Original article

Type of psychosocial stressor as risk factor of depressive symptom in metabolic syndrome

Fauziyati A[1], Siswanto A[2], Purnomo LB[3], Sinorita H[3]

Abstract:

Metabolic syndrome and depression are two major diseases over the world, which are increasing in prevalence over time. Depression is a major mental health burden over the world. In long time, depression can lead to metabolic syndrome, while metabolic syndrome is a risk factor for developing depression. Metabolic syndrome is a major risk factor for developing cardiovascular disease. Chronic stress induced by psychosocial stressor leads to the development of both metabolic syndrome and depression. Further research is important to identify which type of psychosocial stressor is the risk factor for depressive symptom in patients with metabolic syndrome. The objective of this study is to identify the type of psychosocial stressor which could be the risk factor for depressive symptom. The study design was case control. The case group consisted of metabolic syndrome patients with depressive symptom, while the control group consisted of metabolic syndrome patients without depressive symptom. Metabolic syndrome was diagnosed based on International Diabetes Federation (IDF) criteria. Depressive symptom was measured by Beck Depression Inventory (BDI). Psychosocial stressors were measured by Stressful Life Events (SLE) questionnaire. Dependent variable was depressive symptom, while independent variables were type of psychosocial stressors (finance, work, social relationship, health and housing). Analysis methods that used in this study were independent t test, Pearson/ Spearman correlation analysis, chi square and logistic regression. There were 54 patients in this study, consisted of 24 in case group and 30 in control group. There was no significant difference in most basic characteristics between two groups. There was significant difference of SLE score between two groups. Chi square analysis showed that housing, finance, health, social relationship, and work stressors were risk factors for developing depressive symptom in metabolic syndrome (OR 24.5 (p 0.001); 9.7 (p 0.039); 8.4 (p 0.016); 5.4 (p 0.004); 3.9 (p 0.001), respectively). Demographic factor which also influenced depressive symptom was salary less than 1 million per month (OR 45, p 0.004). According to logistic regression analysis, psychosocial stressors which most influenced the depressive symptom were finance and housing. In conclusion, this study showed that housing, finance, health, social relationship and work stressors were risk factors for developing depressive symptom in metabolic syndrome.

Keywords: psychosocial stressor; metabolic syndrome; depression

Bangladesh Journal of Medical Science Vol. 15 No. 02 April'16. Page : 262-268

Introduction

Metabolic syndrome and depression are two major diseases which are increasing over time because of sedentary lifestyle, including high calory intake and poor physical activity[1]. About 15% population ever had major depression episode in their life and

1. Internal Medicine Department, Faculty of Medicine, Universitas Islam Indonesia
2. Sub Division of Psychosomatic, Internal Medicine Department, Faculty of Medicine, Gadjah Mada University
3. Sub Division of Endocrine, Metabolic and Diabetes, Internal Medicine Department, Faculty of Medicine, Gadjah Mada University

Corresponds to: Ana Fauziyati, Internal Medicine Department, Faculty of Medicine, Universitas Islam Indonesia, Jalan Kaliurang km 14,5, Yogyakarta, Indonesia. **E-mail:** afauziyati@yahoo.com

Table 1. Baseline Characteristic between Case Group and Control Group

Characteristic (mean)		Case Group (n=24)	Control Group (n=30)	Significance (p)
Age (year)		51,29	52,05	0,771
Duration of DM (month)		52,67	40,83	0,356
Body Mass Index (kg/m^2)		25,87	27,10	0,37
Waist Circumference (cm)		90,42	94,95	0,124
Systolic Blood Pressure (mm Hg)		134,3	135,5	0,821
Diastolic Blood Pressure (mm Hg)		78,38	78,6	0,52
Fasting Glucose (mg/dL)		187	154	0,196
Post Prandial Glucose (mg/dL)		304	208	0,02*
HbA1C (%)		9,8	8,2	0,095
Trygliserid (mg/dL)		160	188	0,3
HDL Cholesterol (mg/dL)		40,5	46	0,15
LDL Cholesterol(mg/dL)		132	131	0,978
Total Cholesterol (mg/dL)		199	196	0,882
BUN (mg/dL)		17,4	16,9	0,679
Creatinin (mg/dL)		1,30	1,16	0,799
Uric Acid (mg/dL)		6,5	6,0	0,552
SGOT (U/L)		33	22	0,319
SGPT (U/L)		85	22	0,35
Demographic Factor		n (proportion %)		OR (95% CI) P
Education	1	4 (0,17)	3 (0,1)	4,0 (0,55-29,17) p 0,171
	2	17 (0,78)	18 (0,6)	2,83 (0,6-1,2) p 0,164
	3	3 (0,12)	9 (0,3)	Referee
Occupation1		5 (0,21)	9 (0,3)	0,9 (0,2-4,0) p 0,947
	2	12 (0,5)	9 (0,3)	2,28 (0,64-8,15) p 0,202
	3	7 (0,29)	12 (0,4)	Referee
Income	1	9 (0,38)	2 (0,07)	45,0 (3,4-584) p 0,004*
	2	14 (0,59)	18 (0.6)	7,78 (0,88-68) p 0.064
	3	1 (0,42)	10 (0,33)	Referee
Sex	Female	13 (54,2)	16 (53,3)	0,97 (0,33-2,84)
	Male	11 (45,8)	14 (46,7)	p 0,951
Marital Status1		1 (0,042)	2 (0,07)	0,66 (0,05-7,0) p 0,74
	2	4 (0,17)	3 (0,1)	1,75 (0,35-8,79) p 0,494
		19 (0,79)	25 (0,83)	Referee
Complication				
Retinopathy	Yes	5 (20,8)	7 (23,3)	0,86 (0,24-3,17)
	No	19 (79,2)	23 (76,7)	p 0,826
Nephropathy	Yes	5 (20,8)	5 (16,7)	1,32 (0,33-5,21)
	No	19 (79,72)	25 (83,3)	p 0,695
Neuropathy	Yes	10 (41,7)	8 (26,7)	1,96 (0,62-6,17)
	No	14 (58,3)	22 (73,3)	p 0,245
Peripheral Artery Disease	Yes	0 (0)	4 (13,3)	0,52 (0,39-0,68)
	No	24 (100)	26 (86,7)	p 0,063
Coronary Artery Disease	Yes	3 (12,5)	5 (16,7)	0,71 (0,15-3,35)
	No	21 (87,5)	25 (83,3)	p 0,688
Stroke	Yes	0 (0)	1(3,3)	0,55(0,43-0,70)
	No	24 (100)	29 (96,7)	p 0,367

Note: *significant; Education 1: no education andelementary school, 2: junior and senior high school, bachelor, 3: graduate and post graduate; Occupation 1: Unemployed,house wife, 2: Private, labor, farmer 3: government employment, retired, army, policeman,Income 1: < 1 million/month, 2:1-5 million/month, 3: > 5 million/month, Marital Status 1: Never married, 2: married, 3: divorce/death spouse

about 6-8% out patients in primary health care met the criteria of depression. Depression was often undiagnosed[2].

Depression makes the treatment of metabolic syndrome complicated. Some studies showed depression made the glucose control difficult in patient with metabolic syndrome and diabetes mellitus[3,4,5]. Depression decreased quality of life [6,7]. Depression increased the risk of metabolic syndrome and cardiovascular disease[8]. In the other hand, metabolic syndrome also increased the risk of depression[9,10].

The relationship between metabolic syndrome and depression is bidirectional [10,11,12,13,14,15]. There are some studies which could not find the relationship between depression and metabolic syndrome[16,17,18].

Table 2. Correlation between Metabolic Syndrome Component and Depressive Symptom

Metabolic Syndrome Component	Classification	Control Group	Case Group	Significance (p)
Waist Circumference	0	4	6	0,273
	1	26	18	
Systolic Blood Pressure	0	14	13	0,584
	1	16	11	
Diastolic Blood Pressure	0	21	18	0,684
	1	9	6	
Fasting Glucose	0	5	2	0,318
	1	22	21	
Trygliserid	0	15	11	0,49
	1	11	12	
HDL Cholesterol	0	15	9	0,149
	1	10	14	
Total of metabolic syndrome component	≤3	22	14	0,245
	>3	8	10	

Table 3. Comparison of Stressful Life Events (SLE) Score between Case and Control Group

SLE Score (mean)	Case Group	Control Group	Significance(p)
SLE total score	12,2	4,63	0,001*
Finance	3,88	1,00	0,001*
Work	1,21	0,7	0,165
Social Relationship	1,04	0,33	0,023*
Health	4,92	2,2	0,001*
Housing	1,67	0,33	0,004*

Note: *significant

Table 4. Correlation between SLE Score and BDI Score

Dependent Variable	Independent variable	Pearson/Spearman Correlation (r)	Significance (p)
BDI Score	SLE total score	0,688	0,001*
	Finance	0,308	0,076
	Work	0,171	0,423
	Social Relationship	0,643	0,007*
	Health	0,384	0,01*
	Housing	0,480	0,032*

Note: * significant

Psychosocial stressor in long time lead to depression. Type of psychosocial stressor include marital status, family problems, interpersonal relationship, work problem, environtment, law, finance and health[19]. Study showed subject with chronic life stressor especially work and finance had higher risk for developing metabolic syndrome[20].

Psychosocial stressor and chronic stress increased the activity of hypothalamus-pituitary-adrenal which increased cortisol level in blood, which in long time caused the insulin resistance or metabolic syndrome through central obesity[21,22]. Hypercortisolism induced the neurobiology imbalance in amigdala and frontal cortex that manifested in emotional disorder, mood and depression[23]. Psychosocial stressors which are not adapted well will induce the depressive symptomp[19].

Problem in this study is what kind of psychosocial stressor which can be risk factor for developing depressive symptomp in metabolic syndrome.

Method

Design of the study is case control. Case group consist of patients with metabolic syndrome who have depressive symptom, while control group consist of patients without

depressive symptom. The study was conducted at Dr Sardjito Central Hospital, from July 2014 until the minimum sample of subject achieved.

Subjects of the study are achieved from the population who meet the inclusion criteria and do not have exclusion criteria. Inclusion criteria for case group are: age ≥18 and ≤60 years old, signed informed consent and have depressive symptom with Beck Depression Inventory (BDI) score ≥ 14. Inclusion criteria for control group are: age ≥18 and ≤ 60 years old, signed informed consent and do not have depressive symptom (score of BDI <14). Exclusion criteria are: psychotic mental disorder, end stage of renal disease, congestive heart failure class functional IV, acute myocardial infarct, stroke or post stroke, diabetic ulcer, diabetes mellitus more than 10 years, using psychotropic agent, active smoker, alcoholic, and pregnant woman. The measurement of sample size is based on case control design[24].

Characteristic of study subject is presented in mean. Distribution of data was detected by normality test. To analyze the difference of mean between two groups we used t test. To determine the relationship between psychosocial stressor and depressive symptom we used chi square. To determine which psychosocial stressor to be the risk of depressive symptom in metabolic syndrome

Table 5. Chi SquareAnalysis of Type of Psychosocial Stressors as Risk Factor for Developing Depressive Symptom in Metabolic Syndrome

Type of Psychosocial Stressor		Depressive Symptom (+)	No Depressive Symptom	Odds Ratio (OR)	CI 95%	Significance p
Finance	No	24	7	9,714*	2,7-34,07	0,001*
	Yes	6	17			
Work	No	26	15	3,9*	1,02-14,86	0,039*
	Yes	4	9			
Social Relationship	No	27	15	5,4*	1,26-23,04	0,016*
	Yes	3	9			
Health	No	13	2	8,4*	1,67-42,41	0,004*
	Yes	17	22			
Housing	No	29	13	24,5*	2,8-210	0,001*
	Yes	1	11			

Table 6. Logistic Regression of Type of Psychosocial Stressor as Risk Factor for Developing Depressive Symptom in Metabolic Syndrome

Step	Variable	Coefficient	p	OR (CI 95%)
Step 1	Finance	3,277	0,138	0,689-15,732
	Work	1,800	0,500	0,326-9,915
	Social Relationship	3,196	0,235	0,47-21,755
	Health	3,241	0,247	0,443-23,712
	Housing	13,304	0,037*	1,17-151,296
	Constant	0,088	0,050	
Step 2	Finance	3,474	0,160	0,735-16,42
	Social Relationship	3,400	0,196	0,525-23,148
	Health	3,579	0,206	0,495-25,870
	Housing	13,602	0,034*	1,223-152,394
	Constant	0,089	0,050	
Step 3	Finance	3,535	0,105	0,769-16,238
	Health	3,498	0,214	0,485-25,209
	Housing	14,952	0,022*	1,468-152,267
	Constant	0,109	0,009*	
Step 4	Finance	5,876	0,011*	1,500-23,017
	Housing	13,420	0,023*	1,423-126,578
	Constant	0,233	0,020*	

patient, we used multivariate analysis using logistic regression.

During the study, patients who meet the inclusion and exclusion criteria are asked about their history and psychosocial stressor, fulfill the Beck Depression Inventory and the Stressful Life Event Inventory. Physical examination is conducted to all patients, especially to measure height, weight, blood pressure, and waist circumference.

All the study subjects signed their informed consent to joint this study. This study was approved by Ethics Committee of Faculty of Medicine, Gadjah Mada University and had license from Director of Dr. Sardjito Central Hospital.

Result

There were 54 patients, consisted of 24 in case group, and 30 in control group. Table 1 showed no differences of age, duration of diabetes mellitus, body mass index, waist circumference, systolic and diastolic blood pressure, fasting glucose, HbA1c, trygliserid, high density lipoprotein cholesterol, low density lipoprotein cholesterol, total cholesterol, blood urea nitrogen, creatinin, SGOT, SGPT, and uric acid between two groups. There was significant difference in post prandial glucose between two groups (304 vs. 208, p = 0.02). There was no difference between proportions of demographic factors between two groups, except income. Patient with income less than 1 million per month had higher risk for developing depression than patient with income more than 5 million per month (OR 45, CI 95% 3.4-584). Proportion of complication such as retinopathy, nephropathy, neuropathy, peripheral artery disease, coronary heart disease, and were not different between two groups.

Chi square analysis showed no correlation between metabolic syndrome component and total of metabolic syndrome component with depressive symptom (table 2). There was significant difference of SLE total score, score of finance, social relationship, health and housing between two groups (table 3).

Pearson and Spearman correlation test showed that there were positive correlations between Beck Depression Inventory score with SLE total score (r = 0,688, p < 0,001), social relationship (r = 0,643, p = 0,007), health (r = 0,384, p = 0,01) and housing (r = 0,480, p = 0,032) (table 4).

Table 5 showed the high and significant *Odds Ratio* (OR) of all stressors, with the highest was housing (OR 24.5), followed by finance (OR 9.714), health (OR 8.4), social relationship (OR 5.4), and work (OR 3.9). Logistic regression showed that the most influencing factors for developing depressive symptom were housing and finance (table 6).

Discussion

This study compared 24 patients in case group and 30 patients in control group. There was difference of post prandial glucose between two groups, that was significant higher in case groups (304 vs. 208, p=0.02). This is relevant with previous study which stated depression complicate blood glucose control in metabolic syndrome or diabetes patient[3,4,5,25,26].

There was no correlation between metabolic syndrome component and depression. This result was different with previous study[27,28]. There was no difference of complication propotion between two groups, that is good to minimalize bias. Income was correlated with depreesive symptom. This was relevant with previous study that stated low social economic level correlated with mental disorder in obese women[29].

There was significant difference of type of psychosocial stressor between two groups. This evidence supported that psychosocial stressor influenced the developing of depression in metabolic syndrome[23]. Correlation test also showed the moderate and high correlation between SLE total score, social relationship, health and housing with BDI score. Chi square analysis showed that housing, finance, health, social relationship and work stressors were the risk factors for developing depressive symptom in metabolic syndrome. This result was relevant with previous study that stated people with finance and work stressors had higher risk for developing metabolic syndrome[20]. This result was different with previous study that stated there was no correlation between psychological distress and metabolic syndrome[30].

Logistic regression showed that housing and finance stressors were the highest risk factors for developing depressive symptom in metabolic syndrome. This was relevant with previous study[20].

Conclusion

Type of psychosocial stressors which defined as the risk factors for developing depressive symptom in metabolic syndrome were housing, finance, health, social relationship and work.

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