

Smoking Behaviour is a Protective Factor Against the Degree of Knee Osteoarthritis

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ABSTRACT

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Knee osteoarthritis is a chronic, progressive disease due to abnormalities in the structure of the knee joint which become hard and can cause limitations in movement. In general, osteoarthritis is most often caused by getting older. Efforts to prevent osteoarthritis are increasing because several studies have also compared the incidence of osteoarthritis with smoking behaviours. Smoking is a habit that is often carried out by Indonesians with a total of 1.1 billion smokers and Indonesia is ranked third behind China and India. The aim of this study was to determine the relationship between smoking behavior and the degree of osteoarthritis according to Kellgren - Lawrence at the Muhammadiyah Siti Khodijah Sidoarjo Hospital. The cross sectional research design is a quantitative research type. Sampling will use stratified sampling with 51 research samples. The sampling technique is using a questionnaire to determine indicators of smoking behavior in patients and radiology photos of the knee to determine the degree of knee osteoarthritis. Bivariate analysis using the Spearman test on the SPSS platform showed a p value of 0.000 ($p < 0.05$). These results indicate that there is a significant relationship between smoking behavior and the degree of osteoarthritis according to Kellgren - Lawrence. The conclusion of this research is that there is a relationship between smoking behavior and the degree of osteoarthritis according to Kellgren - Lawrence at the Muhammadiyah Siti Khodijah Hospital, Sidoarjo. The next suggestion is to find out with experimental research to see the key protective factors in knee osteoarthritis.

ABSTRAK

Osteoarthritis lutut adalah penyakit kronik progresif karena kelainan struktur sendi lutut yang menjadi keras sehingga dapat menyebabkan limitasi dalam bergerak. secara umum, osteoarthritis paling sering diakibatkan karena usia yang semakin tua. usaha untuk mencegah terjadinya osteoarthritis bertambah karena beberapa studi juga mengkomparasikan kejadian osteoarthritis dengan kebiasaan merokok. merokok adalah kebiasaan yang sering dilakukan oleh orang indonesia dengan total 1,1 milyar orang perokok dan indonesia peringkat tiga terbanyak dibawah cina dan india. Tujuan penelitian ini untuk mengetahui hubungan perilaku merokok dengan derajat osteoarthritis menurut Kellgren - lawrence di Rumah Sakit Muhammadiyah Siti Khodijah Sidoarjo. design penelitian cross sectional berjenis penelitian quantitative. Sampling akan menggunakan stratified sampling dengan 51 sample penelitian. teknis pengambilan sampel yaitu menggunakan kuisioner untuk mengetahui indikator perilaku merokok pada pasien dan foto radiologi lutut untuk mengetahui derajat dari osteoarthritis lutut.

analisis Bivariat menggunakan uji spearman pada platform SPSS menunjukan hasil p value 0,000 ($p < 0,05$). Hasil tersebut menunjukan adanya hubungan yang signifikan antara hubungan perilaku merokok terhadap derajat osteoarthritis menurut Kellgren - Lawrence. Kesimpulan dari penelitian ini adalah terdapat hubungan perilaku merokok terhadap derajat osteoarthritis menurut Kellgren - Lawrence di Rumah Sakit Muhammadiyah Siti Khodijah Sidoarjo. Saran selanjutnya wajib untuk dicari tahu dengan penelitian percobaan agar melihat faktor kunci protektif pada osteoarthritis lutut.



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A. INTRODUCTION

Osteoarthritis is a degenerative disease caused by changes in the structure of the cartilage in and around the joints. The mechanism that often occurs is the thinning of cartilage and the formation of new hard bone (Tjokropawiro & Et.al, 2015). The risk factor that often affects is the age factor which will affect changes in the composition of the cartilage structure due to the lack of nutrients that must be stored and excess body weight because cartilage has to bear more burden than the normal body. In addition to these risk factors, Osteoarthritis can also be influenced by gender, smoking, injury and race.

The prevalence of Osteoarthritis is still a problem that must be seriously considered because it gets the 5th position in the category of low and middle income countries in the cause of disability (Wittenauer et al., 2013). The prevalence of Osteoarthritis in Indonesia reaches 1-2 million elderly people and women aged 75 years and over have a percentage of 35% of existing cases (Setiati, Siti; et. al, 2014). In this research hospital, in 2019 Osteoarthritis had 6571 patients with the 3rd most disease after LBP and COPD.

The controversy that occurs is when there are many studies which state that smoking behavior has no relationship with Osteoarthritis with cross sectional methods and with radiological image analysis (Kang et al., 2016). However, one side has a different statement, namely smoking behavior has an influence on Osteoarthritis through the nicotine it contains (Cai et al., 2019; Teng et al., 2019). The controversy that occurred strongly supports the research because Indonesia is in the 3rd position in the number of active smokers. So it is very possible that this controversy is analyzed more deeply in this study. The aim of this research is to determine the relationship between smoking behavior and the degree of knee osteoarthritis according to Kellgren - Lawrence at Siti Khodijah Muhammadiyah Hospital, Sidoarjo.

B. METHODS

This research uses observational study analysis with stratified sampling techniques. The patient sample used was 51 patients who had been determined by the correlation coefficient formula. The inclusion criteria in this study were Osteoarthritis sufferers aged 45 years and over with a doctor's diagnosis and knee radiology photos with a period of January 2021 - December 2021.

Researchers used a questionnaire which would be delivered by telephone to the sample to determine the smoking behavior index and used x-ray photos of the knee to determine the degree of osteoarthritis according to Kellgren – Lawrence. The research variables used are the Kellgren Lawrence Osteoarthritis Grade 1 (small osteophytes), Grade 2 (Definite osteophytes, unimpaired joint space), Grade 3 (Osteophytes clear, space between joints narrow), Grade 4 (narrow joint space "kissing bone" and presence of sclerosis).

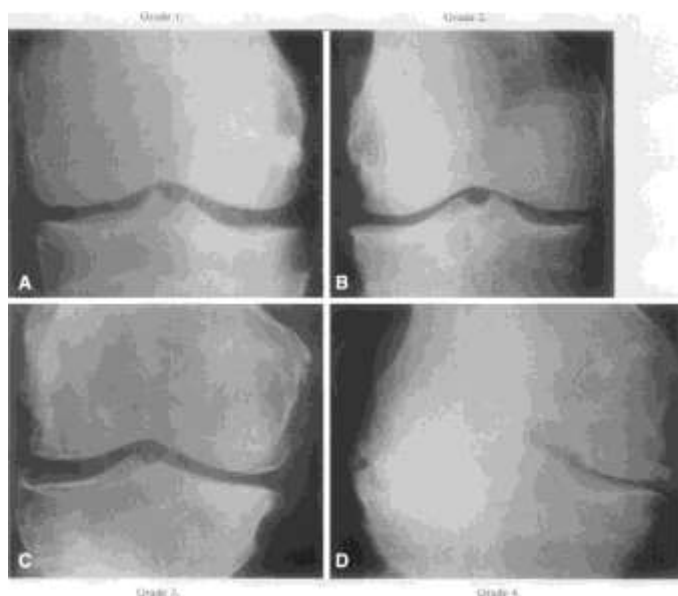


Figure 1. radiological appearance according to Kellgren Lawrence at grade 1 = A, grade 2 = B, grade 3 = C, and grade 4 = D ((Kohn et al., 2016).

The author's smoking behavior uses the Brinkmann index by calculate the average number of smokers per day per cigarette multiplied by the duration of smoking so that it can be accumulated into light smokers (0 – 199), moderate smokers (200 – 599), heavy smokers (>600) and non-smokers as a passive smoker variable(Baba et al., 2018). Variable data analysis will be tested using the Spearman test on the SPSS platform.

C. RESULT AND DISCUSSION

1. Result

The sample used was 51 osteoarthritis patients who had undergone knee radiology photos and adjusted to the variable requirements in the study at Siti Khodijah Muhammadiyah Sidoarjo Hospital by presenting several factors including age, gender, amount of smoking according to the Brinkman index, and degree of osteoarthritis according to Kellgren- Lawrence.

Table 1. Sample Distribution Based on Age

Age	Total	%
45 – 55 Years	18	35,3%
56 – 65 Years	20	39,2%
66 – 75 Years	10	19,6%
> 75 Years	3	5,9%

Based on the table above, a total of 51 patients were classified as aged 45 – 55 years, 56 – 65 years, 66 years – 75 years, and > 75 years. Based on the table above, those aged 56 - 65 years most often experience osteoarthritis with a total of 20 patients (39.2%), while the least number of patients are over the age of 75 years with a total of 3 patients (5.9%)

Table 2. Sample Distribution Based on Gender

Gender	Total	%
Man	23	45,1%
Women	28	54,9%

Based on the table above, the majority of osteoarthritis sufferers in this study were dominated by women with 28 patients (54.9%) from the 51 samples studied. Meanwhile, there were 23 men in this study (45.1%)

Table 3. Sample Distribution of Average Smoking according to the Brinkman Index per year among active smokers

Category Amount of Cigarettes	Total	%
Smoker	21	41,1%
Light Smoker	2	9,5%
Moderate Smoker	4	19,1%
Heavy Smoker	15	71,5%
No Smoke (Passive Smoker)	30	58,9%

Based on the table above, of the 21 Osteoarthritis patients who smoked, 15 patients (71.5%), 4 patients (19%) were in the moderate category, and 2 patients (9.5%) were in the mild category. Meanwhile, 30 patients (58.9%) did not smoke or passive smoke.

Table 4. Distribution of degrees of osteoarthritis according to Kellgren-Lawrence research sample

Grading OA	Total	%
Grade 1	23	45,1%
Grade 2	14	27,4%
Grade 3	13	25,5%
Grade 4	1	2%

Based on the table above, in the 51 samples from this study, it was found that 23 patients (45.1%) had Grade 1 Osteoarthritis. This value is the highest of several other Osteoarthritis degrees. The second most common was Grade 2 osteoarthritis in 14 patients (27.4%), then Grade 3 osteoarthritis in 13 patients (25.5%) and Grade 4 osteoarthritis in 1 patient (2%).

Table 5. Distribution of the relationship between respondent age and degree of osteoarthritis

Age	f	%
45 – 55 Years <i>Grade 1</i>	11	21,6%
45 – 55 Years <i>Grade 2</i>	5	9,8%
45 – 55 Years <i>Grade 3</i>	2	3,9%
45 – 55 Years <i>Grade 4</i>	0	0
56 – 65 Years <i>Grade 1</i>	6	11%
56 – 65 Years <i>Grade 2</i>	4	7,8%
56 – 65 Years <i>Grade 3</i>	9	17,6%
56 – 65 Years <i>grade 4</i>	0	0
66 – 75 Years <i>Grade 1</i>	4	7,8%
66 – 75 Years <i>Grade 2</i>	4	7,8%
66 – 75 Years <i>Grade 3</i>	3	5,9%
66 – 75 Years <i>Grade 4</i>	0	0
> 75 <i>Grade 1</i>	2	3,9%
> 75 <i>Grade 2</i>	0	0
> 75 <i>Grade 3</i>	0	0
> 75 <i>Grade 4</i>	1	2%

Based on the above data, ages 45 years - 55 years have a percentage of 21.6% with Grade 1 Osteoarthritis, which is the largest percentage compared to other age ranges, in second place is the 56 – 65 years age range with Grade Osteoarthritis. 3 with a percentage of 17.6%. Data on other ranges with other degrees of Osteoarthritis Grade are available in the table.

Table 6. Frequency distribution of the relationship between respondent gender and degree of osteoarthritis

Category	Total	%
Men <i>Grade 1</i>	15	29,4%
Men <i>Grade 2</i>	5	9,8%
Men <i>Grade 3</i>	0	0
Men <i>Grade 4</i>	1	2%
Woman <i>Grade 1</i>	8	15,7%
Woman <i>Grade 2</i>	9	17,6%
Woman <i>Grade 3</i>	13	25,5%
Woman <i>Grade 4</i>	0	0

Based on the table above, the first most common are men who experienced Osteoarthritis Grade 1 with a total of 15 patients (29.4%) and women who experienced Osteoarthritis Grade 3 with a total of 13 patients (25.2%). Other data regarding the frequency of each gender regarding the Degree of Osteoarthritis according to Kellgren-Lawrence is also recorded in the table

Table 7. Frequency distribution of the average number of cigarettes consumed per year by respondents on the degree of osteoarthritis

Category	Total	%
Mild <i>Grade 1</i>	2	9,52%

Mild Grade 2	0	0
Mild Grade 3	0	0
Mild Grade 4	0	0
Moderate Grade 1	2	9,52%
Moderate Grade 2	1	4,76%
Moderate Grade 3	0	0
Moderate Grade 4	1	4,76%
Heavy Grade 1	12	57,14%
Heavy Grade 2	3	14,29%
Heavy Grade 3	0	0
Heavy Grade 4	0	0

Based on the table above, 31 samples are active smokers. Most cases of osteoarthritis occurred in heavy smokers with osteoarthritis grade 1, 10 people (58.8%). Statistics on smokers with other classifications are also accompanied by associations with other degrees of Osteoarthritis in the table.

Tabel 8. Crosstabs Test and Spearman Test on the relationship between smoking behavior and the degree of Osteoarthritis according to Kellgren Lawrence

Smoke Behaviour											<i>p-value</i>
No Smoke		Mild		Moderate		Heavy		Total			
<i>Grade OA</i>	N	%	N	%	N	%	N	%	N	%	0,000
<i>Grade 1</i>	8	15,7%	2	3,9%	2	3,9%	11	21,6%	23	45,1%	
<i>Grade 2</i>	9	17,6%	0	0%	1	2%	4	7,8%	14	27,5%	
<i>Grade 3</i>	13	25,5,%	0	0%	0	0%	0	0%	13	25,5%	
<i>Grade 4</i>	0	0%	0	0%	1	2%	0	0%	1	2%	

This study contained 51 samples which were divided into 30 patients (58.8%) non-smokers, 2 patients (3.9%) light smokers, 4 patients moderate smokers (7.8%) and 15 patients heavy smokers (29.4%). Another divider is according to the grading of osteoarthritis suffered by the patient. as many as 23 patients (45.1%) suffered from Osteoarthritis Grade 1, 14 patients suffered from (27.5%) Osteoarthritis grade 2, 13 patients (25.5%) suffered from Osteoarthritis grade 3, and 1 patient (2%) suffered from osteoarthritis grade 4. Based on the Spearman Test results in SPSS analysis, it is known that the results show 0,000 means it is smaller than 5%. This value means that there is an Influence Relationship Smoking Behavior on the Degree of Osteoarthritis at Muhammadiyah Siti Khodijah Muhammadiyah Hospital Sidoarjo

2. Discussion

Analysis of Research Variables

Based on data regarding the prevalence of Osteoarthritis cases in Indonesia, with each increase in age from 40 years onwards, it is found that there is a 5% chance that they will continue to develop Osteoarthritis. In other words, Osteoarthritis can come more quickly

depending on how the person processes their own body in order to prevent various diseases from attacking. This is very relevant and sustainable, with one source stating that ages 45 - 59 years have a 36.2% chance of developing osteoarthritis at RSUP DR. Wahidin Sudirohusodo Makassar (Aiffa & Murtala, 2017; Siddik & Haryadi, 2020). Osteoarthritis also does not exclude other countries, in a study it was stated that in China aged 40 years also had a mild degree of osteoarthritis (Zhang et al., 2016). Data obtained from primary and secondary collection stated that the age was 56 years - 65 years with a total of 20 patients (39.2%). The results and literature obtained by researchers prove that it is true that age is one of the factors causing osteoarthritis to occur in some people with the age criteria mentioned above. Regarding gender characteristics, the data analysed by researchers found that more than half of the samples were women who had osteoarthritis (Jin et al., 2017; Maleki-Fischbach & Jordan, 2010; Xu et al., 2019). This study obtained a sample of 28 female patients and had a percentage of 54.9%. The research above is the basis that it is true that women have a greater likelihood of developing osteoarthritis than men. In terms of smoking, Indonesia is ranked 3rd with almost 1.1 billion people smoking in 2015 and this will continue to increase every year. Apart from that, the increase in cigarette users will clearly result in an increase in disease factors for each person (Siddik & Haryadi, 2020). This is consistent with what was found in this research of the 21 samples who smoked, there were 15 people who were categorized as heavy smokers because they consumed an average of more than 600 cigarettes per year with a percentage of 71.5%. The results obtained were quite far-reaching, so the researchers concluded that active smokers have a very large mass, perhaps even more than the results of this study.

Analysis of the Relationship between Smoking Behavior and Degree of Osteoarthritis according to Kellgren-Lawrence

To find out the relationship between smoking behaviour and the degree of Siti Khodijah Muhammadiyah Hospital Sidoarjo, an analysis was carried out using the SPSS platform using the Spearman test using several categories that have been determined by the author. Based on the results of the analysis using the Spearman test, it was found that the results obtained were a p-value of 0.000. This result is smaller than the significance level of 5% (0.050). These results mean that there is a significant relationship between smoking behaviour and the degree of osteoarthritis at Siti Khodijah Muhammadiyah Hospital Sidoarjo. So it can be interpreted that this research has a relationship with the basic value of Spearman. This study is in line with several previous studies, that there is a relationship between smoking behaviour and the degree of Osteoarthritis. The influence of smoking or not smoking is people who are exposed to nicotine and people who are not exposed to nicotine, so that the influence of nicotine in research on the relationship between smoking behaviour and Osteoarthritis disease plays an important role in the radiographic image of the knee X-ray (Kim & Lee, 2020). Smoking in its influence can have a positive and negative impact. Positive, where smoking can make Osteoarthritis sufferers feel a reduction in the symptoms they feel, so that these patients can live their lives almost as normal. It can be found in several sources that there is a role for nicotine in making the proliferation of

cartilage, so that these patients can be categorized as mild osteoarthritis(Cao et al., 2015; Elloumi & Kallel, 2007; Teng et al., 2019). The negative impact of smoking as an effect of Osteoarthritis is that it can trigger other diseases such as obesity to arise so that the disease can become a weight in the main disease experienced by these patients and the effect of the dose of nicotine given from cigarettes is not strong enough to be a protective factor against Osteoarthritis so that patients feel the same way as natural Osteoarthritis patients(Amin et al., 2007; Dipraja & Gunawan, 2020; Kang et al., 2016). But that does not mean that all possibilities of Osteoarthritis are caused by smoking, with a reasonable analogy that Osteoarthritis is most often caused by excess body weight due to the load carried or imposed on the knee in excess of the load limit. These activities are not always about being overweight but can also be caused by the habit of carrying heavy objects or objects(Setiati, Siti; et al. 2014). This activity triggers prolonged stress on the knee, more specifically the cartilage, so that the probability of osteoarthritis will be greater. Age also affects the likelihood of each individual experiencing Osteoarthritis due to the influence of changes in body regulation when an individual gets older(Sacitharan, 2019). The conclusion that can be obtained in this study is that there is a relationship in the form of protective factors from cigarettes that can protect or reduce the severity of Osteoarthritis. It can be seen from almost all of the heavy smokers who have a degree of Osteoarthritis 1, while the majority of people who do not smoke experience at most a degree of Osteoarthritis 3.

D. CONCLUSION AND SUGGESTIONS

Based on the data analysis carried out in this research, conclusions were obtained in the form of:

1. Characteristics of Osteoarthritis patients as respondents have the majority of aged 56 – 65 years with a total of 20 patients (39.5%). The most criteria for the degree of Osteoarthritis at the age of 45-55 years were 11 patients with Grade 1 of the total (21.6%)
2. Female sex with a total of 28 patients (54.9%), but the distribution of Osteoarthritis was the most in males as many as 15 patients with grade 1 of the total (29.4%)
3. Criteria for smoking behaviour most of the samples are heavy smokers with an average annual consumption of > 600 cigarettes as many as 15 patients (71.5%) of the total smoking. The highest degree of Osteoarthritis in smoking behaviour was with heavy smokers as many as 10 patients with Grade 1 (58.8%)
4. There is a relationship between smoking behaviour and the degree of Osteoarthritis according to Kellgren – Lawrence at Siti Khodijah Muhammadiyah Hospital Sidoarjo with a significance value (p) of 0.000, where a significance value (p) > 0.05.
5. The conclusion in this study supports several studies that smoking is a protective factor against the influence the degree of osteoarthritis.

It is hoped that this research will become the basis and foundation for starting further research and can also become a development of insight into Knee Osteoarthritis. Future researchers can also expand the variables studied and increase the number of samples in the research. It is hoped that future research will carry out a direct experimental study of

each component of cigarettes, especially nicotine, with the aim of finding the key factors that make smoking a protective factor in knee osteoarthritis. because as health workers, researchers cannot advise patients to smoke to prevent osteoarthritis because smoking can cause other dangerous health diseases.

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