ORIGINAL ARTICLE

Determinants of diet pill, powder and liquid use among young adults in private universities in Bangkok, Thailand

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Abstract

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The rise in overweight and obesity globally has facilitated the expansion of the weight-loss food, drinks, supplements, and services industry from a niche environment to the main market. Sales in the Thai dietary supplement market have been increasing, and the causes of this trend are unclear as to what drives people to purchase them. Hence, this study explored the determinants of use of Diet Pill, Powder and Liquid (PPLs). A cross-sectional study of 400 young adults was conducted in Bangkok, Thailand. Self-administered questionnaires were used to collect the data from students at different grade levels of two private universities in Bangkok during May-July 2016.

This study showed that 29.0% had used diet PPLs before and 2.8 % regularly used diet PPLs. Fully 61.7% of users took pills/tablets, while liquid formulations were least popular. The reasons cited for using diet PPLs include fast effect (26.6%), with 11.7% each, citing reliability of the product, friends using and other reasons. Key determinants of the use of diet PPLs are concern about body shape (Adj OR=3.37, 95%CI=1.63-6.99), friends' use (Adj OR=4.52, 95%CI=2.28-8.96) and celebrity influence (Adj OR=5.25, 95%CI=1.58-17.49).

There is a need to monitor the consumption of PPLs in social media, and provide comprehensive information on safe, alternative choices for young adults concerned about their weight.

Keywords: Psycho-Behavior-Social factors, diet PPLs, young adults

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ปัจจัยกำหนดการใช้ผลิตภัณฑ์อาหารเสริมเพื่อการลดน้ำหนักชนิดเม็ด ผงและน้ำในกลุ่มนักศึกษาของมหาวิทยาลัยเอกชน กรุงเทพมหานคร ประเทศไทย

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การเพิ่มขึ้นของภาวะน้ำหนักเกินและโรคอ้วนของประชากรทั่วโลกทำให้ผลิตภัณฑ์อาหาร เครื่องดื่ม และอุตสาหกรรมเพื่อการลดน้ำหนัก มีการขยายตัวอย่างมาก ประเทศไทยก็เป็นประเทศหนึ่งที่ตลาดผลิตภัณฑ์อาหารเสริมเพื่อการลดน้ำหนักเพิ่มจำนวนขึ้นอย่างมาก แต่ก็ยังไม่มีการศึกษาที่ชัดเจนว่าปัจจัยอะไรที่ทำให้ผู้บริโภคต้องใช้ผลิตภัณฑ์อาหารเสริมเพื่อการลดน้ำหนัก การศึกษานี้จึงต้องการที่จะศึกษาปัจจัยกำหนดการใช้ผลิตภัณฑ์เสริมอาหารในกลุ่มผู้ใหญ่ตอนต้นโดยการสำรวจข้อมูลภาคตัดขวาง กลุ่มประชากรตัวอย่างเป็นนักศึกษาที่กำลังศึกษาในระดับปริญญาตรีของมหาวิทยาลัยเอกชนในกรุงเทพมหานคร จำนวน 400 ราย สำรวจโดยใช้แบบสอบถามที่ตอบคำถามด้วยตนเอง ในช่วงเดือนมิถุนายนถึงเดือนกรกฎาคม 2559

ผลการศึกษาพบว่ากลุ่มตัวอย่างสามในสี่เป็นเพศหญิง ร้อยละ 29.0เคยใช้ผลิตภัณฑ์อาหารเสริมเพื่อการลดน้ำหนัก โดยมีเพียงร้อยละ 2.8ที่ใช้ผลิตภัณฑ์อาหารเสริมเป็นประจำ สำหรับกลุ่มที่ใช้ผลิตภัณฑ์อาหารเสริมส่วนใหญ่นิยมใช้ผลิตภัณฑ์อาหารเสริมชนิดเม็ดมากกว่าชนิดน้ำ เหตุผลหลักๆ ที่ใช้ผลิตภัณฑ์อาหารเสริมเนื่องมาจากเห็นผลรวดเร็ว สามารถซื้อได้ง่ายจากอินเทอร์เน็ตและมีเพื่อนใช้ตามลำดับ ส่วนปัจจัยกำหนดการใช้ผลิตภัณฑ์อาหารเสริมเพื่อการลดน้ำหนักได้แก่ความกังวลเกี่ยวกับรูปร่าง (Adj OR=3.37, 95%CI=1.63-6.99) มีเพื่อนที่ใช้ผลิตภัณฑ์อาหารเสริมเพื่อการลดน้ำหนัก (Adj OR=4.52, 95%CI=2.28-8.96) และการได้รับอิทธิพลจากคนดังในสังคม (Adj OR=5.25, 95%CI=1.58-17.49) อิทธิพลของเพื่อนและการเข้าถึงอินเทอร์เน็ตเป็นปัจจัยกำหนดการใช้ผลิตภัณฑ์อาหารเสริมเพื่อการลดน้ำหนัก

ดังนั้นควรมีการเฝ้าระวังและติดตามการบริโภคผลิตภัณฑ์อาหารเสริมเพื่อการลดน้ำหนักในโลกของโซเชียลมิเดียพร้อมกับการให้ข้อมูลอย่างรอบด้านและเท่าทันเพื่อเป็นทางเลือกให้กับเยาวชนที่จะเลือกบริโภคผลิตภัณฑ์ได้อย่างเหมาะสม

คำสำคัญ: ปัจจัยด้านจิต-พฤติกรรม-สังคม, ผลิตภัณฑ์อาหารเสริมเพื่อการลดน้ำหนัก, ผู้ใหญ่ตอนต้น

Introduction

The increasing trend in sales for the diet pill industry shows no signs of slowing, given the number of overweight and obese people who resort to using pills and supplements promising results of weight loss in a short period of time. In a span of seven years, the diet pill industry had revenues reaching $55 billion globally. In 2007, $1.7 billion was spent on diet pills and, in 2010, Europeans alone spent around $1.4 billion on unregulated weight loss supplements; while Americans spent around $1.6 billion a year.[1] In China alone, the sales of weight-loss products totaled 10 billion yuan (US$1.25 billion) in 2004 and are expected to grow to 60 billion yuan by 2010.[2] PPLs are a part of a growing industry representing a large part of the $7 billion sports, energy, and weight-loss industry in the United States.[3] Within this growing market, there is a plethora of unproven weight-loss agents, many of which claim to be "natural" but are tainted with prescription diuretics, anorectics, and weight-reducing agents. In 2009, the US Food and Drug Administration (FDA) identified more than 120 dietary supplements containing undeclared active pharmaceutical ingredients. Unapproved anorectic ingredients found in some of these "supplements" have been linked to serious adverse events such as addiction, suicide, dehydration, and hypokalaemia.[4]

Eating Among Teens found that, among high-school-aged females, use of diet pills doubled from 7.5% to 14.2%, and 20.0% of the surveyed females age 19 to 20 had used diet pills.[5] Individuals with eating disorders associated with vomiting and purging behaviors were found to abuse diet pills, with prevalence estimated as high as 50%.[6] With obesity and being overweight an ever-growing global problem at this time and age, diet pills and weight loss supplements are perceived as a quick solution to cater to the fast-paced lives of the younger generation.[7] In Asia, a growing trend is the mindset that an Asian woman has to be thin. A 2009 study in Taiwan revealed that female Chinese college students were more likely to indulge in binge-eating behaviors and used laxatives and other dietary supplements that aid in weight loss.[7] In Thailand, the concept of beauty is centered around being thin, and eating disorders are increasing in prevalence. Medical professionals and psychologists have failed to come up with a solution to the problem. In addition, many Thai women are too embarrassed to ask for help.[8] Dr. Kittiwan observed that Thai youth, women in particular, are increasingly seeing themselves as being obese, even when they are not clinically overweight. The reasons given are that most youth are influenced by social media where they see celebrities and role models who are thin and living lifestyles that do not conform with reality.[9]

Modern day society and mass media equate beauty with extreme thinness, and no race or ethnic group is immune to this influence.[8] Adolescence is the stage for the development of lasting health behaviors. Thus, health behavior and social media are key factors in understanding the trends in young adult health. Social media has expanded into a variety of platforms that contribute to a person's total diet. The social ecological model describes the intricacy of how people make decisions on what they eat within different ecosystem levels (i.e., socio-cultural norms and values, environmental factors, individual factors, sectors of influence). Included in this domain of influence are media and technology that shape the

perceptions, attitudes, and beliefs on nutrition in the last 50 years.[9] Bandura's triadic reciprocal causation explains that human decisions and functioning come from a product of the interaction of behaviors (B), personal variables (P), and the environment (E). In this perspective, many younger Thais reject certain aspects of Thai traditional life, embracing aspects of Western culture and lifestyles including one's patterns in diet and exercise.[10]

Accordingly, the social ecological model[9] and Bandura's triadic reciprocal causation[10] were chosen to provide the framework of this research. This study examines the interplay of social media and the diet pill industry and other factors leading young adults to use PPLs, potentially leading to diet pill addiction. The risk of adverse effects of diet PPLs is now becoming a rising public health concern,[11] with consumers blindly buying these products without proper knowledge. The use of legally available diet PPLs has not being well studied.[12] The Food and Drug Administration (FDA) has found an emerging trend in the market that dietary supplements presented as over-the-counter (OTC) products contain seemingly hidden ingredients that are potentially harmful since some contain untested and understudied pharmaceutically-active ingredients.[13]

Efforts to curtail the use of diet PPLs can be hindered by indifference, product accessibility, and the total lack of governmental regulation. Also, it is a challenge in trying to determine the prevalence of diet PPLs use due to secrecy issues and bias in self-reported data.[14] In a region where diet PPLs are rampant and young adults are influenced greatly by media outlets, the environment, and how 'healthy' and 'thinness' are viewed, Thailand is an ideal research setting. This study aims to determine the factors that lead to the use and the abuse of diet PPLs in young adults in Bangkok and to determine the prevalence of this abuse among young adults. Research in this area is not common in the region and, so far, only three papers cite concern about the diet habits of Thai adolescents.[10,15] However, only one paper described the diet habits, and suggested that having friends who diet and the pressure to do so are key factors.[15] Therefore, this study explores the prevalence and factors that lead to the use and abuse of diet PPLs by young adults in one part of Thailand. It would be useful to know the prevalence and the factors associated with the use and eventual abuse of diet PPLs and, therefore, propose solutions to end these problems.

Methods

A cross-sectional study design was used to determine the factors and prevalence of the use of diet PPLs among young adults in Thailand. A total of 400 students were gathered using random sampling from two private universities in Bangkok. Self-administered questionnaires were translated into Thai and were used to collect the data from students at different grade levels.

Variables

The questionnaire consists of eight (8) major parts that cover socio-demographic, psychological, behavioral and environmental factors as the independent variables, and the use of diet PPL as the dependent variable. The first part contains thirteen socio-demographic characteristics such as age, sex, year level, course major, parents' educational attainment

and present occupation, monthly household income, daily school allowance, and body mass index (BMI).

Attitudes toward one's self-image were measured using the Rosenberg Self-Esteem tool[16] on a four-point scale. The ten items are reverse scored, that is, strongly agree (SA)=0 to strongly disagree (SD)=3. Scores below fifteen are considered lower self-esteem; fifteen to twenty-five are normal and scores higher than 25 were considered to have high self-esteem. Cronbach's alpha coefficient was 0.77.

The Body Shape Questionnaire (BSQ) by Cooper et al[17] was employed in the study. This tool is a 16-item self- administered questionnaire that assesses body image concern. Response to each item is on a scale from never =1 to always = 6. A score of less than 38 indicates little or no concern; scores of 38 to 51 indicate mild concern; scores of 52 to 66 indicate moderate concern; and scores over 66 indicate marked concern of one's body image. Cronbach's alpha coefficient was 0.94.

The General Self-EfficacyScale[18] is a 10-item psychometric scale that is designed to assess optimistic self-beliefs to cope with a variety of difficult demands in daily life and adaptation after undergoing stressful episodes. Scores range from not true at all = 1 to exactly true = 4. The higher the score the higher is one's self-efficacy. Cronbach's alpha coefficient was 0.89.

The Eating Pattern Behavior Questionnaire (EBPQ)[19] was first created to evaluate dietary fat intake among African-American women in the USA. The reliability and construct validity of the EBPQ has been established. In this study, we used the preliminary version of this questionnaire as applied by Utah State University. This questionnaire consists of 35 self-reported items on healthy and unhealthy eating behaviors. Every item has a response range from 1-Never to 6-Always. Nine eating behavior patterns were assessed by the questionnaire. Cronbach's alpha coefficient was 0.88.

The Exercise Confidence Survey[20] is an eleven-item survey that describes whether the person is willing to exercise and stick with his or her exercise plan. Scoring ranges from 1-5. The higher the score the less likely the individual is to practice and maintain the exercise plans. Cronbach's alpha coefficient was 0.94.

Environmental Factors: Fourteen yes or no questions were used to assess how the respondent values either peer or parental opinion; peer or parent use of PPLs; and peer or parental pressure to lose weight. This also includes reasons of the respondent for using PPLs. In addition, questions as to where the participants have access to the PPLs and whether celebrities influence the way the participants see their bodies were included.

Diet PPLs Exposure: Fourteen yes or no questions measured use of PPLs. Behavioral questions include history of taking any dietary supplement, use of alcohol, smoking, number of hours in the day on the computer, use of social media, and number of hours of sleep per night.

The questionnaires were translated into Thai by professionals who work in the research areas of addiction and health research. A pretest was conducted in a different private university but similar to the target of this study.

Statistical Analysis

The level of significance was set to 0.05 throughout the whole analysis process. The Chi-Square test and multivariate logistic regression were used to determine associations between the independent variables and use of PPLs among young adults.

Ethical Consideration

Approval was sought from the Committee for Research Ethics (Social Science), Mahidol University (MU-SSIRB #2016/117.2903). Written and verbal consent from the participants was obtained before the administration of the questionnaire. Strict confidentiality was implemented throughout the data collection to protect the right to privacy of the participants.

Results

The sample was predominately female: 76.7% versus 23.3% male. The ages ranged from eighteen to twenty-one years. More of the participants were first-year (46.7%) and second-year students (34.7%). The majority of the participants (93.2%) were Buddhists, 4.4% were Christians and 2.2% were Muslims. Most majored in Social Sciences and Arts (61.5%) compared to Science and Technology (38.5%). Fully 43.5% of the sample came from households with low socio-economic status, 31.8% from middle socio-economic status households and 24.8% from high socio-economic status households. Even though the majority of the participants came from lower socio-economic status households, most did not need to take part-time jobs: Only 14.8% said they had part-time jobs. About two-thirds (66.5%) had a monthly allowance of 5,000 baht or less. Also, 56.9% of the participants had healthy BMI (for Thais) despite coming from low socio-economic households.

Interestingly though, while most of the participants have concerns about their body appearance, 33.3% rarely limit their food intake and 38.5% rarely exercised. Also, half of the respondents (50.7%) occasionally drank alcohol and 77.8% never smoked. Fully 90.7% of the participants had a good four (4) to eight (8) hours of sleep per night, and 75.9% spent two to six hours per day on the computer, including social media.

Figure 1 Distribution of respondents by use of diet PPL

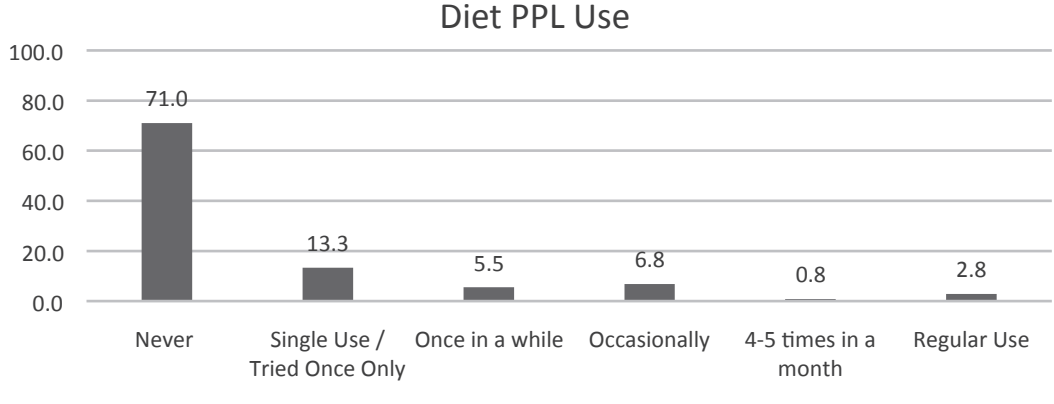

Figure 1 shows 29% of the students have used diet PPLs before; 13% had tried diet PPLs once. This suggests that the remaining 16% of the sample might be regular users of diet PPLs. Students were asked what type of PPLs they used and 61.7% (of users) said they took pills/tablets, while liquid formulations were least popular. The reasons cited for using diet PPLs include fast effect (26.6) and, with 11.7% each, reliability of the product, friends using/other reasons. About one-third (35.2%) of the sample was moderately concerned about their bodily appearance, while one in six (16.7%) were very worried about being too skinny or too fat.

Table 1 presents the summary of the significant associations of the dependent and independent variables. A total of twelve significant associations were found, including: (1) Age, (2) Monthly allowance, (3) Body Mass Index, (4) Body image perception, (5) Self-efficacy, (6) Worried about own body shape, (7) Eating behavior, (8) Physical activity, (9) Friends use diet PPLs, (10) Friends criticize weight, (11) Family members use diet PPLs, and (12) Celebrities (TV personality, actor, singer, model) influences feelings about own body image. Female higher preference in using diet PPL as compared to males but no significant.

Table 1 Association between independent variables and the use of diet PPL

Factors	Use Diet PPL				Chi-Square	P-Value
	YES		NO			
	n	(%)	n	(%)		
Socio-demographic factors						
Sex					2.11	0.076
Male	15	15.9	75	25.7		
Female	79	84.1	217	74.3		
Age					5.06	**0.024**
18-20 yrs	61	64.9	214	76.7		
21-25 yrs	33	35.1	65	23.3		
Monthly Allowance (baht)					4.07	**0.044**
Below 5,000	44	51.2	160	63.5		
5,000 or above	42	48.8	92	36.5		
Body Mass Index					10.01	**0.018**
Less than 18.50	13	14.3	84	30.9		
18.51 – 22.90	62	68.1	145	53.3		
22.91 – 24.90	9	9.9	27	9.9		
More than 24.90	7	7.7	16	5.9		

Table 1 Association between independent variables and the use of diet PPL (Cont.)

Factors	Use Diet PPL				Chi-Square	P-Value
	YES		NO			
	n	(%)	n	(%)		
Psychological Factors						
Body Image Perception					9.01	**0.003**
Good Body Image Perception	44	47.3	181	64.9		
Bad Body Image Perception	49	52.7	98	35.1		
Self-Efficacy					5.45	**0.020**
Low Self-Efficacy	8	8.5	125	2.9		
High Self-Efficacy	86	91.5	160	97.1		
Worried about Own Body Shape					21.60	**<0.01**
Concerned	52	56.5	220	80.9		
Not Concerned	40	43.5	52	19.1		
Behavioral Factor						
Eating Behavior					4.17	**0.041**
Good Eating Behavior	78	83.0	175	90.7		
Bad Eating Behavior	16	17.0	108	9.3		
Physical Activity					6.69	**0.010**
Low Physical Activity	24	25.5	197	14.0		
High Physical Activity	70	74.5	88	86.0		
Environmental Factor						
Friends Use Diet PPL					41.85	<0.01
Yes	72	77.4	108	38.7		
No	21	22.6	171	61.3		
Friends Criticize Weight					8.38	0.004
Yes	53	57.0	111	39.8		
No	40	43.0	168	60.2		
Family Members Use Diet PPL					13.73	<0.01
Yes	28	30.1	37	13.3		
No	65	69.9	242	86.7		
Celebrities (TV Personality, Actor, Singer, Model) Influence Feelings About Own Body					17.11	<0.01
Yes	68	72.3	189	47.3		
No	26	27.7	101	52.7		

The data were entered into three models in order to show which variables dropped out as other variables were added in, and to test which variables had the strongest association with use of diet PPLs (Table 2). The first model explored the association of the socio-demographic factors with the dependent variable. A BMI of the student lower than 18.50, and those that ranged from 18.51 to 22.90 were three times more likely to use diet PPLs. Also, students who had a monthly allowance of 5,000 baht or above were twice as likely to use diet PPLs.

Table 2 Exploration of factors through multiple logistic regression

Model 1: Exploration of Socio-Demographics Factors				
Factors	**Adj OR**	**95% CI**		**P-value**
		Lower	**Upper**	
Socio-Demographics Factors				
Age (years)				
18-20	1.72	0.97	3.03	0.061
21-25	1			
Body Mass Index				
<18.50	1			
18.51 – 22.90	3.14	1.06	9.29	**0.039**
22.91 – 24.90	0.99	0.38	2.62	0.998
>24.90	1.30	0.38	4.45	0.672
Income				
below 5,000 Baht	1.83	1.08	3.10	**0.026**
5,000 Baht or above	1			
Model 2: Exploration of Socio-Demographics, Psycho-Behavior Factors				
Socio-Demographics				
Age (years)				
18-20	1.87	1.01	3.46	**0.045**
21-25	1			
Body Mass Index				
<18.50	1			
18.51 – 22.90	3.15	0.98	10.02	0.052
22.91 – 24.90	1.21	0.43	3.37	0.723
>24.90	1.54	0.39	5.94	0.533
Income				
below 5,000 Baht	1.85	1.04	3.28	**0.035**
5,000 Baht or above	1			

Table 2 Exploration of factors through multiple logistic regression (Cont.)

Factors	Adj OR	95% CI		P-value
		Lower	Upper	
Model 2: Exploration of Socio-Demographics, Psycho-Behavior Factors (Cont.)				
Psychological				
Body image perception				
Good	1			
Bad	1.79	0.97	3.31	0.065
Self-efficacy				
Low	1			
High	1.46	0.39	5.47	0.575
About body shape				
Concerned	2.63	1.39	4.94	**0.003**
Not Concern	1			
Behavioral				
Eating habits				
Good	2.45	1.11	5.43	**0.027**
Bad	1			
Physical activity				
High	2.15	1.06	4.35	**0.034**
Low	1			
Model 3: Exploration of Socio-Demographics, Psycho-behavior-Social Factors				
Socio-demographics				
Age (years)				
18-20	1.65	0.81	3.36	0.169
21-25	1			
Body mass index				
<18.50	1			
18.51 – 22.90	1.84	0.54	6.26	0.326
22.91 – 24.90	0.71	0.23	2.13	0.535
>24.91	1.12	0.25	4.99	0.881
Income				
below 5,000 baht	1.58	0.83	3.01	0.166
5,000 baht or above	1			
Psychological				
Body image perception				
Bad	1.40	0.69	2.82	0.345
Good	1			
Self-efficacy				
High	1.59	0.37	6.93	0.532
Low	1			

Table 2 Exploration of factors through multiple logistic regression (Cont.)

Model 3: Exploration of Socio-Demographics, Psycho-behavior-Social Factors (Cont.)				
Factors	**Adj OR**	**95% CI**		**P-value**
		Lower	**Upper**	
About body shape				
Concern	3.37	1.63	6.99	**0.001**
Not Concerned	1			
Behavioral				
Eating habits				
Good	2.63	0.94	6.83	0.057
Bad	1			
High physical activity				
Good	2.39	0.67	5.38	0.051
Bad	1			
Environmental				
Friends use diet PPL				
Yes	4.52	2.28	8.96	**0.001**
No	1			
Friends criticize weight				
Yes	1.33	0.69	2.64	0.419
No	1			
Family members use diet PPL				
Yes	1.71	0.78	3.74	0.179
No	1			
Celebrity influence				
Yes	5.25	1.58	17.49	**0.007**
No	1			

The second model explored the combination of the socio-demographic, psychological and the behavioral factors. Five significant variables were found in order of descending significance: Age 18 to 20 years, monthly allowance higher than 5,000 baht, concern about own body shape, good eating habits, and high physical activity.

The third model combined all thirteen variables (socio-demographic, psychological, behavioral and environmental) and explored associations with the dependent variable. Out of the four components, the socio-demographic factors did not have any significant variables emerging from the analysis. Psychological factors had one (concern about own body shape) which was associated with three times the chance of using diet PPLs. For environmental factors, those who had friend(s) who used diet PPLs were four times as likely to use them compared to those who did not. Those who reported ease to buy diet PPLs were twice as likely to use them, and those who cited the influence of celebrities were five times more likely to use PPLs.

Overall, environmental influences were the more important factors that determine the use and eventual abuse of diet PPLs among this sample of Thai private college students. The media, peer influence, and convenience of access to PPLs all militate toward negative body self-image among women and girls and, hence, encourage use of diet PPLs. A priority area for study and action is the sub-group of users who are addicted to PPLs, since that could have serious health consequences. The media and celebrities can help influence youth who are not yet addicted but thinking about using PPLs by promoting messages and images which encourage a healthier lifestyle, free of diet drugs. Today's Thai youth need to view themselves independently of artificial norms and assess objectively what is healthy and appropriate for them. Males and females are also held to different body standards which Asian society has imposed on them.

Discussion

Prevalence of the use of diet PPL

The findings on use of diet PPLs among this sample of young adults can be classified into two categories: Use and abuse. The participants who either used the product once in a while, four to five times a month, occasionally, or only once are those with limited contact with diet PPLs and are not dependent on them. By contrast, those use diet PPLs regularly could be speculated to have become dependent or addicted to them. The diet PPL users in this survey reported their first use between the age of 12 and 17 years. This also coincides with general increase in the prevalence of obesity and overweight issues in Thailand.[10] Gender is also a factor since young women are more self-conscious about body weight and image than their male counterparts and, thus, are more likely to be consumers of diet PPLs. Especially in patriarchal societies such as Thailand, women and girls are held to a different standard for appearance than men and boys.[14]

Gender differences in diet PPL use

The study shows male preference in not using diet PPL as compared to females. Most females associate thinness with being appealing or attractive, while males may desire to gain weight and have bigger physique.[21] A study in 2015 showed that if males wanted to lose weight, most would increase exercise and curb eating fat. By contrast, females who wanted to lose weight were most likely to join a weight loss program and take diet pills or go on special diets.[22] This shows that women are more likely to use diet pills as a means to become thin compared to males. Though it may not have emerged significant in the study, it is important to know that there is a difference between gender on their outlook or view towards diet PPL and weight loss.

Socio-Demographic Status

Variables related to socio-demographic status, such as age, sex, college course and year level, monthly household income, the education and occupation of parents, BMI, alcohol and cigarette use, and the monthly allowance (with the inclusion of having a part-time job) were tested. In another study, smoking and alcohol use were found to correlate with use of diet pills.[23] However, in this study, smoking and alcohol use were not significantly associated with use. On the other hand, BMI was significant, and this finding is consistent with the study conducted

by Page and Suwanteerangkul.[15] Monthly allowance also was significantly associated with diet PPL use, which suggests that cost may be a barrier to youth who want to use the PPLs but cannot afford them.

Psychological, behavioral and environmental factors

The synthesis of the individual, behavioral and the environmental variables in this discussion gives a better view of how the interplay of the triadic reciprocal causation by Bandura works. The three factors interact in ways that lead the person to make certain decisions on how things go and what they do in their lives. How the person views oneself has a high impact on how they tackle the other two factors. Body image perception and worry about one's own body shape were significant in this study.[24] That finding supports the literature which suggests that Thai women have a strong tendency to see themselves as overweight even though their BMI was in the normal range.[25] This also supports the empirical data that women go through dieting and other efforts to achieve thinness more than men.[26] Peer emulation equates with acceptance,[27] resulting in shaping of one's identity during adolescence. Still, this is more evident in female peer groups, often leading to unhealthy weight control behavior.[28] Young women also merge body image perception with exercise. This coincides with data in this study which found a high level of physical exercise among the largely female sample. Self-esteem is also inter-related with body image perception that can lead to the use and abuse of diet PPLs. Media influence, wanting to look like celebrities and Western influence of celebrities are significant factors that influence young adults to use diet PPLs in Thailand.[29-30] Youth need to acquire more critical thinking skills so that they can view the media and celebrities more objectively. Indeed, celebrities who advertise diet PPLs probably do not use them. Today's adolescents need to be trained to see through false and misleading advertising and images in the media. Advertising guidelines should ensure responsible direct-to-consumer advertising of weight-loss agents.[31]

There were some challenges and limitations in this study. Results of the study could have been different if the study was conducted for a year to see the changes of an individual over time. Second, only two private universities were chosen. A larger and more diverse sample might have produced different results. Data were collected by self-administered questionnaire during the school day. Thus, students may have felt time pressure to complete the questionnaire. This might have reduced completeness or accuracy of response.

Recommendations

Further study on the factors that determine the use of diet PPL should be explored. Since the diet PPL industry is one of the strongest and high earning industries in the world, this should go under the spotlight as to why this is happening.[32] This is due to the fact that legally available diet PPLs are not being well studied and as reported by the Food and Drug Administration (FDA) these might contain some harmful active ingredients of which we do not know.[33]

In addition, efforts to curtail this phenomenon is adamant since indifference, easy product accessibility, lack of government regularization and wanting to be like celebrities due to media influences from western

influence are hard to control. Thus Thailand being one of the countries who have a high supply of diet pills in the market should look into it and utilize media and its celebrities as a way to educate young adults into engaging healthy lifestyle choices.[34] Even though the study relied on Bandura's Social Cognitive theory which discusses greatly that external forces are what contributes to the individual's desire to do things or use things, we look further into another theory which is the Theory of Behavior Change.

The theory of behavior change also encompasses parts of Bandura's theory; but another theory that adds up to this is the theory of planned behavior and the stages of change model of which can be a good way to help construct the framework to improve the study and be able to explore more factors. A high recommendation that could result in a clearer and wider scope of factors that would show the interplay of the factors would be a new methodology. An example would be a different approach such as a web-based survey that which would be up to the participant to complete at their own pace and at the privacy of which they can be more honest without fear of other being able to see their answers. A different setting such as conducting the study in both public and private universities would be helpful. Expanding the study to participants of eighteen years and below are in a stage where they are still struggling to find their niche and becoming comfortable in their own stances, might be useful.

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