Factors Associated with Cataract Occurrence at the Eye Polyclinic of FMC Hospital Bogor in 2019

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Abstract

The purpose of this study was to determine the factors associated with the incidence of cataracts at the Eye Polyclinic of FMC Hospital. The method used in this research is quantitative research with analytical descriptive. This research uses a cross sectional study approach. The population of this study were all patients who visited the Eye Polyclinic of FMC Hospital Bogor. The sampling method used in this research is purposive sampling. The sample in this study was determined based on the type of cross sectional research. The incidence of cataracts is 70.6%, age 45 years is 83.8%, gender is female, which is 60.3%, work in buildings is 58.8%, history of diabetes mellitus is 66.2% , smoking habits < 20 cigarettes / day that is 40.9%. The results of statistical tests using chi-square, it can be concluded that there is a relationship between age and the incidence of cataracts (p-value 0.01; OR 5.923). There was a significant relationship between gender and the incidence of cataracts (p-value 0.002; OR 6.282). There was no significant relationship between occupation and the incidence of cataracts (p-value 0.421; OR 0.600). There was a significant relationship between a history of diabetes mellitus and the incidence of cataracts (p-value 0.005; OR 5.045). There is no significant relationship between smoking and the incidence of cataracts (p-value 0.056; OR 0.337).

Keywords: Factors Associated, Cataract Occurrence, Woman, Man

Introduction

The eye is a tool for the sense of sight formed to receive stimuli, light rays on the retina by intermediary divert these stimuli to the center of vision in the brain, the part of the eye that functions to focus light stimuli on the retina is the lens.

Cataract is a condition in which the normally clear and clear lens of the eye becomes cloudy. Cataracts are generally a cloudy condition in the eye lens which is usually clear and transparent, the lens located behind the eyeball is refracting and focusing light on the retina or the retina on the yellow spot, if the lens becomes cloudy or light cannot be focused on the yellow spot properly so vision will become blurred, in this condition the relatively small cloudiness of the lens does not interfere much with vision, but if the level of cloudiness is thick it will interfere with vision.

Cataract is still the most dominant disease in the eye and is the main cause of

blindness worldwide. At least 50% of all blindness is caused by cataracts, and 90% of them are in developing countries, including Indonesia.

Blindness due to cataracts or clouding of the eye lens is a global health problem that must be addressed immediately, because blindness can lead to reduced quality of human resources and loss of productivity and requires large costs for treatment.

The etiology of cataracts is still unclear and is related to many factors. Meanwhile, several risk factors associated with cataracts include gender, diabetes mellitus (DM), exposure to ultraviolet light, smoking, and occupation.

The number of cataract sufferers is directly proportional to the number of elderly population. It is estimated that 12 people go blind every minute in the world. In Indonesia, it is estimated that every minute one person becomes blind. This number will double by 2020, this is related to the increased life expectancy.

Nationally, the 10 districts/cities with the highest prevalence of cataracts at age 30 years are North Sulawesi (3.7%), Jambi (2.8%), Bali (2.7%), Aceh (2.8%) , South Sulawesi (2.5%), Central Sulawesi (2.4%), Papua (2.4%), Central Java (2.4%), Riau (2.3%), and North Maluku (2, 3%). For Southeast Sulawesi alone, the prevalence of cataracts at the age of 30 years reached (1.8%).

The incidence of cataract itself can not be separated due to the existing risk factors. Factors causing cataracts themselves can come from within the body itself (intrinsic factors) and factors from outside the body (extrinsic factors). Intrinsic factors include age, gender, ethnicity and genetics. Extrinsic factors include chronic exposure to ultra violet, infrared or sunlight, smoking, nutrition, myopia, alcohol, socioeconomic status, educational status and multivitamins.

Based on a preliminary study conducted by the author at the Eye Polyclinic of FMC Hospital, Bogor in October 2018, data obtained from medical records showed that in 2015 there were 195 cases, in 2016 there were 276 cases, in 2017 there were 420 cases and in 2018 from January to In October, there were 448 cases of cataracts.

The purpose of this study was to determine the factors associated with the incidence of cataracts at the Eye Polyclinic of FMC Hospital.

Method

The method used in this research is quantitative research with analytical descriptive. This research uses a cross sectional study approach, which aims to determine the relationship between variables where the independent and dependent variables are identified in one unit of time. The population of this study were all patients who visited the Eye Polyclinic of FMC Hospital Bogor. The sample is part or representative of the population under study. The sampling method used in this research is purposive sampling. The sample in this study was determined based on the type of cross sectional research.

Results
Sample Characteristics

Table 1 Characteristics of Research Respondents at the Eye Polyclinic of FMC Hospital, Bogor

Variable	N	%
Dependent Variable :		
Cataract		
Cataract	48	70,6
No Cataract	20	29,4
Independent Variables:		
Age		
45 years	57	83,8
< 45 years old	11	16,2
Gender		
Woman	41	60,3
Man	27	39.7
Profession		
Outdoors	28	41,2

Variable	N	%
Inside the building	40	58,8
History of Diabetes Mellitus		
Diabetes mellitus	45	66,2
No Diabetes Mellitus	23	33,8
Smoke		
20 cigarettes per day	25	36,8
< 20 cigarettes per day	43	63,2
Total	68	100

Frequency Distribution of Respondents by Age

Table 2 Frequency Distribution of Respondents' Characteristics by Age at the Eye Polyclinic of FMC Hospital, Bogor

No.	Age	Frequency (Persons)	Percentage (%)
1.	45 years old	57	83,8
2.	< 45 years old	11	16,2
	Amount	68	100

In table 2 it can be seen that most of the respondents are aged 45 years, there are 57 respondents (83.8%) while the respondents aged <45 years are 11 respondents (16.2%).

Description of Respondents by Gender

Table 3 Frequency Distribution of Respondents' Characteristics by Gender at the Eye Polyclinic of FMC Hospital, Bogor

No.	Gender	Frequency (Persons)	Percentage (%)
1.	Woman	41	60,3
2.	Man	27	39,7
	Amount	68	100

In table 3 it can be seen that most of the respondents are female, the number is 41 respondents (60.3%) while the male respondents are 27 respondents (39.7%).

Description of Respondents by Occupation

Table 4 Frequency Distribution of Respondents' Characteristics Based on Occupation at the Eye Polyclinic of FMC Hospital, Bogor

No.	Profession	Frequency (Persons)	Percentage (%)
1.	Outdoors	28	41,2
2.	Inside the building	40	58,8
	Jumlah	68	100

In table 4 it can be seen that most of the respondents are working inside the building, the number is 40 respondents (58.8%) while the respondents who work outside the building are 28 respondents (41.2%).

Description of Respondents Based on History of Diabetes Mellitus

Table 5 Frequency Distribution of Respondents' Characteristics Based on History of Diabetes Mellitus at the Eye Polyclinic of FMC Hospital, Bogor

No.	History of Diabetes Mellitus	Frequency (Persons)	Percentage (%)
1.	Diabetes mellitus	45	66,2
2.	No Diabetes Mellitus	23	33,8
	Amount	68	100

Table 5 shows that most of the respondents had a history of diabetes mellitus, namely 45 respondents (66.2%) while respondents who did not have a history of diabetes mellitus were 23 respondents (33.8%).

Description of Respondents Based on Smoking Habits

Table 6 Frequency Distribution of Respondents' Characteristics Based on Smoking Habits at the Eye Polyclinic of FMC Hospital Bogor

No.	Smoke	Frequency (Persons)	Percentage (%)
1.	20 cigarettes/day	25	36,8
2.	<20 cigarettes/day	43	63,2
	Amount	68	100

In table 6, it can be seen that most of the respondents have the habit of smoking <20 cigarettes/day, the number is 43 respondents (63.2%) while the respondents who have the habit of smoking 20 cigarettes/day are 25 respondents (36.8%).

Research Results and Data Analysis

The Relationship of the Independent Variable (Age) with the Dependent Variable (Cataract Incidence)

Table 7 Relationship of Age with Cataract Incidence

Age	Have Cataracts				Total		p-Value	OR (95% CI)
	Cataract		No Cataract					
	N	%	N	%	N	%		
45 years old	44	77,2	13	22,8	57	100		5,923 1,497 – 23,437
< 45 years old	4	36,4	7	63,6	11	100		
Amount	48	70,6	20	29,4	68	100	0,01	

*Meaningful (P-value < 0.05 and OR 1)

From Table 7 above, it can be seen that the majority of respondents who experienced cataracts were aged 45 years, namely 44 respondents. The results of statistical tests using chi square showed (p-value 0.01; OR 5.923) which means that there is a significant relationship between age and cataracts and respondents aged 45 years have a 5.9 times risk of developing cataracts.

The Relationship of the Independent Variable (Gender) with the Dependent Variable (Cataract Incidence)

Table 8 Relationship of Sex with Cataract Incidence

Gender	Have Cataracts				Total		p-Value	OR (95% CI)
	Cataract		No Cataract					
	N	%	N	%	N	%		
Woman	35	85,4	6	14,6	41	100		
Man	13	48,1	14	51,9	27	100		6,282 1,991-19,617
Amount	48	70,6	20	29,4	68	100	0,002	

*Meaningful (P-value < 0.05 and OR 1)

Based on Table 8 above, it can be seen that most of the respondents who experienced cataracts were female, namely 35 respondents. The results of statistical tests using chi square showed (p-value 0.002; OR 6.282), which means that there is a significant relationship between gender and cataracts, and female respondents have a 6.28 times risk of developing cataracts.

The Relationship of the Independent Variable (Occupation) with the Dependent Variable (Cataract Incidence)

Table 9 Occupational Relationship with Cataract Incidence

Profession	Have Cataracts				Total		p-Value	OR (95% CI)
	Cataract		No Cataract					
	N	%	N	%	N	%		
Outdoors	18	64,3	10	35,7	28	100		0,600 0,209 – 1,721
Inside the building	30	75,0	10	25,0	40	100		
Amount	48	70,6	20	29,4	68	100	0,421	

*Meaningful (P-value < 0.05 and OR 1)

From Table 9 above, it can be seen that most of the respondents who work outside the building do not have cataracts. The results of statistical tests using chi square showed (p-value 0.42; OR 0.600) which means that there is no significant relationship between work and the incidence of cataracts.

The Relationship of the Independent Variable (History of Diabetes Mellitus) with the Dependent Variable (Cataract Incidence)

Table 10 Relationship History of Diabetes Mellitus with Cataract Incidence

History of Diabetes Mellitus	Have Cataracts				Total		p-Value	OR (95% CI)
	Cataract		No Cataract					
	N	%	N	%	N	%		

Diabetes mellitus	37	82,2	8	17,8	45	100		5,045
No Diabetes Mellitus	11	47,8	12	52,2	23	100		
Amount	48	70,6	20	29,4	68	100	0,005	1,647 – 15,456

*Meaningful (P-value < 0.05 and OR 1)

From Table 10 above, it can be seen that most of the respondents who experienced cataracts were respondents who had a history of diabetes mellitus. The results of statistical tests using chi square showed (p-value 0.05; OR 5.045) which means that there is a significant relationship between a history of diabetes mellitus and cataracts and respondents with a history of diabetes mellitus have a 5.04 times risk of developing cataracts.

The Relationship of the Independent Variable (Smoking) with the Dependent Variable (Cataract Incidence)

Table 11 Relationship of Smoking with Cataract Incidence

Smoke	Have Cataracts				Total		p-Value	OR (95% CI)
	Cataract		No Cataract					
	N	%	N	%	N	%		
20 cigarettes/day	14	56,0	11	44,0	25	100		0,337
<20 cigarettes/day	34	79,1	9	20,9	43	100		
Jumlah	48	70,6	20	29,4	68	100	0,056	0,115 – 0,991

*Meaningful (P-value < 0.05 and OR 1)

From Table 11 above, it can be seen that most of the respondents have a smoking habit of <20 cigarettes/day. The results of statistical tests using chi square showed (p-value 0.056; OR 0.337) which means that there is no significant relationship between smoking and cataracts.

Discussion
Overview of Cataract Events at FMC Hospital Bogor

From the results of the study on January 7, 2019 to February 5, 2019, the distribution of the frequency of cataract occurrence at FMC Bogor Hospital was 70.6% while those who did not have cataracts were 29.4%.

According to the theory, cataracts are clouding of the lens. Cataracts vary widely in density and can be caused by many things, but are usually associated with aging. Meanwhile, according to Ilyas (2008) Cataract is a condition where the eye lens which is usually clear and clear becomes cloudy. The origin of the word cataract is from the Greek word cataracta which means waterfall. This is because cataract patients seem to see something like a waterfall is covered in front of their eyes.

Relationship Between Age and Cataract

At FMC Hospital, Bogor, the age with cataract incidence was 45 years in 57 respondents with a percentage of 83.8%. The result of statistical test using chi-square is (p-value 0.01 OR 5.923) which means that there is a significant relationship between age and cataract incidence and age 45 years has a 5.92 times risk of developing cataracts.

According to Miranty Aditya H, et al's research (2016) with the title "Analysis of Risk Factors Associated with the Incidence of Synilic Cataract at Bahteramas General Hospital in 2016". The number of respondents from this study was 140 respondents consisting of 70 cases or cataract patients and 70 controls or non-cataract patients who had been diagnosed by an ophthalmologist and recorded in the medical record book. Respondents by age group in the most cases were at the age of 45 years as

many as 59 respondents (84.3%), then the age group <45 years as many as 11 respondents (15.7%). Meanwhile, in the control group, the majority were in the age group <45 years as many as 51 respondents (72.9%), then aged 45 years as many as 11 respondents (15.7%).

Sex Relationship with Cataract

At FMC Hospital, Bogor, the gender with cataract incidence was female in 41 respondents with a percentage of 60.3%. The results of statistical tests using chi-square are (p-value 0.002 OR 6.282), which means that there is a significant relationship between gender and the incidence of cataracts in women and has a risk of 6.28 times having cataracts.

According to Miranty Aditya H, et al's research (2016) with the title "Analysis of Risk Factors Associated with Senile Cataract Incidence at Bahteramas General Hospital in 2016". According to gender, the majority of cases were female as many as 38 people (54.3%), then male as many as 32 people (45.7%). The results of statistical tests show that the risk of developing cataracts for female respondents is 4.354 times greater than that of male respondents.

Occupational Relationship with Cataract

At FMC Hospital Bogor, the incidence of cataracts in those who work outside the building is 28 respondents with a percentage of 41.2% while those in the building are 40 respondents 58.8%. The result of statistical test using chi-square is (p-value 0.421 OR 0.600) which means that there is no significant relationship between work and cataracts.

According to research by Alfi Laila, et al (2017) "Analysis of Risk Factors for Cataract Occurrence in the Kendari Coastal Area" with a total of 62 respondents. The statistical test results obtained an Odd Ratios value of 2,908 (CI: 1,031 8,201) which indicates that there is a significant relationship between work and the incidence of cataracts and it can be concluded that respondents who work outside the building are at risk of cataracts by 2,908 times compared to those who work inside the building.

According to occupational theory, this is related to exposure to ultraviolet light, where UV light is a risk for cataracts. Ultraviolet rays from sunlight will be absorbed by lens proteins and then will cause photochemical reactions to form free radicals or oxygen species that are highly reactive. This reaction will affect the protein structure of the lens, which in turn causes cloudiness of the lens called cataract. In a study by Neale et al reported a strong positive association between work exposed to sunlight at the age between 20-29 years and nuclear cataracts. Exposure that occurs in the elderly has a weak relationship.

From the results of the study above, it can be concluded that there is no significant relationship between occupation and the incidence of cataracts in this study. Because most of the respondents' daily work is inside the building, which is 40 respondents out of a total of 68 respondents. So that the results of statistical test data processing using chi-square on the work variable, when compared with the results of other studies and compared with theory, the research on the work variable is not appropriate.

Relationship History of Diabetes Mellitus with Cataract

At FMC Hospital Bogor, there were 45 respondents with a history of diabetes mellitus with cataract incidence with a percentage of 66.2%. The result of statistical test using chi-square is (p-value 0.005 OR 5.045) which means that there is a significant relationship between a history of diabetes mellitus and the incidence of cataracts. Respondents with a history of diabetes mellitus have a 5.04 times risk of developing cataracts.

According to research Meisye S, et al (2015) with the title "Factors Associated with Cataract Incidence at the Community Eye Health Center (Bkmm) of North Sulawesi Province in 2014" an analysis of the relationship between diabetes mellitus and the incidence of cataracts shows that there is a relationship between diabetes mellitus with the incidence of cataracts in patients receiving eye treatment at the Community Eye Health Center (BKMM) of North Sulawesi Province. The results of statistical analysis using Chi-square obtained $p = 0.000$ with OR = 9.88 (95% CI = 4.45-21.91), it can be said that people with diabetes mellitus have 9.88 times risk of developing cataracts.

According to theory, cataracts are generally a problem for the elderly, but in people with Diabetes Mellitus who are not well controlled, cataracts can occur at a younger age. It is estimated that the process of cataracts in people with Diabetes Mellitus is the result of the accumulation of sugar metabolism substances by eye cells. Under normal blood sugar conditions, the buildup of these wastes does not occur. When blood sugar levels increase, the conversion of glucose by aldose reductase to sarbitol increases. In addition, the conversion of sarbitol to fructose is relatively long and unbalanced, the levels of sarbitol and the eye lens increase. It is hypothesized that sarbitol increases intracellular osmotic pressure with a consequent increase in water uptake and subsequently, directly or indirectly, cataracts are formed. The long-term clinical effect will result in the occurrence of cataracts in patients with diabetes mellitus compared to non-diabetic patients.

The Relationship of Smoking with Cataracts

In FMC Hospital Bogor, smoking with cataract incidence is 20 cigarettes/day 25 respondents with a percentage of 36.8%, while <20 cigarettes/day 43 respondents with a percentage of 63.2%. The results of statistical tests using chi-square (p-value 0.056 OR 0.337) which means that there is no significant relationship between smoking and the incidence of cataracts.

According to research by Alfi Laila, et al (2017) with the title "Analysis of Risk Factors for Cataract Occurrence in the Kendari Coastal Area" with a total of 62 respondents. Statistical test results obtained an Odd Ratios value of 1.816 (CI: 0.616-5.355) which indicates that there is no statistically significant relationship between smoking and the incidence of cataracts and it can be concluded that respondents who smoke have a risk of cataracts at 0.816 times compared to non-smokers but it is not significant statistically.

According to Miranty Aditya H, et al's research (2016) with the title "Analysis of Risk Factors Associated with Senile Cataract Incidence at Bahteramas General Hospital in 2016". The results of statistical tests show that the risk of developing cataracts for respondents who have a smoking habit is 2.771 times more at risk of developing cataracts than respondents who do not smoke at all. Thus it can be concluded that there is a relationship between smoking and the incidence of senile cataract.

According to the theory smoking and chewing tobacco can induce oxidative stress and are associated with decreased levels of antioxidants, ascorbate and carotenoids. Smoking causes a buildup of the pigmented molecule 3-hydroxyhymurinine and chromophores, which causes yellowing of the lens.

From the results of the study above, it can be concluded that smoking and the incidence of cataracts in this study did not have a significant relationship between smoking and the incidence of cataracts, because the majority of respondents were women where women rarely smoked. The majority of male respondents have a

smoking habit of <20 cigarettes/day. So that the results of statistical test data processing using chi-square on the smoking variable, when compared with the results of other studies and compared with theory, the research on the smoking variable is not appropriate.

Conclusion

The incidence of cataracts is 70.6%, age 45 years is 83.8%, gender is female, which is 60.3%, work in buildings is 58.8%, history of diabetes mellitus is 66.2% , smoking habits < 20 cigarettes / day that is 40.9%. The results of statistical tests using chi-square, it can be concluded that there is a relationship between age and the incidence of cataracts (p-value 0.01; OR 5.923). There was a significant relationship between gender and the incidence of cataracts (p-value 0.002; OR 6.282). There was no significant relationship between occupation and the incidence of cataracts (p-value 0.421; OR 0.600). There was a significant relationship between a history of diabetes mellitus and the incidence of cataracts (p-value 0.005; OR 5.045). There is no significant relationship between smoking and the incidence of cataracts (p-value 0.056; OR 0.337).

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