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Waist circumference and not body mass index as the outcome of a group weight intervention for patients with severe mental illness

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Abstract

Objective: Most weight interventions among patients with severe mental illness (SMI) used body mass index (BMI) as outcome measure but excluded waist circumference (WC) although the latter is a stronger predictor of obesity complications. This study aimed to assess a weight-management program consisting of education, exercise and behavioural techniques for patients with SMI using weight parameters including WC as the outcome measures.

Methods: A group intervention was carried out as part of psychiatric outpatient community service. It used structured modules on diet, exercise and related topics comprising of education and exercises sessions with a total of 12-week duration. The participants were outpatients with SMI recruited through referrals to the program by the treating doctor. The participants' body weight, BMI and WC were measured at the baseline, fortnightly and at the end of the program.

Results: A total of 27 patients participated in the program which was carried out in 6 cycles. The pre- and post-intervention comparisons analysis of the weight parameters found a significant reduction in the WC (mean = 3.878 cm + 5.165, p = 0.001) while no significant changes were recorded in body weight and BMI.

Conclusion: Small but significant loss in WC and possibly weight maintenance were achieved using this non-pharmacological intervention. Modest loss in WC may have an impact on reducing the risk of obesity-related health risks.

1. Introduction

Obesity and its management is a clinical dilemma among patients with severe mental illness (SMI). SMI encompasses disorders like schizophrenia, schizoaffective and major mood disorders which pose a high risk of obesity-associated complications to the sufferers due to various mechanisms. Among these are the lifestyle factors such as poor diet and low physical activity among the patients [1] as well as intrinsic factors like genetic predisposition to metabolic abnormalities [2]. Although the preponderance of obesity in SMI might be independent of medication effect, [3] psychotropic use, especially atypical antipsychotics prompted a fresh concern.

Generally, body mass index (BMI) is used to assess obesity with BMI of 23 kg/m^2 and 25 kg/m^2 as indicative of being overweight in Asian and West populations respectively [4]. Nevertheless, abdominal obesity, assessed by waist circumference (WC), is deemed to be the stronger predictor of obesity-related health risk [5]. Moreover, BMI

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and WC could have independent effects on the medical complications of obesity as the risk rises through the BMI classification from normal to obese whereby for each BMI class, those with high WC scores are at a higher health risk than are those with normal WC values as indicated by the NIH guidelines [6]. Therefore, it is imperative to include WC as a measure of outcome in any weight intervention program.

In Malaysia, the prevalence of patients with schizophrenia who were overweight, obese and had high waist circumference (WC) were found to be as high as 39%, 35% and 64%, respectively [7]. In another study [8], patients with schizophrenia were also found to have high prevalence of diabetes (15%), impaired fasting glucose (15%) and an astounding percentage of insulin resistance (68%). Both body mass index (BMI) and WC were associated with insulin resistance [8]. These carry a significant risk of metabolic syndrome and atherosclerotic cardiovascular disease which accounted for the majority of premature deaths in patients with SMI [9].

Recognizing obesity as a grave problem, particularly among patients with SMI should prompt more active roles among physicians and psychiatrists in tackling this issue. While adopting lifestyle changes is a well-recognized measure in weight control [4], the challenge lies in delivering this most effectively. A survey performed in the United States of America in 2000 looking at the patterns of physician activities related to the obesity management found that failure to involve other health providers (dieticians, physical therapists and other mental health professionals) was an important barrier to adequately treat obesity [10]. Other factors included failure to prioritize obesity as a medical issue, lack of skills needed to help patients lose weight and lack of reimbursement for obesity-related activities [10]. These barriers would be more pronounced within the psychiatric service as symptom control and remission took priority. Therefore, patients with severe mental illness are at a greater disadvantage.

Taking into account all these factors, there is a need for a weight-management program with a multidisciplinary team approach which is practical and specifically targeted patients with SMI. The first published non pharmacologic weight management study for patients with schizophrenia found a variety of behaviours (regular weighing, food diaries, dietary evaluations and exercise classes) were helpful in reducing the weight gain in all of the patients [11]. More recent data available to date utilizing similar techniques also showed positive results [11–15].

On the other hand, among the difficulties highlighted with these interventions include modest weight reductions achieved by the participants, high dropout rates in some studies and limited long-term effect [16]. Despite these limitations, it is probably the most useful intervention available [12].

The weight management program using dietary education, exercise and behavioural techniques that specifically targeted the patients with SMI in Malaysia was piloted in 2008 in a teaching hospital. The program was found to be feasible to be developed in a general hospital setting in Malaysia [17]. It had since been offered to the patients attending the psychiatry outpatient clinic in the hospital as part of its psychosocial service. We aimed to report here the outcomes of the program after 6 cycles of duration in terms of weight parameters that included waist circumference beside body weight and BMI. For one complete program cycle, there were altogether six education and twelve exercises sessions within a total of 12-week period.

2. Methods

This was a naturalistic study of an intervention using structured modules that combined behavioural technique with education on diet, exercise and healthy lifestyle for patients with SMI. Two main objectives of the program were (i) to either lose body weight or prevent further weight gain (ii) to equip patients with the skills of healthy living. The setting up of this program and its module development was described in our earlier paper [17]. Ethical approval was obtained from the Universiti Kebangsaan Malaysia Medical Faculty Research and Ethics Committee.

The patients were recruited through referrals by the treating psychiatrists or psychiatric trainees. The patients were aged between 18 and 65 years old with diagnosis of either schizophrenia, schizoaffective or major mood disorders, who were in remission, with BMI of 23 and above and motivated about weight control or having a motivated family member. The program was carried out in small groups consisting of 4 to 8 patients and comprised of two components 1) education sessions and 2) exercise sessions. The education sessions were conducted fortnightly for forty-five minutes per session and consist of interactive lectures based on structured modules, discussion based on the patients' self-monitoring diaries and individual assessment. The topics included were: healthy eating and meal planning (modules 1 and 4), physical activity and exercise (Module 2), psychological factors related to weight gain and weight loss (modules 3 and 6) and activity scheduling (module 5). The exercise sessions (also 45 minutes per session) were conducted twice weekly supervised by physiotherapists at the Physiotherapy Unit. At the beginning of the exercise sessions, the participants' fitness was assessed by the physiotherapists. Each exercise session consisted of both aerobic and anaerobic exercise such as stretching and toning which was individually tailored according to the participants' fitness level.

Body weight, BMI and WC were measured each time the patients came for education sessions. There were altogether six education and twelve exercises sessions within a total of 12-week duration for one complete program cycle.

Using the Statistical Package for Social Science (SPSS) version 15 [18], descriptive analysis was used to describe the socio-demographic and clinical variables of the participants while paired t-test was used to compare the means of the weight parameters pre- and post- intervention with the level of significance set at 0.05.

3. Results

Although, we aimed to recruit 6 to 8 patients per group, only an average of 4 to 5 participants per group per cycle, participated in the program with a total of 27 patients at the end of six cycles. Seventy-four percent (n = 20) of the participants attended more than half of the total sessions in the program while twenty-six percent (n = 7) attended fewer than half of the total sessions.

Majority of the participants were diagnosed to have schizophrenia (n = 27, 66.7%) while 5 was diagnosed to have bipolar disorder, 3 had major depression and 1 had mental retardation with psychosis. The participants were on various types of medication including typical and atypical antipsychotics, antidepressants and mood stabilisers.

The mean age of the participants was 35.3 (17–65) years old. The rest of the socio-demographic data of the participants were tabulated (Table 1). Bivariate analysis did not show any significant association of socio-demographic variables (includes race, marital status, education level) and clinical factors such as psychotropic medications and psychiatric diagnoses (psychotic versus affective disorders) with changes in weight parameters.

The pre- and post-intervention comparisons analysis of the weight parameters found a significant reduction in the waist circumference (mean = 3.878 cm ±5.165, p = 0.001) while no significant changes were recorded in body weight (p = 0.540) and body mass index (p = 0.437) as shown in Table 2.

Table 1
The socio-demographic and clinical profile of the participants.

Variables	Characteristics	Values (n = 27)
Age (mean ± SD) years old		35.26 ± 11.41
Sex		
Males		8
Females		19
Race	Malays	16
	Chinese	5
	Indians	6
Marital status	Single	20
	Married	6
	Divorced	1
Education level	Up to secondary	17
	Tertiary	10
Employment	Unemployed	
	• Student	1
	• Not working	15
	• Retired	2
	• Home maker	3
	Employed	
	• Full time	4
	• Part-time	2
Psychiatric disorders	Psychotic disorders	
	• Schizophrenia	18
	• Mental retardation with psychosis	1
	Affective disorders	
	• Bipolar disorder	5
	• Major depression	3
Psychotropic medications	Typical antipsychotics	
	• Haloperidol	1
	• Perphenazine	1
	• Sulpiride	1
	Atypical antipsychotics	
	• Olanzapine	5
	• Risperidone	5
	• Quetiepine	6
	• Aripriprazole	1
	• Clozapine	1
	Combination of typical and atypical antipsychotics	2
	Not on any antipsychotic	4
Antidepressant treatment	SSRI	4
	TCA	1
	SNRI	1
	Combination of TCA & SSRI	1
	Not on any antidepressant	20
Mood stabilisers	Lithium	1
	Epilim	15
	Lamotrigine	1
	Combination lamotrigine and tegretol	1
	Not on any mood stabiliser	19
Intramuscular depot antipsychotics	Fluphenazine/flupenthixol	4
	Not on depot	23

4. Discussion

The findings of the present study showed that significant loss in waist circumference but not in weight parameters (body weight and BMI) was achievable using a non-pharmacological intervention. The changes observed pre- and post-intervention in the body weight and BMI were insignificant which implied that participants neither reduced nor increased their weight thus indicating weight maintenance during the study period. Waist circumference, on the contrary, was significantly reduced post-intervention. Similar studies, mainly conducted in the West, reported results that varied from small reductions or at least maintenance of weight [19]. Another multicentre study in South Korea, also using a 12-week weight management, supported feasibility of such program across settings [16]. They also reported comparable outcomes with small but significant mean reductions in BMI (0.98 ± 1.01 kg/m (2), p < .001) and body weight (2.64 ± 2.75 kg, p < .001). However, none of these studies included WC measure as part of the outcome of the studies.

Compared to the studies conducted in South Korea, admittedly the methodology used was more robust compared to this study. Lee et al. [15] conducted a multicenter trial with a larger sample size while Kwon et al. [14] carried out weight management program for thirty-three outpatients who were on olanzapine treatment in a comparison with fifteen control subjects. Both studies had the stated strengths in methodology and showed promising results which prompted a similar intervention to be initiated in our population but with several limitations that would be discussed later.

Nevertheless, this study was comparable to both studies in terms of the intervention which combined education,

Table 2
The pre- and post- intervention comparisons analysis of the weight parameters.

Weight parameters pre-post (N = 27)	Mean	Standard deviation	Degree of freedom	*t*-Test	Significance (2-tailed)
BMI (kg)	0.148	1.420	26	0.259	0.798
Weight (kg/m^2)	0.174	3.493	26	0.542	0.592
WC (cm)	3.878	5.165	26	3.902	0.001**

** $p < 0.005$.

exercise and behavioural techniques for duration of 12-weeks. A significant and common problem in conducting studies that are operator dependent like this is the unavoidable variation in the conduct of the program. Despite our best effort to minimize variability by using essentially similar program or standardized modules, admittedly, there would be individual differences such as the fascilitators' style, personal emphasis and rapport with participants that could rise to inconsistencies of the results of similar studies.

Unlike the former studies, this study reported a significant reduction in the waist circumference (mean = 3.878 ± 5.165 cm, p = 0.001) while no significant changes were recorded in either body weight or body mass index. While BMI is the most recognized and commonly used weight measurement, it is limited in assessing obesity in several circumstances including in those with high muscle mass (e.g. athletes), muscle mass loss and extremes of body height [4]. Moreover, unlike WC which indicates truncal or abdominal obesity, BMI does not provide information of the body fat distribution. Truncal obesity in particular, is strongly linked to adverse metabolic and vascular effects of obesity whereby WC is an independent risk factor for cardiovascular morbidity [4]. In this study, significant WC reduction in the absence of significant changes in body weight and BMI observed might be explained by increased muscle mass and fat redistribution as a result of exercise [20].

This observation also prompted a consideration that each component of the intervention i.e. education and exercise could have had an independent influence on the outcome measure than previously thought. However, this study did not assess each component of the program separately. Objective assessment of this aspect might also prove difficult as the interaction between diet and exercise in fat and protein metabolism is equally important and well recognized.

5. Limitations and strengths of the study

The present study reported outcome from a naturalistic, small sample size and short-duration study with no comparison group. Another main limitation is the presence of other confounding factors that could influence the outcome of the program such as the wide age range and varieties of severe mental illness among the participants. It had high variability components such as motivation and commitment of the service providers, patients and/or accompanying caregivers, all of which could influence the outcome of such intervention [17]. In addition, important variables like diet adherence and continuation of exercise at home which were part of behavioural techniques in this program were not objectively measured. We also recommend to consider assessing the effect of each component i.e. education and exercise in correlation with the weight outcomes.

Despite the discouraging outcomes and limitations of lifestyle modification intervention like this one, we highlighted the WC reduction observed in this study as the potential clinical benefit which deserves further studies particularly for patients with SMI, a population with high cardiovascular risk and other obesity-related morbidities.

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