

BODY MASS INDEX IN SCHIZOPHRENIC PATIENTS AND ITS ASSOCIATION WITH CHARACTERISTIC DEMOGRAPHICS

¹NAZLI MAHDINASARI NASUTION, ²BAHAGIA LOEBIS, ³MUSTAFA MAHMUD AMIN

^{1,2,3} Resident of Psychiatry Department, Faculty of Medicine, Universitas Sumatera Utara, Indonesia

E-mail: its_nazli@yahoo.com

ABSTRACT

People with schizophrenia have a high risk for some physical health problems, including obesity (overweight). Overweight increases the risk of morbidity from a number of conditions such as hypertension, dyslipidemia, type 2 diabetes mellitus, coronary heart disease, stroke, respiratory and endometrial disorders, and cancers. Overweight is associated with increased mortality and social stigmatization. Data show obesity to be 2 to 3 times more frequent in schizophrenic patients than in the general population.

The purpose of this study was to determine the proportion of body mass index in schizophrenic patients and to know the relationship of body mass index with demographic characteristics and antipsychotic treatment.

This research is an analytic research with cross sectional approach. This study was conducted at BLUD Mental Hospital Province North Sumatera from November 2012 to January 2013. The sampling technique using nonprobability sampling technique type consecutive sampling. Samples that meet the inclusion criteria will further be measured body mass index. All information obtained was analyzed using SPSS. The results of this study obtained the proportion of body mass index of weight category : underweight, normal and overweight as much as 12.9%, 40% and 47.1% with the average body mass index was 23.2 ± 4.5 . There was no significant association between demographic characteristics (sex, age, education level, employment status and age) of body mass index in schizophrenic patients. There is a relationship between antipsychotic treatment and body mass index in schizophrenic patients.

Keywords: *Overweight, obesity, body mass index, schizophrenia*

1. INTRODUCTION

In United States population, approximately 55% people have overweight. Half of them, have fulfilled the criteria of obese. The data shows obesity can be 2 to 3 times more prevalent in mental illness than general population (Aquila, 2002). Prevalence of obesity among schizophrenic patients range from 40% to 60% and especially high in women (Beebe, 2008). Excessive body weight increases the risk of morbidity from several conditions such as hypertension, dyslipidemia, type 2 diabetes mellitus, coronary heart disease, stroke, respiratory problems and cancers (Connolly, 2005).

Study in Canada, Shaloom Coodin reported the average of body mass index was 29,2. This study showed the average of body mass index for men was 28,49 and 30,02 for women. The prevalence of obesity in this study was 42,08% (Coodin, 2001). Kitabayashi reported from 273 schizophrenic patients in Japanese, the average of

BMI was 23.0 ± 4.3 . The proportion of patients who were obese, normal weight and underweight was 30.8%, 53.1% and 16.1%, respectively (Kitabayashi et al, 2006).

In a study in Malaysia by Norlelawati et al., Of 216 participants found 28% of obese participants and 32% of overweight participants (Norlelawati et al, 2012). In the French study by Limosin et al., Of 5756 individuals with schizophrenia, the prevalence of obesity was 17%. The prevalence of obesity was significantly higher for female patients, ages 40-59, outpatients and patients who were also treated with antidepressants (Limosin et al, 2008). Evidence from several studies illustrates the problem. In a study of schizophrenic patients in Scotland by McCreedy and colleagues, 73% of the samples were overweight, with 86% of schizophrenic women being overweight or obese. A study of 240 patients with schizophrenia or schizoaffective disorder in North America, by Cohn et al. found that 31% of

men and 43% of women were obese (Newcomer et al, 2009).

2. LITERATURE REVIEW:

Schizophrenia is a severe and chronic mental disorder with a high prevalence (about 1% of the general population), usually begins before the age of 25, lasting throughout life, and affects people from all social classes. Schizophrenia is a clinical syndrome of variable, but profoundly disruptive, psychopathology that involves cognition, emotion, perception, and other aspects of behavior (Sadock, 2004).

Pharmacologic treatment depends on the phase of the disorder. In acute phase, it is usually characterized by psychotic symptoms that require immediate clinical attention. These symptoms show the first or more frequent psychotic episodes, a relapse in individuals who have experienced multiple previous episodes. Treatment in this phase emphasizes the decline of the most severe psychotic symptoms. After an acute phase that usually lasts 4-8 weeks and has been restrained and then entered the stabilization phase, the patient remains at risk of relapse if treatment is stopped or when exposed to stress. During this phase, treatment is focused on the consolidation of therapeutic achievements, with similar treatments used in acute phase. This phase can last up to 6 months followed by recovery from acute symptoms. In the third phase is a stable or maintenance phase when the disturbance is either in the relative phase of remission or is symptomatic stable. The goal during this phase is to prevent relapse or psychotic exacerbations and help patients improve their functional level (Kane et al., 2009).

Physical illness is known to occur in large proportions in patients with mental disorders. Life expectancy of schizophrenic patients is 9-12 years shorter than the general population. The high rates of morbidity and mortality among patients with mental disorders can be attributed to lifestyle factors, diseases and related drugs. Side effects of antipsychotic medications such as obesity, impaired glucose tolerance and hyperlipidemia contribute to increased risk of physical illness in this population (Atakan et al., 2008).

Body Mass Index (BMI) is a simple index of the weight-height ratio. Body Mass Index is the most commonly used and practical indicator for measuring population levels of overweight and obesity in adults. For epidemiological research used BMI or Quetelet index. BMI is currently the most

useful indicator for determining overweight or obesity. Weight-height ratio that is typically used to classify underweight, overweight and obesity in adults (Sugondo, 2006).

The Asia Pacific region at this time has proposed its nutritional state classification in the following table:

Tabel.1. Body Mass Index in Asia

Nutritional status	BMI (Kg/m ²)
Underweight	< 18,5
Normal	18,5 – 22,9
Overweight	≥ 23
Pre obese	23,0 – 24,9
Obesitas class I	25,0 – 29,9
Obesitas class II	≥ 30,0

Source : Harahap, et al. Penggunaan Berbagai *Cut-Off* Indeks Massa Tubuh Sebagai Indikator Obesitas Terkait Penyakit Degeneratif Di Indonesia. Gizi Indon. 2005.

Obesity or overweight is a condition that occurs if the quantity of body fat tissue compared to the total body weight is greater than the normal state, or a condition where there is excessive body fat accumulation so that one's body weight far above normal. While overweight is a state in which a person's body weight exceeds normal weight. Obesity and overweight can occur because of an imbalance between the energy of the incoming food is greater than the energy used by the body (Sandjaja, 2005).

Schizophrenic patients may have a higher risk of becoming overweight or obese due to several factors such as clinical, physiological, psychosocial, environmental, and possibly additional genetic factors. Negative symptoms of schizophrenia, such as apathy and social withdrawal, as well as poverty can be clearly hypothesized to have contributed to the sedentary lifestyle and poor diet of this patient population (Newcomer, 2009).

There are several possibilities that lead to an increase in obesity prevalence among schizophrenic patients. It has been reported that poor eating habits, lifestyle and antipsychotic medications may cause weight gain among schizophrenic patients, leading to obesity associated with morbidity and mortality (Norlelawati et al., 2012).

Obesity is always associated with high-fat intake, and lack of physical activity. Among schizophrenic patients, there is considerable evidence to suggest a strong association between

schizophrenia and obesity. Some factors that contribute to obesity in schizophrenia may be related to disease, the effects of antipsychotic medication or a combination of both (Norlelawati, 2012).

There is evidence to suggest that treatment with psychotropic medication, especially some antipsychotics, may induce weight gain and adipose tissue. Antagonistic drugs for strong histamine (H1) receptors and lower $\alpha 1$ adrenoceptors, are involved in antipsychotic-induced weight gain. In general, the treatment of some drugs can reduce energy expenditure, through sedation or decreased motor activity, or increase caloric intake, through increased appetite or decreased satiety, can potentially increase body weight (Newcomer, 2009).

Psychotropic with a higher ability to block H-1 receptors suggests a greater potential for weight gain (Nihalani et al., 2010). The mechanism which responsible for weight-gain induced by antipsychotics has not been understood. Changes in glucose homeostasis and its metabolism and increased food intake have been suggested to be responsible mechanisms for antipsychotic-induced weight gain (Kroeze et al., 2003). In Kim and colleagues' research, it was shown that atypical antipsychotics are selectively orexigenic and potentially stimulate AMP-kinase hypothalamus, which is related to regulation of food intake, and the opposite of the action of anorexigenic leptin hormone. Their findings suggest an appetite stimulation associated with weight gain with atypical antipsychotic drugs by mediating the activation of the hypothalamus AMP-kinase associated with inhibition of H1 histamine receptors (Kim et al., 2007).

3. METHODS

The purpose of this study was to determine the proportion of body mass index in schizophrenic patients and to know the relationship of body mass index with demographic characteristics and antipsychotic treatment.

This study was an analytic research with cross sectional approach. This study was conducted at BLUD Mental Hospital Province North Sumatera from November 2012 to January 2013. The sampling technique using nonprobability sampling technique type consecutive sampling. Inclusion criteria : schizophrenic patients were fulfilled PPDGJI-III criteria, Age above 20, get atypical

antipsychotic, in stabilisation phase, cooperative. Exclusion criteria: have general medical illness, use anntidepressant, mood stabilizer, corticosteroid, pregnancy. Samples that meet the inclusion criteria will further be measured body mass index. All information obtained was analyzed using SPSS.

4. RESULTS

A total of 85 schizophrenic outpatients in BLUD RSJ North Sumatra Province were included in this study. Research subject research conducted consecutive sampling period November 1, 2012 until January 31, 2013.

Table 2. Proportion of Body Mass Index

	Total (85)	%
Body mass index :		
- Underweight	11	12,9
- Normal	34	40
- Overweight	40	47,1
Obesity state :		
- Underweight	11	12,9
- Normal	34	40
- Overweight :		
➤ Pre Obese	20	23,5
➤ Obese class I	15	17,6
➤ Obese class II	5	6

From table 1, the proportion of underweight, normal and overweight was 12,9 %, 34% and 47,1%.

Table 3. Association of Characteristic Demographics and Body Mass Index

	Underweight n = 11 n (%)	Normal n = 34 n (%)	Overweight n = 40 n (%)	p
Sex :				
- Men	9 (81,8)	26 (76,5)	26 (65)	0,40
- Women	2 (18,2)	8 (23,5)	14 (35)	
Age (years) :				
- 20-29	4 (36,4)	8 (23,5)	15 (37,5)	
- 30-39	6 (54,5)	17 (50)	10 (25)	
- 40-49	1 (9,1)	7 (20,6)	10 (25)	0,17
- 50-59	0 (0)	2 (5,9)	4 (10)	
- ≥ 60	0 (0)	0 (0)	1 (2,5)	
Educational level :				
- Not school	2 (18,2)	1 (2,9)	1 (2,5)	
- Primary school	2 (18,2)	7 (20,6)	7 (17,5)	
- Junior high school	1 (9,1)	9 (26,5)	11 (27,5)	0,96
- Senior high school	6 (54,5)	17 (50)	18 (45)	
- College	0 (0)	0 (0)	3 (7,5)	

Job status :				who found higher prevalence of obesity in male sex (42.1%) and female sex (37.5%). In the study by Hsiao et al found no significant difference between male and female outpatient schizophrenic patients treated with antipsychotics (Hsiao et al., 2004).
- Not working	8 (72,7)	24 (70,6)	23 (57,5)	
- Working	3 (27,3)	10 (29,4)	17 (42,5)	
Ethnic :				0,50
- Batakese	4 (36,4)	26 (76,5)	26 (65)	
- Non Batakese	7 (63,6)	8 (23,5)	14 (35)	
Antipsychotic :				0,04
- Risperidone 4 mg	5 (45,5)	5 (15,47)	0 (0)	
- Risperidone 4 mg + Clozapine 25 mg	3 (27,3)	15 (44,1)	10 (25)	
- Risperidone 4 mg + Clozapine 50 mg	2 (18,1)	10 (29,4)	15 (37,5)	
- Risperidone 6 mg	1 (9,1)	0 (0)	2 (5)	
- Risperidone 6 mg + Clozapine 25 mg	0 (0)	3 (8,8)	10 (25)	
- Risperidone 6 mg + Clozapine 50 mg	4 (36,4)	1 (3)	3 (7,5)	

5. DISCUSSION

From this study found the proportion of body mass index of weight underweight, normal and overweight was 12.9%, 40% and 47.1% respectively. This was consistent with the literature which says that the incidence of obesity ranges from 40% to 62% (Beebe, 2008). This also corresponds to the literature which says that the incidence of obesity becomes 2 to 3 times more frequent in mental disorders (Norlelawati et al., 2012). This increased 2.4 times the proportion of general obesity by 19.1% based on the results of Riset Kesehatan Dasar in 2007. In this study also found the proportion underweight was high in schizophrenic patients, which usually was not uncommon. This condition can be due to the patient's economic factors are lacking. This was in accordance with research conducted by Kitabayashi et al. In the study Kitabayashi found the proportion of weight less by 16.1% (Kitabayashi et al., 2006).

From this research was found that body mass index with weight category was more mostly found on male gender group as much as 26 people that was 65%. From result of analysis using chi square test to associate of gender with body mass index in schizophrenic patient found result $P = 0,40$ ($P > 0,05$). This statistically showed no significant relationship between sex and body mass index. The results were consistent with those of Hsiao et al

From table 3, it was found that body mass index with weight category was more mostly in the age group of 20-29, that was 15 people (37,5%). From the results of analysis using chi square on the age relationship with body mass index in schizophrenic patients found results $P = 0.17$ ($P > 0.05$). This statistically showed no significant relationship between age and body mass index in schizophrenic patients. This is not in accordance with research conducted by Limosin et al and Kitabayashi et al. Limosin et al reported higher prevalence of obesity at the age of 40-59 years and it was suggested that age was a significant factor, with an increased risk of obesity until the age of 60 years later there was a decline (Limosin et al., 2008). In a study conducted by Kitabayashi et al found that the prevalence of obesity mostly in the age group of 50-59 years. The result of this study was not in accordance with the result of research conducted by Limosin et al and Kitabayashi et al caused by several factors that can affect the body mass index including the state of physical and psychiatric status of patients, genetic factors, economic factors and lifestyle. Cognitive impairment resulting from psychosis and the influence of motivation from negative symptoms such as flattened affect can lead to poor lifestyle choices such as unhealthy food selection and decreased physical activity. These symptoms can lead to social isolation resulting in fewer opportunities for activity and therefore lead to a decrease in energy consumption (Vella et al., 2011). A person's weight is 40-70% genetically determined. Weight is also influenced by the environment, eating habits, lack of physical activity, and poverty/prosperity (Sugondo, 2006).

From educational level, it was found that body mass index with weight category was more mostly in senior high school group as much 18 people, that is 45%. From result of analysis using chi square to correlation of education level with body mass index in schizophrenic patient found result $P = 0,96$ ($P > 0,05$). This statistically showed no significant relationship between educational level and body mass index in schizophrenic patients. This is in accordance with a study conducted by Norlelawati et al. who suggested that there was no significant relationship between education and obesity (Norlelawati et al., 2012).

From job status, it was found that body mass index with weight category was more mostly in the group had no job as many as 23 people that is 57,5%. From the results of analysis using chi square to associate job status with body mass index in schizophrenic patients found results $P = 0.42$ ($P > 0.05$). This statistically showed no significant relationship between the job status and body mass index in schizophrenic patients. This is in accordance with research conducted by Coodin. In the study by Coodin there was no relationship between body mass index and income. In Statistics Canada's 1996-1997 National Population Health Survey suggested obesity was more prevalent in people with low incomes but also found a prevalence of body weight that increased with income (Coodin, 2001). In a study by Norlelawati et al found that the proportion of obesity increased among schizophrenic patients as carers Household compared to other employment status (Norlelawati, 2012).

From ethnic, it was found that body mass index with weight category was more mostly in Batak ethnic group as much as 26 people that is 65%. From result of analysis using chi square to relation of ethnic with body mass index in schizophrenic patient found result $P = 0,05$ ($P > 0,05$). This statistically showed no significant association between ethnic and body mass index in schizophrenic patients. This is not in accordance with research conducted by Norlelawati. In research by Norlelawati et al found significant difference BMI between the ethnic of Malaysia, India and China, which in certain tribe of genetic polymorphism and lifestyle of various cultures that can influence the incidence of obesity (Norlelawati, 2012).

From the treatment, it was found that body mass index with weight category was more prevalent in those who received antipsychotic treatment combination of risperidon 4 mg with clozapine 50 mg counted 15 people that is 37,5%. From result of analysis using chi square to antipsychotic relation with body mass index in schizophrenic patient found result $P = 0,04$ ($P < 0,05$). This statistically showed a significant association between antipsychotics and body mass index in schizophrenic patients. This is consistent with the literature which suggests that in a meta-analysis of 81 articles, Allison et al reported effects of antipsychotics on body weight after 10 weeks of treatment. In the investigation of this meta-analysis, clozapine and olanzapine have the greatest potential to induce weight among antipsychotics (Hsiao et

al., 2004). Nasrallah also reported that weight gain was most significant with clozapine and olanzapine, whereas risperidone and quetiapine were moderate (Atakan et al., 2008). The weight gain associated with antipsychotics results from several mechanisms, by increasing appetite through the affinity of a central stimulating appetite system (McIntyre et al., 2005). In mice, activation of 5-HT_{2c} receptors decreased feeding behavior and mice lacking 5-HT_{2c} receptors became obese. Many of the antipsychotics (olanzapine, clozapine) have this 5-HT_{2c} inhibiting property (Nihalani et al., 2010).

REFERENCES

1. Atakan Z, Duddu V. The complex needs patient. Dalam : Beer MD, Pereira SM, Parton C. Psychiatric Intensive Care. Edisi Kedua : Cambridge University Press. New York, 2008. h. 136.
2. Aquila R. Management of weight gain in patients with schizophrenia. J Clin Psychiatry. 2002;63 Suppl 4:33-36.
3. Beebe LH. Obesity in schizophrenia: screening, monitoring, and health promotion. Perspective in Psychiatric Care. Jan 2008; 44,1 :25-31.
4. Connolly M., Kelly C. Lifestyle and physical health in schizophrenia. Advances in Psychiatric Treatment. 2005; 11: 125-132.
5. Coodin S. Body mass index in persons with schizophrenia. Can J Psychiatry. 2001; 46: 549-555.
6. Harahap H, Widodo Y, Mulyati S. Penggunaan berbagai *cut-off* indeks massa tubuh sebagai indikator obesitas terkait penyakit degenratif di Indonesia. Gizi Indon 2005, 31.
7. Kane JM, Stroup TS, Marder SR. Schizophrenia: Pharmacological treatment. Dalam: Kaplan & Sadock's Comprehensive Textbook of Psychiatry. Vol. I. Edisi Kesembilan. Philadelphia: Lippincott Williams & Wilkins, 2009. h. 1548.
8. Kim SF, Huang AS, Snowman AM, Teuscher C, Snyder SH. Antipsychotic drug-induced weight gain mediated by histamine H1 receptor-linked activation of hypothalamic AMP-kinase. PNAS. 2007; 104(9):3456-3459.
9. Kitabayashi Y, Narumoto J, Kitabayashi M, Fukui K. Body mass index among Japanese inpatients with schizophrenia. Int'L J Psychiatry Medicine. 2006; 36(1) : 93-102.

10. Kroeze WK, Hufeisen SJ, Popadak BA, Renock SM, Steinberg S, Ernsberg P dkk. H1-histamine receptor affinity predicts short-term weight gain for typical and atypical antipsychotic drugs. *Neuro psychopharmacology*. 2003; 28 : 519-526.
11. Limosin F, Gasquet I, Leguay D, Azorin J-M, Rouillon F. Body mass index and prevalence of obesity in a French cohort of patients with schizophrenia. *Acta Psychiatrica Scandinavica*. 2008; 118: 19-25.
12. Newcomer JW, Fahnstock PA, Haupt DW. Medical health in schizophrenia. Dalam Kaplan & Sadock's Comprehensive Textbook of Psychiatry. Vol. I. Edisi Kesembilan. Philadelphia: Lippincot Williams & Wilkins, 2009. h. 1576-1577.
13. Nihalani N, Schwartz TL, Siddiqui UA, Megna JL. Weight gain, obesity, and psychotropic prescribing. *Journal of Obesity*. 2010. Doi:10.1155/2011/893629.
14. Norlelawati AT, Kartini A, Ramli M, Norsidah K, Azizi WW, Tariq AR. Obesity in multiracial schizophrenia patients receiving outpatient treatment in a regional tertiary hospital in Malaysia. *East Asian Arch Psychiatry*. 2012; 22: 49-56.
15. Sadock VA. Schizophrenia. Dalam Kaplan & Sadock's Concise Textbook of Clinical Psychiatry. Edisi Kedua : Philadelphia : Lippincot Williams & Wilkins, 2004. h. 134.
16. Sandjaja, Sudikno. Prevalensi gizi lebih dan obesitas penduduk dewasa di Indonesia. *Gizi Indon* 2005, 31.
17. Sugondo S. Obesitas. Dalam Buku Ajar Ilmu Penyakit Dalam. Jilid 3. Edisi Keempat; Pusat Penerbitan Departemen Ilmu Penyakit Dalam Fakultas Kedokteran Universitas Indonesia. Jakarta, 2006. h. 1919-1923.