



ELSEVIER



<http://www.iorf.org/oonet/aoaso.htm>

ORIGINAL ARTICLE

Weight loss behavior in obese patients before seeking professional treatment in Taiwan

Tsan-Hon Liou^{a,b}, Nicole Huang^c, Chih-Hsing Wu^d, Yiing-Jenq Chou^c,
Yiing-Mei Liou^e, Pesus Chou^{c,*}

^a Department of Physical Medicine and Rehabilitation, Taipei Medical University-Wan Fang Hospital, Taipei, Taiwan

^b Graduate Institute of Injury Prevention and Control, College of Public Health and Nutrition, Taipei Medical University, Taiwan

^c Community Medicine Research Center and Institute of Public Health, National Yang-Ming University, Taipei, Taiwan

^d Department of Family Medicine, National Cheng Kung University Hospital, Tainan, Taiwan

^e Institute of Community Health Nursing, National Yang-Ming University, Taipei, Taiwan

Received 13 March 2008; received in revised form 22 September 2008; accepted 14 October 2008

KEYWORDS

Obesity;
Anti-obesity drug;
Weight expectation;
Weight loss behavior

Summary

Objective: To assess weight loss strategies and behaviors in obese patients prior to seeking professional obesity treatment in Taiwan.

Design: A cross-sectional study was conducted between 1 July 2004 and 30 June 2005.

Setting and subjects: Obese subjects (1060; 791 females; age, ≥ 18 years; median BMI, 29.5 kg/m²) seeking treatment in 18 Taiwan clinics specializing in obesity treatment were enrolled and completed a self-administered questionnaire.

Results: Of the 1060 subjects, the prevalence of anti-obesity drug use was 50.8%; more females than males used anti-obesity drugs (53.6% vs. 42.4%). Approximately one-third of normal weight or overweight subjects with no concomitant obesity-related risk factors took anti-obesity drugs. Merely 26.7% of female and 34.7% of male subjects regularly received panel-recommended levels of physical activity. Further, two-thirds (66.1%) of subjects expressed an intention to lose more than 20% of initial body weight. Multiple logistic regression analyses revealed a substantially higher odds ratio (OR) for anti-obesity drug use in females than in males (OR, 2.3, 95% CI: 1.7–3.2). Obesity was also associated with younger age and higher body mass index (BMI). Females were more likely than males to have unrealistic

* Corresponding author at: Community Medicine Research Center and Institute of Public Health, National Yang-Ming University, 155 Li-Nong St., Sec. 2, Peitou, Taipei, Taiwan. Tel.: +886 2 28267050; fax: +886 2 28201461.

E-mail address: pschou@ym.edu.tw (P. Chou).

weight loss goals. Younger patients and those with high BMI were also more likely to have unrealistic weight goals than their reference groups.

Conclusion: Obese patients in Taiwan tend to use anti-obesity drugs, receive inadequate physical activity and have unrealistic weight loss expectations before seeking professional treatment for obesity.

© 2008 Published by Elsevier Ltd on behalf of Asian Oceanian Association for the Study of Obesity.

Introduction

According to obesity treatment guidelines, three major components of weight loss therapy are dietary therapy, increased physical activity and behavior therapy [1–4]. Lifestyle therapy should be attempted for at least 6 months before considering pharmacotherapy. Additionally, pharmacotherapy should be considered as an adjunct to lifestyle therapy in obese or overweight patients with concomitant obesity-related diseases. Studies have shown that most patients who have been prescribed anti-obesity drugs, including orlistat and sibutramine, are not treated in accordance with obesity treatment guidelines [5,6]. Many patients continue to take anti-obesity drugs even after achieving normal body weight.

Further, although individuals attempting to lose weight are more likely to engage in regular physical activity, most have not permanently adopted a physically active lifestyle [7]. Jakicic and Otto demonstrated that more than 80% of individuals engaging in physical activity as a weight loss strategy expend insufficient energy to significantly improve health, let alone weight loss [8]. Current international association for study of obesity (IASO) guidelines recommend 60 min of moderately intense physical activity on most days to prevent weight gain and 60–90 min on most days to avoid regaining weight following significant weight loss [9]. Therefore, those at risk for weight gain or seeking to maintain recent weight loss must maintain the recommended activity levels. Obese subjects are initially encouraged to reach a target level of 30 min per day of moderately intense physical activity according to current guidelines for the general population [10]. Further increase in duration, frequency, or intensity may be needed to meet the current guidelines [9].

In a study of binge eating disorders (BED), ideal, satisfactory and minimum acceptable BMI were considered by subjects to require average weight reductions of 36, 29 and 23%, respectively [11]. Even the “disappointed” body mass index (BMI) was an average 14% reduction in current weight and

1.5–3 times higher than expert recommendations (5–10%). Obese patients tend to have unrealistic weight loss expectations. A significant disparity has been noted between what physicians and what patients consider ideal weight loss [12]. Studies of goal setting have observed that weight loss goals which are unrealized or overly difficult to achieve tend to increase the likelihood of negative emotions, impaired task performance and abandonment of weight loss goals. Dalle Grave et al. suggested that baseline weight loss expectations are independent cognitive predictors of attrition in obese patients entering a weight loss program [12]. Unrealistic weight loss goals should be tackled at the very beginning of treatment.

As more and more subjects aware the importance to lose weight, there are lots of weight losing and slimming methods in Taiwan. It is important to know how people attempt to lose weight. Given the limited available data in Taiwan, this study examined weight loss behavior, including anti-obesity drug use, weight loss expectation and daily level of physical activity in Taiwanese adults prior to seeking professional obesity treatment. This study will provide valuable data for clinical physicians better understanding of their patients.

Methods

Sampling of obesity clinics and subjects were shown in Fig. 1 and described in detail elsewhere [13]. This study was approved by the Committee of Institutional Human Subject Review Board of Taipei Medical University-Wan Fang Hospital, Taiwan. Each subject completed a self-administered questionnaire with help from a trained assistant. The questionnaire was divided into three sections: (1) a socio-demographic section for recording data for age, gender, marital status, education level, tobacco and alcohol use, monthly income, etc.; (2) a medical history section for hypertension, dyslipidemia, CHD, type 2 diabetes and sleep apnea data; (3) a weight loss section to examine behavior during the previous year, such as weekly level of physical

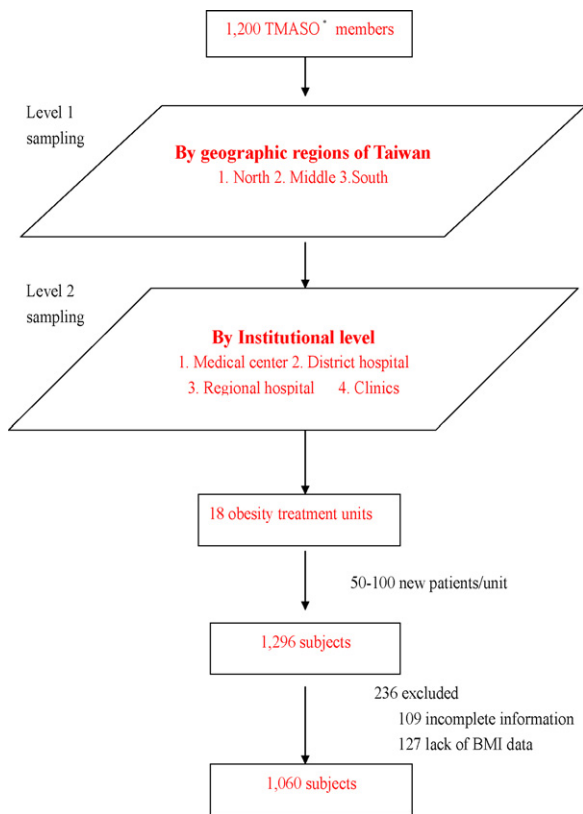


Figure 1 Sampling method and flow of subjects (TMASO*: Taiwan Medical Association for Study of Obesity).

activity, diet control and use of anti-obesity drugs. BMI was calculated as weight in kilograms divided by height in meters squared (kg/m^2). The following BMI categories were utilized: <24 , normal weight; $24\text{--}26$, overweight; ≥ 27 , obese [14]. We use the Short-Form Self-administered International Physical Activity Questionnaire (IPAQ) assess their amount of past 7-day physical activity, a culture adoptive tool that could prove useful for both clinicians and researchers in the field and suitable for international comparison [15–17]. This 7-day recall questionnaire consists of seven questions assessing the frequency and duration of participation in vigorous, moderate-intensity, and walking activity as well as the time spent sitting during a weekday, globally in all contexts (leisure-time, transportation, occupation, and house-work) of everyday life. Scores for vigorous, moderate, and walking activity are calculated in minutes per week, and is time spent sitting per day. The sum of the above three activity scores gives an indicator of vigorous, moderate and walking physical activity (VMWPA). Recommendations for data truncation made by the IPAQ executive committee as of April 2004 were applied. Taiwanese version was validated in

2004 and demonstrated reasonable test–retest reliability ($\text{ICC} = 0.67$) and fairly good inter-method validity (Spearman's $\rho = 0.86$) [18,19].

Diet and weight history, weight loss expectations and primary motivation for seeking treatment were systematically recorded. Weight loss goals were assessed by asking, “How much weight do you intend to lose and in what duration?”

Statistics

Statistical analyses were performed using SPSS for Windows version 13.0 (SPSS, Inc., Chicago, IL, USA). Prevalence data were presented as percentages (%). Chi-squared test and linear trend test were conducted. Multiple logistic regression analyses were performed to assess associations between behaviors violating obesity treatment guidelines and demographic variables, including gender, age and current BMI. A p -value less than 0.05 was considered statistically significant.

Results

Basic characteristics of respondents

Table 1 shows the basic demographic data for all respondents. Of the 1060 respondents, 53.7% (569/1060) were college educated, and 51.5% (546/1060) were married. Approximately one-third of the patients were 25–35 years old. Most residents had a monthly income of NT\$ 10,000–50,000.

Appropriateness of use of anti-obesity drug

Of the 1060 respondents, 16% (179/1060) had normal weight, 15.6% (165/1060) were overweight with no co-morbidity, 6.7% (71/1060) were overweight with at least one co-morbidity and 60.2% (638/1060) were obese. Of the 1060 respondents, 536 (51%) had used at least one anti-obesity drug, including orlistat, sibutramine or other unproven weight loss drugs. According to obesity treatment guidelines in Taiwan, pharmacotherapy should be considered as an adjunct to lifestyle therapy in patients with a $\text{BMI} \geq 27$ without concomitant obesity-related diseases and patients with a $\text{BMI} \geq 24$ with concomitant diseases. However, approximately one-third of the subjects in this study had taken anti-obesity drugs without prescription. Further, use of anti-obesity drugs was significantly more common in females than in males. A linear trend was observed between anti-obesity drug use and BMI, indicating that use of

Table 1 Demographic characteristics of participants ($n = 1060$).

	All (%)	Female (%)	Male (%)	p -Value for χ^2 -test
Age (years)				0.087
18–24	196 (18.5)	134 (16.9)	62 (23.0)	
25–34	331 (31.2)	244 (30.8)	87 (32.3)	
35–44	268 (25.3)	209 (26.4)	59 (21.9)	
≥ 45	265 (25.0)	204 (25.8)	61 (22.7)	
Marital status				0.001
Unmarried	464 (43.8)	326 (41.2)	138 (51.3)	
Married	546 (51.5)	419 (53.0)	127 (47.2)	
Others	50 (4.7)	46 (5.8)	4 (1.5)	
Educational level				<0.001
\leq Senior high school	148 (14.0)	129 (16.3)	19 (7.1)	
Senior high school	343 (32.6)	268 (33.9)	75 (27.9)	
\geq College/University	569 (53.7)	394 (49.8)	175 (65.1)	
Monthly income (NT\$)				<0.001
$\leq 10,000$	260 (25.8)	205 (27.7)	55 (20.6)	
10,001–30,000	358 (35.6)	285 (38.5)	73 (27.3)	
30,001–50,000	253 (25.1)	174 (23.5)	79 (29.6)	
$\geq 50,001$	136 (13.5)	76 (10.3)	60 (22.5)	

anti-obesity drugs increased as BMI increased in all subjects (Table 2).

Physical activity level

Physical activity is essential for weight management. Nearly 62% of subjects did not regularly engage in moderate or vigorous physical activity. In this study, only one-quarter (26.0%) of subjects regularly engaged in the minimum suggested level of physical activity [20]. According to IASO guidelines, 60–90 min of moderate intensity activity or lesser amounts of vigorous intensity activity on most days of the week is required to prevent weight gain. Three hundred minutes of physical activity (including walking) per week is the minimum requirement to prevent unhealthy weight gain [9]. In this study, only 28.7% of all subjects (27% of females and 34.7% of males), received the recommended 300 min of physical activity per week. Men were significantly less inactive and had a higher proportion of physically active than did women (Table 3).

Anticipated weight loss

In accordance with published weight loss guidelines, patients were expected to lose 10% of initial body weight after a 6-month weight loss program [20]. The target rate of weight reduction was set at approximately 1–2 lb/week (2–4 kg/month). However, most respondents had unrealistic weight loss goals. Two-thirds of subjects expressed a desire to lose more than 20% of initial body weight, and

females tended to have more dramatic weight loss goals than males ($p < 0.001$). Moreover, 45% of females wanted to lose as much as 30% of their initial body weight. In this study, the anticipated rate of weight reduction was much higher than what is reasonable as the guideline suggested. Approximately half of the subjects set a weight loss goal of 2–5 kg/month whereas 22% of subjects wanted to lose weight at a rate of 6 kg/month or higher. Females also expected to lose weight faster than males (Table 4).

Risk factors for unhealthy weight loss behavior

Multiple logistic regression analysis was performed to assess the relationship between basic demographic characteristics and unhealthy weight loss behaviors. The analytical results showed that females were more likely than males to take anti-obesity drugs (OR: 2.3; 95% CI: 1.7–3.2), have inadequate physical activity (OR: 1.7; 95% CI: 1.2–2.3), and have unrealistic weight loss goals (OR: 5.8; 95% CI: 3.8–8.8). A linear trend was observed in subjects with higher BMI, who were more likely to take anti-obesity drugs and have unrealistic weight loss goals than those with normal BMI. Anti-obesity drugs use, inadequate physical activity and unrealistic weight loss goals were more common in younger subjects than in those above age 45. Further modeling by multiple logistic regression analysis revealed a similar result; however, low levels of physical activity but not higher

Table 2 Prevalence of anti-obesity drug use presented by body mass index (BMI) and co-morbidity ($n = 1060$).

BMI (kg/m ²)	All						
	Female			Male			
	No. of subjects	No. of drug user	Prevalence (%)	p^*	No. of subjects	No. of drug user	
<24	172	70	40.7	<0.01	12	3	25
24–26(–)	163	73	44.8		17	7	41.2
24–26(+)	68	32	47.1		17	2	11.8
27–29	226	118	52.2		52	19	36.5
30–34	256	130	50.8		98	39	39.8
≥35	175	116	65.7	71	44	60.3	
							<0.01

(–) with no co-morbidity and (+) with co-morbidity.
 p^* p -Value for linear trend.

weight loss goals were predictive of anti-obesity drug use in this age group (Table 5).

Discussions

In this outpatient clinic-based study of subjects seeking obesity treatment, 50.8% subjects had used anti-obesity drugs. Approximately one-third of subjects who had normal weight or were overweight with no concomitant obesity-related risk factors took anti-obesity drugs although they were not suggested to do so. Approximately three-quarters of subjects did not adequately exercise or had a physical activity level insufficient to prevent unhealthy weight gain. More than two-thirds of subjects had unrealistic weight loss expectations. This study is one of the few to provide comprehensive data for weight loss behavior in Taiwan.

Like other Asian countries, Taiwan has experienced rapid socioeconomic growth with dramatic lifestyle changes in recent decades [14]. The growing availability of anti-obesity drugs has increased the involvement of physicians in treating obesity. Park et al. reported that primary care physicians tend to over-prescribe anti-obesity medications without allowing enough time for diet and exercise treatment to take effect in obese patients in Korea [6]. Approximately 90% of physicians report receiving requests by non-obese patients to prescribe anti-obesity medication, and 70% of those physicians subsequently comply. Hayton reported that most patients prescribed orlistat and sibutramine are not treated in accordance with NICE guidelines [5]. In accordance with these studies as well as previous studies in Taiwan, the current investigation suggested that the compliance among obese patient to the obesity treatment guideline is low [21]. Obesity treatment guidelines suggest that clinical therapy should first address lifestyle changes such as modification of behavior, diet and exercise [20]. When lifestyle modification schemes are unsuccessful, drug therapy can be considered. Anti-obesity treatment by drug therapy has become common in the last 30 years. However, most anti-obesity drugs, such as fenfluramine-phentermine (fen-phen) [22,23], phenylpropanolamine (PPA) [24,25] and ephedra [26], have been withdrawn from the market due to serious adverse effects. Currently, only sibutramine and orlistat are FDA-approved for long-term obesity treatment. Sibutramine and orlistat were the most frequently used prescription weight loss drugs by the subjects in this study. Notably, 18.3% of respondents in this study reported using unproven weight loss drugs such as a cocktail therapy.

Table 3 Weekly amount of physical activity among subjects ($n = 1030$).

Physical activity	All		Women		Men		p -Value for χ^2 -test
	No.	%	No.	%	No.	%	
VM (min/week)							0.15
0	638	61.9	484	63.3	154	58.1	
1–149	124	12.0	94	12.3	30	11.3	
≥ 150	268	26.0	187	24.4	81	30.6	
VMW(min/week)							0.02
0	490	47.6	382	49.9	108	40.8	
1–299	244	23.7	179	23.4	65	24.5	
≥ 300	296	28.7	204	26.7	92	34.7	

VM: physical activity of vigorous and moderate intensity and VMW: physical activity of vigorous and moderate intensity and walking.

Regarding drug safety, health care professionals must actively assist their patients in making appropriate choices. Use of unproven weight loss drugs should be regulated by an government regulatory authority.

As in other studies, not all clients requesting obesity drugs were overweight or obese [6,27,28]. In this study, 40% of all respondents were females who did not meet the pharmacotherapy criteria ($BMI \geq 27 \text{ kg/m}^2$) proposed by National Institute of Health [20]. Females were more likely than males to use weight loss drugs. Additionally, more females than males in each BMI category used anti-obesity drugs. Khan et al. indicated that females are four times more likely than males to report weight loss drug use [27]. In a population-based study, females were almost nine times more likely than males to report using a PPA weight loss product [29]. A possible explanation for this gender difference is that females are more concerned than males with being thin and tend to be more dissatisfied with their bodies. Moreover, females tend to attempt weight loss at a lower BMI than males [30].

Total physical activity, expressed as minutes per week, was also categorized to determine the proportion of each sample meeting the CDC-ACSM physical activity guideline, which is often simplified as "at least 150 min/week of at least moderate-intensity physical activity" [10]. The *Healthy People 2000* objectives recommend regular sustained physical activity lasting 30 min, 5 days per week, particularly for weight loss [31]. In this study, 75.6% of female and 69.4% of male subjects were considered insufficiently active based on IPAQ recommendations. This rate is higher than those of other countries [15,16] and Taiwan [19] from general population. Furthermore, in a city population study in Brazil [32], the proportion of insufficiently active subjects was 43.1 and 47.8% in obese females and males, respectively, which is lower than that observed in the current study. However, the rate of this study is comparable to other studies from obese subjects. Regarding studies using instruments other than the IPAQ, a German study assessing physical activity by the Stanford 7-d Recall questionnaire at entry into a weight loss intervention

Table 4 Anticipated weight loss among participants ($n = 969$).

	All		Women		Men		p -Value for χ^2 -test
	No.	%	No.	%	No.	%	
Weight loss rate (kg/month)							0.015
<2	120	11.3	81	11.7	39	16.7	
2–3	330	31.1	234	33.9	96	41.0	
4–5	241	22.7	189	27.4	52	22.2	
6–9	165	15.6	128	18.6	37	15.8	
10–	68	6.4	58	8.4	10	4.3	
Percentage of weight loss (%)							<0.001
<10	47	4.4	24	3.3	23	9.5	
10–19	222	20.9	148	20.4	74	30.5	
20–29	326	30.8	225	31.0	101	41.6	
30–	374	35.3	329	45.3	45	18.5	

Table 5 Logistic regression model for relationship between demographic characteristics and behaviors violating to recommendations.

	Anti-obesity drug use		Inadequate physical activity (<300 min/week)		Unrealistic weight goal (>20% body weight)		Anti-obesity drug use	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Gender								
F:M	2.3	1.7–3.2	1.7	1.2–2.3	5.8	3.8–8.8	2.2	1.6–3.2
BMI								
<24	1.0		1.0		1.0		1.0	
24–26 (–)	1.3	0.8–1.9	1.0	0.6–1.6	3.4	2.0–5.6	1.1	0.7–1.8
24–26 (+)	1.9	1.0–3.4	1.6	0.8–3.3	2.0	1.0–4.0	2.0	1.0–4.0
27–29	2.0	1.3–3.1	1.1	0.7–1.8	5.7	3.4–9.5	1.6	1.0–2.6
30–34	2.2	1.5–3.4	1.0	0.7–1.6	9.2	5.3–15.7	2.1	1.3–3.3
≥35	4.4	2.7–7.2	1.7	1.0–3.0	20.1	10.2–41.8	4.2	2.4–7.3
Age								
18–24	1.9	1.0–3.4	2.0	1.1–3.8	4.4	2.1–9.3	1.6	0.9–3.1
25–34	2.2	1.4–3.4	2.4	1.5–4.0	2.2	1.3–3.8	2.0	1.2–3.3
35–44	1.6	1.1–2.4	1.9	1.2–2.9	2.1	1.3–3.3	1.5	1.0–2.3
≥45	1.0		1.0		1.0		1.0	
VMW < 300 min/week							1.4	1.0–2.0
VMW > 300 min/week							1.0	
Weight goal > 20%							1.1	0.8–1.5
Weight goal < 20%							1.0	

Adjusted for monthly income, educational level, marital status and obesity-related co-morbidity. VMW: physical activity of vigorous and moderate intensity and walking.

found that 61.5% of 109 obese subjects did not meet current physical activity recommendations, which is comparable to the finding of this study [33]. Bish et al., in analysis of 2000 BRFSS data, found that only one-fifth of individuals attempting weight loss employed a strategy combining calorie reduction and minimum recommended physical activity level of 150 min/week [34]. Nevertheless, significant evidence indicates that overweight or obese adults unable to achieve this level of activity can still realize significant health benefits by participating in at least 30 min of moderately intense daily physical activity. Interventions targeting these physical activity levels are therefore important for improving health-related outcomes and facilitating long-term weight control. This finding is important for establishing public health guidelines for physical activity in obese patients. National guidelines are recommended to encourage physical activity among obese people.

In 1998, the National Heart, Lung and Blood Institute recommended a 10% weight loss as a general goal of obesity management [20]. The 10% recommendation was derived from the observation that obesity-associated morbidity is significantly decreased by moderate weight reduction, even if patients remain in the obese classification [35–37]. However, other studies have found that most obese

patients seeking treatment consider the recommended 10% weight loss a highly unsatisfactory goal [11,36]. Their minimum acceptable weight loss expectations are over twice as high as the 10% weight loss usually attained by the best evidence-based non-surgical weight loss treatments (e.g., behavior therapy and pharmacotherapy). Dalle Grave et al. indicated that baseline weight loss expectations are independent cognitive predictors of attrition in obese patients entering a weight loss program; the higher the expectations, the higher the attrition at 12 months [13]. The analytical results of this study show that most subjects had unrealistic weight loss goals (weight loss \geq 20% of initial body weight). In a clinical setting, the decision to lose weight must be made jointly by the clinician and patient. Absolute commitment by the patient is crucial to success. Thus, distinguishing between feasible and unrealistic goals is vital for avoiding overconfidence and false hopes which often lead to eventual failure and distress. This task might be particularly difficult in subjects seeking treatment for appearance-related reasons, those with lower BMI but greater body dissatisfaction and those with lower self-esteem. Therefore, unrealistic weight goals should be addressed at the very beginning of treatment. In this study, weight loss goals significantly differed between men and

women whereas actual weight loss achieved did not. Additionally, a previous study revealed only 27% of interviewed obese subjects initially had a realistic anticipated rate of weight loss [38]. The present study also illustrated the dramatic disparity between patient expectations and professional recommendations and the need to help patients establish more modest weight loss goals.

This study had several limitations. First, the cross-sectional study design limits conclusions regarding causal relationships between characteristics and weight loss behaviors. Second, the participants in this study may not have accurately reported the anti-obesity products actually used, and the use of over the counter, herbal therapies and other unknown drugs may have been under-reported [39]. That is, the recall bias of this study may have underestimated their use in Taiwan. Third, only performed for at least 10 min duration per occasion were included. Finally, the analytical results were based on outpatient data. Consequently, the findings of this study should be extrapolated with caution to the general population.

However, this study conclusively demonstrated that patients seeking obesity treatment still inappropriately use anti-obesity drugs despite the implementation of obesity treatment guidelines in Taiwan. Further, those seeking obesity treatment rarely receive recommended levels of physical activity. Like other Asian countries, Taiwan obese subjects often have unrealistic weight loss goals which may cause discouragement [40–43]. Further government initiatives and clinical studies of obesity are needed to reduce unhealthy weight loss behavior in the Taiwan population.

Acknowledgments

The authors would like to thank the Department of Health of the Republic of China, Taiwan for financially supporting this research under Contract No. DOH93-TD-D-113-022(2). The physicians involved in this study are highly appreciated for their valuable assistance.

References

- [1] Clinical guideline for obesity management. Taiwan: Department of Health; 2002.
- [2] Gandjour A, Westenhofer J, Wirth A, Fuchs C, Lauterbach KW. Development process of an evidence-based guideline for the treatment of obesity. *Int J Qual Health Care* 2001;13:325–32.
- [3] International Obesity Task Force. Asia-Pacific perspective: redefining obesity and its treatment. Sydney: Western Pacific Region; 2000.
- [4] Snow V, et al. Pharmacologic and surgical management of obesity in primary care: a clinical practice guideline from the American College of Physicians. *Ann Intern Med* 2005;142:525–31.
- [5] Hayton B. National institute for clinical excellence (NICE) guidance for anti-obesity medication: is it being followed? *J Hum Nutr Dietet* 2004;17:575–8.
- [6] Park HS, Park JY, Cho HJ. Attitudes and reported practice for obesity management in Korea after introduction of anti-obesity agents. *J Kor Med Sci* 2005;20:1–6.
- [7] Gordon PM, Heath GW, Holmes A, Christy D. The quantity and quality of physical activity among those trying to lose weight. *Am J Prev Med* 2000;18:83–6.
- [8] Jakicic JM, Otto AD. Treatment and prevention of obesity: what is the role of exercise? *Nutr Rev* 2006;64(2 Pt 2):S57–61.
- [9] Saris WH, Blair SN, van Baak MA, Eaton SB, Davies PS, Di Pietro L, et al. How much physical activity is enough to prevent unhealthy weight gain? Outcome of the IASO 1st Stock Conference and consensus statement. *Obes Rev* 2003;4:101–14.
- [10] Pate RR, Pratt M, Blair SN, Macera CA, Bouchard C, Buchner D, et al. Physical activity and public health. A recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. *JAMA* 1995;273:402–7.
- [11] Masheb RM, Grilo CM. Weight loss expectations in patients with binge-eating disorder. *Obes Res* 2002;10:309–14.
- [12] Dalle Grave R, Calugi S, Magri F, Cuzzolaro M, Dall'aglio E, Luccchin L, et al. Weight loss expectations in obese patients seeking treatment at medical centers. *Obes Res* 2004;12:2005–12.
- [13] Liou TH, Wu CH, Chien HC, Lin WY, Lee WJ, Chou P. Anti-obesity drug use before professional treatment in Taiwan. *Asia Pac J Clin Nutr* 2007;16:580–6.
- [14] Pan WH, Flegal KM, Chang HY, Yeh WT, Yeh CJ, Lee WC. Body mass index and obesity-related metabolic disorders in Taiwanese and US whites and blacks: implications for definitions of overweight and obesity for Asians. *Am J Clin Nutr* 2004;79:31–9.
- [15] Craig CL, Marshall AL, Sjoström M, Bauman AE, Booth ML, Ainsworth BE, et al. International physical activity questionnaire: 12-country reliability and validity. *Med Sci Sports Exerc* 2003;35:1381–95.
- [16] Macfarlane DJ, Lee CC, Ho EY, Chan KL, Chan DT. Reliability and validity of the Chinese version of IPAQ (short, last 7 days). *J Sci Med Sport* 2007;10:45–51.
- [17] Tehard B, Saris WH, Astrup A, Martinez JA, Taylor MA, Barbe P, et al. Comparison of two physical activity questionnaires in obese subjects: the NUGENOB study. *Med Sci Sports Exerc* 2005;37:1535–41.
- [18] Liou YM. The website of the surveillance system of the physical activity, Taiwan. Retrieved by <http://140.129.70.70>. The Bureau of Health Promotion, Department of Health, Taiwan, ROC.
- [19] Liou YM. Development and verification of validity and reliability of the Taiwan version of international physical activity questionnaires. Unpublished dissertation. National Taiwan University, Taipei; 2004.
- [20] NHLBI. Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults—the evidence report. National Institutes of Health. *Obes Res* 1998;6:515–209S.

- [21] Wong Y, Huang YC. Obesity concerns, weight satisfaction and characteristics of female dieters: a study on female Taiwanese college students. *J Am Coll Nutr* 1999;18:194–200.
- [22] Connolly HM, Crary JL, McGoon MD, Hensrud DD, Edwards BS. Valvular heart disease associated with fenfluramine-phentermine. *N Eng J Med* 1997;337:581–8.
- [23] Cardiac valvulopathy associated with exposure to fenfluramine or dexfenfluramine: U.S. Department of Health and Human Services interim public health recommendations, November 1997. *Morb Mortal Wkly Rep* 1997;46:1061–6.
- [24] Kernan WN, Viscoli CM, Brass LM, Broderick JP, Brott T, Feldmann E, et al. Phenylpropranolamine and the risk of hemorrhagic stroke. *N Eng J Med* 2000;343:1826–32.
- [25] Lake CR, Gallant S, Masson E, Miller P. Adverse drug effects attributed to phenylpropranolamine: a review of 142 case reports. *Am J Med* 1990;89:195–208.
- [26] Morgenstern LB, Viscoli CM, Kernan WN, Brass LM, Broderick JP, Feldmann E, et al. Use of ephedra-containing products and risk for hemorrhagic stroke. *Neurology* 2003;60:132–5.
- [27] Khan LK, Serdula MK, Bowman BA, Williamson DF. Use of prescription weight loss pills among U.S. adults in 1996–1998. *Ann Intern Med* 2001;134:282–6.
- [28] Serdula MK, Mokdad AH, Williamson DF, Galuska DA, Mendlein JM, Heath GW. Prevalence of attempting weight loss and strategies for controlling weight. *JAMA* 1999;282:1353–8.
- [29] Blanck HM, Khan LK, Serdula MK. Use of nonprescription weight loss products—result from a multistate survey. *JAMA* 2001;286:930–5.
- [30] Blanck HM, Khan LK, Serdula MK. Prescription weight loss pill use among Americans: patterns of pill use and lessons learned from the fen-phen market withdrawal. *Prev Med* 2004;39:1243–8.
- [31] US Health and Human Services. Healthy People 2000: National Health Promotion and Disease Prevention Objectives—full report, with commentary. Washington, DC: US Health and Human Services, Public Health Service; 1991. DHHS Publication No. PHS 91-50212.
- [32] Hallal PC, Victora CG, Wells JC, Lima RC. Physical inactivity: prevalence and associated variables in Brazilian adults. *Med Sci Sports Exerc* 2003;35:1894–900.
- [33] Weyer C, Linkeschowa R, Heise T, Giesen HT, Spraul M. Implications of the traditional and the new ACSM physical activity recommendations on weight reduction in dietary treated obese subjects. *Int J Obes* 1998;22:1071–8.
- [34] Bish CL, Blanck HM, Serdula MK, Marcus M, Kohl III HW, Khan LK. Diet and physical activity behaviors among Americans trying to lose weight: 2000 Behavioral Risk Factor Surveillance System. *Obes Res* 2005;13:596–607.
- [35] Blackburn G. Effect of degree of weight loss on health benefits. *Obes Res* 1995;3:2115–65.
- [36] Foster GD, Wadden TA, Vogt RA, Brewer G. What is a reasonable weight loss? Patients' expectations and evaluations of obesity treatment outcomes. *J Consult Clin Psychol* 1997;65:79–85.
- [37] Goldstein DJ. Beneficial health effects of modest weight loss. *Int J Obes* 1992;16:397–415.
- [38] Ford MJ, Scorgie RE, Munro JF. Anticipated rate of weight loss during dieting. *Int J Obes* 1977;1:239–43.
- [39] Moyers SB. Medications as adjunct therapy for weight loss: approved and off-label agents in use. *J Am Diet Assoc* 2005;105:948–59.
- [40] Sakamaki R, Amamoto R, Mochida Y, Shinfuku N, Toyama K. A comparative study of food habits and body shape perception of university students in Japan and Korea. *Nutr J* 2005;4:31–6.
- [41] Sakamaki R, Toyama K, Amamoto R, Liu CJ, Shinfuku N. Nutritional knowledge, food habits and health attitude of Chinese university students—a cross sectional study. *Nutr J* 2005;4:4–8.
- [42] Cheung PC, Ip PL, Lam ST, Bibby H. A study on body weight perception and weight control behaviours among adolescents in Hong Kong. *Hong Kong Med J* 2007;13:16–21.
- [43] Wardle J, Haase AM, Steptoe A. Body image and weight control in young adults: international comparisons in university students from 22 countries. *Int J Obes* 2006;30:644–51.

Available online at www.sciencedirect.com

