Original article

Metabolic syndrome in patients with major depressive disorder: A study of one year incidence and associated factors

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Objective To examine the one year incidence of metabolic syndrome and factors associated with major depressive disorder.

Methods Patients who had came for treatment of major depressive disorder (MDD) at Maharaj Nakorn Chiang Mai Hospital were screened using the metabolic syndrome criteria proposed by the American Heart Association/National Heart, Lung, and Blood Institute (updated ATPIII). Subjects who did not meet the criteria of metabolic syndrome were screened again at a one year follow-up. Age, history of atypical antipsychotic medication usage, duration of illness, severity of illness, and family history of metabolic syndrome were assessed as factors potentially associated with the metabolic syndrome. Data was analyzed using, standard deviation, student t-test, chi-square test, and Fisher's exact test and is presented as percentages and means.

Results One hundred and forty subjects were recruited of whom 53 were excluded because they already had metabolic syndrome. After one year, 77 of the 87 returned for a follow-up visit and were again screened for metabolic syndrome. The one-year incidence of metabolic syndrome, evaluated according to ATP III criteria, was 16.9% (13 subjects). Both Baseline triglyceride and HDL levels were significantly associated with metabolic syndrome in patients with major depressive disorder ($p \leq 0.001$). Age, history of atypical antipsychotic medication usage, duration of illness, severity of illness, and family history of metabolic disorders were not found to be associated with metabolic syndrome.

Conclusions MDD patients are likely to have or to develop metabolic syndrome. These findings emphasize the importance of assessing and monitoring metabolic syndrome in MDD patients, especially patients who have both high triglyceride and HDL levels. **Chiang Mai Medical Journal 2018;57(3):159-63.**

Keywords: metabolic, depression, incidence, factors

Introduction

Metabolic syndrome is a clustering of at least three of the following five medical conditions: abdominal (central) obesity, elevated blood pressure, elevated fasting plasma glucose, high serum triglycerides, and low high-density lipoprotein (HDL) levels. Metabolic

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syndrome is associated with the risk of developing cardiovascular disease and type 2 diabetes (1). Metabolic syndrome is becoming more common due to the rise in obesity rates among adults.

Recent studies have shown that metabolic syndrome in psychiatric patients may be more common than in the general population (2). In recent years, there have been a number of studies related to metabolic syndrome in major depressive patients. All those studies reported a high prevalence of metabolic syndrome in major depressive patients. Heiskamen et al. examined the prevalence of metabolic syndrome in 121 MDD patients (3). They reported that 44 of the 121 patients examined (34%) had metabolic syndrome. This conforms to Heiskanen's study in Finland (36%) and Hat's study in Malaysia (37.5%) (3,4). A differential prevalence of metabolic syndrome across ethnic groups, possibly due to several factors, e.g., lifestyle influences and genetic factors, has been found in the general population (5). Although the evidence has shown that MDD and metabolic syndrome are frequently comorbidities, we do not know how soon metabolic syndrome appears after a diagnosis of MDD. We, therefore, evaluated the one-year incidence rates of metabolic syndrome in Thai major depressive disorder patients.

Methods

This prospective study was carried out at a psychiatric clinic at Maharaj Nakorn Chiangmai Hospital. The study was approved by the Ethics Committee for Research, Faculty of Medicine, Chiang Mai University.

All major depressive disorder patients who came to our outpatient clinic were invited to join this study. Subjects who gave their consent to join the study had their diagnosis reconfirmed using the Mini-International Neuropsychiatric Interview (MINI). The interviewer was a psychiatrist and the diagnostic criteria was based on criteria in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5). Subjects who had a confirmed diagnosis and met the inclusion criteria and who had no exclusion criteria were screened for metabolic syndrome.

Diagnosis of metabolic syndrome was based on the National Cholesterol Education Program (NCEP) Adult Treatment Panel III (ATP III) definition. According to the NCEP and ATP III, metabolic syndrome is present if three or more of the following five criteria are met: waist circumference over 90 centimeters (men) or 80 centimeters (women), blood pressure over 130/85 mmHg, fasting triglyceride (TG) level over 150 mg/dl, fasting high-density lipoprotein (HDL), cholesterol level less than 40 mg/dL (men) or 50 mg/dl (women), and fasting blood sugar over 100 mg/dl. Subjects who met the metabolic syndrome criteria were excluded from the study and were given treatment. Subjects who did not meet metabolic syndrome criteria were followed up and screened for metabolic syndrome again after one year. Age and history of atypical antipsychotic medication use, duration of illness, severity of illness (Hamilton rating scale for depression), and a family history of diabetes, hypertension and dyslipidemia were the factors that we examined for association with metabolic syndrome.

Results

One hundred forty-five patients with MDD were invited to join the study. Five were dropped because they did not come for a scheduled blood test, leaving 140 patients in the study. After screening, 53 of the 140 patients (37.8%) met ATP III metabolic syndrome criteria and the remaining 87 patients were scheduled for a one year follow-up. After one year, 77 of the 87 patients came for their scheduled follow-up and screening for metabolic syndrome. Of those 77 patients, 21 were male and 56 were female; the mean age was 46.51 years (Std. deviation 11.933). Thirteen (16.9%) met the criteria of metabolic syndrome. Analysis with the independent t-test and the chi square test found no association between age and history of atypical antipsychotic usage, duration of illness, severity of illness and family history of diabetes, hypertension or dyslipidemia and metabolic syndrome (Table 1). The independent t-test showed that baseline triglyceride and HDL levels were significantly associated with metabolic syndrome in patients with major depressive disorder ($p \leq 0.001$)

Discussion

Recent studies have reported that metabolic syndrome is commonly found in patients with major depressive disorder. To the best of our knowledge, this is the first study of the

Table 1. Factors Related to Metabolic Syndrome

	Metabolic syndrome		*p*-value
	Yes (n=13)	No (n=64)	
Age	51.31	45.53	0.112
Duration of illness (months)	106.54	70.05	0.051
Family history of diabetes	5	28	0.487
Family history of hypertension	8	35	0.445
Family history of dyslipidemia	5	23	0.549
Use atypical antipsychotic	2	7	0.473
HAMD score	5.92	4.89	0.436
Waist circumference	88.80	83.56	0.72
Triglyceride	130.92	58.56	0.26
HDL	51	61.17	0.01
Fasting blood sugar	92.23	91.61	0.86

incidence of metabolic syndrome in MDD patients. Hwang et al. examined the incidence of metabolic syndrome in the Korean general population and found that the one year incidence was 3% in men and 4.6% in women (6). Hadaegh et al. examined the incidence of metabolic syndrome in the general population in Iran and found the one year incidence to be 7.5% in men and 4.3% in women (7). Santos et al. surveyed the south European population and found the incidence was 4.7% and that it was similar in men and women. Our study found the one year incidence of metabolic syndrome in major depressive disorder patients to be 16.9% (8). These studies demonstrate how rapidly metabolic syndrome can emerge in patients with major depressive disorder. Age and history of atypical antipsychotic medication use, duration of illness, severity of illness, family history of diabetes, hypertension and dyslipidemia were not found to be associated with metabolic syndrome. This finding is in contrast to Hadaegh et al. who reported a family history of diabetes was independently associated with an increased risk of metabolic syndrome in the general population of more than 20% (7). Santos et al. found that the incidence rate of metabolic syndrome increased with age in the general population. Although atypical antipsychotic medication usage has been reported to be associated with metabolic syndrome (8), we found no such association, findings which correspond to a study by Goethe et al. Controversial factors such as these will require more research with a larger sample size to achieve more conclusive results.

Our findings indicated that the duration of illness was not associated with metabolic syndrome. This contrasts with Hat's finding that the incidence increases with the duration of the illness (4). The difference can be explained by the fact that the duration of illness of the patients in our study was relatively short, *i.e.,* less than three years (12.8%).

High baseline levels of either triglyceride or HDL was a risk factor for metabolic syndrome. This finding is supported by Hwang et al. and Santos et al. who reported that the relative risk was increased by a factor of 1.22 in men (95% CI, 0.43-3.51) and 2.21 in women (95% CI, 0.98-4.97). The risk increased by a factor of 3.33 (95%CI,1.65-6.74) for individuals who evidenced at least one component of metabolic syndrome at baseline.

Limitations of our study include the small sample size and the fact that it was a hospital-based study. Although the sample size was calculated to achieve the desired power, the small number of subjects might have resulted in some associated factors not being statistically significant, *e.g.*, atypical antipsychotic medication use. Because the study was done in a hospital setting, patients were aware of their illness, which is potentially not representative of the community as a whole, *i.e.*, it does not include individuals who were not aware

of their illness and thus did not seek medical treatment.

Conclusions

MDD patients are likely to already have or to rapidly develop metabolic syndrome. It is important to assess and monitor metabolic syndrome in MDD patients, especially in patients who have high triglyceride or high HDL levels.

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อุบัติการณ์ภาวะอ้วนลงพุงของผู้ป่วยโรคซึมเศร้าชนิดรุนแรงในรอบหนึ่งปี

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วัตถุประสงค์ เพื่อศึกษาอุบัติการณ์ภาวะอ้วนลงพุง (metabolic syndrome) ของผู้ป่วยโรคซึมเศร้าชนิดรุนแรง (major depressive disorder) ในรอบหนึ่งปีและปัจจัยที่เกี่ยวข้อง

วิธีการศึกษา งานวิจัยนี้ได้ผ่านการเห็นชอบจากคณะกรรมการจริยธรรมวิจัยคณะแพทยศาสตร์ มหาวิทยาลัยเชียงใหม่ ผู้ป่วยโรคซึมเศร้าชนิดรุนแรงที่มารับการรักษาที่แผนกผู้ป่วยนอกโรงพยาบาลมหาราชนครเชียงใหม่จะได้รับเชิญเข้าร่วมวิจัย ผู้ป่วยที่มีภาวะอ้วนลงพุงอยู่เดิมจะถูกคัดออกจากประวัติการเจ็บป่วย การตรวจร่างกาย (วัดรอบเอว) ตรวจระดับน้ำตาลและไขมันในเลือดโดยใช้เกณฑ์ของ Adult treatment panel III ผู้ป่วยที่ไม่มีภาวะอ้วนลงพุงจะถูกเชิญมาติดตามภาวะอ้วนลงพุงเมื่อครบหนึ่งปีด้วยการตรวจเช่นเดิมเพื่อดูอุบัติการณ์ในรอบปี อายุ ประวัติการใช้ยาต้านโรคจิต ระยะเวลา และความรุนแรงของโรคซึมเศร้า รวมถึงประวัติครอบครัวจะถูกนำมาหาความสัมพันธ์กับการเกิดโรค

ผลการศึกษา มีผู้ป่วยซึมเศร้าชนิดรุนแรง 140 ราย เข้าร่วมโครงการ ผู้ป่วย 53 ราย ถูกคัดออกเพราะมีภาวะอ้วนลงพุงอยู่เดิม เมื่อครบหนึ่งปี ผู้ป่วย 77 ราย จาก 87 ราย มารับการตรวจซ้ำ พบว่ามีผู้ป่วย 13 ราย (ร้อยละ 16.9) มีภาวะอ้วนลงพุง โดยพบว่าระดับของไตรกลีเซอร์ไรด์และไขมันความหนาแน่นสูง (HDL) ตอนเริ่มโครงการสัมพันธ์กับการเกิดภาวะอ้วนลงพุง ส่วนอายุ ประวัติการใช้ยาต้านโรคจิต ระยะเวลา และความรุนแรงของโรคซึมเศร้า รวมถึงประวัติครอบครัวไม่พบความสัมพันธ์กับภาวะอ้วนลงพุง

สรุป ผู้ป่วยซึมเศร้าชนิดรุนแรงมีอุบัติการณ์ของภาวะอ้วนลงพุงสูง จึงควรติดตามคัดกรองโดยเฉพาะคนที่มีระดับของไตรกลีเซอร์ไรด์ และไขมันความหนาแน่นสูง (HDL) สูงอยู่เดิม **เชียงใหม่เวชสาร 2561;57(3):159-63.**

คำสำคัญ: metabolic, depression, incidence, factors