

## **The Correlation Of Body Mass Index With The Severity Degree of Knee Osteoarthritis Based on Plain Radiographs According to The Kellgren-Lawrence Grading Scale in Patients at Siti Khodijah Muhammadiyah Sepanjang Hospital.**

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### **ABSTRACT**

*Osteoarthritis is a disorder that attacks the cartilage of the joints so that they are thinned and sometimes accompanied with mild inflammation (Sylvia A.Price, 2006). In 2019 the incident of osteoarthritis cases at the Siti Khodijah Muhammadiyah Sepanjang Hospital was 6571 patients. Therefore, osteoarthritis is the 3rd common disease after LBP and COPD. Obesity in one of the causes that can increased risk of osteoarthritis. especially those can affect the body's weight support joints such as the knee. Body mass index calculations are used to classify overweight in adults. To determine is there a corelation between body mass index and severity degree of knee osteoarthritis based on plain radiographs according to the Kellgren-Lawrence grading scale in patients at Siti Khodijah Muhammadiyah Sepanjang Hospital. This study used a cross-sectional design with consecutive sampling technique on 49 knee osteoarthritis patients at Siti Khodijah Muhammadiyah Sepanjang Hospital. The data that used in this study is patient's medical record. From the severity of osteoarthritis in 49 respondents, the results were grade I as much as 13 (26,5%), grade II as much as 11 (22, 4%), grade III as much as 14 (28, 6%), and grade IV as much as 11(22, 4%) respondents. Whereas on the body mass index, the results were thin ( $\leq 17,0-18,4$ ) as much as 2 (4,1%), normal (18,5-25,0) as much as 24 (49%), obesity (25,1-27,0) as much as 12 (24,5%), and severe obesity ( $>27,0$ ) as much as 11 (22,4%) respondents. The result of statistical test using the Spearman test obtained a significance value (p): 0.578 ( $p > 0.05$ ). There is no significant relationship between body mass index and the severity degree of knee osteoarthritis based on plain radiographs according to the Kellgren-Lawrence grading scale at the Siti Khodijah Muhammadiyah Sepanjang Hospital.*

**Keywords :** *Knee osteoarthritis, severity degree of knee osteoarthritis, body mass index.*

### **ABSTRAK**

Osteoarthritis adalah gangguan yang menyerang kartilago persendian sehingga mengalami penipisan dan kadang disertai dengan inflamasi ringan. (Sylvia A.Price, 2006). Pada tahun 2019 angka kejadian kasus osteoarthritis di Rumah Sakit Siti Khodijah Muhammadiyah Cabang Sepanjang adalah 6571 pasien. Oleh karena itu, osteoarthritis menjadi penyakit terbanyak ke-3 setelah LBP dan PPOK. Obesitas merupakan salah satu penyebab meningkatnya resiko terjadinya osteoarthritis terutama yang menyerang sendi penopang berat

tubuh seperti lutut. Penghitungan indeks massa tubuh digunakan untuk mengklasifikasikan kelebihan berat badan pada orang dewasa. Untuk mengetahui apakah ada hubungan dari indeks massa tubuh dengan derajat keparahan pada osteoarthritis lutut dari foto polos menurut Kellgren-Lawrence grading scale pada pasien di Rumah Sakit Siti Khodijah Muhammadiyah Cabang Sepanjang. Penelitian ini menggunakan desain cross sectional dengan teknik pengambilan sampel consecutive sampling pada 49 pasien osteoarthritis lutut di Rumah Sakit Siti Khodijah Muhammadiyah Cabang Sepanjang. Pengambilan sampel data menggunakan rekam medis pasien. Data yang diperoleh akan dianalisis dengan menggunakan uji korelasi spearman. Dari kategori derajat osteoarthritis pada 49 responden didapatkan hasil yaitu derajat I sebanyak 13 (26,5%), derajat II sebanyak 11 (22,4%), derajat III sebanyak 14 (28,6%), dan derajat IV sebanyak 11 (22,4%) responden. Sedangkan pada indeks masa tubuh didapatkan hasil kurus ( $\leq 17,0-18,4$ ) sebanyak 2 (4,1%), normal (18,5-25,0) sebanyak 24 (49%), obesitas (25,1-27,0) sebanyak 12 (24,5%), dan obesitas berat ( $>27,0$ ) sebanyak 11 (22,4%) responden. Hasil uji statistik menggunakan uji korelasi spearman antara indeks massa tubuh dengan derajat keparahan osteoarthritis didapatkan nilai signifikansi (p) sebesar 0,578 ( $p>0,05$ ). Tidak terdapat hubungan yang signifikan antara indeks massa tubuh dengan derajat keparahan osteoarthritis lutut dari foto polos menurut Kellgren-Lawrence grading scale di Rumah Sakit Siti Khodijah Muhammadiyah Cabang Sepanjang.

**Kata kunci** : Osteoarthritis lutut, derajat keparahan osteoarthritis lutut, indeks massa tubuh.

## INTRODUCTION

Osteoarthritis is a disorder that attacks the cartilage of the joints so that they are thinned and sometimes accompanied with mild inflammation. This is a chronic slow progressive disease characterized by abrasion of joint cartilage and the formation of new bone on the joint surface. Osteoarthritis is the most common form of arthritis arthritis with a number of patients having slightly more than half of arthritis patients. Osteoarthritis is found in women over 45 years of age (Sylvia A.Price, 2006). The etiology that causes of osteoarthritis is still uncertain but some of these things can be the etiology of osteoarthritis including age, gender, obesity, genetic or family history, and a history of physical injury (Sambrook *et.al.*, 2005).

According to the data in 2013, the province of East Nusa Tenggara (NTT) is the province with the highest prevalence of osteoarthritis which is around 33,1% and the

province with the lowest prevalence is Riau, which is around 9%, while in East Java the prevalence rate is quite high at 27% (Riskesdas, 2013). In 2019 the incidence of osteoarthritis cases at the Siti Khodijah Muhammadiyah Sepanjang Hospital was 6571 patients. Therefore, osteoarthritis is the most common diseases after LBP and COPD in the general clinic of Siti Khodijah Muhammadiyah Hospital.

Obesity is a condition where there is a compilation of excess fat in the body caused by consumption of high-fat foods, like of exercise so that the metabolism in the body is not goes properly. In Indonesia, due to the high incident of overweight and obesity still be a problem. Data from Riskesdas Depkes RI in 2013 state that obesity in the adult age group was 15,4% and the incidence of overweight was 13,5%. If the incident of obesity and overweight is added up, the prevalence of the Indonesian population who is overweight is 28,9% (Kemenkes RI, 2013). The prevalence of overweight in Indonesia is quite high because more than a quarter of Indonesia's population in the adult group is overweight.

Excessive body weight is one of the causes of increased risk of osteoarthritis, especially affecting the joints that support the weight of the body such as the knee. As a result of supporting excess body weight on this joint, the damage to the joints will get worse and cause pain. According to the research in Padang by Endang, M et,al., 2016 in the Andalas Health Journal said that there was a correlation between an increase of body mass index and the severity degree of knee osteoarthritis on radiological examination. Therefore, the researchers conducted this study aimed to find out the correlation between body mass index and the severity degree of knee osteoarthritis based on radiographs

according to the Kellgren-Lawrence grading scale at Siti Khodijah Muhammadiyah Sepanjang Hospital.

**METHODS**

This research is a quantitative research with an observational analytic. The research sample was taken using a cross-sectional system. The data taken in this study were medical records of patient who had knee osteoarthritis, the data scale form is ordinal - ordinal. The medical record data taken were height, weight, and the results of the severity degree of patient's knee based on plain radiograph according to the Kellgren–Lawrence grading scale. The sample of this research was 49 people. the data obtained were processed using the SPSS 25 software with the Spearman correlation test to determine the correlation between body mass index and severity degree of knee osteoarthritis based on plain radiograph according to the Kellgren-Lawrence grading scale.

**RESULT**

**1. Distribution of Respondent Data Frequency by Age Category**

Table 1.1 Distribution of respondent data frequency by age category

Age	Number	Percentage %
36 - 45	3	6,1
46 - 55	25	51
56 - 65	9	18,4
65 - over	12	24,5

Total	49	100%
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(Secondary data processed, 2021)

Based on the age of the respondents which can be seen from the table above, the result of respondents aged 36 – 45 years are 3 people (6.1%), ages 46 – 55 years are 25 people (51%), ages 56 – 65 years are 9 people (18.45), and the other 12 people aged 65 – over (24.5%).

From the total respondents, the most age range category of the respondents were 46 – 55 years old, with 25 out of 49 total respondents. Then followed by respondents with the age range of 65 – over with 12 respondents, and age range category of 56 – 65 years old with 9 respondents, the last is respondents with the age range category of 36 – 45 years old with 3 respondents.

## 2. Distribution of Respondent Data Frequency by Gender

Table 1.2 Distribution of respondent data frequency by gender

Gender	Number	Percentage %
Male	16	32,6
Female	33	67,4
Total	49	100%

(Secondary data processed, 2021)

Based on the table above, a total of 49 respondents indicated that the frequency based on the gender of respondents consisted of 16 Male (32.6%) and 33 Female (67.4%).

From the data, the total respondents who experienced knee osteoarthritis, the most were female respondents with 33 respondents. Meanwhile, respondents with male gender were found as many as 16 respondents out of 49 respondents in total.

**3. Distribution of Respondent Data Frequency by Category of Body Mass Index**

Table 1.3 Distribution of respondent data frequency by category of body mass index

<b>Body Mass Index</b>	<b>Number</b>	<b>Percentage %</b>
Thin ( $\leq 17,0 - 18,4$ )	2	4,1
Normal (18,5 – 25,0)	24	49,0
Obesity (25,1 – 27,0)	12	24,5
Severe Obesity ( $>27,0$ )	11	22,4
<b>Total</b>	<b>49</b>	<b>100%</b>

(Secondary data processed, 2021)

Based on the data in table 1.3 it can be seen that there are 2 respondents (4.1%) with a body mass index in the thin category, 24 respondents (49%)

with a body mass index in the normal category, 12 respondents (24.5%) with body mass index in the obesity category, while the others 11 respondents (22.4%) had body mass index in the severe obesity category.

From these data, it was found that respondents with the most body mass index category were in the normal category with 24 respondents out of 49 in total respondents. Then there were 12 respondents with body mass index obesity category and followed by respondents with body mass index severe obesity category with 11 respondents. Body mass index in the thin category is the least amount, there was only 3 respondents out of 49 in total respondents.

**4. Distribution of Respondent Data Frequency by Category of Severity Degree of Knee Osteoarthritis Based on Plain Radiographs According to the Kellgren-Lawrence Grading Scale**

Table 1.4 Distribution of respondent data frequency by category of severity degree of knee osteoarthritis based on plain radiographs according to the Kellgren-Lawrence grading scale

<b>Severity Degree of Knee Osteoarthritis</b>	<b>Number</b>	<b>Percentage %</b>
Grade I	13	26,5
Grade II	11	22,4

Grade III	14	28,6
Grade IV	11	22,4
Total	49	100%

(Secondary data processed, 2021)

Based on the table above, it shows the number of respondents with grade I of the severity degree of knee osteoarthritis were 13 respondents (26.8%), 11 respondents with grade II (22.4%), 14 respondents with grade III (28%), and the others 11 respondents with grade IV (22.4%).

From the data above, it can be seen that the distribution of severity degree of knee osteoarthritis on the data is almost the same, the category with a highest number of respondents is grade III, which is 14 respondents out of 49 in total respondents followed by grade I category with 13 respondents. For the category II and IV degrees, it has the same number of respondents, it was 11 respondents out of 49 in total respondents.

#### **5. Correlation Between Age and Severity Degree of Knee Osteoarthritis Based on Plain Radiographs According to the Kellgren-Lawrence Grading Scale**

To determine whether there is a correlation between age and the severity degree of knee osteoarthritis based on plain radiographs according to the Kellgren-Lawrence grading scale at Siti Khodijah Muhammadiyah



Sepanjang Hospital, it is necessary to form cross tabulation (crosstabs) that can show the distribution of data in more detail, as can be found. Seen in the following table form.

Table 1.5 Cross tabulation between age and severity degree of knee osteoarthritis based on plain radiographs of respondents according to the Kellgren-Lawrence grading scale.

		<b>Grade of Osteoarthritis</b>				<b>Total</b>
		<b>Grade I</b>	<b>Grade II</b>	<b>Grade III</b>	<b>Grade IV</b>	
<b>Age 36 – 45 Years</b>	Count	2	1	0	0	3
	% of Total	4,1%	2%	0%	0%	6,1%
<b>46 – 55 Years</b>	Count	6	5	8	6	25
	% of Total	12,2%	10,3%	16,3%	12,2%	51%
<b>55 – 65 Years</b>	Count	2	2	2	3	9
	% of Total	4,1%	4,1%	4,1%	6,1%	18,4%
<b>65 – over</b>	Count	3	3	4	2	12

	% of	6,1%	6,1%	8,1%	4,1%	24,4%
	Total					
Total	Count	13	11	14	11	49
	% of	26,5%	22,4%	28,6%	22,4%	100,0%
	Total					

(Secondary data processed, 2021)

In table 1.5 it can be seen that the 3 of respondents with the age category of 36 - 45 years, there 2 respondents suffer from grade I of knee osteoarthritis. While the 1 other person suffers from grade II of knee osteoarthritis. Furthermore, it can be seen that 25 respondents with the age category 46 - 55 years, 6 respondents suffer from grade I of knee osteoarthritis, 5 respondents suffer from grade II of knee osteoarthritis, 8 respondents suffer from grade III of knee osteoarthritis, while 6 respondents suffer from grade IV of knee osteoarthritis. Then from 9 respondents with the age category 55 - 66 years, 2 respondents suffer from grade I of knee osteoarthritis, 2 respondents suffer from grade II of knee osteoarthritis, 2 respondents suffer from grade III of knee osteoarthritis, 3 respondents suffer from grade IV of knee osteoarthritis. As for the 12 respondents in the 65 - over age category, 3 respondents suffer from grade I of knee osteoarthritis, 3 respondents suffer from grade II of knee osteoarthritis, 4 respondents suffer from grade III of knee osteoarthritis, while 2 respondents suffer from grade IV of knee osteoarthritis.

To determine whether there is a correlation between age and severity degree of knee osteoarthritis based on plain radiographs according to the Kellgren-Lawrence grading scale, this study use Spearman test to analyse. Based on the test result from crosstabs in the table 1.5 regarding the crosstabs between age and severity degree severity degree of knee osteoarthritis based on plain radiographs according to the Kellgren-Lawrence grading scale, a significance value (p) was obtained of 0,498, where the significant value (p)  $> 0.05$ . then obtained value of contingency correlation coefficient of 0.099, it shows that the correlation between age and severity degree of knee osteoarthritis based on plain radiographs according to the Kellgren-Lawrence grading scale is very weak. So, it can conclude that there is no significant correlation between age and severity degree of knee osteoarthritis based on plain radiographs according to the Kellgren-Lawrence grading scale at Siti Khodijah Muhammadiyah Sepanjang Hospital

#### **6. Correlation Between Gender and Severity Degree of Knee Osteoarthritis Based on Plain Radiographs According to the Kellgren-Lawrence Grading Scale**

To find out whether there is a correlation between gender and severity degree of knee osteoarthritis based on plain radiographs according to the Kellgren-Lawrence grading scale at Siti Khodijah Muhammadiyah Sepanjang Hospital, it is necessary to form cross tabulation (crosstabs) that can show the

distribution of data in more detail, as can be found. Seen in the following table form.

Table 1.6 Cross tabulation between gender and severity degree of knee osteoarthritis based on plain radiographs of respondents according to the Kellgren-Lawrence grading scale.

		<b>Degree of Osteoarthritis</b>				<b>Total</b>	
		Grade I	Grade II	Grade III	Grade IV		
<b>Gender</b>	Male	Count	6	1	6	3	16
		% of	12,2%	2%	12,2%	6,1%	32,5%
		Total					
	Female	Count	7	10	8	8	33
		% of	14,3%	20,4%	16,3%	16,3%	67,3%
		Total					
<b>Total</b>		Count	13	11	14	11	49
		% of	26,5%	22,4%	28,6%	22,4%	100,0%
		Total					

(Secondary data processed, 2021)

In the result of the cross tabulation (cross tabs) above, it can be seen that the 16 respondents with male gender, 6 respondents suffer from grade I of knee osteoarthritis, 1 respondent suffer from grade II of knee osteoarthritis, 6 respondents suffer from grade III of knee osteoarthritis, while 3 others respondent suffer from grade IV of knee osteoarthritis. furthermore, it can be seen that of the 33 Female respondents, 7 respondents suffer from grade I of knee osteoarthritis, 10 respondents suffer from grade II of knee osteoarthritis, 8 respondents suffer from grade III of knee osteoarthritis, while 8 others respondent had grade IV of knee osteoarthritis.

To determine whetere there is a correlation between gender and gender and severity degree of knee osteoarthritis based on plain radiographs according to the Kellgren-Lawrence grading scale, this study use Chi-square analysis test. Based on the test result from table 1.6 regarding cross tabulation of gender between severity degree of knee osteoarthritis based on plain radiographs according to the Kellgren-Lawrence grading scale, a significant value (p) of 0.198 was obtained, where the significant value (p) > 0.05. So, it can be concluded that there is no significant correlation between gender and severity degree of knee osteoarthritis based on plain radiographs according to the Kellgren-Lawrence grading scale at Siti Khodijah Muhammadiyah sepanjang Hospital.

To find out whether there is a correlation between gender and body mass index of respondents at Siti Khodijah Muhammadiyah Sepanjang

Hospital, it is necessary to form cross tabulation (crosstabs) that can show the distribution of data in more detail, as can be found. Seen in the following table form.

Table 1.7 Cross tabulation between gender and body mass index of respondents.

		<b>Body Mass Index</b>					<b>Total</b>
		Thin	Normal	Obesity	Severe obesity		
<b>Gender</b>	Male	Count	0	10	2	4	16
		% of	0%	20,4%	4%	8,1%	32,5%
		Total					
	Female	Count	2	14	10	7	33
		% of	4%	28,5%	20,4%	14,2%	67,3%
		Total					
<b>Total</b>		Count	2	24	12	11	49
		% of	4%	49%	24,4%	22,4%	100,0%
		Total					

(Secondary data processed, 2021)

Based on the table above, it can be seen that there more woman who have excess body mass index or obesity, 10 of woman respondents who have a body mass index in obesity category and the 7 other respondents in the severe

obesity category out of 33 of total female respondents. For male respondents, the highest body mass index category is the normal category where there are 10 respondents out of 16 male total respondents.

**7. Correlation Between Body Mass Index and Severity Degree of Knee Osteoarthritis Based on Plain Radiographs According to the Kellgren-Lawrence Grading Scale**

To find out whether there is a correlation between gender body mass index and the severity degree of knee osteoarthritis based on plain radiographs according to the Kellgren-Lawrence grading scale at Siti Khodijah Muhammadiyah Sepanjang Hospital, it is necessary to form cross tabulation (crosstabs) that can show the distribution of data in more detail, as can be found. Seen in the following table form.

Table 1.8 Cross tabulation between body mass index and severity degree of knee osteoarthritis based on plain radiographs of respondents according to the Kellgren-Lawrence grading scale.

		<b>Degree of Osteoarthritis</b>				<b>Total</b>
		Grade I	Grade II	Grade III	Grade IV	
<b>BMI Thin</b>	Count	0	1	1	0	2

	% of	0%	2%	2%	0%	4,1%
	Total					
<b>Normal</b>	Count	4	7	7	6	24
	% of	8,2%	14,3%	14,3%	12,2%	49%
	Total					
<b>Obesity</b>	Count	6	2	1	3	12
	% of	12,2%	4,1%	2%	6,1%	24,5%
	Total					
<b>Severe Obesity</b>	Count	3	1	5	2	11
	% of	6,1%	2%	10,2%	4,1%	22,4%
	Total					
<b>Total</b>	Count	13	11	14	11	49
	% of	26,5%	22,4%	28,6%	22,4%	100,0%
	Total					

(Secondary data processed, 2021)

In table 1.8 it can be seen that the 2 of respondents with the thin body mass index category, 1 respondent suffers from grade II of knee osteoarthritis, while 1 other respondent suffers from grade III of knee osteoarthritis. furthermore, it can be seen that the 24 respondents with normal body mass index category, 4 respondent suffers from grade I of knee osteoarthritis, 7 respondent suffers from grade II of knee osteoarthritis, 7 respondent suffers from grade III of knee osteoarthritis, while 6 respondent suffers from grade



IV of knee osteoarthritis. then the 12 others respondents with obesity body mass index category, 6 respondent suffers from grade I of knee osteoarthritis, 2 respondent suffers from grade II of knee osteoarthritis, 1 respondent suffers from grade III of knee osteoarthritis, while 3 respondent suffers from grade IV of knee osteoarthritis. as for the 11 respondents with severe obesity body mass index category, 3 respondent suffers from grade I of knee osteoarthritis, 1 respondent suffers from grade II of knee osteoarthritis, 5 respondent suffers from grade III of knee osteoarthritis, while 2 respondent suffers from grade IV of knee osteoarthritis.

To determine whether there is a correlation between body mass index and the severity degree of knee osteoarthritis based on plain radiographs according to the Kellgren-Lawrence grading scale, this study use Spearman test to analyse. Based on the test result from crosstabs in the table 1.8 regarding the crosstabs between body mass index and severity degree severity degree of knee osteoarthritis based on plain radiographs according to the Kellgren-Lawrence grading scale, a significant value ( $p$ ) 0.578 was obtained, where the significant value ( $p$ )  $> 0.05$  so that means  $H_0$  was accepted and  $H_1$  was rejected. The result of the analysis test showed that the value of contingency correlation coefficient of 0.081 means that the correlation between body mass index and the severity degree of knee osteoarthritis based on plain radiographs according to the Kellgren-Lawrence grading scale is very weak. So, it can be concluded that there is no significant correlation

between body mass index and severity degree of knee osteoarthritis based on plain radiographs according to the Kellgren-Lawrence grading scale at Siti Khodijah Muhammadiyah sepanjang Hospital.

## **DISCUSSION**

This study was conducted to determine whether there is a correlation between body mass index and the severity degree of knee osteoarthritis based on plain radiograph according to the Kellgren - Lawrence grading scale at Siti Khodijah Muhammadiyah Sepanjang Hospital. This study used 49 sample of patients with knee osteoarthritis at Siti Khodijah Muhammadiyah Sepanjang Hospital. The total number of samples did not leave the study because all of the samples were secondary sample and match with the inclusion criteria.

Based on the result of research conducted during the. From September 2020 to February 2021, it was found that there was no correlation between body mass index and the severity degree of knee osteoarthritis from plain radiograph according to the Kellgren - Lawrence grading scale. From the results of the research it was found that the number of patients with the highest degree of knee osteoarthritis severity was grade III with 14 respondents, followed by grade II with 13 respondents, then grade I and IV with 11 respondents. In addition, this study show that all osteoarthritis patients start in late adulthood (36 - 45 years), the highest number of age of respondents is the early elderly (46 - 55 years) with 51% of the total respondents. This is thought to be due to decreased bone regeneration, weakness around the joints and decreased muscle stability due to decreased body regulation, hormonal imbalance, tissue damage, cartilage classification,

and lack of physical activity. (Umami *et al*, 2014). Previous research on the aging process so the influence of a pro-inflammatory cell phenotype called the Senescence Associated Secretory Phenotype (SASP). This phenotype is induced by various stimulation associated with cell aging such as DNA damage. Cells such as fibroblasts that have this phenotype produce cytokines and matrix metalloproteinase (MMP) including IL-1 $\beta$ , IL-6, IL-8, MMP-3 dan MMP-13, Which are often found in joints with osteoarthritis. The development of SASP is also related to the production of Reactive Oxygen Species (ROS) from mitochondrial dysfunction. (Haigis MC dan Yankner BA. 2010). The increasing number of age the prevalence of osteoarthritis also increases. (Pearson, 2008).

After the medical record data in the form of age and severity degree of knee osteoarthritis were obtained and analyzed using the Spearman test, the significance (p) was 0.498, Where the significance (p) value  $> 0.05$ . So, it can be concluded that There is no significant correlation or influence between age and the severity degree of knee osteoarthritis from plain radiograph according to the Kellgren - Lawrence grading scale at Siti Khodijah Muhammadiyah Sepanjang Hospital. This result can be influenced by various factors, one of which is the severity degree of osteoarthritis, apart from being influenced by age it can also be influenced by an imbalance of the estrogen hormone in the woman who entered menopause, genetic factors were bone calcification and bone regeneration are not balanced so that the formation of osteophytes and joint narrowing is faster. (Hanfin, Najma N, 2018).

Female respondents have a highest gender percentage which is 67.3% of the total samples. This is thought to be due to the influence of decreased level of the hormone

estrogen which is important in bone regeneration and osteoporosis can occur as a result of the menopause proses that occurs in elderly woman (Andini, 2015).

After being analyzed using the chi-square test, it was obtained a significance the value (p) of 0.198 where the significance value (p) > 0.05. So, it can be concluded that there is no significant correlation or influence between gender and severity degree of knee osteoarthritis from plain radiographs according to the Kellgren - Lawrence grading scale at Siti Khodijah Muhammadiyah Sepanjang Hospital. The results of the analysis showed that there was no correlation between gender and severity degree of knee osteoarthritis, but incidents of knee osteoarthritis are higher for women than man. In other studies, the results showed that osteoarthritis in the female gender was greater as many as 57 people (90.67%) compared to 6 people (9.5%) for a man (Miftakuljannah dan Hartutik,2018). Then the data in others studies found that the Female gender total was 49 people (66.22%) and the male gender amounted to 25 people (33.78%). This shows that the incidence of osteoarthritis is more often in the woman than man (Kusuma, 2014). Then the data in others studies found that the Female gender total was 49 people (66.22%) and the Male gender amounted to 25 people (33.78%). This shows that the incidence of osteoarthritis is more often in the woman than man (O'Connor, *et al.* 2011). In addition the muscle mass around the knee of woman is less than men (Misnadiarly, 2010).

In the study of the correlation between body Mass index and the severity degree of knee osteoarthritis, it was found that there were 2 respondents with thin body Mass index category, there were one person suffering from knee osteoarthritis grade II, while the other person had knee osteoarthritis grade III. furthermore, it can be seen that the highest

patient body mass index is in the normal category where there are 24 respondents. There are 4 people suffering from the knee osteoarthritis grade I, there are 7 people suffering from the knee osteoarthritis grade II, there are 7 people suffering from the knee osteoarthritis grade III, while 6 others people suffering from the knee osteoarthritis grade IV. then of the 12 respondents with the obesity body mass index category, there were 6 people suffering from the knee osteoarthritis grade 1, 2 people suffering from the knee osteoarthritis grade II, 1 people suffering from the knee osteoarthritis grade III, while 3 other people suffering from the knee osteoarthritis grade IV. As for the 11 respondents with the body mass index category of severe obesity, there were 3 people suffering from the knee osteoarthritis grade I, 1 people suffering from the knee osteoarthritis grade II, 5 people suffering from the knee osteoarthritis grade III, and 2 other people suffering from the knee osteoarthritis grade IV.

Based on the results of the Spearman analysis test, a significance value ( $p$ ) of 0.578 was obtained, where the significance value ( $p$ )  $> 0.05$ , the analysis test showed that the contingency correlation coefficient was 0.081, it means the correlation between body mass index and the severity of the knee osteoarthritis from plain radiographs according to the Kellgren - Lawrence grading scale is very weak. From this without it can be concluded that there's no significant correlation between body mass index and the severity of the knee osteoarthritis from plain radiographs according to the Kellgren - Lawrence grading scale at Siti Khadijah Muhammadiyah Sepanjang Hospital. Things that can affect the severity degree of knee osteoarthritis very widely, these are several intrinsic dan extrinsic factors that can be involved. One of the intrinsic factors is genetic and hormonal

which can affect density, synovial fluid production, and the rate of bone regeneration. Extrinsic factors other than obesity that may affect is daily activity, exercise and History of injury to the knee can also affect the severity of osteoarthritis. Because of many activities that involve on movement of the knee joint, lack of exercise and have experienced injury to the knee can potentially make the worse condition of the knee joint that suffering from osteoarthritis.

The results of a study are consistent with previous research conducted in Surabaya by Lucas Widhiyanto, Andre Triadi Desnantyo, et.al., (2017) where the design use in that study is the same as the results of this study, the previous research used 30 people for sample, after analyzing the results of the Spearman test showed a significant value (p) of 0.822 where the significant value (p) > 0.05 which means that there is no correlation between body mass index and the severity degree of knee osteoarthritis. The study shows that the severity of knee osteoarthritis is not only influenced by body mass index by many other associated with another risk factors, such as hormonal factors, history of physical injury, physical activity, and the anatomical shape of the leg. Which they can affect the severity degree of knee osteoarthritis (Widhiyanto. Lukas, Triadi Desnantyo. Andre, *et al.* 2017). This is also supported by other studies conducted by Quddusi, Tilka Rahmatika et.al., 2021 showing that from 36 samples of knee osteoarthritis patients after univariate and bivariate analytical test, the result shows a likelihood ratio of 0.142 (p value > 0.05) was obtained. This shows that there is no correlation between body mass index and the severity degree of knee osteoarthritis based on plain radiographs according to the Kellgren - Lawrence grading scale.

## CONCLUSION

The distribution of research data, it was found that the most of respondents age category was around 46 – 55 years which is 25 respondents, the most gender of patient with knee osteoarthritis they were female amounting to 33 respondents, the body mass index of the most respondents was the normal category which is 24 respondents and the highest severity degree of knee osteoarthritis was category III with 14 respondents.

Significant correlation between body mass index and the severity degree of knee osteoarthritis from plain radiograph according to the Kellgren - Lawrence Grading Scale where the significance value ( $p$ ) is 0.578, where the significance value ( $p$ )  $> 0.05$ . So that  $H_0$  is accepted and  $H_1$  is rejected. From the value of the contingency correlation coefficient, it is obtained a value of 0.081, which means that the correlation between body mass index and the severity degree of knee osteoarthritis from plain radiograph according to the Kellgren - Lawrence grading scale is very weak.

In the future, clinicians need an educational approach to the patients aged  $> 50$  years, especially female patients who have entered menopause to better maintain healthy bones and joints by exercising frequently. Eating nutritious foods and controlling body mass index. Check the condition of the bones and joints frequently may help for decrease the incidence of osteoarthritis. For further researchers, there's hope for make a research can be carried away related to the other factors affect the severity degree of knee osteoarthritis from plain radiograph according to the Kellgren - Lawrence grading scale in the same place, at Siti Khodijah Muhammadiyah Sepanjang Hospital.

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