The Relationship Between Gender and Weight, Height, Age, Pregnancy, Heredity, Joint Laxity, Body Mass Index, and Physical Activity in Spondylolisthesis Patients at RSUP Fatmawati Jakarta in 2023-2024

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Abstract

Spondylolisthesis is the displacement of a vertebra relative to the vertebra below it, causing pain. While various risk factors for spondylolisthesis exist, few studies have explored which risk factors are specific to one gender. Therefore, this study aims to find the relationship between gender and parameters that are commonly considered risk factors for spondylolisthesis. This cross-sectional study was conducted from May to June 2024. A total of 35 patients with spondylolisthesis who underwent surgery at RSUP Fatmawati Jakarta were selected. Patient data were collected from medical records and screened based on inclusion and exclusion criteria. Of the patients, 45.7% were male and 54.3% were female. The data were analyzed using SPSS 16.0. There was a significant difference in the average weight and height between male and female spondylolisthesis patients (weight $p=0.017<\propto$, height $p=0.000<\propto$). There was no significant difference in age. Women with multigravida had the highest frequency (19) compared to primigravida (5), indicating a potential risk factor. No differences were found in joint laxity ($p=0.968>\propto$), BMI, heredity ($p=0.922>\propto$), or physical activity ($p=0.076>\propto$) between genders. There are various risk factors for spondylolisthesis. This study found significant differences in weight and height between genders in spondylolisthesis cases, but no significant differences in other parameters. The study also suggests that multiparity may be a significant risk factor, although further research is needed to confirm this.

Keywords: Body mass index, heredity, joint laxity, pregnancy, spondylolisthesis

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Abstrak

Spondilolistesis adalah pergeseran satu vertebra terhadap vertebra di bawahnya yang menyebabkan nyeri. Meskipun terdapat berbagai faktor risiko spondilolistesis, hanya sedikit penelitian yang mengeksplorasi faktor risiko mana yang spesifik terhadap satu jenis kelamin. Oleh karena itu, penelitian ini bertujuan untuk menemukan hubungan antara jenis kelamin dan parameter-parameter yang umumnya dianggap sebagai faktor risiko spondilolistesis. Penelitian ini merupakan studi potong lintang yang dilakukan pada bulan Mei hingga Juni 2024. Sebanyak 35 pasien dengan spondilolistesis yang menjalani operasi di RSUP Fatmawati Jakarta dipilih sebagai sampel. Data pasien dikumpulkan dari rekam medis dan disaring berdasarkan kriteria inklusi dan eksklusi. Dari total pasien, 45,7% berjenis kelamin laki-laki dan 54,3% berjenis kelamin perempuan. Data dianalisis menggunakan SPSS versi 16.0. Terdapat perbedaan yang signifikan pada rata-rata berat badan dan tinggi badan antara pasien spondilolistesis laki-laki dan perempuan (berat badan $p=0,017<\propto$, tinggi badan $p=0,000<\propto$). Tidak terdapat perbedaan yang signifikan pada usia. Perempuan dengan riwayat multigravida memiliki frekuensi tertinggi (19) dibandingkan dengan primigravida (5), yang menunjukkan potensi sebagai faktor risiko. Tidak ditemukan perbedaan pada laksitas sendi ($p=0,968>\propto$), IMT, riwayat keturunan ($p=0,922>\propto$), maupun aktivitas fisik ($p=0,076>\propto$) antara laki-laki dan perempuan. Terdapat berbagai faktor risiko untuk spondilolistesis. Penelitian ini menemukan perbedaan yang signifikan pada berat badan dan tinggi badan antara jenis kelamin pada kasus spondilolistesis, tetapi tidak terdapat perbedaan signifikan pada parameter lainnya. Penelitian ini juga menunjukkan bahwa multiparitas dapat menjadi faktor risiko yang signifikan, meskipun penelitian lebih lanjut diperlukan untuk mengonfirmasi temuan ini.

Kata kunci: Indeks massa tubuh, kehamilan, laksitas sendi, spondilolistesis

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Introduction

Spondylolisthesis is a condition in which the vertebra shifts against the vertebra below it, causing radicular or mechanical pain.1 The shifting of the vertebrae in spondylolisthesis can be directed anteriorly, laterally, or posteriorly from one vertebra to another adjacent vertebra.[2]

Spondylolisthesis has 6 classifications, namely *degenerative, isthmic, post-traumatic, dysplastic, pathological*, And *post-operative*. Spondylolisthesis *degenerative* occurs from degenerative changes in the spine without any abnormalities in the pars interarticularis. Spondylolisthesis *isthmic* caused by abnormalities in the pars interarticularis due to microtrauma during sports such as*gymnastics*. Spondylolisthesis *post traumatic* due to trauma. Dysplastic spondylolisthesis due to congenital abnormalities. Spondylolisthesis *pathological* caused by bone destruction in tuberculosis or neoplasm. Post-operative spondylolisthesis is caused by bone decompression surgery.[3,4]

Spondylolisthesis usually occurs in the lower lumbar vertebrae, but can also occur in the cervical vertebrae, and is rare in the thoracic vertebrae, unless caused by trauma. Degenerative spondylolisthesis is more common in adults, especially in women and those who are obese. Isthmic spondylolisthesis is more common in adolescents and young adults, although it may not be detected until adulthood, and is more common in men. Dysplastic spondylolisthesis occurs primarily in children, with females more often affected than males. The prevalence of isthmic spondylolisthesis is estimated to be 6-7% by age 18 years, and up to 18% in adults undergoing lumbar MRI. Grade I spondylolisthesis predominates at 75% of all cases. The most common location is at the L5-S1 level, followed by the L4-5 level.[5,6]

There are various risk factors for spondylolisthesis, but there are not many studies that discuss what risk factors are specific risk factors for one gender. Therefore, this study aims to find the relationship between gender and parameters that are usually risk factors for spondylolisthesis.

Method

This study is an analytical observational study with a cross-sectional approach, namely a study that aims to explain the meaning of a relationship by collecting data simultaneously at one time. This study was conducted in December 2023 - January 2024 with a sample of 35 spondylolisthesis patients who had undergone surgery at Fatmawati Hospital, Jakarta.

The patient's baseline data was taken from medical records, then selected based on inclusion and exclusion criteria. The sample in this study was degenerative spondylolisthesis patients who had been recorded in the data book at Fatmawati General Hospital, Jakarta who met the inclusion criteria.

The selected sample consisted of 35 spondylolisthesis patients who had undergone surgery consisting of 16 men (45.7%) and 19 women (54.3%). After that the data was processed and analyzed using SPSS 16.0 software. The characteristics of the research sample are explained in the image below.

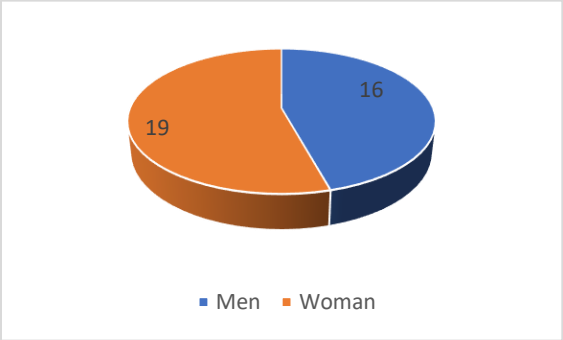

Figure 1. Gender Characteristics

Results

In this study, bivariate analysis was conducted to determine the relationship between gender and weight, height, age, pregnancy, heredity, joint laxity, body mass index, and physical activity in spondylolisthesis patients. The type of data in this study is unpaired categorical data. Based on this, the bivariate test used is the Chi-Square test. The relationship between gender and weight in spondylolisthesis patients can be seen in the histogram in Figure 2.

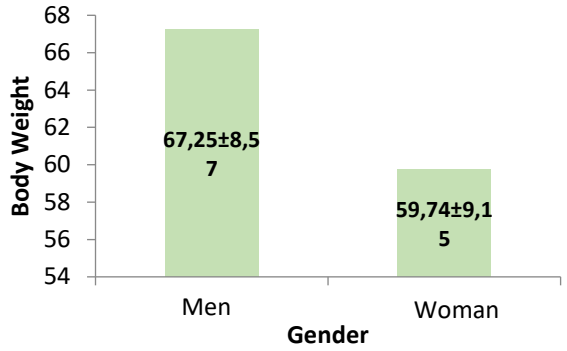

Figure 2. Relationship between gender and body weight

Figure 2 shows a bar chart (histogram) of the mean±standard-deviation of the weight of male patients is higher than that of female patients with a 95% confidence interval. This means that the average weight of men is indeed much different from the weight of female patients. So there is a significant difference in the weight of male and female patients (p=0.017<∝).

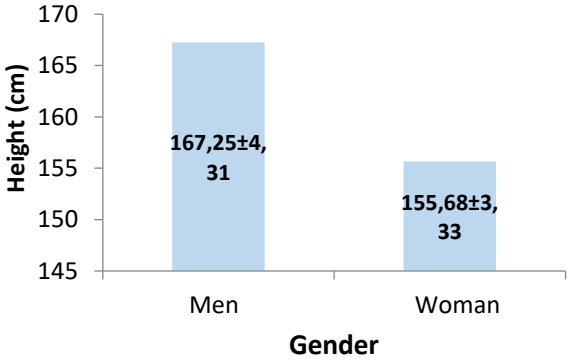

Figure 3. Relationship between gender and height in spondylolysis patients

Figure 3 shows the distribution of male height, the average is 167.25 cm and the standard deviation is ±4.31 cm. It also appears that the distribution of female height is on average 155.68 cm and the standard deviation is ±3.33 cm. There is a significant difference in the height of male patients with the height of female patients (p=0.000<∝).

Table 1. Age Distribution in Spondylolisthesis Patients

Variables	Mean±Sd	n	>50 years	<50 years
Age (years):				
Man	55.5±9.5	16	12 (75%)	4 (25%)
Woman	55.9±7.8	19	15 (79%)	4 (21%)

Table 1 shows that the distribution of patient age data between men and women is almost the same. Both men and women spondylolisthesis patients show the same, most patients who undergo surgery are spondylolisthesis patients over 50 years of age. So there is no relationship between gender and age in spondylolisthesis patients (p = 0.405>∝).

Specifically for female patients, it shows information about pregnancy with a distribution between prigravida and multigravida. The distribution of pregnancy from 19 female spondylolisthesis patients is explained in full in Table 2.

This table shows the distribution of pregnancy of patients from 19 people spread out, there are 14 people (73.7%) multigravida and there are 5 people (26.3%) who are primigravida. It can be assumed that pregnancy history can support the occurrence of spondylolisthesis in adult women. The more often a mother gives birth, the greater the risk of spondylolisthesis.

Table 2. Results of patient pregnancy analysis

Variables	frequency	percentage
Pregnancy:		
• **Multigravida**	14	73.7%
• **Primigravida**	5	26.3%
Amount	19	100%

The distribution of joint laxity in 35 male and female spondylolisthesis patients is explained in full in Table 3 below.

Table 3. Joint laxity analysis results

Variables	Frequency (percentage)		*p-value*
	Man	**Woman**	
***Joint laxity*:**			0.968
• **There isn't any**	6 (37.5%)	7 (36.8%)	
• **There is**	10 (62.5%)	12 (63.2%)	
Amount	16 (100%)	19 (100%)	

It appears that most of the spondylolisthesis patients who underwent surgery, both male and female, showed that they had joint laxity. It can be assumed that the presence of joint laxity in a person will trigger the occurrence of spondylolisthesis. So there is no relationship between gender differences and the presence of joint laxity in spondylolisthesis patients ($p = 0.968 > \propto$).

The distribution of heredity/genetics of 35 male and female spondylolisthesis patients is explained in full in Table 4 below.

Table 4. Results of heredity analysis

Variables	Frequency (percentage)		*p-value*
	Man	**Woman**	
descendants:			0.050
• **There is**	4 (25%)	11(57.9%)	
• **There isn't any**	12 (75%)	8 (42.1%)	
Amount	16 (100%)	19 (100%)	

Among the 35 patients, it turned out that there was heredity/genetics in most female patients, while in male patients it was found only in some. There were 11 female patients (57.9%) who showed heredity/genetics and only 8 female patients (42.1%) who showed no heredity/genetics. In male patients, there were 12 patients who showed no heredity/genetics and only 4 patients who showed heredity/genetics.

The distribution of body composition of 35 male and female spondylolisthesis patients is explained in full in Table 5 below.

Table 5.BMI analysis results

Variables	Mean±Sd	n	>25	<25	*p-value*
Body composition (BMI):					0.922
• **Man**	24.24±3.19	16	7 (43.8%)	9 (56.2%)	
• **Woman**	24.24±3.90	19	8 (42.1%)	11 (57.9%)	

Based on table 5 shows that among 16 male patients, there are 7 people (43.8%) who show a body composition of more than 25 and there are 9 people (56.2%) who show a body composition of less than 25. So most male spondylolisthesis patients who undergo surgery show less than 25 in their body composition. Among 19 female patients, there are 8 people (42.1%) who show a body composition of more than 25 and there are 11 people (57.9%) who show a body composition of less than 25. So most female spondylolisthesis patients who undergo surgery show a body composition of less than 25. So there is no relationship between gender differences and body composition (BMI) in spondylolisthesis patients ($p = 0.922 > \propto$).

The distribution of physical activity of patients is explained in Table 6 below.

Table 6. Results of physical activity analysis

Variables	Frequency (percentage)		*p-value*
	Man	**Woman**	
Physical activity:			0.076
• **Active**	13 (81.3%)	10 (52.6%)	
• **Not active**	3 (18.7%)	9 (47.4%)	
amount	16 (100%)	19 (100%)	

In male patients, there were 13 patients (81.3%) who showed physical activity and 10 female patients (52.6%) who showed physical activity. While in male patients, there were only 3 patients who showed no physical activity and 9 female patients who showed no physical activity. So there is no relationship between gender

differences and physical activity in spondylolisthesis patients ($p = 0.076 > \propto$).

Discussion

Finding significant differences in risk factors between the sexes in spondylolisthesis disease can lead us to risk factors that are specific to one sex. In general, there is no significant difference between the sexes in the incidence of spondylolisthesis. This was also reported by Longo et.al who collected patient data from 2001-2016 in Italy7. However, if we look at spondylolisthesis etiologically, gender differences can be seen, such as post-traumatic and isthmic spondylolisthesis which occur more often in men, while degenerative and dysplastic spondylolisthesis occur more often in women.4,8. Likewise, age, which epidemiologically has different prevalence depending on its etiology5. The absence of a significant difference between the incidence of spondylolisthesis in the two sexes in this study may be due to the etiology of the cases in this study which were not grouped so that the influence or difference in each etiology of spondylolisthesis could not be found. This is due to the insufficient number of samples in this study.

The average weight and height that differ significantly between the two sexes, are also reflected in the average BMI that is not significantly different. No high BMI was found to dominate the cases in this study. However, this is contrary to the study conducted by Kalichman et.al where BMI can be a risk factor for the emergence of spinal degeneration features which are the beginning of one of the etiologies of spondyloisthesis9. However, as explained above, this may be because this study did not group cases according to their etiology.

This study also revealed multiparity as a significant risk factor in cases of spondylolisthesis. This was also found in a study by Cholewicki et.al who found the number of term pregnancies, along with age and BMI as co-variates, to be significant predictors of the incidence of degenerative spondylolisthesis10. However, it should be noted that the age in the study was between 40-80 years where in general women in that age group are usually multiparous. This study also found that the average age of the sample was 50 years. Further research is needed with more primigravida or nullipara samples with the same average age to isolate risk factors.

The absence of differences in joint laxity between the two sexes in this study was due to joint laxity being correlated with the incidence of spondylolisthesis which has the same role in both men and women11. The absence of differences between the two sexes in the parameters discussed above is possible because these parameters may be risk factors for both sexes and are not specific to only one sex, or not at all.

Conclusion

There are various risk factors for spondylolisthesis. In this study, there was a significant difference in weight and height between the two sexes in cases of spondylolisthesis, but no significant difference was found in other parameters. This study also found multiparity to be a significant risk factor, although further research is needed for this. In planning further research, it is recommended to group spondylolisthesis cases according to their etiology, so that the revealed risk factors will be more specific.

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