Original Article

A Retrospective Study of Weight Change and Risk Factors Associated with Weight Gain among Patients with Schizophrenia in the Inpatient Psychiatry Unit at a University Hospital in Bangkok, Thailand

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Objective: To study weight change during admission and after being discharged for 1 year as well as risk factors associated with weight gain among patients with schizophrenia in the Inpatient Psychiatry unit at Siriraj Hospital.

Materials and Methods: A retrospective chart review was conducted on patients with schizophrenia who were admitted during 2002 to 2013.

Results: Out of 706 reviewed inpatient charts, 306 admissions met inclusion criteria. The mean of length of stay was 29.1 days (SD 14.9). During admission, an average weight gain was 1.9 kg (SD 2.9) and average increasing body mass index [BMI] was 0.7 kg/m^2 (SD 1.1). After 1 year follow-up, an average weight gain was 3.6 kg (SD 6.3) and the mean of increasing BMI was 1.4 kg/m^2 (SD 2.4). The risk factors associated with weight gain included low weight at admission, being young patients, long length of stay, current smokers and treatment naive group.

Conclusion: Patients with schizophrenia were likely to gain weight during psychiatric hospitalization and tend to gain weight further after being discharged for 1 year. There are many factors associated with weight gain during admission. Weight control interventions during hospitalization are crucial for patients at risk.

Keywords: Weight change, Risk factors, Schizophrenia, Inpatient

J Med Assoc Thai 2018; 101 [Suppl. 1]: S119-S125
Full text. e-Journal: http://www.jmatonline.com

From literature reviews, it was found that patients with psychiatric diseases are more prone to risks in developing physical comorbidities such as metabolic syndrome, diabetes mellitus, and also myocardial infarction[1]. These comorbidities make them more vulnerable to premature mortality than the general population. Moreover, patients with schizophrenia have lower life expectancy than general population by about 20%[2,3]. They tend to experienced overweight problems because of many factors such as medication treatment, diet consuming behavior, and disturbance of the endocrine systems[4-7].

There were many studies regarding weight change in people with mental illnesses who received treatment in outpatient unit. However, there were only a few studies about weight changes during admission especially in Asian population-whose influential factors might differ from the western population. In addition, there is no previous research regarding weight change among patients with schizophrenia in Thailand.

Thus, the researchers aimed to study weight changes of patients with schizophrenia who were admitted to a psychiatric ward and to identify risk factors for weight gain during admission and at the period of 1 year after being discharged. The advantages of

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How to cite this article: Pruttithavorn W, Wannasewok K, Ngamthipwatthana T. A Retrospective Study of Weight Change and Risk Factors Associated with Weight Gain among Patients with Schizophrenia in the Inpatient Psychiatry Unit at a University Hospital in Bangkok, Thailand. J Med Assoc Thai 2018;101;Suppl. 1: S119-S125.

studying about weight changes among hospitalized patients are that many confounding factors including activities could be controlled when compared to the studies in outpatient unit. During admission, a patient's weight will be monitored closely and regularly during admission, a patient's weight will be monitored closely and regularly. The authors expect to use information from this study in developing weight control program for patients with schizophrenia who were admitted to the inpatient psychiatry unit of Siriraj hospital.

Objective

To study weight changes during admission and at 1 year after being discharged and risk factors associated with weight gain among patients with schizophrenia in the Inpatient Psychiatry Unit, Siriraj hospital.

Materials and Methods

Subjects

This study was a retrospective chart review. All patients who were diagnosed with schizophrenia or F20 according to ICD-10 by attending psychiatrists and admitted in the Prasert Kangsadarn psychiatric ward, Department of Psychiatry, Siriraj Hospital during 2002 to 2013 were included in this study.

The exclusion criteria are as follows:

1) The patients who were admitted less than 14 days.

2) The patients whose data regarding weight and height were not recorded completely.

3) The patients who were diagnosed with eating disorders or F50 according to ICD-10.

4) The patients who had received any kind of intravenous fluid during admission.

The sample size was calculated based on the results from a previous study[8] about weight change among patients with schizophrenia who were admitted to the hospital. It was found that 18.5% of psychiatric patients would experience change in body mass index [BMI] during admission. When specifying the confidence level at 95% and approximation error at 5%, the sample size of 232 patients with schizophrenia was required.

Ethic consideration

The present study was approved by the Siriraj Institutional Review Board, the project code was 826/2556 (EC3). The permission to use the data in the medical records of Siriraj Hospital was granted by the Director of Siriraj Hospital.

Statistical analysis

The data were calculated using SPSS software version 15.0. For descriptive statistics, number and percentage were used to present categorical data. Mean, standard deviation, median, a maximum value and minimum value were used to present continuous data without normal distribution. For inferential statistics, McNemar test was used when comparing BMI before and after being treated and multiple linear regression was used to analyze the correlation between each factor and weight change in patients by specifying the level of statistical significance at 0.05.

Results

During 2002 to 2013, there were total of 706 inpatient charts that were diagnosed with schizophrenia. Among this group, 400 charts of the patients were excluded (314 patients who were readmitted or patients who were admitted less than 14 days, 63 patients who received intravascular fluid and 23 patients whose recorded data regarding body weight and height were incomplete). Therefore, only 306 inpatient charts were used in data analysis.

The age of this sample group ranges from 18 to 80 years old and the mean age of this group is 36 years (SD = 11.8). More than half of them are female (n = 166, 54.2%). Majority of them were below 40 years old (n = 201, 65.7%). More than half had educational level of at least diploma (n = 167, 54.5%) and more than one third obtained bachelor degree (n = 121, 39.5%). The mean height and body weight at the first date of admission was 162.3 cm (SD 8.3) and 59.8 kg (SD = 16.6), respectively. The mean body mass index at the first date of admission was 22.7 kg/m^2 (SD 4.96) which was in the normal range according to body mass index classification of World health organization for Asian population[9] (Underweight BMI <18.50 kg/m^2; normal range BMI 18.50 to 22.99 kg/m^2; Overweight BMI 23.00 to 27.49 kg/m^2; Obese >27.50 kg/m^2)[9]. Majority of the patients had duration of illness of more than 1 year (n = 261, 85.3%). More than three-fourths were admitted in a psychiatric ward (n = 207, 76.7%) and almost half of them were admitted in inpatient psychiatry unit at Siriraj Hospital (n = 145, 47.4%). Less than one-sixth of them were in the treatment naive group (n = 42, 13.7%). On the first day of admission, more than half received monotherapy of antipsychotic drugs (n = 157, 51.3%). The most common prescribed psychotropic medication were typical antipsychotic drugs (n = 185, 60.5%), atypical antipsychotic drugs (n = 177, 57.8%),

antidepressants (n = 64, 20.9%) and mood stabilizers (n = 14.1, 14.1%) respectively. Less than a quarter of them had physical comorbidities (n = 72, 23.5%) such as dyslipidemia (n = 20, 6.5%), diabetes mellitus (n = 17, 5.6%) and hypertension (n = 17, 5.6%) respectively. Most of them had no psychiatric comorbidities (n = 281, 91.8%). Less than one-tenth of them had psychiatric comorbidities (n = 25, 8.2%) such as substance dependence, depressive disorder, and dementia. Patients with history of substance use before admission included substances such as tobacco (n = 66, 21.6%), alcohol (n = 30, 9.8%), amphetamine (n = 11, 3.6%), cannabis (n = 7, 2.3%), inhalant (n = 2, 0.7%) and opioid (n = 1, 0.3%), respectively.

Most of the patients had a regular diet during admission (n = 278, 90.8%). The length of stay in this sample group varied from 14 days up to 93 days and the mean length of stay was at 29.1 days (SD 14.8). About half of them were admitted not more than 25 days (n = 155, 50.7%).

The result of the weight change in the present study was found that average weight gain during admission was 1.9 kg (SD 2.9) and the mean of increasing BMI was 0.7 kg/m^2 (SD 1.1) as shown in Table 1. A majority of the patients with schizophrenia gained weight during admission (n = 238, 77.8%). Moreover, almost one-sixth of this sample group (n = 44, 14.4%) gained weight of statistical significance at *p*-value <0.001 which makes them change the group of BMI at the discharge date when compared to the first day of admission as shown in Table 3. The sample group which their BMI at the first day of admission was categorized in the underweight group and normal range group, will have an average of weight change more than the sample group, which was initially in the overweight group as shown in Table 2.

Based on the results of weight changes after being discharged for 1 year, there were only 127 patients (41.5% of all sample groups) for which data regarding weight were collected from outpatient medical records as shown in Table 3 because of many patients were later referred to other hospitals, lost to follow-up or their weight data were incompletely recorded. After being discharged for 1 year, their mean for weight gain was 3.6 kg (SD 6.3) and the mean for increased BMI was 1.4 kg/m^2 (SD 2.4) as shown in Table 1. Moreover, after 1 year of following up, there were 36 patients (28.4% of 127 patients) whose BMI increased at a statistically significant level *p*-value of <0.001 which made them change the BMI group after being discharged for 1 year when compared to the discharge day as shown in Table 3.

Table 1. Descriptive statistics of weight and BMI

	n	Weight (kg)		BMI	
		Mean ± SD	Min, max	Mean ± SD	Min, max
At the first date of admission	306	59.8±14.6	31.4, 142.5	22.7±5.0	13.1, 47.6
Before being discharged	306	61.6±14.3	35.7, 138.1	23.4±4.8	14.8, 46.1
At 1 year after being discharged	127	65.4±17.6	37.3, 163.0	24.8±5.6	15.5, 54.5
Change					
During admission	306	1.9±2.9	-7.8, 11.9	0.7±1.1	-3.1, 4.4
1 year after being discharged	127	3.6±6.3	-16.5, 27.6	1.4±2.4	-6.0, 9.2

Table 2. Weight change during admission in each group of BMI (n = 306)

BMI at the first date of admission	n	Weight change during admission	
		Mean ± SD	Median (min, max)
Underweight	50	2.9±2.7	2.4 (-3.8, 11.9)
Normal	134	2.1±2.5	1.9 (-3.8, 10.3)
Overweight	77	1.3±3.1	1.3 (-7.8, 11.6)
Obese	45	1.9±3.1	0.9 (-5.7, 6.8)

Table 3. Change of BMI status (calculating by McNemar test)

	Discharge: number (%)					
	Underweight	Normal	Overweight	Obese	Total	*p*-value
Admission						
Underweight	33 (10.8%)	17 (5.6%)	-	-	50 (16.3%)	
Normal	1 (0.3%)	114 (37.3%)	19 (6.2%)	-	134 (43.8%)	<0.001
Overweight	-	4 (1.3%)	65 (21.2%)	8 (2.6%)	77 (25.2%)	
Obese	-	-	1 (0.3%)	44 (14.4%)	45 (14.7%)	
Total	34 (11.1%)	135 (44.1%)	85 (27.8%)	52 (17.0%)	306 (100.0%)	
1 year after being discharged						
Underweight	8 (6.3%)	1 (0.8%)	-	-	9 (7.1%)	
Normal	7 (5.5%)	33 (26.0%)	3 (2.4%)	1 (0.8%)	44 (34.6%)	<0.001
Overweight	1 (0.8%)	16 (12.6%)	23 (18.1%)	1 (0.8%)	41 (32.3%)	
Obese	-	1 (0.8%)	11 (8.7%)	21 (16.5%)	33 (26.0%)	
Total	16 (12.6%)	51 (40.2%)	37 (29.1%)	23 (18.1%)	127 (100.0%)	

Table 4. Regression analysis of weight change during admission (n = 306)

	Univariable		Multivariable	
	b	*p*-value	b	*p*-value
Weight at admission (kg)			-0.050 (0.012)	0.0001*
Height at admission (cm)	0.064 (0.021)	0.002*	0.041 (0.025)	0.106
Length of stay (days)	0.033 (0.011)	0.002*	0.032 (0.011)	0.003*
Age (years)	-0.05 (0.013)	0.0001*	-0.042 (0.015)	0.005*
Gender				
Female	-0.653 (0.350)	0.063	0.442 (0.466)	0.344
Educational level	0.001 (0.140)	0.993	0.030 (0.147)	0.836
Current smoking	1.082 (0.388)	0.006*	1.238 (0.493)	0.013*
Alcohol use	0.860 (0.538)	0.111	-0.050 (0.639)	0.938
Drug use	0.864 (0.633)	0.173	-0.282 (0.715)	0.694
Previous psychiatric admission	-0.399 (0.345)	0.248	0.222 (0.417)	0.595
Naive treatment	1.063 (0.467)	0.024*	1.339 (0.558)	0.017*
Physical comorbidity	-0.417 (0.383)	0.278	0.123 (0.450)	0.748
On regular diet	1.055 (0.557)	0.059	0.014 (0.676)	0.984
Use of antipsychotic:				
Typical	0.050 (0.328)	0.878	0.216 (0.437)	0.621
Atypical	0.170 (0.327)	0.603	0.199 (0.443)	0.653
Use of antidepressant	0.493 (0.394)	0.211	0.620 (0.396)	0.119
Use of mood stabilizer	0.662 (0.461)	0.151	0.419 (0.466)	0.369

A regression analysis illustrated in Table 4 found that age of the sample group correlated conversely with weight changes during admission to be statistically significant (*p*-value = 0.005). Whereas, other general information namely gender, educational level, alcohol use, substance use, having physical comorbidities and type of diet ordered by doctors were not correlated with weight gain during admission.

The patients in this study tended to gain weight 0.032 kg per day during receiving treatment (*p*-value = 0.003). Moreover, being a current smoker correlated with weight gain 1.238 kg (*p*-value = 0.013) and treatment-naive group correlated with weight gain 1.339 kg (*p*-value = 0.017) which is the most weight

gaining when compared to other factors. When considering types of medication, it showed that there is no statistically significant correlation between types of medication and weight gain during admission.

Discussion

This is the first study that concerned weight changes in Thai patients with schizophrenia who were treated at the inpatient psychiatry unit, Siriraj Hospital during 2002 to 2013. According to the present study, mean BMI at the first day of admission was 22.7 kg/m^2 which was in a normal range. After being discharged, their BMI was 23.4 kg/m^2 which was categorized into the overweight group. When following-up after 1 year, their BMI would increase 1.4 kg/m^2. This result is similar to the result of studies in Western countries[8,10].

Moreover, the rate of weight gain during admission was 0.7 kg per day which is higher than the rate of weight gain after being discharged which was 0.009 kg per day. It was found that the patients with schizophrenia whose BMI was initially in normal range had a tendency to gain weight and shift their BMI group more than other groups. These results are relevant to previous studies in western countries[8,10] but differ from the study in Japanese patients for whom their BMI group had not changed after being discharged[11].

Regarding factors related to weight gain during admission, the results were found that younger patients with schizophrenia tend to gain weight at a statistical significant level more than older patients with schizophrenia. Physiological factors such as hormones, appetite, and basal metabolic rate acted on adverse effects of treatments in each age group differently. There is evidence that supported the fact that elders have less appetite when compared to younger patients[12,13]. Even though the results from the present study were relevant to the research study on Japanese patients, it is not related to research from western countries. Therefore, race and ethnicity may exercise influence on weight gain among different age group.

When considering factors regarding psychiatric treatments, it was found that length of stay was related to weight gain which also corresponds with the previous studies[8,10]. If they were admitted longer in the psychiatric wards with small space where physical activities were limited as at Prasert-Kangsadarn psychiatric ward, it is harder for the patient to control their weight during admission. However, the result of the present study did not found that receiving antipsychotics was related to weight gain. This can be explained by the following factors:

1) When considering a course of the disease, it was found from previous studies that patients with chronic schizophrenia who received treatment for longer than 1 year will slightly gain weight, the treatment naive group will gain weight rapidly within the first several weeks after taking antipsychotic drugs[4]. This might be because the majority of this sample group in this study were diagnosed with schizophrenia for more than 1 year (n = 261, 85.3%) and had been treated (n = 264, 86.3%). Thus, this study's result found that there was no correlation between having antipsychotic drugs and weight gain during admission. On the other hand, the patients in treatment naive group gained weight during admission in a statistically significant way and had the highest beta coefficient when compared to other factors.

2) When considering types of antipsychotics, it was found that there was a ratio of using typical antipsychotic drugs similar to atypical antipsychotic drugs (1.05: 1, respectively). This is different from previous studies both in western countries and Japan for which the patients were prescribed atypical antipsychotic drugs more than they were typical antipsychotic drugs (1: 0.1 to 0.22, respectively). Regarding patients who received typical antipsychotic drugs except chlorpromazine and thioridazine tended to gain less weight than patients receiving atypical antipsychotic drugs; this might be the reason that there is no correlation between having antipsychotic drugs and weight change of statistical significance[5].

In addition, the results show that the type of diet on doctor's orders was not correlated with weight gain during admission. However, there was a limitation in that the type and quantity of additional food and snacks received from their relatives during admission were not recorded.

Moreover, the results of the present study found that current smokers, who were forced to quit smoking during admission (n = 66, 21.6%), were related to weight gain during admission. In general, the smokers will gain weight after they quit smoking. It might be because their body will experience an increase in energy expenditure when smoking and a decrease in energy expenditure after smoking stops[14]. Thus, it is important to focus on weight control for patients with schizophrenia who have a history of smoking before admission because they have a higher chance to gain weight.

Limitation

Data were collected only from medical records;

some information such as a history of smoking, alcohol use including other substances use may not have been recorded or might not have been recorded precisely. In addition, the researchers in this study could not control the possible confounding of factors such as medication received before admission, the number of admissions, type and quantity of food derived from patients' relatives during visiting time, etc. Moreover, numerous patients who were admitted less than 14 days were excluded from this study. This could have created a selection bias in the present study.

Lastly, the generalizability of this result is still limited for clinical application in other mental health service centers where their setting context could differ from the inpatient psychiatry unit of a university hospital which have only 15 to 18 psychiatric beds with quite small space for physical activities.

Recommendation

The authors considered that the information from the study might be useful to improve weight control program for patients with schizophrenia during admission and after being discharged. Psychiatric professional staff should implement interventions for preventing weight gain and its complications in a high-risk group such as younger patients, patients who are current smokers and the treatment-naive group. For instance, providing knowledge regarding the importance of diet control and promoting physical activities including exercise during admission and after being discharged might be essential for patients with schizophrenia who have these risk factors in order to take care of themselves in the long-term.

The future studies about weight change during admission should focus more on Asian patients with schizophrenia because there are many factors associated with weight gain in this group that are different from those patients in western countries.

Conclusion

The results from this retrospective, 306-chart review found that patients with schizophrenia, who were admitted to the psychiatric ward, Siriraj Hospital during 2002 to 2013, tend to gain weight during hospitalization (mean of weight gain = 1.9 kg, SD 2.9) and tend to gain weight further after discharging for 1 year (mean of weight gain = 3.6 kg, SD 6.3), especially in young patients, patients with underweight and normal range of BMI at the first day of admission, current smokers, treatment naive group and having long duration of hospitalization. Weight control is crucial for patients with schizophrenia who are at risk during hospitalization.

Acknowledgements

We appreciated our colleagues from the Department of Psychiatry, Faculty of Medicine Siriraj Hospital Mahidol University who provided insight and expertise that greatly assisted this research, Miss Wandee Wansrisuthon for important data gathering and Dr. Saowalak Hunnangkul from clinical epidemiology unit, Department of Health research and development at Faculty of Medicine Siriraj Hospital for assistance with research methodology and statistical analysis that greatly improved this manuscript.

What is already known on this topic?

From previous studies, we had already known that patients with psychiatric diseases especially schizophrenia have risks to develop metabolic syndrome such as diabetes mellitus including overweight problem because of many factors such as medication treatment, diet consuming behavior and disturbance of endocrine systems. This overweight problem can lead them to premature mortality and have shorter life expectancy than the general population.

What this study adds?

The results from the present study demonstrated the mean of weight changes, which included increasing BMI during admission and after following-up and also factors correlated with a weight gain of patients with schizophrenia who had been admitted to the inpatient psychiatry unit, Siriraj Hospital. This evidence might be useful for developing intervention to control weight for patients with schizophrenia.

Potential conflicts of interest

None.

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