

# Demographic profile, clinical characteristics, motivations and weight loss outcomes of patients in a nonsurgical weight management programme

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**INTRODUCTION** Weight management programmes (WMPs) can help overweight individuals lose weight, and thus prevent complications associated with obesity. Herein, we describe the demographic profile, clinical characteristics, motivations and expectations, and outcomes of patients enrolled in a nonsurgical WMP.

**METHODS** This was a retrospective study of consecutive patients with a body mass index (BMI) of  $> 23 \text{ kg/m}^2$  enrolled in the four-month WMP at the Health For Life Clinic, Alexandra Hospital, Singapore, between 1 and 31 August 2009. Demographic data, medical history and source of referral were recorded. Details on personal motivations and weight loss goals were obtained from the completed self-administered questionnaires of the WMP participants. Weight, waist circumference, fat percentage and BMI were measured at the start and end of the WMP. A weight loss of  $\geq 5\%$  was deemed as a successful outcome.

**RESULTS** A total of 58 patients (mean age 37.2 years) were included in our study. Of these 58 patients, 58.6% were of Chinese ethnicity and 55.2% were male. Many patients (32.8%) attributed their weight gain to work- or study-related stress, and a minority to poor eating habits (12.1%) or a lack of exercise (10.3%). Patients' motivations included a desire for better health (53.4%) and better fitness (15.5%). However, only 53.4% patients scored their motivation as high (i.e. a score of  $> 7$ ). The mean expected weight loss was 9.9 kg at 4 months, and 14.1 kg at 12 months. Among the 40 patients (69.0%) who completed the programme, the mean percentage weight loss was  $1.8 \pm 4.3\%$ . A weight loss of  $\geq 5\%$  was achieved by 8 (13.8%) patients.

**CONCLUSION** Although the patients in our study cohort were young and educated, only a portion of them appeared to be highly motivated to lose weight, despite joining the WMP. There is a need for patients to be guided on how to set realistic weight loss goals.

Keywords: demographics, obesity, results, Singapore, weight management

## INTRODUCTION

The rapid increase in the prevalence of obesity worldwide is reflected in Singapore's National Health Survey statistics; between 1992 and 2010, the prevalence of obese adults (defined as having a body mass index [BMI]  $\geq 30.0 \text{ kg/m}^2$ ) in Singapore more than doubled from 5.1% to 10.8%.<sup>(1)</sup> The prevalence of obesity is even higher if the BMI cutoffs recommended by the World Health Organization to define risks for Asian populations are applied – in 2010, 32.3% of Singapore residents had a moderate-risk BMI (i.e.  $23\text{--}27.4 \text{ kg/m}^2$ ) and 23.0% had a high-risk BMI ( $\geq 27.5 \text{ kg/m}^2$ ).<sup>(1,2)</sup> Consequently, obesity and obesity-related morbidity and mortality have become a growing public health concern in Singapore.<sup>(3,4)</sup> Increased BMI is a major risk factor for noncommunicable diseases such as cardiovascular diseases (primarily heart disease and stroke), diabetes mellitus, musculoskeletal disorders and certain cancers (e.g. breast and colon cancers).<sup>(5)</sup> The Singapore Chinese health study recently reported an increased risk of mortality for individuals with a BMI of  $> 27.5 \text{ kg/m}^2$ , independent of age or smoking status.<sup>(6)</sup>

Hospital-based, nonsurgical weight management programmes (WMPs) can assist overweight individuals in losing weight, preventing the possible complications associated with

obesity. Such WMPs ensure that weight loss is done in a safe and supervised manner. To date, there have been few local reports on the profile of patients who attend such WMPs, the motivations for weight loss in the local population, and the amount of weight loss that can be realistically expected from such WMPs.<sup>(7)</sup>

Thus, this retrospective descriptive case series aimed to determine the demographic profile, clinical characteristics, weight loss motivations and expectations, and weight loss outcomes of patients enrolled in a four-month nonsurgical WMP conducted by the Health For Life Clinic (HFLC) at Alexandra Hospital, Singapore (the centre was relocated to Khoo Teck Puat Hospital in April 2010). The WMP was set up in August 2000, and since its inception, the programme has seen a steady increase in the number of patients enrolling every year. Similar programmes have also been established in other public and private hospitals in Singapore.

## METHODS

The study was conducted in 2009, when HFLC was still part of Alexandra Hospital. The medical records of consecutive patients newly enrolled in the WMP between 1 and 31 August

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2009 were reviewed. The study was approved by the Domain Specific Review Board of the National Healthcare Group.

The WMP at HFLC is a physician-supervised programme that involves regular, scheduled consultations with physicians and a team of dietitians, physiotherapists and occupational therapists. There are typically five consultations with a physician – once upon enrolment into the programme and once at the end of every month for the next four months to assess the patient's progress. Patients also attend five consultations with a dietitian, who provides personalised nutrition counselling and guidance on dietary modification. Furthermore, patients receive two supervised gym sessions with physiotherapists for exercise planning, and spend two group sessions with occupational therapists and fellow WMP participants undergoing behavioural modification therapy.

Patients enrolled in the WMP are required to complete a detailed self-administered questionnaire on their weight loss history, personal motivations and weight loss goals. The questionnaire also includes questions on previous attempts at weight loss, factors that the patients believed had contributed to their weight gain, and their motivation to lose weight, scored using a scale that ranged from '1' (low/no motivation) to '10' (highly motivated).

During the study period, the programme was run by eight different physicians. Weight loss medications such as orlistat (Xenical; Roche, Basel, Switzerland) and sibutramine (Reductil; Abbott Laboratories, Chicago, IL, USA) were available at that time and could be prescribed by the supervising physicians. The decision to prescribe weight loss medication was guided by the Ministry of Health's Clinical Practice Guidelines on Obesity,<sup>(8)</sup> physicians' familiarity with the medications, and patients' requests. In general, patients with a BMI of > 27.5 kg/m<sup>2</sup>, those with a BMI of > 25 kg/m<sup>2</sup> and obesity-related comorbidities, and those who did not achieve the targeted weight loss of at least 2 kg per month were offered weight loss medication.

Patients aged 18–65 years with a BMI of > 23 kg/m<sup>2</sup> were included in the study. Patients were excluded if there was a secondary cause for weight gain, such as uncontrolled thyroid disease or Cushing's syndrome. Case records were reviewed by a single investigator and relevant data was collected in a standardised form. Demographic data (e.g. age, gender, ethnicity and educational level), previous medical problems, and the source of referral were documented. Patients' weight, waist circumference, fat percentage and BMI were measured and recorded at the start, and upon completion, of the four-month programme. If patients did not complete the four-month programme, the last recorded measurement was documented for the purposes of the study. No attempts were made to contact the patients who did not complete the programme to elicit the reasons for dropping out of the WMP. Patients who achieved a percentage weight loss of  $\geq$  5% at the end of the WMP, or at the last documented visit, were considered to have

**Table 1. Demographics of the patients enrolled in the non-surgical weight management programme (n = 58).**

Variable	No. of patients (%)
<b>Age (yrs)</b>	
≤ 19	1 (1.7)
20–29	13 (22.4)
30–39	21 (36.2)
40–49	15 (25.9)
50–59	6 (10.3)
≥ 60	2 (3.4)
<b>Gender</b>	
Men	32 (55.2)
Women	26 (44.8)
<b>Ethnicity</b>	
Chinese	34 (58.6)
Malay	5 (8.6)
Indian	14 (24.1)
Other	5 (8.6)
<b>Nationality</b>	
Singaporean	52 (89.7)
Other	6 (10.3)
<b>Education</b>	
University	20 (34.5)
Polytechnic diploma	11 (19.0)
Junior college	5 (8.6)
ITE/other diploma	3 (5.2)
Secondary	14 (24.1)
Primary	2 (3.4)
Not indicated	3 (5.2)
<b>Marital status</b>	
Married	24 (41.4)
Single	13 (22.4)
Divorced	1 (1.7)
Not indicated	20 (34.5)

ITE: Institute of Technical Education

had a successful outcome.<sup>(9)</sup> The relationship between various patient factors and successful weight loss was explored.

Statistical analyses were conducted using the Microsoft Excel 2003 software version 11 (Microsoft Corp, Redmond, WA, USA) and VassarStats: Website for Statistical Computation, developed by Richard Lowry (available at: <http://vassarstats.net/>). Data was presented as mean  $\pm$  standard deviation for continuous variables, and where appropriate, chi-square test or Fisher's exact test was performed to compare proportions among the groups for categorical variables. A p-value < 0.05 was considered statistically significant.

## RESULTS

A total of 60 patients were enrolled in the WMP at HFLC between 1 and 31 August 2009. However, two patients were excluded because of documented uncontrolled hyperthyroidism (n = 1) and Cushing's disease (n = 1). Thus, the total number of patients included in the present study was 58.

The mean age of the 58 patients was 37.2  $\pm$  10.1 years; 32 (55.2%) were male and 26 (44.8%) were female (Table 1). The majority of the patients were Chinese (n = 34, 58.6%), while 14 (24.1%) were Indian, 5 (8.6%) were Malay, and 5 (8.6%) were of other ethnicities. Although most of the patients (n = 36, 62.1%) had graduated from junior college or higher, 2 (3.4%) only received a primary education. Of the

**Table II. Referral source and medical history of the patients enrolled in the nonsurgical weight management programme (n = 58).**

Variable	No. of patients (%)
<b>Source of referral</b>	
Government polyclinic	17 (29.3)
General practitioner	3 (5.2)
Specialist	6 (10.3)
Self	13 (22.4)
Corporate client	19 (32.8)
<b>Medical comorbidities*</b>	
Hypertension	18 (31.0)
Hyperlipidaemia	13 (22.4)
Knee pain/osteoarthritis	13 (22.4)
Type 2 diabetes mellitus	6 (10.3)
Asthma	5 (8.6)
Thyroid problems	4 (6.9)
Anterior cruciate ligament tear	4 (6.9)
Gout	4 (6.9)
Obstructive sleep apnoea	2 (3.4)
Ischaemic heart disease	1 (1.7)
Fatty liver	1 (1.7)
<b>Lifestyle factor</b>	
Smoking	11 (19.0)
Alcohol consumption	25 (43.1)

\*Some patients had multiple medical comorbidities.

58 patients, 24 (41.4%) were married and 13 (22.4%) were single. Many patients (34.5%) did not respond to the query on marital status.

The source of referral for 20 (34.5%) patients was a primary care physician, while 13 (22.4%) patients were self-referred and 19 (32.8%) were referred to the programme by their employers (Table II). Among the 19 employer-referred patients, 18 were from a single corporate client of the HFCL. Obesity-related medical comorbidities were observed in many patients – 18 (31.0%) had hypertension, 13 (22.4%) had hyperlipidaemia and 6 (10.3%) had type 2 diabetes mellitus. Joint problems were also common – 13 (22.4%) patients had osteoarthritis of the knee or nonspecific knee pain, and 4 (6.9%) had anterior cruciate ligament tears of the knee joint. Some patients also had obesity-associated complications – 2 (3.4%) had obstructive sleep apnoea and 1 (1.7%) had fatty liver. Although four patients mentioned a history of thyroid problems, these patients were euthyroid at the start of the programme. Of the 58 patients, 11 (19.0%) were smokers and 25 (43.1%) consumed alcohol regularly.

The patients had been queried on what they believed was the cause or trigger of their excessive weight gain – 19 (32.8%) attributed their weight gain to work- or study-related stress, 9 (15.5%) to marriage or family issues, and 7 (12.1%) to previous pregnancies (Table III). Only a minority of patients attributed their weight gain to poor eating habits (n = 7, 12.1%) or a lack of exercise (n = 6, 10.3%). A majority of patients (n = 32, 55.2%) indicated that they enjoyed exercise 'greatly' or 'moderately', and only 6 (10.3%) responded 'not at all'.

Of the 58 patients, 30 (51.7%) had previously tried to lose weight through various means, including other weight loss programmes and over-the-counter or physician-prescribed

**Table III. Weight loss history and motivations of the patients enrolled in the nonsurgical weight management programme (n = 58).**

Variable	No. of patients (%)
<b>Trigger for weight gain*</b>	
Work/school stress	19 (32.8)
Marriage/family issues	9 (15.5)
Poor eating habits	7 (12.1)
Previous pregnancy	7 (12.1)
Lack of exercise	6 (10.3)
Health-related	3 (5.2)
Others	4 (6.9)
Not indicated	9 (15.5)
<b>Enjoy exercise</b>	
Greatly	10 (17.2)
Moderately	22 (37.9)
Slightly	15 (25.9)
Not at all	6 (10.3)
Not indicated	5 (8.6)
<b>Past attempt at weight loss</b>	
Yes	30 (51.7)
No	26 (44.8)
Not indicated	2 (3.4)
<b>Motivation to lose weight*</b>	
Better health	31 (53.4)
Better figure	10 (17.2)
Better fitness	9 (15.5)
Greater confidence	3 (5.2)
Not indicated	9 (15.5)
<b>Motivation score</b>	
10	12 (20.7)
9–8	19 (32.8)
7–6	17 (29.3)
≤ 5	4 (6.9)
Not indicated	6 (10.3)
<b>Acceptable methods to achieve weight loss*</b>	
Exercise	51 (87.9)
Dieting	47 (81.0)
Medications	28 (48.3)
Surgery	9 (15.5)

\*Some patients indicated multiple reasons.

weight loss medications. Motivating factors among patients for losing weight included better health (n = 31, 53.4%) or fitness (n = 9, 15.5%); 10 (17.2%) patients indicated that the desire for a better figure was a motivation for losing weight. The patients were also asked to rate their motivation; 31 (53.4%) patients indicated motivation scores in the range of 8 to 10. Of these 31 patients, 12 indicated a motivation score of 10. Patients indicated that, in order to lose weight, they were open to exercise (n = 51, 87.9%), dieting (n = 47, 81.0%), and the use of weight loss medications (n = 28, 48.3%). Only 9 (15.5%) patients considered bariatric surgery as an acceptable means of weight loss.

On average, patients expected to lose  $9.9 \pm 6.2$  kg four months after joining the WMP,  $14.1 \pm 8.4$  kg at 12 months, and  $24.2 \pm 12.4$  kg by 24 months (Table IV). The ideal weight that patients hoped to achieve was  $75.3 \pm 34.1$  kg. At the start of the programme, the mean patient weight was  $98.4 \pm 24.3$  kg, mean waist circumference was  $108.1 \pm 17.0$  cm, mean fat percentage was  $44.4 \pm 10.0\%$  and mean BMI was  $35.7 \pm 7.6$  kg/m<sup>2</sup>. Several patients did not complete the WMP –

**Table IV. Weight loss expectations and outcomes of the patients enrolled in the nonsurgical weight management programme (n = 58).**

Variable	Mean ± SD	Range
<b>Expected weight loss (kg)</b>		
At 4 mths	9.9 ± 6.2	3.0–20.0
At 12 mths	14.1 ± 8.4	8.0–40.0
At 24 mths	24.2 ± 12.4	10.0–50.0
Ideal weight	75.3 ± 34.1	55.0–130.0
<b>Initial patient measurements</b>		
Weight (kg)	98.4 ± 24.3	63.6–193.1
Waist circumference (cm)	108.1 ± 17.0	84.0–170.0
Fat percentage (%)	44.4 ± 10.0	29.1–69.4
Body mass index (kg/m <sup>2</sup> )	35.7 ± 7.6	24.5–69.2
<b>Final patient measurements (all patients)*</b>		
Weight (kg)	96.9 ± 31.4	64.5–167.4
Waist circumference (cm)	106.7 ± 25.7	82.0–153.0
Fat percentage (%)	43.3 ± 12.0	24.6–70.6
Body mass index (kg/m <sup>2</sup> )	35.1 ± 9.6	24.9–60.0
Weight loss <sup>†</sup> (kg)	1.8 ± 4.8	–10.6 to 25.7
Percentage weight loss <sup>†</sup> (%)	1.7 ± 3.7	–9.5 to 13.3
<b>Final patient measurements (patients who completed the WMP)*</b>		
Weight (kg)	95.4 ± 23.5	64.5–167.4
Waist circumference (cm)	106.0 ± 16.8	82.0–153.0
Fat percentage (%)	43.6 ± 11.1	24.6–70.0
Body mass index (kg/m <sup>2</sup> )	34.9 ± 7.4	24.9–60.0
Weight loss <sup>†</sup> (kg)	2.1 ± 5.7	–10.6 to 25.7
Percentage weight loss <sup>†</sup> (%)	1.8 ± 4.3	–9.5 to 13.3

\*Includes the 55 patients who had at least one documented session with measurements. †Negative values signify weight gained during the programme.

\*Includes the 40 patients who completed the WMP. SD: standard deviation; WMP: weight management programme

3 (5.2%) did not return for any session following their initial assessment and 15 (25.9%) dropped out midway through the programme. Of the 15 patients who dropped out midway, 7 patients defaulted after the first-month review, 4 after the second-month review and 3 after the third-month review.

Among the 55 patients who had at least one measurement taken after the initial assessment, 40 patients maintained or lost weight (range 0–25.7 kg), while 15 patients gained weight (range 0.1–10.6 kg). At the end of the programme, the mean patient weight was 96.9 ± 31.4 kg, mean waist circumference was 106.7 ± 25.7 cm, mean fat percentage was 43.3 ± 12.0%, and mean BMI was 35.1 ± 9.6 kg/m<sup>2</sup>. The mean absolute weight loss was 1.8 ± 4.8 kg and the mean percentage weight loss was 1.7 ± 3.7%.

A total of 40 (69.0%) patients completed the four-month programme – 29 patients maintained or lost weight (range 0–25.7 kg), 8 achieved a weight loss of ≥ 5%, and 2 had a weight loss of ≥ 10% at the end of the programme. Among the patients who completed the WMP, the mean absolute weight loss was 2.1 ± 5.7 kg and the mean percentage weight loss was 1.8 ± 4.3%.

Medications were prescribed to 31 (53.4%) patients during the course of the WMP – 26 (44.8%) were prescribed orlistat and 5 (8.6%) were given a combination of orlistat and sibutramine. These weight loss medications were used for over a period of four weeks for 19 (32.8%) patients. Excluding the three patients who dropped out of the WMP following initial assessments, 30 patients who were prescribed weight loss medications achieved a mean percentage weight loss of 2.53%, compared to the mean percentage weight loss of 0.68% among the 25 patients who were not given such medication. However, independent sample *t*-test showed that

the difference in the percentage weight loss between these two groups of patients was not statistically significant (*p* = 0.07).

Fisher's exact test revealed that there was no statistically significant association between successful weight loss and factors such as gender, ethnicity, referral source (self-referral vs. others; employer referred vs. others), previous weight loss attempts, presence of medical comorbidities, motivation for weight loss (health and/or fitness vs. other reasons; better figure vs. other reasons), motivation score (score 8–10 vs. score 1–7; score 10 vs. score 1–9) and the use of weight loss medications. Similarly, we did not find any statistically significant difference with regard to the aforementioned factors between the patients who completed of the programme and those who did not.

## DISCUSSION

In general, patients enrolled in the WMP during the study period were young (most were aged 20–49 years) and well educated (most had a junior college/vocational education or higher). The numbers of male and female patients in the study were almost equal (32 male, 26 female). A significant proportion of patients were previously diagnosed with obesity-related comorbidities (i.e. hypertension, hyperlipidaemia and type 2 diabetes mellitus) and obesity-associated complications (i.e. knee pain and obstructive sleep apnoea). This group of patients should be aware of the health risks associated with obesity, and this is reflected accordingly by the majority of patients who cited 'better health' as their main motivation for losing weight. Not surprisingly, 17.2% of patients indicated 'better figure' as a primary motivation for weight loss. Irrespective of the patients' motivation, slightly over half of our study cohort had made one or more previous attempts at weight loss.

Most of our patients were open to dietary modifications, exercise and the use of weight loss medications; only a minority felt that surgery was a suitable means of weight loss. However, only half of our patients rated themselves as highly motivated (score 8–10), and means for weight loss such as diet, exercise and the use of medications largely depend on the patient's self-motivation. Three patients did not return for any session subsequent to the initial visit and the overall dropout rate in our study was 30.0%. As we did not follow up with any of the patients who dropped out of the programme, we were unable to ascertain whether attrition was related to factors such as a lack of motivation, disappointment with actual weight loss achieved or extenuating circumstances (e.g. illnesses and financial difficulties).

Almost a third of our patients were referred to the WMP by their employers, but this may be unique to our centre because of our work with corporate clients. Most of the other patients were either referred by primary care physicians or self-referred. In contrast to the general assumption that self-referred and employer-referred patients would be more motivated to lose weight, such a correlation was not demonstrated in our study. It is also likely that some physician referrals were made at the behest of the patient, especially since referrals from polyclinics would have allowed patients to participate in the WMP at government-subsidised rates.

Although weight gain is in part due to excessive caloric intake and insufficient physical activity, we found that very few patients in our study felt that poor eating habits or a lack of exercise was a contributing factor to their obesity. Interestingly, a large number of patients linked their weight gain to work- and study-related stress or family and marital issues. Although in our study we did not examine how stress could have led to weight gain, possibilities may include irregular meals and stress-related/binge eating. A local study from a restructured hospital conducting a WMP found that 17.1% of the patients they surveyed had moderate or severe binge eating symptoms and 9.7% of patients reported moderate or severe depressive symptoms.<sup>(7)</sup> This suggests that a significant percentage of patients opting for weight management may have psychological symptoms. While stress management is a general component of behaviour modification therapy in WMPs, patients who cite 'stress' as a primary reason for their weight gain should be asked about psychological symptoms, as this group of patients may benefit from further interventions involving counsellors, psychologists and/or psychiatrists.

In the present study, we found that our patients had very high expectations and goals in terms of their expected weight loss. Patients expected to lose nearly 10 kg four months into the programme and up to 24 kg in two years. Published literature, however, have suggested that dietary and exercise treatments for obesity in adults can result in a weight loss of about 3–5 kg (compared to those receiving no treatment or usual care), and with the prescription of weight loss medications (e.g.

sibutramine and orlistat), a weight loss of up to 5–10 kg, although such weight loss was not sustained after cessation of the medications.<sup>(10)</sup> Overall, the patients in our study who completed the WMP achieved a mean weight loss of 2.1 kg. Although less than 15% of our patients could be considered to have achieved successful outcomes in terms of weight loss (i.e. weight loss of  $\geq 5\%$ ), at least two patients managed to achieve a weight loss of  $\geq 10\%$  upon completion of the programme.

Our study was not without limitations. As the study was a retrospective single-centre case series with a small sample size, our findings may not be representative of all patients attending WMPs in Singapore. In addition, the ten-point motivation scale used in our study was developed by our programme to document the patient's own subjective interpretation of his/her motivation. This scale was not based on the findings of previous studies, and neither was the scale validated. Also, as the number of patients who achieved successful outcome in our study was small, it was difficult to ascertain any significant association between patient factors and successful weight loss. Given that obesity is a multifactorial disease that is influenced by genetic, environmental, socioeconomic and psychological factors, a much larger study population and a more detailed investigation would be required to find significant associations between patient factors and successful weight loss.

To conclude, in our study cohort of predominantly young and educated individuals who were likely aware of the health risks of obesity, only half appeared to be highly motivated to lose weight and nearly 30% did not complete the programme. As many of the patients in our study attributed their weight gain to stress, greater emphasis on stress management counselling may prove helpful in the management of these patients' weight. Our findings also highlight the need to guide patients toward setting achievable weight loss goals, as patients who participate in WMPs may have unrealistic expectations.

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