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Factors that Influence the Speed of Occurence of Senile Cataracts in South Sumatra

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ABSTRACT

Introduction. Cataracts are any condition of opacity in the lens that can occur due to the hydration (fluid addition) of the lens, the lens protein denaturation or the consequences of both. Factors that can affect the development rate of the opacity of the lens such as diabetes mellitus, hypertension, certain medications, the B ultraviolet rays from sunlight, toxic effects of smoking, alcohol, less vitamin E, and chronic inflammation in the eyeball.

Methods. The type of research is observational analytical with a *cross-sectional* design. This study was held in August to December in 2019 in Eye hospital in South Sumatra with sampling as many as 234 patients from the medical record. Data is processed using SPSS. The *Chi-square* test is conducted to determine the relationship of factors that affect the rate of senile cataract in Eye Hospital in South Sumatera Province.

Results. From 234 patients, as many as 177 patients (75.6%) with mature cataract and 57 patients (24.4%) with immature cataract. There is no meaningful relation between senile cataract and hypertension (p = 0,068; OR = 1,084; 95% CI = 0,589-1,995). There is no meaningful relation between senile cataract and diabetes mellitus (p = 1.808; OR = 1,876; 95% CI = 0,741-4,747). There is no meaningful relation between senile cataract and gender (p = 0.51; OR = 0,933; 95% CI = 0,514-1,696). There is no meaningful relation between the senile cataract and age (p = 0,784; OR = 1,319; 95% CI; 0,714-2,437).

Conclusion. There is no significant relationship between senile cataract occurence, hypertension, diabetes mellitus, gender and age.

Keywords. Cataract, diabetes mellitus, hypertension, ultraviolet rays, protein denaturation.

INTRODUCTION

A cataract is any condition of cloudiness in the lens that can occur due to hydration (addition of fluid) to the lens, denaturation of the lens protein or a result of both.[1] When the eye loses its clarity, the vision will be cloudy and can result in loss of sight. Cataracts usually occur bilaterally but have different rates in each eye. Can be caused by trauma or systemic events, such as diabetes. But most of them are a consequence of the normal ageing process.

Cataracts can occur at any age, depending on the trigger factor. Several factors are thought to affect the incidence of senile cataracts such as ageing, eye inflammation, eye trauma, diabetes mellitus, family history of cataracts, prolonged (oral) or specific other steroid use, eye surgery, smoking, exposure to a lot of ultraviolet light (sun).[2] Various factors can cause cataracts to appear more rapidly. Factors that can affect the speed at which lens cloudiness develops, such as diabetes mellitus, hypertension, certain drugs, ultraviolet B rays, the toxic effects of cigarettes, alcohol, lack of vitamin E, and chronic inflammation of the eyeball.

Unlike other blindness, blindness caused by cataract is the blindness that can be rehabilitated with surgery. According to WHO, therapy for cataracts is surgery and is very successful in restoring vision. To diagnose cataracts, there are several tests, such as a *slit lamp*. *Slit-lamp* assesses corneal thickness & corneal opacity, lens image, lens position, and integrity of zonular fibres, and a *shadow test* to determine cataract maturity. Senile cataracts are classified into four stages of lens opacity, namely incipient cataract stage, immature stage, mature stage and hyper mature stage.

The impact of cataracts is that sufferer can experience permanent blindness so that it can affect their daily activities. Signs and symptoms of cataracts are usually blurred vision, sensitive in capturing light so that what is seen is only a pseudo-circle and the longer it will look like a cloudy white spot in the centre of the lens, then this cataract sufferer will find it challenging to receive light to reach the retina and will produce a shadow blurred on the retina.[3]

Senile cataract is a clouding of the lens that occurs due to the degeneration process and usually begins to appear at the age of over 50 years.[4] In old age, there are often changes in the eye lens, such as an increase in lens mass and lens thickness and a decrease in accommodation capacity. This results in a higher incidence of cataracts in the elderly. Age is a risk factor for cataracts. Meanwhile, some risk factors associated with cataracts include gender, diabetes

mellitus (DM), hypertension, exposure to ultraviolet light, smoking, and work.[5] By knowing the factors that influence cataracts, it is hoped that it can increase prevention in reducing the incidence of cataracts.

METHODS

This type of research is an observational analytic study with a cross-sectional design. This research was conducted from August to December 2019 at the Eye Hospital of South Sumatra Province. Total sample on this study was 234 patients.

The data used in this study are secondary data obtained from medical records at the Eye hospital of South Sumatra Province from January to December 2018. The data will be processed using SPSS data processing software and analyzed with the *Chi-square* test to see the relationship between the variables studied.

RESULTS

Distribution Based on the classification of Senile Cataracts

The distribution based on the senile cataract classification was divided into two groups. Of the 234 subjects, 57 patients (24.4%) had immature senile cataracts and 177 patients (75.6%) had mature senile cataracts.

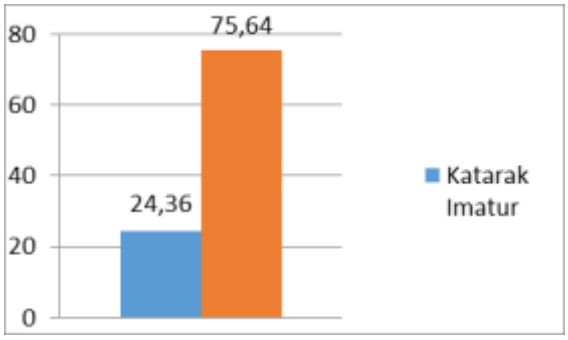


Figure 1. Distribution Based on Classification of Senile Cataracts (n = 234)

Distribution of Senile Cataracts by Age

The results of this study show that most data are in the age group above 60-year hospital, namely 151 people (64.53%) and those aged 40-60 years, namely 83 (35.47%). This is in line

with the definition of senile cataract, namely lens opacity that occurs due to degeneration and usually begins to appear at the age of over 50 years. Especially at the age of 60 years, almost 60% experience cataracts.

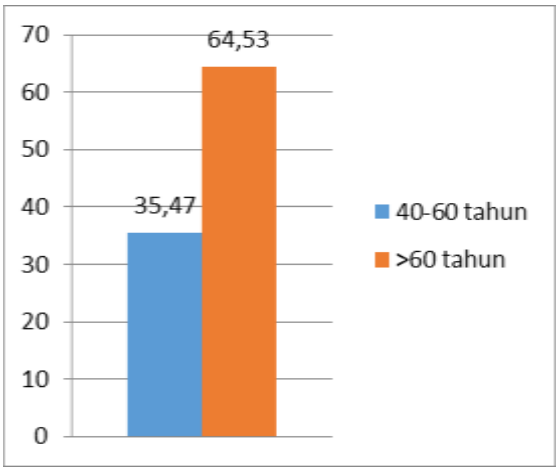


Figure 2. Distribution Based on Age Classification (n = 234)

Distribution of Senile Cataracts by Gender

It was found that the gender in this study were 118 women (50.4%) and 116 men (49.6%). This is in line with the results of a survey conducted by NHANES, the *Framingham Eye Study*, a study in Punjab showing that the prevalence in women is increasing.

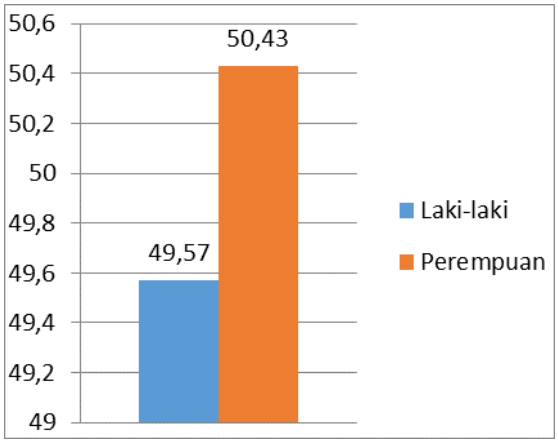


Figure 3. Distribution Based on Gender Classification (n = 234)

Distribution of Senile Cataracts Based on Hypertension

The results showed that there were 143 people with senile cataract with hypertension (61.11%) and 91 people without hypertension (38.89%). This is in line with the *Framingham*

Eye Study, where systolic blood pressure was significantly higher in cataract patients compared to non-cataracts with the subject of the same age and gender.

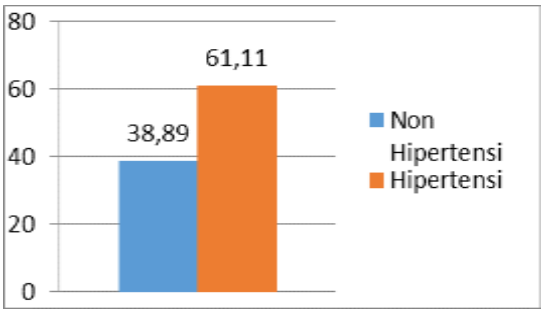
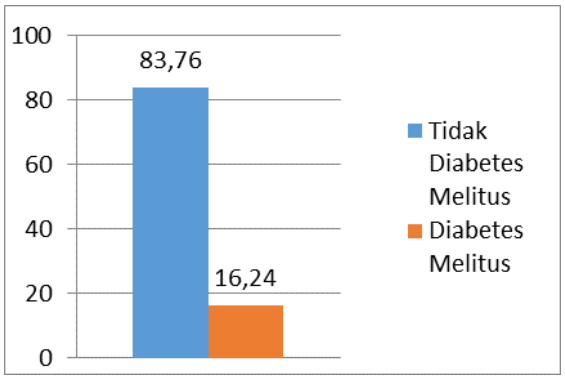


Figure 4. Distribution based on hypertension classification (n = 234)

Senile cataract distribution based on diabetes mellitus

Based on the results obtained, there were 38 patients with diabetes mellitus (16.24%) and 196 people without diabetes mellitus (83.76%).



Graph 5. Distribution Based on Classification History of Diabetes Mellitus (n = 234)

Relationship between senile cataract and age

The table below describes the relationship between senile cataracts and age. Complete data is presented in the following table.

Table 1. Senile cataract relationship based on age

Age	Senile cataract						P-Value	OR	95% CI
	Mature		Immature		Total				
	N	%	N	%	N	%			

40-60	60	72,3	23	27,7	83	100			
>60	117	77,5	34	22,5	151	100	0,468	1,319	0,712-2,437
Total	177	75,6	57	24,4	234	100			

In the table above, it is known that 60 samples suffer from mature senile cataract in patients aged 40-60 years (72.3%) and those aged > 60 years as many as 117 people (77.5%). Thus age > 60 years is more than the age of 40-60 years. Patients suffering from immature senile cataracts aged 40-60 years as many as 23 people (27.7%) and those aged > 60 years were 34 (22.5%). Thus juvenile senile cataract patients aged > 60 years were more than those aged 40-60 years. Based on the Chi-square test, it was found that p = 0.468 (p > α) and OR = 1.319 where there was no statistically significant relationship between senile cataracts and age.

Senile Cataract Relationship with Gender

The table below describes the relationship between the incidence of senile cataracts and gender. Complete data is presented in the following table.

Table 2. Senile cataract relationship based on gender

Gender	Senile cataract						P-Value	OR	95% CI
	Mature		Immature		Total				
	N	%	N	%	N	%			
Male	87	75	29	25	116	100			
Female	90	76,3	28	23,7	118	100	0,941	0,933	0,514-1,696
Total	177	75,6	57	24,4	234	100			

Based on the table above, it can be seen that the relationship between senile cataracts and gender (p = 0.941) and OR = 0.933 states that there is no significant relationship between senile cataracts and sex, the relationship between senile cataracts and gender is considered significant if p = 0.05. One hundred seventy-seven people had mature senile cataracts with a total of 87

men and 90 women, 57 people had immature senile cataracts, with 29 men and 28 women. The relationship between senile cataract and gender, $p = 0.941$ ($p > \alpha$) and OR = 0.933 states that there is no statistically significant relationship between senile cataract and gender.

Senile Cataract Relationship with Hypertension

The table below describes the relationship between senile cataracts and hypertension. Complete data is presented in the following table:

Table 3. Relationship of Senile Cataracts Based on Hypertension

Age	Senile Cataracts						P-Value	OR	95% CI
	Mature		Immature		Total				
	N	%	N	%	N	%			
Hypertension	109	76,2	34	23,8	143	100			
Not Hypertension	68	74,7	23	25,3	91	100	0,917	1,084	0,589-1,995
Total	177	75,6	57	24,4	234	100			

Based on the table above, it can be seen that 109 people with mature senile cataract with hypertension (76.2%) and those without hypertension were 68 people (74.7%), and 34 patients suffering from immature senile cataract with hypertension (23.8%) and those without hypertension were 23 people (25.3%).

The relationship between senile cataract and hypertension $p = 0.917$ ($p > \alpha$) and OR = 1.084 stated that there was a statistically insignificant relationship between senile cataract and hypertension. Study results for hypertension regarding the association with cataract prevalence are inconsistent.[6] The Blue Mountain Eye Study reports an association between blood pressure and undergoing cataract surgery.[7] The Los Angeles Latino Eye Study shows that systolic blood pressure is a separate risk factor for posterior subcapsular cataracts.[8] A variety of different antihypertensive drugs may be a determining factor in all of these observational investigations, and further prospective studies will be needed.[6]

Senile Cataract Relationship Based on Diabetes Mellitus

The table below describes the relationship between the incidence of senile cataracts and diabetes mellitus. Complete data is presented in the table below:

Table 4. Relation of Senile cataract based on diabetes mellitus

Age	Senile cataract						P-Value	OR	95% CI
	Mature		Immature		Total				
	N	%	N	%	N	%			
DM	32	84,4	6	15,8	38	100			
Not DM	145	74	51	26	196	100	0,255	1,876	0,741-4,747
Total	177	75,6	57	24,4	234	100			

Based on the table above, 32 patients with mature senile cataract with diabetes mellitus (84.2%) and 145 people without diabetes mellitus (74%), and 6simmaturee senile cataract patients with diabetes mellitus (15). 8%) and those without diabetes mellitus were 51 people (26%).

The relationship between senile cataract and diabetes mellitus p = 1.808 ($p > \alpha$) and OR = 1.876 stated that there was a statistically insignificant relationship between senile cataract and diabetes mellitus.

Diabetes was associated with a significantly higher risk for posterior nuclear and subcapsular cataracts.[6] In contrast to the AREDS study results, cortical cataracts were not significantly associated with diabetes in this study.[9] The Blue Mountains study confirmed diabetes as a risk factor for nuclear cataracts and impaired glucose levels. Fasting is considered a possible risk factor for cortical cataracts.[7]

Meanwhile, in this study, there was no statistically significant relationship between cataracts and diabetes. This may be due to the unknown type of cataract in the sample, which, according to some studies, only nuclear and subcapsular cataracts have an association with diabetes.

DISCUSSION

Several factors can influence the rate at which senile cataracts occur. Senile cataract is a clouding of the lens that occurs in old age. According to a study by Vashist et al., the highest prevalence of senile cataract occurs at > 60 years of age. In this study, 83 patients aged 40-60 years and > 60 years were 151 patients. According to the study of Manhas et al., Out of 72 patients, 72.22% had mature cataracts, and 27.78% had immature cataracts. According to Manhas et al., this is related to the maximum number of cataracts that occur at the age of > 60 years or elderly where at an advanced age, people will depend on their family if they want to get treatment, so if family members do not accompany them, so older adults have limitations for treatment.[11]

In several studies, there is a relationship between gender and senile cataracts. The results of a survey conducted by the NHANES, *Framingham Eye Study*, a study in Punjab showed that the prevalence in women is more increasing. This is related to reduced estrogen in postmenopause so that the protective effect of the lens is reduced. In this study, there were 118 women and 116 men with the incidence of more occurring in women than men. In this study, it was found that the *Chi-square* test p = 0.941, where there was no significant difference between the sexes of men and women.

Hypertension is one of the factors related to the rate at which senile cataracts occur. According to the *Framingham Eye Study*, systolic blood pressure is significantly higher in cataract patients compared to non-cataracts with subjects of the same age and sex. Hypertension stimulates changes in the conformational structure of proteins in the lens capsule, causing changes in membrane transport and ion permeability, leading to increased intraocular pressure and exacerbating cataracts. In this study, the *Chi-square* test p = 0.608 was obtained where there was no significant difference between senile cataracts and hypertension.

In several epidemiological studies and baseline studies, it was found a relationship between diabetes mellitus and senile cataracts. Although some studies suggest the relationship between senile cataracts and diabetes mellitus is still not fully understood. However, some theories say this is due to the formation of free radicals which lead to swelling of the lens fibres, and the lens becomes cloudy. The main risk factors are the long duration of diabetes and poor metabolic control. Diabetes is an established risk factor for cataracts. In this study, it was found that the Chi-square test p = 0.255, where there was no significant relationship between senile cataracts and diabetes mellitus. This may be due to the insufficient number of samples. Cataracts also occur in diabetes that is not well controlled

CONCLUSION

In this study, the following conclusions were obtained that there is no significant relationship between senile cataract and gender. There was no meaningful relationship between senile cataracts and age. There was no meaningful relationship between senile cataract and hypertension. There was no significant relationship between senile cataract and diabetes mellitus.

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