CORRELATION OF METABOLIC SYNDROME WITH PELVIC ORGAN PROLAPS SEVERITY

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Abstract: This research supposed to assess correlation between metabolic syndrome and the severity of Pelvic Organ prolapse at H Adam Malik Hospital and the University of North Sumatra Medan Hospital. This research was an analytical study with a cross sectional design of women with Pelvic Organ prolapse who came to the Gynecology Polyclinic at Haji Adam Malik Hospital and Universitas Sumatra Utara Hospital from October 2019 until the number of samples was reached. Sampling was done by non-probability sampling with consecutive sampling technique. To assess this relationship, the ANOVA test was used and if the data is not normally distributed, Kruskal-Wallis test was used. Then determine which factors have the most influence with logistic regression analysis. The results of the analysis are significant if p <0.05, with a confidence degree of 95%. The association between metabolic syndrome and the severity of pelvic organ prolapse starting from stage I to stage IV was significant with a value of p = 0.001. Fasting KGD, triglyceride, and HDL categories showed significant values with p <0.05. From multinomial logistic regression analysis, low HDL (OR 1.42, 95% CI 0.25 ± 0.78, p = 0.035), and high triglycerides (OR 1.58, 95% CI 1.23 ± 1.58, p = 0.000) will increase the risk of stage POP ≥ III. This research concluded that there was significant relationship between metabolic syndrome and the occurrence of Pelvic Organ Prolapse.

Keyword: Pelvis, Prolapse, Metabolic Syndrome.

I. INTRODUCTION

Pelvic Organ prolapse (POP) is a health problem that can affect women of all ages, but most common in older women. The prevalence of POP increases to its peak at the age of 60-69 years around 5%. On physical examination, approximately 41% -50% cases will be detected, but only 3% of women will report any symptoms. Some data show that POP will continue until menopause.[1]

The high prevalence of obesity increases the incidence of metabolic syndrome. Metabolic syndrome or syndrome X is a collection of metabolic abnormalities consisting of hypertension, central obesity, insulin resistance, and atherogenic dyslipidemia. The diagnosis of metabolic syndrome is made if there are three of five criteria, namely central obesity (abdominal circumference ≥ 90 cm for Asian men and ≥ 80 cm for Asian women), triglycerides ≥ 150 mg / dL or is being treated for hypertriglycerides, high-density lipoprotein cholesterol (HDL) <40 mg / dL in men and <50 mg / dL in women or being on medication to raise HDL cholesterol levels, systolic blood pressure ≥ 130 mmHg or diastolic ≥ 85 mmHg or on medication for hypertension, and fasting blood sugar ≥ 100 mg / dl or diabetes mellitus type 2.[2]

Many studies have found that abdominal obesity is a precursor and crucial aspect of metabolic syndrome. From Kim et al research, it was found that metabolic syndrome is related to the severity of POP symptoms. The study of Gava et al. showed that there is a relationship between POP severity and metabolic syndrome, namely POP-Q IV class. Then there was an increase in triglyceride levels, fasting blood sugar, BMI and decreased levels of HDL (High Density Lipoprotein). Triglyceride levels and fasting blood sugar increased and HDL decreased in POP-Q III and IV patient groups. Metabolic syndrome can increase the severity of POP symptoms through different mechanisms. Patients with metabolic syndrome exhibit pathological microvascular conditions due to endothelial dysfunction and atherosclerosis. Metabolic syndrome also increases the risk of prothrombosis and proinflammation. This condition is related to the remodeling of the connective tissue of the pelvic organs which causes changes in the synthesis and / or degradation of collagen and elastin. And also there is damage to the musculoskeletal tissue.[3,4,5]

II. RESEARCH METHODOLOGY

This research was an analytical study with cross sectional design of 25 women with Pelvic Organ prolapse who visited Obstetrics and Gynecology Polyclinic of RSUP Haji Adam Malik Medan and Universitas Sumatera Utara Hospital Medan from October 2019 until the number of samples was reached.

Sampling was done by non-probability sampling with consecutive sampling technique, where each sample meets the inclusion criteria, namely women diagnosed with Pelvic Organ Prolapse, willing to participate in the study and sign an informed consent, women who are not using hormone replacement therapy, never undergo surgery Pelvic Floor Disorder (PFD), does not experience congenital abnormalities related to connective tissue such as Ehler Danlos Syndrome, Marfan Syndrome, and women with a history of vaginal delivery ≤ 5 times; and the exclusion criteria namely damaged blood samples and women who had given birth more than 5 times.

The sample recruitment process was through direct interviews with all polyclinic patients. Then take anamnesis (age, parity and symptoms of pelvic organ prolapse: palpable / visible lump / tissue out of the vagina), physical examination (weight, height, waist circumference, and blood pressure). Then carried out laboratory tests to check fasting blood sugar and lipid profiles (triglycerides and HDL) at the H. Adam Malik Hospital Laboratory. After that, gynaecology examination is carried out and using a ruler to determine the degree of pelvic organ prolapse (POP) with POP-Q. After the data was collected, the criteria for metabolic syndrome were determined and divided into a control group (<3 criteria) and a group with metabolic syndrome (> 3 criteria). After reaching the specified sample size, statistical analysis was carried out.

Data were analyzed descriptively to see the frequency distribution of research subjects based on characteristics. Then proceed with an analysis to see the relationship between metabolic syndrome and the incidence of pelvic organ prolapse. All data will be analyzed using statistical software and displayed in tabulated form. To assess this relationship, the ANOVA test was used and if the data were not normally distributed, Kruskal-Wallis test was used. Then determine which factors have the most influence with logistic regression analysis. The results of the analysis are mean to be significant if $p < 0.05$, with a confidence degree of 95%.

III. RESULTS AND DISCUSSION

Characteristics of Research Subjects

The characteristics of Pelvic Organ Prolapse patients which most age group was 60-69 years with 14 people (56%). From the Body Mass Index category, the highest category was Overweight with 14 people (56%). From the parity category, it was found that multiparous was the largest with a total of 24 people (96%), and from the menopause category, it was found that all the study samples had experienced menopause.

Table 1. Characteristics of Research Subjects

Characteristics	n (total)	Persentage (%)
Age (years old)		
40-49	0	0
50-59	10	40
60-69	14	56
> 70	1	4
Body Mass Index (m^2/kg)		
Underweight	0	0
Normoweight	1	4
Overweight	14	56
Obesitas	10	40
Parity		
Primipara	0	0
Sekundipara	1	4
Multipara	24	96

Menopause		
Yes	25	100
No	0	0
Total	25	100

This is in accordance with Nizomy et al. research on 2013, at Dr. Soetomo, Surabaya, which obtained from 147 samples, 32 cases (61.96%) POP patients were aged 60-70 years.[6] Increasing age will increase the risk of POP by 40% per decade of increasing age. Increasing age is a complex process and is associated with the incidence of POP which results from a combination of age, hypoestrogens, and degenerative diseases. With increasing age, the connective and fascial tissues of the pelvic floor become weaker, leading to prolapse.[7] As someone aging, there is a constant increase in prolapse symptoms over the age of 40.[6]

Based on data from Kusuma et al. on 2017, it was found that the highest BMI was 26-29.9 kg / m2 with 19 people (44.19%) followed by 17 people (39.53%) with BMI ≤ 25 kg / m2.[7] From Gava's et al. research on 2018, majority of POP with a mean BMI of 26.4 ± 4.4.[5] BMI ≥30 kg / m2 will increase the risk of POP by 40-75%. Increased body weight will increase intra-abdominal pressure which will affect the pelvic floor. This increase in pressure will cause excessive stress on the pelvic floor, causing dysfunction and progression to POP.[7] Overweight and obesity will increase the risk of POP in women by 2 times.[5] The risk of prolapse progression in overweight and obese women increases by 43% and 69% sequentially.[8]

In this study, 24 people (96%) were multiparous. This is in accordance with the Yakubu ret al. research on 2017 which obtained from 91 study subjects who experienced POP, as many as 60 people (65.9%) were multiparous.[9] According to research by Gurjar et al. on 2017, from 256 samples, the highest parity was obtained with parity 3 as many as 73 women (28%).[10] According to Islam RL et al on 2016, in study in Bangladesh was found that women who had given birth to more than 3 children positively would have at least one symptom of pelvic floor disorder.[10] In the study of Kusuma et al. on 2017, found that 24 people (55.81%) had given birth more than 4 times. Parity increases the risk of POP and vaginal delivery is a major risk factor for POP development. The risk increases 8.4 times in women who have given vaginal delivery 2 times and increases 10.9 times in women with parity more than four times.[7] In a case control study conducted by Fatima et al. on 2016, there were 114 POP cases and 114 controls, namely women normal, the mean parity of patients with POP was 5.2 ± 2.0, and the mean parity of control patients was 3.97 ± 2.30. From this study, it was found that high vaginal parity > 5 would increase the risk of POP incidence (OR = 2.9, CI = 1.16-4.27, p = <0.001).[11]

During pregnancy and the post partum involution phase, there is a remodeling process of connective tissue and the degradation of collagen and elastin. This process also appears on the pelvic floor during pregnancy, childbirth, and post partum. Later, during labor and vaginal delivery, direct trauma to the nerves, muscles, and connective tissue may occur. The levator ani muscle can denervation, lose tone, and cause an open genital hiatus, leading to POP.[7]

Of this study, where all patients, 25 people (100%) had experienced menopause. This is in accordance with the Kusuma, et al. research on 2017, which obtained from 43 samples, 39 samples (90.7%) have experienced menopause.[7] Meanwhile, from Gurjar et al. research on 2017, from 75 samples with POP, 44 samples were obtained (58.6%) have experienced menopause.[10] Menopause plays a role in the occurrence of POP. At menopause, there is a decrease in estrogen levels in the blood. This condition will increase the amount of collagen type III and will decrease the ratio between collagen type I / III. Collagen synthesis at menopause is immature collagen, which is susceptible to endogenous proteases, this will affect the strength and resistance of connective tissue. These changes will affect the subepithelial tissue, uterosacral ligaments, and cardinal ligaments that will cause POP.[7]

From Gumanga et al. research on 2014 which is in 112 samples, 10% were stage II POP, and 17% were stage III and IV POP were patients with a prolapse duration of 1-3 years, then 2.6% were stage II POP and 8% were POP patients with stage III and IV with a duration of prolapse of 3-5 years. However, no studies have discussed the relationship between prolapse duration and the incidence of prolapse.[12]

Distribution of Metabolic Syndrome Criteria in Pelvic Organ Prolapse Patients

In metabolic syndrome category, the variable with a waist circumference ≥ 80 cm was the most with 17 people (68%), the most triglyceride levels were ≥ 150 mg / dL with 18 people (72%), the most HDL levels were <50 mg / dL with a total of 14 people (56%), the highest fasting blood glucose level was <100

mg / dL with 19 people (76%), and mostly sample blood pressure was <130/85 mmHg with 15 people (60%).

Table 2. Distribution of Metabolic Syndrome Criteria in Pelvic Organ Prolapse Patients

Variable	n (Total)	Persentage (%)
Waist Circumferences (cm)		
< 80	8	32
≥ 80	17	68
Triglyceride (mg/dL)		
< 150	7	28
≥ 150	18	72
HDL (mg/dL)		
≥ 50	11	44
< 50	14	56
BP (mmHg)		
<130/85	15	60
≥ 130/85	10	40
Fasting Blood Glucose (mg/dL)		
< 100	19	76
≥ 100	6	24
Total	**25**	**100**

Correlation between Body Mass Index and Metabolic Syndrome in Pelvic Organ Prolapse Patients

As many as 1 person (4%) with normoweight had metabolic syndrome, 5 people (20%) with overweight had metabolic syndrome, and 7 people (28%) with obese had metabolic syndrome. Obtained an insignificant relationship between BMI and metabolic syndrome with p value = 0.157 (p> 0.05).

Table 3. Correlation between Body Mass Index and Metabolic Syndrome in Pelvic Organ Prolapse Patients

BMI	Metabolic Syndrome		P value*
	Yes	**No**	
Underweight	0	0	0.157
Normoweight	1 (4%)	0	
Overweight	5 (20%)	9 (36%)	
Obesity	7 (28%)	3 (12%)	

*** chi square tests**

Correlation of Waist Circumference and Metabolic Syndrome in Pelvic Organ Prolapse Patients

As many as 7 people with waist circumference < 80 cm had metabolic syndrome, and 6 people with waist circumference ≥ 80 cm had metabolic syndrome. There was no significant relationship between waist circumference and metabolic syndrome with p value = 0.891 (p> 0.05)

Table 4. Correlation of Waist Circumference and Metabolic Syndrome in Pelvic Organ Prolapse Patients

Waist Circumferences	Metabolic Syndrome		P value*
	Yes	No	
< 80 cm	4 (32%)	4 (32%)	0.157
≥ 80 cm	9 (36%)	8 (32%)	

*** chi square tests**

Metabolic syndrome or syndrome X, is an abnormality in the form of central obesity, increased blood pressure, hyperglycemia, hypertriglyceridemia, and decreased HDL levels. This condition will cause heart disease and diabetes mellitus. Obesity, old age, physical inactivity, smoking, postmenopause, and high carbohydrate consumption are all proven risk factors in people with metabolic syndrome. According to the American Heart Association, in women, metabolic syndrome is diagnosed if there are ≥ 3 of the 5 criteria for metabolic syndrome, namely central obesity ≥ 80 cm, hypertriglyceridemia ≥ 150 mg / dL, low HDL with <50 mg / dL or currently taking cholesterol drugs, and increase in blood pressure, namely ≥ 130/85 mmHg or are currently taking antihypertensive drugs.[13,14]

Based on Claudius et al. research on 2016, the prevalence of metabolic syndrome in women over 35 years is 49.3%. The prevalence increases in the 55-64% age group. Menopause is also an important predictor of metabolic syndrome in that study, 68.8% of subjects had metabolic syndrome. BMI and menopausal status are two factors that significantly influence the emergence of metabolic syndrome. The condition of menopause based on logistic regression analysis showed that 1.78 times could cause metabolic syndrome higher than premenopause.[15]

The waist circumference in relation to visceral fat of 100 cm^2 is 90 cm in women. The cut off based on Japanese data is the only one based on the area of visceral fat for disease prevalence. In the Gierach et al. study group on 2014, waist circumference was found to be significantly correlated with BMI (r = 0.78, *P* <0.01) and the correlation was more pronounced among women (*r* = 0.80). According to the revised International Diabetes Foundation (IDF) criteria, abdominal obesity in the European population is defined as a waist circumference ≥80 cm in women. Waist circumference is the optimal measure of abdominal adipose tissue, which is a risk factor for diabetes and is strongly associated with risk factors for cardiovascular disease. Thus it is suggested that waist circumference is a better predictor of metabolic risk factors for metabolic syndrome than BMI and suggests that metabolic risk factors should be discarded in women with a waist circumference that exceeds 80 cm, regardless of BMI size.[16]

Waist circumference should be considered in clinical practice to estimate the risk of abdominal fat accumulation and as a predictor of cardiometabolic risk, eg, metabolic syndrome. Waist circumference had a positive correlation with body mass (r = 0.77, p = 0.00), BMI (r = 0.71, p = 0.00), body fat (%) (r = 0.36, p = 0.00), body fat (kg) (r = 0.69, p = 0.00), visceral fat (r = 0.49, p = 0.00), subcutaneous fat (r = 0.34, p = 0.00). Interestingly, waist circumference was positively correlated with total metabolic syndrome parameters (r = 0.57, p = 0.00). Research by Sigit et al. on 2020, shows the standard deviation for BMI is 4.4 kg / m2 and 11.6 cm for waist circumference in the Indonesian population. Per standard deviation (SD) in BMI and waist circumference, the odds ratios for metabolic syndrome were 1.4 (1.2–1.6) and 2.3 (2.0–2.7) in Indonesian women. When considering the linear association with the components as a sustained outcome, higher overall adiposity (BMI and waist circumference) was associated with higher serum triglycerides, higher fasting plasma glucose, and lower HDL cholesterol. Additionally obesity causes increased cardiac output and increased intravascular volume, which in turn leads to left ventricular hypertrophy and higher blood pressure. Abdominal adiposity is highly correlated with the metabolic syndrome. A higher odds ratio of metabolic syndrome per waist circumference, not per BMI, because abdominal obesity is also a component of the metabolic syndrome.[17]

Correlation between Body Mass Index and Pelvic Organ Prolapse in Patients

Between overweight sample, as many as 6 people (24%) were stage II, 4 people (16%) were stage III and IV. Patients with obese were 3 (12%) on stage II, 1 person (4%) stage III, and 6 (24%) stage IV. There was also an insignificant relationship between BMI and POP stage with p value = 0.373 (p> 0.05).

Table 5. Correlation between Body Mass Index and Pelvic Organ Prolapse in Patients

BMI	POP Stage			p*
	II	III	IV	
Underweight	0	0	0	0.373
Normoweight	1 (4%)	0	0	
Overweight	6 (24%)	4 (16%)	4 (16%)	
Obesity	3 (12 %)	1 (4%)	6 (24%)	

*** chi square tests**

The most likely mechanism for POP development in obese women is increased intra-abdominal pressure leading to weakening of the pelvic floor muscles and fascia. The calculation of the risk ratio for the BMI category according to the WHO definition, showed that women in the overweight and obese category had a risk ratio of at least 1.36 (95% CI, 1.20-1.53) and at least 1.47 (95% CI , 1.35-1.59), respectively.[18] Research by Gyhagen et al. on 2013, showed the chance of POP increased by 3% (OR 1.03; 95% CI 1.01-1.05) for each increase in the BMI unit. With normal BMI for reference, the odds of POP increased significantly for overweight and obese women in the vaginal delivery group. This result has also been demonstrated in the study by Miedel et al. and in the Women's Health Initiative.[19] In Pomian et al, study on 2016, nearly 40% of women seen with pelvic organ prolapse were obese.[20] Women who are overweight and obese are at high risk for pelvic organ prolapse, with an odds ratio of 2.51 and 2.56, respectively.[21] Kuldish et al. evaluated the association between weight change and development / regression of pelvic organ prolapse in women over 5 years. The risk of developing prolapse in overweight and obese women compared with women with normal BMI, appears to be an increase of 32% and 48% for cystocele, 37% and 58% for rectocele and 43% and 69% for uterine prolapse, respectively.[18] Study by Sayko et al. on 2018, showed a strong relationship between the degree of uterine prolapse and obesity (contingency coefficient = 0.373).[22] Epidemiological studies in Indonesia show that BMI> 30 kg / m^2 increases the risk of POP by 40-75%. Chronic weight gain increases intra-abdominal pressure and affects the pelvic floor. The increased pressure will put excessive pressure on the pelvic floor, causing dysfunction, and then POP.[7]

Research by Yeniel et al. on 2013, with logistic regression analysis showed that BMI significantly increased the incidence of POP. However, a significant protective relationship between BMI and POP in the univariate analysis was that a higher BMI was slightly protective.[23] In contrast to studies by Shalom et al. on 2012, where there is no correlation between BMI and POP-Q data.[24] Other studies have also shown no association between obesity and the degree of POP, including uterine prolapse, but obesity can affect symptoms of pelvic floor disorders. This fact shows that weight factors such as obesity that affect the degree of uterine prolapse are not the only factors that trigger an increase in the degree of uterine prolapse.

Correlation of Waist Circumference to Pelvic Organ Prolapse in Patients

Patients with waist circumference <80 cm, 2 people (8%) were stage II, 3 people (12%) were stage III and IV. Patients with a waist circumference ≥ 80 cm, as many as 8 people (32%) were stage II, 2 people (8%) were stage III, and 7 people (28%) were stage IV. There was an insignificant relationship between waist circumference and POP stage with p value = 0.289 (p> 0.05).

Table 6. Correlation of Waist Circumference to Pelvic Organ Prolapse in Patients

Waist Circumferences	POP Stage			p*
	II	III	IV	
< 80 cm	2 (8%)	3 (12%)	3 (12%)	0.289
≥80 cm	8 (32%)	2 (8%)	7 (28%)	

*** chi square tests**

Research by Rogowski et al. on 2015, shows that increasing waist circumference does not show a significant difference between the four POP groups from stage I-IV. In line with previous reports, neither BMI nor waist circumference did not correlate with POP-Q stage in this study. Thus, increased BMI and obesity can be risk factors for POP but are not related to the severity of POP in symptomatic patients.[4] The study by Kuldish et al. demonstrated a significant association between POP and waist circumference (P <0.001). Of interest, a risk factor for waist circumference> 88 cm was associated with the severity of the prolapse state in 20% of cystocele cases and 31% of rectocele cases. Researchers speculate that these steps are a reflection of greater mechanical forces directed to the pelvic floor at rest or during coughing or the Valsalva maneuver, contributing to the development of dysfunction.[25,26]

Mean Value of Metabolic Syndrome Category (Waist Circumference, Blood Pressure, Fasting Blood Glucose, Triglycerides, and HDL) in Pelvic Organ Prolapse Patients.

The mean value for each metabolic syndrome variable from waist circumference with a mean value of 81.6 ± 3.23, triglycerides with a mean value 168.16 ± 24.43, mean HDL value was 50.28 ± 3.74, mean systolic blood pressure was 126 ± 14.4, mean diastolic blood pressure was 81 ± 9.4, mean value for fasting blood glucose was 95.9 ± 14.01.

Table 7. Mean Value of Metabolic Syndrome Category (Waist Circumference, Blood Pressure, Fasting Blood Glucose, Triglycerides, and HDL) in Pelvic Organ Prolapse Patients

Metabolic Syndrome	Mean ± SD
Waist Circumference (cm)	81.6 ± 3.23
Triglycerides (mg/dL)	168.16 ± 24.43
HDL (mg/dL)	50.28 ± 3.74
Systolic Blood Pressure (mmHg)	126 ± 14.4
Diastolic Blood Pressure (mmHg)	81 ± 9.4
Fasting Blood Glucose (mg/dL)	95.9 ± 14.01

Characteristics Distribution of Pelvic Organ Prolapse Severity

Table 8. Characteristics Distribution of Pelvic Organ Prolapse Severity

Severity	n (Total)	Percentage (%)
Stage I	0	0
Stage II	10	40
Stage III	5	20
Stage IV	10	40
Total	**25**	**100**

Correlation between Metabolic Syndrome and Pelvic Organ Prolapse Severity

Correlation between metabolic syndrome and pelvic organ prolapse severity starting from stage I to stage IV, obtained p value = 0.001, this indicates that there is a significant relationship between metabolic syndrome and the severity of pelvic organ prolapse.

Table 9. Correlation between Metabolic Syndrome and Pelvic Organ Prolapse Severity

Metabolic Syndrome	POP Stage II	III	IV	p*
Yes	1	2	10	0.001
No	9	3	0	

*** chi square tests**

Correlation between Metabolic Syndrome Categories and Pelvic Organ Prolapse

Correlation between metabolic syndrome categories and pelvic organ prolapse severity showed fasting blood glucose, triglyceride, and HDL wih significant values and p value <0.05.

Table 10. Correlation between Metabolic Syndrome Categories and Pelvic Organ Prolapse

Metabolic Syndrome	Pelvic Organ Prolapse			P*
	Stage II	Stage III	Stage IV	
	Mean ± SD	Mean ± SD	Mean ± SD	
Fasting Blood Glucose	89.3 ± 9.26	91.4 ± 6.02	104.9 ± 16.48	0.005
Waist Circumferences	78.0 ± 2.70	78.0 ± 2.12	81.2 ± 3.52	0.289
TGL	148.7 ± 7.16	166.0 ± 8.63	188.7 ± 24.80	0.001
HDL	52.8 ± 2.93	51.4 ± 2.70	47.2 ± 2.70	0.001
Systolic Blood Pressure	119.0 ± 8.75	130.0 ± 12.24	130.0 ± 18.25	0.233
Diastolic Blood Pressure	80.0 ± 8.16	82.0 ± 4.47	82.0 ± 12.29	0.233

*** chi square tests**

Metabolic Syndrome Risk Factors with Pelvic Organ Prolapse Severity

Multinomial logistic regression analysis showed low HDL (OR 1.42, 95% CI 0.25 ± 0.78, p = 0.035), and high triglycerides (OR 1.58, 95% CI 1.23 ± 1.58, p = 0.000) will increase the risk of stage POP ≥ III.

Table 11. Metabolic Syndrome Risk Factors with Pelvic Organ Prolapse Severity

Risk Factor	OR	β	95% CI	*p value**
Stage III				
HDL < 50 mg/dL	1.42	-3.114	0.25±0.78	0.035
Triglyceride ≥ 150 mg/dL	1.58	-2.470	1.23±1.58	0.000

*** chi square tests**

According to Gava et al. on 2018, it was obtained from 122 women with POP, 27 people (22.1%) with stage II, 58 people (47.5%) with stage III, 29 people (23.7%) with stage IV. According to by Gava, et al. research on 2018, it was found that the triglyceride category, and a decrease in HDL had a significant value and could increase the risk of stage ≥ III POP in people with POP.[5] Meanwhile, according to Rogowski et al. study on 2015, there was an increase in the proportion of POP severity with increasing triglyceride levels. The proportion of women with metabolic syndrome also increases in women with stage III-IV POP. The proportion of triglycerides is also increased in postmenopausal women with POP stage III-IV.[17] According to by Kim et al. research on 2011, it was found that metabolic syndrome has a significant relationship with the incidence of POP. Among the components of the metabolic syndrome, waist circumference and triglycerides are significant components.[3]

Increased waist circumference may be associated with increased intra-abdominal pressure due to accumulation of visceral fat. Experimental studies looking at the relationship between vascular risk factors and pelvic floor dysfunction in women suggest that there is chronic ischemia or damage to the micro-blood vessels of the pelvic floor which impairs muscle function and the innervation of the pelvic floor. Increased BMI and obesity are risk factors for POP, but not risk factors for POP severity when POP symptoms appear. The metabolic syndrome can increase the severity of POP through several mechanisms. It has been reported that in the metabolic syndrome, microvascular pathological conditions occur due to endothelial dysfunction and atherosclerosis. Metabolic syndrome also increases the risk of protorombosis and proinflammation.

Metabolic syndrome is also associated with chronic inflammation that causes disruption of unregulated tissue repair and tissue damage.[3,4,5]

Hypertriglyceridemia is a common form of dyslipidemia and an independent cardiovascular risk factor. The mechanism of triglycerides for POP is unclear and there are few data on it. Recently, however, the Peroxysome Proliferator-Activator receptor (PPAR gamma-2) and beta-3-adrenergic receptor polymorphisms were seen in elevated triglycerides and connective tissue disease. These pathological conditions can increase the remodeling of the pelvic floor connective tissue causing changes in collagen and elastin synthesis and degradation.[3,4,5]

IV. CONCLUSION

There is a significant correlations between metabolic syndrome and the incidence of pelvic organ prolapse. Of the five categories of metabolic syndrome, fasting blood glucose, triglycerides, and HDL are significant factors in patients with pelvic organ prolapse. From the data, it was found that an increase in triglycerides and a decrease in HDL had an effect of 1.58 times and 1.42 times, respectively on the increase in the severity of pelvic organ prolapse.

V. ACKNOWLEDGEMENT

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