasing incidence of childhood obesity, which can lead to long-term health implications and a higher likelihood of obesity in adulthood (12).

Weight loss is a crucial strategy in mitigating the negative consequences of overweight and obesity. Prescription medications are available to aid in weight loss for those experiencing health complications due to excessive body weight (13). When combined with lifestyle and behavioral changes, such as improved diet and increased physical activity, these medications can support weight loss and maintenance. However, the potential side effects of these medications may outweigh their benefits, and their use requires medical supervision (14). Additionally, some weight management drugs have been linked to severe health complications, leading to their withdrawal from the market.

In response to these concerns, many individuals turn to weight-loss dietary supplements (DS) as an alternative. A cross-sectional study conducted among individuals classified as overweight or obese revealed that approximately 19% of the respondents reported consuming weight-loss DS, with the cited reasons including a desire for immediate weight loss effects and an inability to achieve weight reduction through diet and exercise (15). Cultural and psychological factors, including societal pressures to maintain a slim physique and the normalization of thinness as a beauty standard, potentially play a significant role in driving individuals to seek rapid solutions such as weight-loss DS (16). These pressures, can lead to low self-esteem and body dissatisfaction, further increasing reliance on marketed weight-loss DS.

Additionally, weight-loss DS are more easily obtained as they typically require no prescription, making them more accessible to those seeking such products. Moreover, these supplements are often perceived as safe and natural (17). This perception of safety, combined with their convenience, makes these supplements an attractive option for many seeking to manage their weight.

However, the popularity of weight-loss DS is frequently driven by aggressive and unethical marketing practices. These advertisements often exploit consumer vulnerabilities by using exaggerated and misleading claims about the efficacy and safety of the products. Testimonials, before-and-after images, and endorsements from celebrities or influencers are commonly used to create unrealistic expectations of rapid weight loss, even when these results may not be typical or scientifically validated (18, 19). Such tactics are ethically problematic, as they capitalize on consumers' insecurities and desire for quick-fix solutions, often at the expense of their health and well-being. The pervasive nature of these advertisements can foster an environment in which consumers are misled into believing that DS are a safe and effective alternative to evidence-based weight-loss strategies, despite the lack of rigorous scientific support for many of these products.

The ethical concerns extend beyond misinformation, as these marketing strategies can perpetuate harmful social norms surrounding body image and weight (20). By normalizing the pursuit of extreme weight loss and reinforcing the stigmatization of larger bodies, these advertisements contribute to an unhealthy culture of body dissatisfaction. This, in turn, may influence consumer behavior, leading individuals to purchase and use DS under false pretenses, driven by fear, shame, and the promise of unattainable results. As a result, many consumers fail to

critically evaluate the legitimacy of these products and may disregard the potential risks associated with their use (21).

Despite the widespread use of weight-loss DS and the prevalence of misleading marketing practices, there is a notable gap in the literature regarding how overweight or obese individuals perceive these advertisements, particularly in the Malaysian context. While previous studies have focused on the use of DS, few have explored how targeted advertising influences the perceptions and purchasing decisions of this vulnerable population. Understanding these perceptions is critical, as overweight and obese individuals may be more susceptible to the exaggerated claims commonly found in weight-loss DS advertisements. The primary objective of this study was to investigate the perceptions of overweight and obese individuals in Malaysia regarding such advertisements. The findings can provide valuable insights that could guide interventions or strategies aimed at enhancing the regulation of weight-loss DS advertising.

METHOD

This pilot cross-sectional study used an online questionnaire that was undertaken over a six-week period from 5th April to 17th May 2023. This study, which focuses on overweight and obese individuals in Malaysia, received approval from the Research Ethics Committee of Universiti Teknologi MARA (UiTM), Malaysia (REC [PH]/UG/033/2023) prior to its commencement.

Study Participants

Individuals aged 18 years or over with a body mass index (BMI) of 25 kg/m² or above, who were proficient in either Malay or English, and who had ever encountered advertisements for weight-loss DS in the past month were eligible to take part in this study. Non-Malaysian respondents were excluded from the survey.

Survey Instrument

This study employed a self-administered questionnaire that was tailored to this research and based on past literature (15, 22-25). The questionnaire comprises three sections. The first gathered socio-demographic data including gender, highest qualification, monthly income, and history of medical condition. This section also included an item prompting participants to indicate whether they had purchased weight-loss DS after encountering advertisements for such products in the past month.

The second section of the questionnaire encompassed six items designed to assess the participants' perceptions of weight-loss DS product advertisements. Meanwhile, the third section comprised three items aimed at gathering information about the participant's past experiences after encountering such advertisements. The second and third sections utilized a five-point Likert scale ranging from "strongly disagree" (1) to "strongly agree" (5) to gauge the participants' responses.

The questionnaire underwent a thorough review by six experienced pharmacy lecturers to ensure its relevance and appropriateness. The reviewers were requested to rate the relevance of each item on a scale of 1 (not relevant) to 4 (very relevant), the essentiality of each item on a scale of 1 (not essential) to 3 (essential), and the clarity of each item on a scale of 1 (not clear) to 3 (very clear). The content validity index (CVI) for each item was calculated by dividing the number of panelists who rated the item as either "quite relevant" or "very relevant" by the total number of panellists. All items scoring CVI \geq 0.83, meeting the accepted threshold for content validity (26). The mean essentiality and clarity scores falling within acceptable ranges (scores of 2 and above). Minor adjustments of survey item wordings were made based on feedback from the experts. The questionnaire was then converted into an online survey using SurveyMonkey and pilot-tested with 20 participants. These participants took five to seven minutes to complete the pilot test. The responses from the pilot study participants were excluded from the final data analysis.

Data Collection

A non-probability convenience sampling method was utilized by distributing the survey link via common social media platforms. The introduction page of the online survey outlined the study's objectives, estimated

completion time, assurance of anonymity and confidentiality, and details of the investigators. This page emphasized that participation was voluntary and that participants had the option to withdraw from the survey at any point. Upon giving their consent, the participants proceeded to the questionnaire, where a screening page gauged their eligibility. Ineligible individuals were directed to the last page of the survey, where the process ended.

Statistical Analysis

The data were entered and analyzed using IBM SPSS Statistics version 28. Chi-square or Fisher's exact tests were used to explore the relationships between the use of weight-loss DS, the respondents' beliefs about weight-loss DS advertisements, and the participants' socio-demographic details.

RESULTS

Characteristics of participants

In total, 146 individuals participated in the study, with the majority being female (82.9%) and most holding a bachelor's degree or higher (69.9%) (Table 1). A high proportion of the participants had a monthly income of ≤ RM 2000 (67.8%), were single (71.2%), and belonged to the age group younger than 30 years old (69.9%). Additionally, 53.4% were classified as overweight, while 46.6% were classified as obese. Overall, 39.7% of the participants reported purchasing a weight-loss DS they had seen advertised. The study also revealed that individuals with a monthly income of > RM 2000, married people, and those aged 30 years or older were significantly more likely to have bought a weight-loss DS that they had encountered in advertisements (monthly income: $\chi^2 [1, N = 146] = 5.2, p = 0.022$; marital status: $\chi^2 [1, N = 146] = 5.6, p = 0.018$; and age group: $\chi^2 [1, N = 146] = 7.7, p = 0.006$, respectively).

Table 1. Demographic characteristics of study participants (n = 146)

Characteristic	Had purchased weight-loss DS ^a		p-value ^b	All (n=146)
	No (n=88)	Yes (n=58)		
Gender				
Female	72 (81.8)	49 (84.5)	0.676	121 (82.9)
Male	16 (18.2)	9 (15.5)		25 (17.1)
Highest qualification				
Lower than bachelor's degree	23 (26.1)	21 (36.2)	0.194	44 (30.1)
Bachelor's degree and higher	65 (73.9)	37 (63.8)		102 (69.9)
Monthly income				
≤ RM 2000	66 (75)	33 (56.9)	0.022	99 (67.8)
> RM 2000	22 (25)	25 (43.1)		47 (32.2)
Marital status				
Single	69 (78.4)	35 (60.3)	0.018	104 (71.2)
Married	19 (21.6)	23 (39.7)		42 (28.8)
Age group				
< 30 years old	69 (78.4)	33 (56.9)	0.006	102 (69.9)
≥ 30 years old	19 (21.6)	25 (43.1)		44 (30.1)
BMI				
Overweight	51 (58)	27 (46.6)	0.177	78 (53.4)
Obese	37 (42)	31 (53.4)		68 (46.6)
Had chronic disease				
Yes	7 (8)	3 (5.2)	0.740 ^c	10 (6.8)
No	81 (92)	55 (94.8)		136 (93.2)

DS, dietary supplement; BMI, body mass index

^a Based on the item: "I have purchased a weight-loss dietary supplement that I saw in advertisements".

^b Chi-square test used unless specified otherwise.

^c Fisher's exact test used.

Perceptions about Weight-Loss Dietary Supplement Advertisements

Most respondents (92.5%) believed that weight-loss DS advertisements generally make exaggerated claims (Table 2 and 3). Additionally, 74% of the respondents had the perception that these advertisements often contain unverified claims, while 76% believed that the advertisements frequently include misleading information. Notably, only around 60% of the respondents considered most advertisements for weight-loss DS to be unethical, while nearly 90% agreed that exaggerated claims in advertisements can influence consumers to purchase the products, and approximately 85% believed that people are influenced to buy frequently advertised weight-loss DS.

The Fisher's exact test showed that marital status ($p = 0.008$) and the BMI category ($p = 0.006$) exhibited significant associations with the perception that consumers purchase frequently advertised weight-loss DS (% expressed agreement: single = 88.5% vs. married = 76.2%; and obese = 94.1% vs. overweight = 76.9%) (Table 2 and 3). Furthermore, a significant association ($p = 0.049$) was identified between the history of weight-loss DS purchasing and the perception that advertisements often make exaggerated claims, with 94.8% of purchasers expressing agreement with this, compared to 90.9% of non-purchasers. Additionally, a significant association ($p = 0.015$) was noted between a history of purchasing weight-loss DS and the belief that advertisements for these products frequently contain unverified claims, with 80.7% of non-purchasers expressing agreement with this, compared to 63.8% of purchasers (Table 3).

Table 2. Perceptions about weight-loss DS product advertisements (n=146) on page 271

Items	Response	Gender		p-value ^a	Highest qualification		p-value ^a	Monthly income (RM)		p-value ^a	Marital status		p-value ^a
		Female (n=121)	Male (n=25)		<Bachelor's degree (n=44)	>Bachelor's degree (n=102)		≤2000 (n=99)	>2000 (n=47)		Single (n=104)	Ever married (n=42)	
Weight-loss DS advertisements generally make exaggerated claims.	Strongly Disagree/Disagree	2(1.7)	0(0)	0.763 ^b	1(2.3)	1(1)	0.415 ^b	1(1)	1(2.1)	0.432 ^b	1(1)	1(1)	0.603 ^b
	Unsure	7(5.8)	2(8)		4(9.1)	5(4.9)		5(5.1)	4(8.5)		6(5.8)	3(7.1)	
	Agree / Strongly agree	112(92.6)	23(92)		39(88.6)	96(94.1)		93(93.9)	42(89.4)		97(93.3)	38(90.5)	
Weight-loss DS advertisements often contain unverified claims.	Strongly Disagree/Disagree	3(2.5)	0(0)	0.784 ^b	0(0)	3(2.9)	0.731 ^b	2(2)	1(2.1)	0.225 ^b	2(1.9)	1(2.4)	0.563 ^b
	Unsure	28(23.1)	7(28)		11(25)	24(23.5)		20(20.2)	15(31.9)		23(22.1)	12(28.6)	
	Agree / Strongly agree	90(74.4)	18(72)		33(75)	75(73.5)		77(77.8)	31(66)		79(76)	29(69)	
Weight-loss DS advertisements often contain misleading information.	Strongly Disagree/Disagree	5(4.1)	0(0)	0.242 ^b	0(0)	5(4.9)	0.275 ^b	5(5.1)	0(0)	0.134 ^b	5(4.8)	0(0)	0.497 ^b
	Unsure	22(18.2)	8(32)		11(25)	19(18.6)		17(17.2)	13(27.7)		21(20.2)	9(21.4)	
	Agree / Strongly agree	94(77.7)	17(68)		33(75)	78(76.5)		77(77.8)	34(72.3)		78(75)	33(78.6)	
Most advertisements for weight-loss DS are unethical.	Strongly Disagree/Disagree	7(5.8)	1(4)	1.000 ^b	2(4.5)	6(5.9)	0.714 ^b	5(5.1)	3(6.4)	0.873 ^b	5(4.8)	3(7.1)	0.746 ^b
	Unsure	39(32.2)	8(32)		12(27.3)	35(34.3)		33(33.3)	14(29.8)		35(33.7)	12(28.6)	
	Agree / Strongly agree	75(62)	16(64)		30(68.2)	61(59.8)		61(61.6)	30(63.8)		64(61.5)	27(64.3)	
Advertisements for weight-loss DS with exaggerated claims can influence consumers to purchase the products	Strongly Disagree/Disagree	4(3.3)	0(0)	0.104 ^b	2(4.5)	2(2)	0.314 ^b	3(3)	1(2.1)	0.336 ^b	3(2.9)	1(2.4)	0.898 ^b
	Unsure	9(7.4)	5(20)		6(13.6)	8(7.8)		12(12.1)	2(4.3)		11(10.6)	3(7.1)	
	Agree / Strongly agree	108(89.3)	20(80)		36(81.8)	92(90.2)		84(84.8)	44(93.6)		90(86.5)	38(90.5)	

People will purchase frequently advertised weight-loss DS.	Strongly Disagree/ Disagree	2(1.7)	2(8)	0.074 ^b	1(2.3)	3(2.9)	0.911 ^b	1(1)	3(6.4)	0.137 ^b	0(0)	4(9.5)	0.008^b
	Unsure	13(10.7)	5(20)		6(13.6)	12(11.8)		11(11.1)	7(14.9)		12(11.5)	6(14.3)	
	Agree / Strongly agree	106(87.6)	18(72)		37 (84.1)	87(85.3)		87(87.9)	37(78.7)		92(88.5)	32(76.2)	

DS, dietary supplement, ^a Chi-squared test used unless stated otherwise, ^b Fisher's exact test used

Table 3. Perceptions about weight-loss DS product advertisements (n=146) (continued)

Items	Response	Age group (years old)		p-value ^a	BMI		p-value ^a	Had purchased weight-loss DS		p-value ^a	All
		<30 (n=102)	≥30 (n=44)		Overweight (n=78)	Obese (n=68)		No (n=88)	Yes (n=58)		
Weight-loss DS advertisements generally make exaggerated claims.	Strongly Disagree/ Disagree	1(1)	1(2.3)	0.415 ^b	1(1.3)	1(1.5)	1.000 ^b	0(0)	2(3.4)	0.049^b	2(1.4)
	Unsure	5(4.9)	4(9.1)		5(6.4)	4(5.9)		8(9.1)	1(1.7)		9(6.2)
	Agree / Strongly agree	96(94.1)	39(88.6)		72(92.3)	63(92.6)		80(90.9)	55(94.8)		135(92.5)
Weight-loss DS advertisements often contain unverified claims.	Strongly Disagree/ Disagree	2(2)	1(2.3)	0.260 ^b	2(2.6)	1(1.5)	1.000 ^b	0(0)	3(5.2)	0.015^b	3(2.1)
	Unsure	21(20.6)	14(31.8)		19(24.4)	16(23.5)		17(19.3)	18(31)		35(24)
	Agree / Strongly agree	79(77.5)	29(65.9)		57(73.1)	51(75)		71(80.7)	37(63.8)		108(74)
Weight-loss DS advertisements often contain misleading information.	Strongly Disagree/ Disagree	5(4.9)	0(0)	0.275 ^b	3(3.8)	2(2.9)	0.895 ^b	2(2.3)	3(5.2)	0.489 ^b	5(3.4)
	Unsure	19(18.6)	11(25)		17(21.8)	13(19.1)		20(22.7)	10(17.2)		30(20.5)
	Agree / Strongly agree	78(76.5)	33(75)		58(74.4)	53(77.9)		66(75)	45(77.6)		111(76)
Most advertisements for weight-loss DS are unethical.	Strongly Disagree/ Disagree	5(4.9)	3(6.8)	0.826 ^b	6(7.7)	2(2.9)	0.502 ^b	2(2.3)	6(10.3)	0.120 ^b	8(5.5)
	Unsure	34(33.3)	13(29.5)		25(32.1)	22(32.4)		29(33)	18(31)		47(32.2)
	Agree / Strongly agree	63(61.8)	28(63.6)		47(60.3)	44(64.7)		57(64.8)	34(58.6)		91(62.3)
Advertisements for weight-loss DS with exaggerated claims can influence consumers to purchase the products.	Strongly Disagree/ Disagree	3(2.9)	1(2.3)	1.000 ^b	3(3.8)	1(1.5)	0.840 ^b	2(2.3)	2(2.3)	0.379 ^b	4(2.7)
	Unsure	10(9.8)	4(9.1)		7(9)	7(10.3)		11(12.5)	3(5.2)		14(9.6)
	Agree / Strongly agree	89(87.3)	39(88.6)		68(87.2)	60(88.2)		75(85.2)	53(91.4)		128(87.7)
People will purchase frequently advertised weight-loss DS.	Strongly Disagree/ Disagree	2(2)	2(4.5)	0.190 ^b	4(5.1)	0(0)	0.006^b	2(2.3)	2(3.4)	0.077 ^b	4(2.7)
	Unsure	10(9.8)	8(18.2)		14(17.9)	4(5.9)		15(17)	3(5.2)		18(12.3)
	Agree / Strongly agree	90(88.2)	34(77.3)		60(76.9)	64(94.1)		71(80.7)	53(91.4)		124(84.9)

DS, dietary supplement, ^a Chi-square test used unless stated otherwise, ^b Fisher's exact test used

Past Experiences after Encountering Weight-Loss-Dietary Supplement Advertisements

In general, only around 60% of the survey respondents sought information from various sources to validate the effectiveness of advertised weight-loss DS (Table 4 and 5). Of the individuals who had purchased these products, approximately 80% had sought additional information to confirm their effectiveness. The Chi-square test showed that individuals who had bought a weight-loss DS ($\chi^2 [2, N = 146] = 15.6, p < 0.001$) and those classified as obese ($\chi^2 [2, N = 146] = 8.1, p = 0.017$) were significantly more likely to seek information from other sources to confirm the effectiveness of the DS, compared to those who had not purchased such a product and overweight respondents, respectively (Table 5).

Notably, only 33.6% of the respondents had sought information from healthcare professionals about weight-loss DS seen in advertisements (Table 5). Of those who had purchased weight-loss DS, fewer than 50% sought information from healthcare professionals. However, those who had purchased such products were significantly

more likely to seek this type of information from these professionals, compared to those who had not purchased such supplements ($\chi^2 [2, N = 146] = 8.1, p = 0.017$).

Table 4. Experiences after encountering weight-loss DS product advertisements (n = 146)

Items	Response	Gender		p-value ^a	Highest qualification		p-value ^a	Monthly income (RM)		p-value ^a	Marital status		p-value ^a
		Female (n=121)	Male (n=25)		<Bachelor's degree (n=44)	>Bachelor's degree (n=102)		≤2000 (n=99)	>2000 (n=47)		Single (n=104)	Ever married (n=42)	
I sought information from other sources about the advertised weight-loss DS to confirm its effectiveness.	Strongly Disagree/Disagree	23(19)	8(32)	0.311 ^b	6(13.6)	25(24.5)	0.145	23(23.2)	8(17)	0.674	21(20.2)	10(23.8)	0.507
	Unsure	25(20.7)	3(12)		12(27.3)	16(15.7)		18(18.2)	10(21.3)		18(17.3)	10(23.8)	
	Agree / Strongly agree	73(60.3)	14(56)		26(59.1)	61(59.8)		58(58.6)	29(61.7)		65(62.5)	22(52.4)	
I sought information from healthcare professionals about a weight-loss DS that I saw in advertisements.	Strongly Disagree/Disagree	58(47.9)	8(32)	0.217	16(36.4)	50(49)	0.208	47(47.5)	19(40.4)	0.481	48(46.2)	18(42.9)	0.754
	Unsure	26(21.5)	5(20)		13(29.5)	18(17.6)		22(22.2)	9(19.1)		23(22.1)	8(19)	
	Agree / Strongly agree	37(30.6)	12(48)		15(34.1)	34(33.3)		30(30.3)	19(40.4)		33(31.7)	16(38.1)	
I recommended a weight-loss DS to others after seeing it in advertisements.	Strongly Disagree/Disagree	90(74.4)	14(56)	0.091 ^b	27(61.4)	77(75.5)	0.167	77(77.8)	27(57.4)	0.018	80(76.9)	24(57.1)	0.047^b
	Unsure	14(11.6)	3(12)		8(18.2)	9(8.8)		7(7.1)	10(21.3)		9(8.7)	8(19)	
	Agree / Strongly agree	17(14)	8(32)		9(20.5)	16(15.7)		15(15.2)	10(21.3)		15(14.4)	10(23.8)	

DS, dietary supplement, ^a Chi-square test used unless stated otherwise, ^b Fisher's exact test used

Table 5. Experiences after encountering weight-loss DS product advertisements (n = 146) (continued)

Items	Response	Age group		p-value ^a	BMI		p-value ^a	Had purchased weight-loss DS		p-value ^a	All
		<30 years old (n=102)	≥30 years old (n=44)		Overweight (n=78)	Obese (n=68)		No (n=88)	Yes (n=58)		
I sought information from other sources about the advertised weight-loss DS to confirm its effectiveness.	Strongly Disagree/Disagree	23 (22.5)	8 (18.2)	0.707	23 (29.5)	8 (11.8)	0.017	25 (28.4)	6 (10.3)	<0.001	31 (21.2)
	Unsure	18 (17.6)	10 (22.7)		16 (20.5)	12 (17.6)		22 (25)	6 (10.3)		28 (19.2)
	Agree / Strongly agree	61 (59.8)	26 (59.1)		39 (50)	48 (70.6)		41 (46.6)	46 (79.3)		87 (59.6)
I sought information from healthcare professionals about a weight-loss DS that I saw in advertisements.	Strongly Disagree/Disagree	48 (47.1)	18 (40.9)	0.684	38 (48.7)	28 (41.2)	0.519	47 (53.4)	19 (32.8)	0.017	66 (45.2)
	Unsure	22 (21.6)	9 (20.5)		17 (21.8)	14 (20.6)		19 (21.6)	12 (20.7)		31 (21.2)
	Agree / Strongly agree	32 (31.4)	17 (38.6)		23 (29.5)	26 (38.2)		22 (25)	27 (46.6)		49 (33.6)
I recommended a weight-loss DS to others after seeing it in advertisements.	Strongly Disagree/Disagree	79 (77.5)	25 (56.8)	0.027	59 (75.6)	45 (66.2)	0.443	74 (84.1)	30 (51.7)	<0.001	104 (71.2)
	Unsure	8 (7.8)	9 (20.5)		8 (10.3)	9 (13.2)		10 (11.4)	7 (12.1)		17 (11.6)
	Agree / Strongly agree	15 (14.7)	10 (22.7)		11 (14.1)	14 (20.6)		4 (4.5)	21 (36.2)		25 (17.1)

DS, dietary supplement, ^a Chi-square test used unless stated otherwise

A small percentage of the respondents (17.1%) had recommended a weight-loss DS to others after seeing it advertised. Those earning over RM 2000 a month ($\chi^2 [2, N = 146] = 8.1, p = 0.018$), those aged 30 or older ($\chi^2 [2, N = 146] = 7.2, p = 0.027$), and those who had purchased weight-loss DS ($\chi^2 [2, N = 146] = 25.6, p < 0.001$) were significantly more likely to recommend a weight-loss DS to others, compared to those earning RM 2000 or less a month, those aged below 30, and those who had never purchased a weight-loss DS (Table 4 and 5). Furthermore, the Fisher's exact

test revealed a significant association ($p = 0.047$) between marital status and a history of recommending a weight-loss DS to others after seeing it advertised (% expressed agreement: married = 23.8% vs. single = 14.4%).

DISCUSSION

Interpretation of Key Findings

To the best of the authors' knowledge, this is the first study to solicit the perspectives of Malaysian overweight and obese individuals regarding weight-loss DS advertisements. In this study, approximately 40% of the respondents reported purchasing weight-loss DS after encountering these products through advertisements. Currently, no local studies investigate the association between weight-loss DS use and exposure to weight-loss DS advertisements, limiting our ability to compare our data. However, the prevalence of weight-loss DS use in this study is notably higher than the 12.3% reported in a previous local study by Malik et al. (2019). It should be noted that the study involved patients, 74% of whom had one or more medical conditions, and most were middle-aged or older (15). Additionally, another study by Ibrahim et al. (2023)(23), which focused on undergraduates from a Malaysian university, revealed an even lower usage rate of 6.8%. Notably, participants in that study were predominantly neither overweight nor obese. The discrepancies between the reported usage of weight-loss DS in the present study and previous local studies may be attributed to the variations in the study populations, with the present study focusing on individuals who encountered weight-loss DS through advertisements, which likely explains the higher percentage of weight-loss DS use (15, 23). However, the prevalence of weight-loss DS use in this study falls within the range reported in Western countries, where usage rates have been documented to range from 15.2% to 59.2% (27-29).

Comparison with Previous Studies and Implications for Public Health

In this study, individuals with a monthly income exceeding RM 2000, those who were married, and those aged 30 years and older were observed to be more inclined to purchase weight-loss DS. Previous studies have documented how higher-income individuals are more inclined to use DS (30, 31), which is unsurprising given their greater disposable income to expend on health and wellness products. Moreover, higher-income individuals may feel societal pressure to maintain a particular body image, especially as they engage more in social and professional settings. Married individuals and those aged 30 years or older often face weight-related challenges, which may lead to a heightened focus on health and appearance as they navigate the complexities of marriage and aging (32-34). Additionally, lifestyle changes, a slowing metabolism, and societal expectations often prompt this demographic to become more concerned about their weight and utilize weight-loss DS.

The study revealed several intriguing findings, particularly regarding participants' perceptions of weight-loss DS advertisements. In this study, most participants expressed the belief that these advertisements are unethical, often characterized by exaggerated and unverified claims, as well as misleading information. Ironically, a considerable proportion of respondents who held these beliefs admitted to purchasing weight-loss DS after encountering them in advertisements. This raises important questions about whether consumers, especially those using weight-loss DS, view the prevalence of exaggerated claims and misleading information as commonplace marketing tactics rather than as ethical issues. Such findings highlight a concerning normalization of misleading and unverified claims within weight-loss DS advertisements, potentially leading to consumer desensitization toward unethical marketing practices.

Our findings highlight the potential impact of advertising tactics on consumer decision-making, underscoring the need for greater awareness and scrutiny of these marketing strategies. Consumer education initiatives should focus on raising awareness of deceptive advertising practices and enhancing media literacy, particularly among overweight and obese individuals (3, 35). Given the high prevalence of weight-loss DS purchases among individuals with higher income, those who are married, and those aged 30 years and older, public health campaigns should specifically target these groups, emphasizing the importance of critically evaluating advertising claims and consulting healthcare professionals before using weight-loss DS.

A multi-faceted approach is essential, incorporating public health campaigns, digital literacy programs, and partnerships with healthcare providers and digital platforms. Developing culturally sensitive, consumer-friendly

resources and utilizing diverse media channels will ensure a broad reach. Regular evaluations should be conducted to assess the effectiveness of these strategies and facilitate continuous improvement. Additionally, stricter regulations are necessary to uphold ethical advertising standards and protect consumers from misleading or unverified claims.

Notably, despite the relatively low percentage of individuals who recommended weight-loss DS they saw in advertisements, it was observed that those who had bought weight-loss DS, including those earning more than RM 2000 per month and those aged 30 years or older, were more inclined to recommend these products to others. Although the present study did not investigate the basis for these recommendations, it is possible that their endorsements were influenced by anecdotal experiences. However, recommendations from non-professionals can be misleading and biased, potentially resulting in the unsafe and inappropriate use of weight-loss DS.

A somewhat reassuring finding that emerged from the study was that approximately 80% of the individuals who had purchased weight-loss DS sought additional information to validate the effectiveness of these products. In this study, however, no data were gathered about the specific information resources used by consumers to confirm this effectiveness. Previous research has highlighted that people generally favored the Internet to obtain DS-related information (25, 36). Nevertheless, studies have also reported the limitations of the information available on DS websites, suggesting that using the Internet may not enable reliable and informed decision-making regarding the use of weight-loss DS (24, 37).

Hence, consumers intending to use weight-loss DS must engage in discussions with healthcare professionals such as doctors and pharmacists (36, 38). Nonetheless, it was observed in this study that fewer than 50% of the weight-loss DS purchasers had consulted such a professional about these products. Previous studies have also reported a low rate of consultation with healthcare professionals among weight-loss DS users (15, 23, 39). Reports have shown that weight-loss DS could be adulterated with banned substances such as sibutramine, which has recognized associations with cardiovascular complications and could lead to palpitations, dizziness, anxiety, and restlessness (40). Unregistered weight-loss DS products or those sold on the black market are more likely to carry these risks. Therefore, seeking professional healthcare advice can help in identifying unregistered and unsafe products.

It is noteworthy that many weight-loss DS are available through community or retail pharmacies, which studies indicate are preferred by consumers for obtaining these products (22, 25). Thus, community pharmacists should play an active role in ensuring the safe and quality use of weight-loss DS (41). They can provide personalized counseling to consumers and offer accurate information about the potential risks and benefits of these products. Additionally, pharmacists can monitor and assess consumers' health conditions to determine the suitability of specific weight-loss DS, based on individual needs. Moreover, they can advocate evidence-based practices, recommend reputable brands, and emphasize the importance of seeking professional medical advice before using such supplements (42).

Overall, the findings from this study have significant implications for regulatory policies in Malaysia and other countries confronting similar challenges related to weight-loss DS. They underscore the urgent need for stricter advertising regulations that mandate scientific substantiation of health claims to protect consumers from misleading marketing practices, particularly those targeting vulnerable populations such as overweight or obese individuals. Moreover, fostering collaboration among regulatory authorities, healthcare professionals, and public health organizations can enhance consumer education initiatives, encouraging critical evaluation of advertisements and informed decision-making. Policymakers should also consider enforcing transparency requirements for DS companies and guidelines for online marketing, as well as engaging in international cooperation to adopt best practices in regulation. Collectively, these measures can contribute to a more trustworthy DS market, ultimately leading to improved public health outcomes.

Limitations of the Study and Recommendations for Future Research

This study has several limitations. Firstly, the small sample size, as well as the predominant representation of female, young, unmarried, and healthy individuals among the study participants, restrict the generalizability of the findings to the broader local population. Moreover, the survey relied on the participants' ability to recall their

experiences, potentially introducing recall bias and leading to either over- or under-reporting of responses. To minimize recall bias, we limited the recall period for their experiences to the past one month, ensuring participants could report their experiences more accurately. Additionally, distributing the survey through online platforms may have excluded certain populations, such as individuals in rural areas, older people, and those with limited social media engagement (43). While convenience sampling allowed for quick recruitment, it introduced potential selection bias, particularly favoring younger, more tech-savvy participants. Furthermore, while the study identified individuals who had purchased weight-loss DS after seeing an advertisement, no data was captured on the specific types of weight-loss DS purchased or the platforms through which these products were advertised, highlighting avenues for exploration in future research.

Future research should also aim for a larger and more diverse sample that includes various demographics, to enhance the generalizability of findings. Longitudinal studies and qualitative methods, such as focus groups, can provide deeper insights into consumer motivations and attitudes towards weight-loss DS and their advertisements. Investigating specific types of weight-loss DS purchased and the channels through which consumers encounter advertisements will inform targeted public health campaigns. Additionally, examining the impact of regulatory measures on consumer behavior can help improve consumer safety. Finally, exploration of cultural factors and assessment of the effectiveness of consumer education programs can be warranted.

CONCLUSION

This study investigates the perspectives of a sample of overweight and obese Malaysians regarding weight-loss DS advertisements. Approximately 40% of respondents reported purchasing weight-loss DS after exposure to these advertisements, indicating that advertising potentially influences consumer behavior. The results underscore the urgent need for enhanced regulatory frameworks to safeguard consumers from misleading marketing practices, particularly among vulnerable populations. Policymakers and public health officials should implement stricter advertising regulations that mandate scientific substantiation of health claims and foster transparency in marketing. Future research should engage larger, more diverse samples and examine specific types of advertised DS and their respective marketing channels. This study contributes to the literature on weight-loss DS, establishing a foundation for future inquiries aimed at bolstering consumer awareness and informing public health strategies. Strengthening consumer protection initiatives is essential for fostering informed decision-making and improving public health.

AUTHOR'S CONTRIBUTION STATEMENT

All authors contributed to the conceptualization, design, and implementation of the study. All Authors provided valuable insights and feedback throughout the research process. All authors contributed to writing and revising the manuscript.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this article.

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BIBLIOGRAPHY

1. Bentham J, Di Cesare M, Bilano V, Bixby H, Zhou B, Stevens GA, et al. Worldwide trends in children's and adolescents' body mass index, underweight and obesity, in comparison with adults, from 1975 to 2016: A pooled analysis of 2,416 population-based measurement studies with 128.9 million participants. *Lancet* 2017; 390:2627-42. doi: 10.1016/S0140-6736(17)32129-3.
2. World Health Organization. Obesity and overweight 2024. Available at <https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight>
3. Lim JS, Chock TM, Golan GJ. Consumer perceptions of online advertising of weight loss products: The role of social norms and perceived deception. *J Mark Commun* 2020; 26:145-65. <https://doi.org/10.1080/13527266.2018.1469543>
4. Mohamad Nor NS, Ambak R, Mohd Zaki N, Abdul Aziz NS, Cheong SM, Abd Razak MA, et al., An update on obesity research pattern among adults in Malaysia: A scoping review. *BMC Womens Health* 2018; 18:5-15.
5. National Health and Morbidity Survey 2019 Non-communicable diseases, healthcare demand, and health literacy. 2019. doi: 10.1186/s12905-018-0590-4.
6. Apalasy YD, Awang H, Mansor N, AbRashid N, Kamarulzaman ND, Lih Yoong T. Factors associated with obesity and abdominal obesity among Malaysian older adults. *Asia Pac J Public Health* 2021; 33:547-54. doi: 10.1177/10105395211014634.
7. Rao VRBV, Candasamy M, Bhattamisra SK. Obesity an overview: Genetic conditions and recent developments in therapeutic interventions. *Diabetes Metab Syndr* 2019; 13:2112-20. doi: 10.1016/j.dsx.2019.05.004.
8. Alsulami S, Baig M, Ahmad T, Althagafi N, Hazzazi E, Alsayed R, et al. Obesity prevalence, physical activity, and dietary practices among adults in Saudi Arabia. *Front Public Health* 2023; 11:1124051. doi: 10.3389/fpubh.2023.1124051.
9. Dikaoui P, Bjorck L, Adiels M, Lundberg CE, Mandalenakis Z, Manhem K, et al. Obesity, overweight and risk for cardiovascular disease and mortality in young women. *Eur J Prev Cardiol.* 2021;28(12):1351-9. doi: 10.1177/2047487320908983.
10. Kim R, Jun JS. Impact of Overweight and Obesity on Functional and Clinical Outcomes of Early Parkinson's Disease. *J Am Med Dir Assoc.* 2020;21(5):697-700. doi: 10.1016/j.jamda.2019.11.019.
11. Zou Y, Pitchumoni CS. Obesity, obesities and gastrointestinal cancers. *Dis Mon.* 2023;69(12):101592. doi: 10.1016/j.disamonth.2023.101592.
12. Ling J, Chen S, Zahry NR, Kao TSA. Economic burden of childhood overweight and obesity: A systematic review and meta-analysis. *Obes Rev* 2023; 24:e13535. doi: 10.1111/obr.13535.
13. Fujioka K. Current and emerging medications for overweight or obesity in people with comorbidities. *Diabetes Obes Metab* 2015; 17:1021-32. doi: 10.1111/dom.12502.
14. Natesan V. Therapeutics in Metabolic Diseases. *Adv Exp Med Biol.* 2023;1396:255-73. doi: 10.1007/978-981-19-5642-3_17.
15. Abd Malik MA, Ali MF, Muhammad NA. The use of weight loss products among overweight and obese patients in Malaysia. *Malay J Med Health Sci* 2019; 15:23-30.
16. Campbell A, Carins J, Rundle-Thiele S, Deshpande S, Baker B. Motivators of Indiscriminate and Unsafe Supplement Use among Young Australians. *Int J Environ Res Public Health.* 2021;18(19). doi: 10.3390/ijerph18199974.
17. Nathan JP, Kudadjie-Gyamfi E, Halberstam L, Wright JT. Consumers' information-seeking behaviors on dietary supplements. *Int Q Community Health Educ* 2020; 40:171-6. doi: 10.1177/0272684X19874967.
18. Hua SV, Granger B, Bauer K, Roberto CA. A content analysis of marketing on the packages of dietary supplements for weight loss and muscle building. *Prev Med Rep* 2021; 23:101504. doi: 10.1016/j.pmedr.2021.101504.
19. Lee A, Vasquez LJ, Wong WC, Shin J. Evaluation of dietary supplement advertisements in popular Spanish, Chinese, and Korean media outlets: A cross-sectional study. *BMC Nutr* 2015; 1:1-8. Available at <https://bmcnutr.biomedcentral.com/articles/10.1186/s40795-015-0038-2>

20. Rosenberg K. Dietary Supplement Labels May Be Inaccurate and Misleading. *Am J Nurs*. 2022;122(12):56. doi: 10.1097/01.NAJ.0000904100.46205.b5.
21. Schmitz Sm Md MPH, Lopez HI Md MS, Mackay DN, Nguyen HB, Miller PB. Serious Adverse Events Reported with Dietary Supplement Use in the United States: A 2.5 Year Experience. *J Diet Suppl*. 2020;17(2):227-48. doi: 10.1080/19390211.2018.1513109.
22. Abd Wahab MS, Hamdi H, Ali AA, Karuppanan M, Zulkifli MH, Maniam S, et al. The use of herbal and dietary supplements for COVID-19 prevention: A survey among the public in a Malaysian suburban town. *J Herbal Med* 2023; 39:100650. <https://doi.org/10.1016/j.hermed.2023.100650>
23. Ibrahim NI, Zainuddin NS, Shamsudin J. The Use of Weight Loss Products and Body Mass Index among University Students in Kota Bharu, Kelantan. *Malaysian J Health Sci* 2023. 21:131-41. <http://dx.doi.org/10.17576/JSKM-2023-2102-10>
24. Wahab MSA, Abd Hamid NN, Yassen AO, Naim MJ, Ahamad J, Zulkifli NW, et al. How Internet Websites Portray Herbal Vitality Products Containing *Eurycoma longifolia* Jack: An Evaluation of the Quality and Risks of Online Information. *Int J Environ Res Public Health* 2022; 19:11853. <https://doi.org/10.3390/ijerph191911853>
25. Wahab MSA, Zaini MH, Ali AA, Sahudin S, Mehat MZ, Abdul Hamid H, et al. The use of herbal and dietary supplement among community-dwelling elderly in a suburban town of Malaysia. *BMC Complement Med Ther* 2021; 21:1-13. doi: 10.1186/s12906-021-03287-1.
26. Yusoff, MSB. ABC of content validation and content validity index calculation. *Educ Med J* 2019; 11:49-54. <http://dx.doi.org/10.21315/eimj2019.11.2.6>
27. Amariles P, González LI, Giraldo NA. Prevalence of self-treatment with complementary products and therapies for weight loss: A randomized, cross-sectional study in overweight and obese patients in Colombia. *Curr Ther Res* 2006; 67:66-78. <https://doi.org/10.1016/j.curtheres.2006.02.001>
28. Blanck HM, Serdula MK, Gillespie C, Galuska DA, Sharpe PA, Conway JM, et al. Use of nonprescription dietary supplements for weight loss is common among Americans. *J Am Dietetic Assoc* 2007; 107:441-7. doi: 10.1016/j.jada.2006.12.009.
29. Pillitteri JL, Shiffman S, Rohay JM, Harkins AM, Burton SL, Wadden TA. Use of dietary supplements for weight loss in the United States: Results of a national survey. *Obesity* 2008; 16:790-6. doi: 10.1038/oby.2007.136.
30. Dickinson A, MacKay D. Health habits and other characteristics of dietary supplement users: A review. *Nutr J* 2014; 13:14. doi: 10.1186/1475-2891-13-14.
31. Pouchieu C, Levy R, Faure C, Andreeva VA, Galan P, Hercberg S, et al. Socioeconomic, lifestyle and dietary factors associated with dietary supplement use during pregnancy. *PLoS One* 2013; 8: e70733. doi: 10.1371/journal.pone.0070733.
32. Jeffery RW, Rick AM. Cross-sectional and longitudinal associations between body mass index and marriage-related factors. *Obes Res* 2002; 10:809-15. doi: 10.1038/oby.2002.109.
33. Lipowicz A, Gronkiewicz S, Malina RM. Body mass index, overweight and obesity in married and never married men and women in Poland. *Am J Hum Biol* 2002. 14:468-75. doi: 10.1002/ajhb.10062.
34. Muhihi AJ, Njelekela MA, Mpembeni R, Mwiru RS, Mligiliche N, Mtabaji J. Obesity, overweight, and perceptions about body weight among middle-aged adults in Dar es Salaam, Tanzania. *Int Sch Res Notices* 2012; 2012:368520. <https://doi.org/10.5402/2012/368520>
35. Hobbs R, Broder S, Pope H, Rowe J. How adolescent girls interpret weight-loss advertising. *Health Educ Res* 2006. 21:719-30. doi: 10.1093/her/cyl077.
36. Wahab MSA, Jalani MM, Goh KW, Ming LC, Faller EM. Why did I consult my pharmacist about herbal and dietary supplements? An online survey amid the COVID-19 pandemic in Malaysia. *Int J Environ Res Public Health* 2022; 19:10994. doi: 10.3390/ijerph191710994.
37. Kaplan Y, Demir O, Karadas B, Kaplan MD. Online weight loss supplement market and public health: An analysis of Turkish websites marketing weight loss supplements. *Cumhuriyet Med J* 2012; 34:138-45. <http://dx.doi.org/10.7197/1305-0028.973>

38. Chan SP, Chui WC, Lo KW, Huang KC, Leyesa ND, Lin WY, et al. Consensus statement: Appropriate consumer education and communication programs for weight-loss agents in Asia. *Asia Pac J Public Health* 2012; 24:641-49. doi: 10.1177/1010539511402189.
39. Xing S, Sharp L, Touchette D. Weight loss drugs and lifestyle modification: Perceptions among a diverse adult sample. *Patient Educ Couns* 2017; 100:592-97. doi: 10.1016/j.pec.2016.11.004.
40. Ariffin SH, Wahab IA, Hassan Y, Abd Wahab MS. Adulterated traditional-herbal medicinal products and its safety signals in Malaysia. *Drug Healthc Patient Saf* 2021; 13:133-40. doi: 10.2147/DHPS.S305953.
41. Abd Wahab MS, Abd Malik NA, Sahudin S, Meor Mohd Affandi MMR, Othman N, Ali AA. Exploring the factors associated with the intention to assess customers' herbal and dietary supplement use by community pharmacists in Kuala Lumpur, Malaysia. *J Appl Pharm Sci* 2019; 9:108-16. <http://dx.doi.org/10.7324/JAPS.2019.91215>
42. Wahab MSA, Sakthong P, Winit-Watjana W. Qualitative exploration of pharmacist care for herbal and dietary supplement users in Thai community pharmacies. *J Pharm Health Serv Res* 2019; 10:57-66. <http://dx.doi.org/10.1111/jphs.12238>
43. Ting CY, Abd Wahab MS, Lee KS, Tan RT, Ming LC. A cross-sectional study on the use of, preference for, and perceived reliability of mass media for drug-related information among the general public in Sarawak. *Ther Innov Regul Sci* 2017; 51:212-20. doi: 10.1177/2168479016674041.