

RESEARCH ARTICLE

THE RELATIONSHIP OF THE INCIDENT OF METABOLIC SYNDROME AND OVERACTIVE BLADDER IN FEMALE PATIENTS AT DR. M. DJAMIL PADANG IN 2023

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Abstrak

Overactive Bladder (OAB) is a chronic medical condition that has a negative impact on an individual's health and quality of life. Cardiovascular problems are considered to be one of the risks associated with OAB where one of the higher cardiovascular parameters is metabolik syndrome. Aim to determine the relationship between metabolik syndrome and Overactive Bladder in female patients at Dr. M. Djamil Hospital Padang. Quantitative research with a case control design using a questionnaire according to the Overactive Bladder Symptom Score (OABSS) and examination based on metabolik syndrome symptoms. The research was conducted at Dr. M. Djamil Hospital Padang in November 2022 to September 2023. There were 60 respondents who were divided into the OAB (28/60) and no-OAB group (32/60). Most respondents were aged 50-59 years (45,0%), graduated from high school (53.3%), worked as housewives (76.7%) and had diabetes mellitus (78,3%). In this study it was also found that 48,3% of respondents suffered from hypertension and 45.0% suffered from obesity. A total of 46.7% of respondents experienced OAB symptoms with a higher percentage of OAB found in the metabolik syndrome group (76,7%) than no-metabolik syndrome group (16.7%). Bivariate analysis found a relationship between metabolik syndrome and overactive bladder symptoms ($p = 0.000$) with metabolik syndrome affected the incidence of overactive bladder by 16.4 times (OR 16.42, CI 95% 4.56-59.07). There is a relationship between metabolik syndrome and the incidence of OAB.

Kata kunci: Metabolic syndrome, OAB

PENDAHULUAN

Overactive Bladder (OAB) is a chronic medical condition that has a negative impact on an individual's health and quality of life.¹ Overactive Bladder is defined as urinary urgency (with or without urinary incontinence), frequency and nocturia.²⁻⁴ The occurrence of OAB can affect up to 12% of the adult population in the world.⁵ In Asia, the prevalence of OAB was reported to be 53.1%.⁶ The prevalence of OAB will increase with age. In 2013, Indonesia was in the third highest position after Hong Kong (84%) and Thailand (63%) with an OAB prevalence of 43%. The incidence of OAB begins with disturbances when urinating which are called lower urinary tract symptoms (LUTS).^{6,7} The prevalence of LUTS was found to be 76% in women aged 40-99 years who said that they sometimes had LUTS, and 53% said they often complained of LUTS.¹¹ Prevalence of LUTS and OAB conducted in 5 countries, including Canada, Germany, Italy, Sweden, and the United Kingdom, showed more than 19,000 participants, with an overall prevalence of OAB symptoms of 11.8% (10.8% in men and 12.8 % in women).^{4,8} Other studies have reported an OAB prevalence of 30-40% which increases with age.^{4,9} OAB is a symptom complex that affects more than 45% of women aged 65 years and over.

OAB is a dynamic syndrome and may be a subtype of neurogenic inflammation triggered by activation of primary sensory neurons, leading to the release of inflammatory mediators.⁹ Increasing evidence links OAB to cardiovascular risk factors, such as metabolic syndrome, smoking, and a sedentary lifestyle.¹⁰ Cardiovascular problems are one of the risks associated with OAB. One of the cardiovascular problems that often occur or is often associated is metabolic syndrome, where metabolic syndrome is considered a marker of higher cardiovascular disease.¹¹ Metabolic syndrome is a growing health problem in developed countries. Metabolic syndrome is a group of disorders and risk factors that describe several metabolic disorders, including central obesity, dyslipidemia, hypertension, insulin resistance, and glucose intolerance.⁹ Many studies have shown a link between metabolic syndrome and genitourinary diseases, such as erectile dysfunction or lower urinary track symptoms (LUTS).¹²

Metabolic syndrome is defined by at least three of five criteria, namely blood pressure level 130/85 mmHg, blood glucose level 5.6 mmol/l, triglyceride concentration level 1.7, waist circumference reaching 102 cm for men and 89 cm for women and concentration level High Density Lipoprotein (HDL-C) <1.03 mmol/l for men and <1.4 mmol/l for women. One of the main factors contributing to the occurrence of metabolic syndrome is obesity, reduced physical activity and changes in dietary habits.¹³ Central obesity is associated with increased pressure on the bladder and fatty tissue acts as a neuroendocrine organ that produces inflammatory factors and induces the sympathetic nervous system.¹⁴ The current diagnostic criteria for Metabolic Syndrome refer to the diagnostic criteria of WHO, National Cholesterol Education Program (NCEP), Adult Treatment Panel (ATP) III and International Diabetes Federation (IDF) which include central obesity, hypertriglyceridemia, hypertension,

hyperglycemia, and microalbuminuria.¹³ Prevalence metabolic syndrome based on epidemiological data in 2014 is 20-25% in the world with a prevalence of respondents aged 26-82 years of 29.4% in men and 23.1% in women.¹³

Changes in bladder function may be related to changes in the bladder vasculature, disruption of the epithelium, nerve supply, smooth muscle and connective tissue leading to LUTS.¹¹ There are several reported reasons why women with metabolic syndrome may be at greater risk of OAB, including Excessive sympathetic activity, proinflammatory state, oxidative stress, and endothelial dysfunction, in addition to ischemic bladder damage, decreased bladder perfusion, increased non-esterification of fatty acids and nitric oxide deficiency.⁹ In addition, metabolic syndrome causes OAB symptoms through several mechanisms.

Several recent studies emphasize the importance of factors such as obesity and fat distribution in relation to the incidence of OAB. However, there is still limited research that discusses the relationship between waist circumference and the incidence of OAB.¹³ OAB can be diagnosed easily and managed effectively with non-pharmacological therapy or pharmacological therapy. First-line treatment is lifestyle intervention, bladder training and pelvic floor muscle exercises and anticholinergic drugs.¹⁵

Initial management includes behavioral modification with a focus on total daily fluid intake, avoidance of bladder irritation, treatment of constipation, weight loss, timed voiding, urge-suppression techniques, and pelvic floor physical therapy. Oral medication options include muscarinic and β -adrenergic agents, which can be used in conjunction with behavioral therapy.⁵ Very few individuals with OAB come forward seeking help and even fewer receive treatment. In fact, individuals with OAB often delay seeking treatment or simply discussing their symptoms with a healthcare provider. Based on the data presented above, the author is interested in researching "The Relationship Between the Incidence of Metabolic Syndrome and Overactive Bladder in Female Patients at RSUP Dr. M. Djamil Padang".

Methods

This research is a case control study conducted at the Polyclinic of Central General Hospital Dr. M. Djamil Padang from November 2022 to October 2023. The research sample (n) is a collection of research subjects (units of analysis) taken from the study population (N) where measurements were taken. The sample in this study was a collection of women aged ≥ 40 years who had symptoms of OAB at the Polyclinic at Dr. Central General Hospital. M. Djamil Padang according to the inclusion and exclusion criteria.

1. The inclusion criteria for the subjects of this research are as follows:

Case Group:

- Women aged ≥ 40 years who are patients at Dr. Central General Hospital. M. Djamil Padang with symptoms of Overactive Bladder.
- Willing to sign a research agreement after being given an explanation (informed consent).

- Female patients who are not pregnant, do not have chronic diseases, lungs, etc. other than metabolic syndrome.

Control Group:

- Women aged ≥ 40 years without Overactive Bladder Symptoms
2. The exclusion criteria for the subjects of this research are as follows:
- Women aged ≥ 40 years with symptoms of urinary tract infection.

Sample size affects the precision of a study. The sample size depends on the type of research, variable measuring scale, precision measure, research objectives, confidence interval and test power. This study tested Overactive Bladder Symptom with metabolic syndrome. Therefore, the following sample formula for the different proportion test from Lemeshow is used.

$$n1 = n2 = \left[\frac{\left(Z_{1-\alpha/2} \sqrt{2\bar{P}(1-\bar{P})} + Z_{1-\beta} \sqrt{P_1(1-P_1) + P_2(1-P_2)} \right)^2}{(P_1 - P_2)} \right]^2$$

$n1$: Number of samples from the metabolic syndrome group

$n2$: The number of samples in the normal group without symptoms of metabolic syndrome

Z_{α} : Z value for 95% Confidence Interval = 1,96.

Z_{β} : Z value for 80% Power Test = 0,84

P_1 : The proportion in the Overactive Bladder Symptoms group of metabolic syndrome was 0.64 (64%) (Uzun et al, 2012)⁵⁸

P_2 : The proportion of metabolic syndrome symptoms in the group without Overactive Bladder Symptoms was 0.35 (35%) (Uzun et al, 2012)⁵⁸

$\bar{P}$: Average proportion of P_1 and P_2 = 0,112

Based on the calculation formula above, the results obtained were 28 samples for each group so that the total sample in this study was 56 people in order to achieve a confidence level of 95%.

Results

Research Characteristics

In this study, most respondents were aged 50-59 years old (45.0%), followed by those aged ≥ 60 years (36.7%) and the least aged 40-49 years (18.3%). Most respondents had graduated from high school (53.3%), and 25.0% had graduated from college. The remaining 8.3% had completed a diploma, 6% had completed junior high school, and 3.3% had completed elementary school. Housewife constituted the majority of those participating in

the study (76.7%), with a small proportion working as teachers (10.0%), entrepreneurs (8.3%) and civil servants (5.0%).

Based on Table 1, 46.7% of respondents experienced overactive bladder, and 53.3% did not experience overactive bladder. Metabolic syndrome was present in 30 study respondents. The most common components of metabolic syndrome were impaired glucose regulation or diabetes (78.3%), hypertension (48.3%), and obesity (45.0%). Meanwhile, insulin resistance was found in 3.3% of respondents, and increased plasma triglycerides, and or low HDL cholesterol were found in 1.7% of respondents. No microalbuminuria was found in this study.

Table 1. Research characteristics

Characteristics	Frequency	
	f	(%)
Age (year)		
40-49	11	18.3
50-59	27	45.0
>=60	22	36.7
Education		
Elementary school	2	3,3
Junior high school	6	10,0
Senior high school	32	53,3
Diploma	5	8,3
Bachelor	15	25,0
Pekerjaan		
Housewife	46	76,7
Self-employed	5	8,3
Teacher	6	10,0
Civil servants	3	5,0
Overactive Bladder		
Overactive Bladder	28	46,7
Not Overactive Bladder	32	53,3
Metabolic syndrome	30	50
Impaired glucose regulation or diabetes.	47	78,3
Hypertension	29	48,3
Central obesity and/or BMI > 30 kg/m2.	27	45,0
Insulin resistance	2	3,3
Increased plasma tryglycerides and/or low HDL cholesterol	1	1,7
Microalbuminuria	0	0

Relationship Between Metabolic Syndrome and Overactive Bladder Symptoms

In table 2, 82.1% of metabolic syndrome respondents had overactive bladder symptoms, and 21.8% did not have overactive bladder symptoms. Of the respondents who did not meet the criteria for metabolic syndrome, 17.9% had overactive bladder symptoms, and 78.2% did not have overactive bladder symptoms. Chi square analysis found a significant relationship between metabolic syndrome and overactive bladder symptoms ($p = 0.000$). So, it can be concluded that metabolic syndrome increases the risk of overactive bladder symptoms by 16.4 times (OR 16.43 [CI 95% 4.56 -59.07]).

Table 2. Relationship between metabolic syndrome and overactive bladder symptoms.

Metabolic Syndrome		Overactive Bladder Symptom				P value	OR (95% CI)
		Yes		No			
		n	%	n	%		
•	Yes, metabolic syndrome (have ≥ 2 symptoms).	23	82,1	7	21,8	0,000	16,43 (4,56-59,07)
•	Not metabolic syndrome (have < 2 symptoms).	5	17,9	25	78,2		
Total		28	100	32	100		

Discussion

Characteristics of Research Respondents

In this study, most respondents were aged 50-59 years. Research explains that increasing age is associated with an increased incidence of metabolic syndrome and OAB. Research by Eapen et al. (2016) found that around 73% of men and 72% of women who participated in the EPIC study aged < 60 years, and among participants aged 40–59 years, 51% were men, and 56% of women experienced storage symptoms.¹⁶ Regarding metabolic syndrome, a study by Gouveia et al. (2021) found that the average age of respondents was 59.8 ± 19.7 years.¹⁷

Most of the respondents graduated from high school. Regarding the incidence of OAB, lower education is considered a risk factor associated with higher level hygiene and urinary tract infections.¹⁸ In metabolic syndrome, low education is also a risk factor where better education is associated with lifestyle changes that are easier to intervene so that the incidence of chronic diseases that cause metabolic syndrome can be reduced.¹⁹

Housewife constituted the majority of those participating in the study. Research by Chae et al. (2018) found that housewife was a determining factor in the severity of OAB from bivariate analysis, but after further analysis, no relationship found between working as a housewife and the incidence of OAB.²⁰ In this study, overall, 46.7% of respondents experienced overactive bladder, and 53.3% did not experience overactive bladder. This figure is high because as many as 50% of the sample had metabolic syndrome, which accounts for quite a large proportion of the incidence of OAB.²¹ In addition, the average age in this study was 50-59 years, where increasing age is also associated with an increase in the incidence of OAB, which has been discussed previously.¹⁶ The same prevalence was found by Irer who found that 42.8% of adult women in Turkey had OAB. In this study, the influence of metabolic syndrome on the incidence of OAB was also assessed.¹⁸

In this study, it was found that the most common components of metabolic syndrome were impaired glucose regulation or diabetes (78.3%), hypertension (48.3%), and obesity (45.0%). Research by Nsiah et al. (2015) examined the prevalence of metabolic syndrome in type 2 diabetes mellitus patients and found a prevalence of metabolic syndrome of 58% in

the Ghanaian population. In patients with type 2 DM, hypertension was found more frequently (60%), followed by central obesity (48.67%) and dyslipidemia (37%).²²

Relationship between metabolic syndrome and overactive bladder symptoms

In this study, 82.1% of respondents with metabolic syndrome had more overactive bladder symptoms compared to 17.9% in the group who did not have metabolic syndrome, and there was a significant relationship between metabolic syndrome and overactive bladder symptoms, with metabolic syndrome influencing the incidence of overactive bladder symptoms by 16.4 times. Similar results were found by Novakovic et al. (2017) who conducted research on 114 patients with 57 metabolic syndrome patients and 57 control respondents. This study found that 78% of patients were positive for OAB based on the OAB-V8 questionnaire on metabolic syndrome, which was more than 29% in the control group. From this research, there was a relationship between metabolic syndrome and OAB ($p < 0.001$).²²

A systematic review by Bunn et al. (2014) which included 27 studies on the relationship between metabolic syndrome and OAB, found that three studies assessed the relationship between metabolic syndrome and OAB, the rest assessed the relationship between more specific metabolic syndromes such as obesity and OAB, obesity with urinary symptoms, insulin resistance with OAB. This research found an important relationship between metabolic syndrome and OAB.¹¹

This research is in line with research by Uzun et al. (2012) regarding the relationship between metabolic syndrome and OAB and it was found that metabolic syndrome was diagnosed in 64% of patients with OAB and 35% of patients without OAB. This difference found a statistical relationship between metabolic syndrome and OAB ($p = 0.002$).¹⁵

Literature review by Rosa et al. (2021) which includes studies from the last ten years (2009-2019) that discuss the relationship between metabolic syndrome and OAB in nurses. In this research, it was found that most studies showed a relationship between metabolic syndrome and OAB.²³

Research by Baytaroglu et al. (2021) on 200 respondents assessed the relationship between metabolic syndrome components and the incidence of OAB, and having a higher BMI and longer waist circumference were significantly associated with OAB.¹⁴

OAB is a multifactorial situation with many causes. Aydin et al. (2020) stated that age, central obesity, hyperlipidemia, and the presence of more than one chronic disease are among these factors. Determining risk factors for the diagnosis and treatment of OAB, particularly central obesity, has led to the consideration that lifestyle changes such as weight loss and exercise may be effective. In addition, it should not be forgotten that lifestyle changes and weight loss will improve the control of accompanying chronic diseases and according to them the combined effect will reduce the symptoms of OAB.²⁵

Hsu et al (2022) stated that the common pathophysiology in the relationship between metabolic syndrome and OAB includes autonomic and peripheral neuropathy, chronic ischemia, proinflammatory status, dysregulation of nutrient-sensing pathways (eg insulin

resistance in the bladder mucosa and excessive succinate intake), and the possible role of dysbiosis.²⁶

Research by Dagdeviren et al. (2018) on 90 patients divided into patients with OAB, patients with OAB and metabolic syndrome and patients without OAB and metabolic syndrome found that when the groups were compared with respect to NGF levels, group 2 was found to have significantly higher NGF levels. higher ($p = 0.001$). This supports the theory that possible sympathetic overactivity, proinflammatory states, oxidative stress, and other pathological conditions occur in metabolic syndrome and are potentially involved in the development of OAB.⁹

Diabetes mellitus is associated with increased overactivity of the detrusor because it is known that one of the late complications of DM is peripheral neuropathy. Causes of diabetic neuropathy include disorders of glucose metabolism, ischemia, formation of free radicals due to superoxide, damage to axonal transport, and metabolic disorders of Schwann cells which result in segmental demyelination, nerve conduction disorders and irregularities in urothelial sensitivity. Therefore, peripheral neuropathy may cause detrusor overactivity and may be an important risk factor for OAB. Pelvic ischemia caused by atherosclerosis is also one of the most accepted hypotheses regarding the development of OAB.^{14,18}

Research Limitations

This research discusses the relationship between metabolic syndrome and OAB. However, this study does not provide real evidence of the mechanism by which metabolic syndrome causes OAB. In addition, this study assessed insulin resistance only from physical examination, namely the presence of acanthosis nigricans. This study did not assess the relationship of metabolic components to the incidence of OAB considering the limited number of samples to assess the influence of each component on OAB.

Conclusion

1. Most of the respondents were aged 50-59 years, had a high school education, and worked as housewives with the majority of respondents suffering from diabetes mellitus, half of them had hypertension and almost half of them were obese.
2. Symptoms of overactive bladder were found in 76.7% of respondents with metabolic syndrome.
3. There is a relationship between metabolic syndrome and the incidence of overactive bladder symptoms.

Suggestion

1. It is hoped that the results of this study can be used in clinical decisions where metabolic syndrome patients need to be screened for OAB symptoms.
2. Research regarding the pathomechanism of the occurrence of OAB in metabolic syndrome needs to be carried out to determine the exact course that causes the

influence of metabolic syndrome in OAB.

3. Research with a larger sample was carried out to identify the relationship between each component of the metabolic syndrome and the incidence of OAB and to find out which parameters have the strongest influence on OAB.

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