The Relationship between Hypertension History, Smoking Degree, and Ultraviolet (UV) Exposure to The Incidence of Seniilis Cataracts at Praya Regional General Hospital

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Abstract.

Background: Senile cataract is the leading cause of blindness and remains a significant public health problem, particularly among the elderly population. This condition is multifactorial and influenced by various risk factors, including a history of hypertension, smoking intensity, and exposure to ultraviolet (UV) radiation. This study aimed to analyze the association between a history of hypertension, smoking intensity, and ultraviolet (UV) radiation exposure with the occurrence of senile cataract at Praya Regional General Hospital. Methods: This study employed an analytical observational design with a cross-sectional approach. The study subjects consisted of patients with senile cataract and non-cataract patients who met the inclusion and exclusion criteria. Data were collected through interviews, questionnaires, and medical records. Statistical analysis was performed using the chi-square test and Fisher's exact test with a significance level of 0.05. Results: The characteristics of the respondents were predominantly female, with 44 individuals (53.7%), and the largest age group was 60–69 years, comprising 39 individuals (47.6%). In terms of occupation, most respondents were farmers, totaling 37 individuals (45.1%), followed by housewives with 30 individuals (36.6%). The analysis showed that a history of hypertension was significantly associated with the occurrence of senile cataract (p = 0.007). Meanwhile, smoking intensity (p = 0.316) and ultraviolet (UV) radiation exposure (p = 1.000) were not significantly associated with the occurrence of senile cataract. Conclusion: A history of hypertension is a risk factor associated with senile cataract, whereas smoking intensity and ultraviolet radiation exposure were not proven to have a significant association. Continuous screening and health education efforts are needed to control modifiable risk factors in order to reduce the incidence of senile cataract.

Keywords: Senile cataracts; hypertension; tuxedo and ultraviolet exposure.

I.   INTRODUCTION

Vision impairment is a significant global health problem and has a serious impact on human life. The prevalence of cataract cases in the world is 25.81%. Developing countries such as Indonesia, occupy the first position as the largest contributor of cataract cases in Southeast Asia. The highest cases of blindness due to cataracts in Indonesia are found in East Java Province (4.4%), followed by West Nusa Tenggara Province (4%) and South Sumatra Province (3.4%) (Hashemi et al., 2020; Ministry of Health of the Republic of Indonesia, 2018).According to the Ministry of Health of the Republic of Indonesia, this vision disorder is also still a major health problem in Indonesia. According to data from The International Agency for the Prevention of Blindness (IABP) in 2020, cataracts are the number two cause of vision impairment after refractive disorders and are the leading cause of blindness in the world. Based on the results of the Rapid Assessment of Avoidable Blindness (RAAB) survey by the Indonesian Association of Ophthalmologists (PERDAMI) and the Health Research and Development Agency (Balitbangkes), cataracts occupy the first position as the cause of blindness in Indonesia with a proportion of 81.2%. R&D and the Ministry of Health stated that the prevalence of blindness due to cataracts in Indonesia is 1.9% in the population over 50 years old (Bourne et al., 2021; Ministry of Health of the Republic of Indonesia, 2018, 2020; Praja et al., 2023). Based on research conducted in 2019, the number of cases of Cataract Senilis at the NTB Provincial Hospital was 192 cases out of a total of 272 cataract cases. This number exceeded 50% of the total cataract cases at the NTB Provincial Hospital in 2019.

In a study conducted by salsabila et al., in 2021, it was found that the prevalence of senilized cataracts at the NTB Provincial Hospital in the January-June 2019 period amounted to 192 patients (70.6%) and those who did not suffer from senilized cataracts were 80 patients (29.4%). Patients with senile cataracts consisted of 105 males (54.7%) and 87 females (45.3%). The age group of the late elderly (56-65 years) has the largest prevalence (45.3%), as well as patients who live in Mataram City (37.5%). The number of cataract incidents in NTB is 29,314 and is still growing according to the increase in the number and age of the population. The area with the highest incidence of senile cataracts in NTB is in East Lombok district, followed by Central Lombok, and West Lombok (Ministry of Health of the Republic of Indonesia, 2020; Indonesian Ophthalmologist Association (PERDAMI), 2023; C. I. Salsabila et al., 2021). Cataracts are of several types and can be grouped based on the age of their formation. One type of cataract that is commonly found in Indonesia and West Nusa Tenggara Province is senilis cataracts. Cataracts are cloudiness of the lens of the eye that results in blurred vision. This disease is characterized by a decrease in visual acuity, both unilateral and bilateral, depending on the affected eye. Senile cataracts are the most common type of cataract and are associated with degenerative processes. The cause of cataracts that occur in the age group of 50 years and older has not been known for sure until now. However, senile cataracts are a multifactorial disorder that can be linked to a variety of risk factors. One of the risk factors for the onset of cataracts is age.   Based on age, cataracts are differentiated into congenital cataracts, juvenile cataracts, presenile cataracts and senilic cataracts.

enilis cataracts are cataracts that appear after the age of 50 and are the most common cataract. Senilized cataract patients are estimated to account for 90% of all cataract cases (Hanis et al., 2021; Praja et al., 2023).Hypertension is the most common cardiovascular disorder and is a condition of serious health problems. The WHO also mentions that about 1.28 million people aged 30-79 years suffer from hypertension, and generally live in lower-middle-income countries. Hypertension can significantly increase the risk of abnormalities in various organs, including the eyes. In the association between hypertension and cataracts, high blood pressure in people over 40 years of age is 1.49 times more likely to suffer from cataracts than people with normal blood pressure (Hasriani et al., 2020).The increase in the incidence of senile cataracts is significantly influenced by highly modifiable risk factors, namely active smoking. Based on the findings of the Ministry of Health on the results of the Global Adult Tobacco Survey (GATS), there was an increase in the number of adult smokers from 2011 to 2021 by 8.8 million people. Epidemiological data related to the relationship between smoking habits and the incidence of senile cataracts were consistently stated and there was an increased risk of senile cataracts both in current active smokers and people who had smoked and had stopped compared to non-smokers. Smokers who smoke 20 cigarettes a day are twice as likely to suffer from cataracts (Detri et al., 2019; Yuan et al., 2022).Exposure to Ultraviolet (UV) rays is also one of the important risk factors for the occurrence of senile cataracts. Each individual's work is a benchmark for the duration of UV exposure.

According to data from the Central Statistics Agency (BPS) in February 2022, the employment of the Indonesian population is dominated by the agricultural sector with a proportion of 29.96%. This agricultural sector is associated with a long duration and high amount of UV exposure over a long period of time. Irawan et al. in their study stated that senilis cataracts with higher maturity tend to occur in outdoor workers who are exposed to excessive sunlight compared to indoor workers who are not exposed to sunlight for a long period of time (Irawan et al., 2022).Various studies show that a history of hypertension, smoking habits, and exposure to ultraviolet (UV) rays are risk factors associated with the incidence of senilis cataracts. Research at Dr. M. Djamil Padang Hospital reported that hypertension increased the risk by almost tenfold (OR=9.94; p=0.000), while smoking increased the risk by 3.75 times (p=0.006). A study in Jakarta found that smoking duration >20 years and sun exposure >7 hours/day significantly increased the risk of senile cataracts (OR=7.25). Other studies in Jember and Makassar also confirmed a significant association between smoking, hypertension, and sun exposure with senile cataracts (Christine et al., 2020; Harun et al., 2020; Rohmah, 2024).The research gap is still unanswered.

First, most of the research was conducted outside the Lombok region, while local data, especially in Central Lombok Regency, NTB, was not yet available. Second, some studies only distinguish between

"smokers" and "non-smokers", whereas measuring smoking degrees with the Brinkman Index can provide a more accurate picture of the relationship between dose and cataracts. Third, UV exposure measurements often still use the category of occupational type, not the duration of daily exposure quantitatively, so the risk of UV exposure in the local population has not been clearly depicted. In addition, previous studies have tended to assess risk factors separately, while analysis of the interactions between hypertension, smoking degrees, and UV exposure has been rare. Thus, this study is important to fill the local data gap and provide new scientific evidence regarding the relationship between hypertension history, smoking degree, and UV exposure with the incidence of senilis cataracts at Praya Hospital, Central Lombok, NTB (Irawan et al., 2022; Lumunon & Kartadinata, 2020; Martyana, 2024).

II.   METHODS

This study is a quantitative research with an analytical observational approach using a cross-sectional design. The research was conducted at the Praya Regional General Hospital (RSUD) in the period from September to December 2025. The study population included all patients who visited the Eye Polyclinic of Praya Hospital during the study period. The sample size was determined using the Slovin formula with an error rate of 10%, based on a total population of 448 patients, so that a minimum sample number of 82 respondents was obtained. The sampling technique used is consecutive sampling, where all patients who meet the inclusion criteria and are not included in the exclusion criteria are recruited sequentially until the number of samples is met.The inclusion criteria in this study include patients aged ≥50 years who come to the Eye Polyclinic of Praya Hospital with complaints of eye disturbances and/or decreased vision function and are willing to participate by signing an informed consent sheet. The exclusion criteria include patients with non-senilized cataracts (as a result of trauma, congenital, or long-term steroid use), patients with diabetes mellitus, patients with optic nerve disorders such as glaucoma, ischemic optic neuropathy, optic neuritis, or papiledema, as well as patients who refuse to participate in the study.The dependent variable in this study was the incidence of senile cataracts, which is defined as lens cloudiness due to degenerative processes in old age and is established based on the ophthalmologist's diagnosis recorded in the medical record. Independent variables included a history of hypertension, degree of smoking, and exposure to ultraviolet light.

History of hypertension is determined based on previous medical diagnosis or regular use of antihypertensive medications. The degree of smoking was measured using the Brinkman Index, while exposure to ultraviolet light was assessed based on the duration and intensity of outdoor activities through a questionnaire adapted from the Sun Exposure Survey.The research instruments used included informed consent sheets, structured questionnaires, patient medical records, and supporting devices in the form of stationery, laptops, and cameras or mobile phones for documentation. The data obtained were analyzed univariate and bivariate. Univariate analysis was used to describe the frequency distribution of each study variable, while bivariate analysis was performed to assess the relationship between independent variables and senile cataract incidence using the Chi-square test or Fisher's Exact test, with a confidence level of 95% and a significance value set at $\alpha = 0.05$.This research has considered the principles of research ethics by obtaining approval from the Ethics Commission of the Faculty of Medicine, Al-Azhar University. All respondents were given an explanation of the objectives and procedures of the research before giving written consent. The confidentiality of the respondent's identity is maintained by not including names on the research instrument, and all data obtained is guaranteed confidentiality and is used only for academic purposes.

III.   RESULT AND DISCUSSION
Research Results

This research was carried out at the eye polyclinic of the Praya Regional General Hospital in November-December 2025. This study aims to analyze the relationship between hypertension history, smoking degree, and exposure to ultraviolet (UV) rays with the incidence of senile cataracts at Praya Regional General Hospital. This study is an *analytical observational* research with a cross sectional research design. The sampling technique used is *consecutive sampling,* which is a sample determination technique by

taking all subjects that meet the inclusion criteria in order until the number of samples is met. The sample size used was 82 respondents.The research data that has been collected is analyzed univariate and bivariate with the help of *computer software*, namely *the Statistical Package for the Social Sciences* (SPSS) version 22. The bivariate analysis used was the chi-square analysis test and the fisher exact test.

Analysis of respondent characteristics

Table 1. Respondent Characteristics

Variable	Amount(s)	Present(%)
Gender		
Male	38	46,3
Women	44	53,7
Age		
50-59	26	31,7
60-69	39	47,6
70-79	13	15,9
80-85	4	4,9
Jobs		
Farmer	37	45,1
PNS	5	6,1
Retirees	10	12,2
IRT	30	36,6
Total	**82**	**100,0**

Based on Table 1. The number of respondents in this study was 82 polyophthalmic patients at the Praya Regional General Hospital. Based on gender, female respondents were more than men, namely 44 people (53.7%), while male respondents amounted to 38 people (46.3%). This shows that most of the respondents in this study are women. Based on age group, the most respondents were in the age range of 60-69 years, which was 39 people (47.6%). Furthermore, the age group of 50-59 years amounted to 26 people (31.7%), the age group of 70-79 years was 13 people (15.9%), and the age group of 80-85 years was the least, namely 2 people (4.9%). Based on occupation, most of the respondents worked as farmers, namely 37 people (45.1%). Respondents with the status of housewives (IRT) amounted to 30 people (36.6%), followed by retirees as many as 10 people (12.2%), and civil servants were the group with the least number, namely 5 people (6.1%).

Univariate Analysis

Table 2. Distribution of frequency of hypotension history, degree of smoking, and exposure to ultraviolet (UV) light

Variable	Quantity (n)	Present (%)
History of Hypertension		
Yes	60	73,2
No	22	26,8
Degree of Smoking		
No smoking	54	65,9
Lightweight (1-199)	2	2,4
Medium (200-599)	17	20,7
Weight (≥ 600)	9	11,0
Ultraviolet (UV) Exposure		
Lightweight	34	41,5
Medium	26	31,7
Weight	22	26,8
Total	**82**	**100,0**

Based on Table 2, out of 82 respondents, 60 (73.2%) respondents had a history of hypertension, while 22 (26.8%) respondents had no history of hypertension. Based on smoking status, 54 (65.9%) respondents did not smoke, 2 (2.4%) respondents included light smokers (1–199), 17 (20.7%) respondents included moderate smokers (200–599), and 9 (11.0%) respondents included heavy smokers (≥600). Furthermore, based on exposure to ultraviolet (UV) rays, 34 (41.5%) respondents had mild ultraviolet (UV)

exposure, 26 (31.7%) respondents had moderate exposure to ultraviolet (UV) rays, and 22 (26.8%) respondents had severe ultraviolet (UV) exposure.

Bivariate Analysis

Table 1. Bivariate analysis of the history of hypertension with the incidence of senile cataracts

Variable	Senilized Cataracts		No Cataracts Synilis		Total		*p-value*	PR	95%CI
	n	**%**	**n**	**%**	**n**	**%**			
History of Hypertension									
Yes	56	78,9	4	36,4	60	73,2	0,007	1,369	1,021-
No	15	21,1	7	63,6	22	26,8			1,836
Total	71	100	11	13,4	82	100,0			

Based on Table 4.3, it is known that of all respondents who experienced senile cataracts (n=71), as many as 56 people (78.9%) had a history of hypertension, while 15 people (21.1%) had no history of hypertension. Meanwhile, in the group of respondents who did not experience senile cataracts (n=11), most had no history of hypertension, namely 7 people (63.6%), while 4 people (36.4%) had a history of hypertension.The results of the statistical test showed a p-value = 0.007 (p < 0.05) which means that there is a significant relationship between the history of hypertension and the incidence of senilized cataracts. The Prevalence Ratio (PR) value was 1.37 with a 95% *Confidence Interval* (CI) of 1.02–1.84, indicating that respondents with a history of hypertension had a 1.37 times greater risk of developing senile cataracts compared to respondents with no history of hypertension.

Table *Error! No text of specified style in document.*. Bivariate analysis of the degree of smoking with the incidence of senile cataracts

Variable	Senilized Cataracts		No Cataracts Synilis		Total		*p-value*	PR	95%CI
	n	**%**	**n**	**%**	**n**	**%**			
Degree of Smoking									
Smoking (mild, moderate, severe)	26	36,6	2	18,2	28	34,1	0,316	0,897	0,767-1,050
No Smoking	45	63,4	9	81,8	54	65,9			
Total	71	100	11	100	82	100,0			

Based on Table 4.4, it is known that of all respondents who experienced senile cataracts (n=71), most of them did not smoke, namely 45 people (63.4%), while respondents who smoked (mild, moderate, severe) as many as 26 people (36.6%). Meanwhile, in the group of respondents who did not experience senile cataracts (n=11), most of them also did not smoke, namely 9 people (81.8%), and those who smoked as many as 2 people (18.2%).The results of the statistical test showed a p-value = 0.316 (p > 0.05) which means that there was no significant relationship between the degree of smoking and the incidence of senile cataracts. The Prevalence Ratio (PR) value was 0.897 with a 95% *Confidence Interval* (CI) of 0.767–1.050, indicating that respondents who smoked had about the same risk of developing senile cataracts compared to non-smoking respondents.

Table 2. Bivariate analysis of ultraviolet (UV) exposure with the incidence of senile cataracts

Variable	Senilized Cataracts		No Cataracts Synilis		Total		*p-value*	PR	95%CI
	n	**%**	**n**	**%**	**n**	**%**			
Ultraviolet Exposure									
Medium-Heavy	42	59,2	6	59,2	48	58,5	1,000	1,026	0,861-1,223
Lightweight	29	40,8	5	40,8	34	41,5			
Total	71	100	11	100	82	100,0			

Based on Table 5, of all respondents who experienced senilis cataracts (n = 71), most had exposure to moderate-severe ultraviolet rays, namely 42 people (59.2%), while respondents with mild exposure were 29 people (40.8%). Meanwhile, in the group of respondents who did not experience senile cataracts (n = 11), the proportion of respondents with exposure to moderate-severe ultraviolet light was 6 people (59.2%), and respondents with mild exposure were 5 people (40.8%).The results of the statistical test showed *a p-value =* 1,000 (p > 0.05) which means that there was no significant relationship between exposure to ultraviolet light and the incidence of senile cataracts. The *Prevalence Ratio* (PR) value was 1.026 with *a 95% Confidence Interval* (CI) of 0.861–1.223, indicating that respondents exposed to moderate-to-severe ultraviolet light had

almost the same risk of developing senile cataracts compared to respondents with mild ultraviolet light exposure.

Discussion

Relationship between the history of hypertension and the incidence of senile cataracts

Based on the results of the bivariate analysis in the table, it is shown that there is a significant relationship between the history of hypertension and the incidence of senile cataracts. Respondents with a history of hypertension mostly experienced senile cataracts, namely of all respondents who experienced senile cataracts (n=71), as many as 56 people (78.9%) had a history of hypertension, while 15 people (21.1%) had no history of hypertension. Meanwhile, in the group of respondents who did not experience senile cataracts (n=11), most had no history of hypertension, namely 7 people (63.6%), while 4 people (36.4%) had a history of hypertension. The statistical test yielded a p-value of 0.007 (p < 0.05), which showed a significant relationship between the two variables. A Prevalence Ratio (PR) value of 1.369 with a 95% *Confidence Interval* (CI) of 1.021–1.836 indicates that respondents with a history of hypertension have a 1.37 times greater risk of developing senile cataracts compared to respondents without a history of hypertension. The confidence *interval* range that does not exceed 1 indicates that hypertension is a risk factor for the occurrence of senile cataracts.The results of this study in line with research Praja et al. (2023) who reported a significant association between the history of hypertension and the incidence of senile cataracts (p < 0.05). The study showed that a history of hypertension had a significant relationship with the incidence of senile cataracts, with a p value of <0.001 and *odds ratio* (OR) of 9.94. These findings indicate that hypertension is an important risk factor for the occurrence of senilized cataracts, which are thought to be through vascular and metabolic changes in the lens of the eye.

Similar findings were also obtained in the study *Case-control* at PKU Muhammadiyah Gamping Hospital by Setyandriana & Indrani (2024) showed a significant relationship between the history of hypertension and the incidence of cataracts, with a p value of < 0.05. Analysis using tests *Chi-Square* obtained a significance value of p = 0.000, which indicates a significant correlation between the two variables. Based on the results of the study, it was concluded that a history of hypertension contributes to an increased risk of cataracts. Population-based research by Hasriani et al. (2020) in visual impairment screening participants in West Nusa Tenggara Province reported a significant association between hypertension and cataract incidence (p = 0.0001). The results of the analysis show the value of *prevalence ratio (*PR) of 1.49 (95% CI: 1.24–1.81), meaning that respondents with a history of hypertension had a 1.49 times higher risk of developing cataracts compared to respondents without a history of hypertension.Research conducted by Putri Setia et al. (2023) which states that hypertension is one of the main risk factors for cataracts. The study explains that high blood pressure in the long term can cause oxidative stress and nutritional disturbances in the lens of the eye, thereby accelerating the process of lens cloudiness. Research by Pasaribu et al. (2025) in the coastal area of Kedung Cowek, Surabaya, showed that out of 12 respondents with a history of hypertension, as many as 8 people (66.7%) had eye disorders, with cataracts as the most finding of 5 cases (41.7%).

These results show that cataracts are the dominant eye disorder in hypertensive patients. The researchers concluded that hypertension can accelerate the formation of cataracts through oxidative stress mechanisms and disruption of lens microcirculation, which is aggravated by exposure to high ultraviolet rays in coastal areas.The development of cataracts in individuals suffering from hypertension is associated with increased inflammatory markers and impaired ion transport in lens epithelial cells. Hypertension can increase levels of inflammatory cytokines such as tumor necrosis factor-alpha (TNF-α) and interleukin-6 (IL-6), as well as increase levels of C-reactive protein (CRP), which indicates systemic inflammation. This condition contributes to chronic inflammatory processes that are known to play a role in the formation of cataracts. In addition, hypertension can increase the number of free radicals that can trigger oxidative stress. In this state, the supply of antioxidants and vitamins that act as protectors of the eye tissue will not be sufficient to protect the lens of the eye from further oxidative modification. This contributes to the formation of cataracts (Jaaz & Al-Nasrawi, 2024; Praja et al., 2023).

The relationship between smoking degree and the incidence of senile cataracts

Based on the results of the bivariate analysis in Table 4.4, it is shown that there is no significant relationship between the degree of smoking and the incidence of senile cataracts. Of all respondents who experienced senile cataracts (n=71), most did not smoke, namely 45 people (63.4%), while 26 respondents smoked (mild, moderate, severe) (36.6%). Meanwhile, in the group of respondents who did not experience senile cataracts (n=11), most of them also did not smoke, namely 9 people (81.8%), and those who smoked as many as 2 people (18.2%). Statistical tests using chi-square yielded a p-value of 0.316 (p > 0.05) with a Prevalence Ratio (PR) of 0.897 and a 95% *Confidence Interval* (CI) of 0.767–1.050, indicating that there is no statistically significant relationship between the degree of smoking and the incidence of senile cataracts. This indicates that the variation in the degree of smoking in the respondents of this study did not have a meaningful effect on the incidence of senile cataracts.The results of this study are in line with the research conducted at the Eye Polytechnic of Drs. H. Abu Hanifah Hospital in 2022 by Royani et al. (2024). The study reported that of the 55 respondents who experienced cataracts, as many as 20 people (66.7%) had a smoking habit, more than the respondents who did not smoke.

However, the results of the statistical test using Chi-square showed a value of p = 0.645 (p > 0.05), which means that there was no significant relationship between smoking habits and the incidence of cataracts in the elderly. Further analysis in the study also showed the value of Prevalence *Odds Ratio* (POR) of 0.632 with 95% *Confidence Interval* (CI) 0.192–2.078. This value indicates that respondents who smoke do not have a significantly higher risk of developing cataracts compared to respondents who do not smoke, due to the range of *Confidence interval* passing the number 1 and the association value is statistically insignificant.Inversely proportional to the research conducted at the Cataract and Refractive Surgery Clinic of Cicendo Eye Hospital Bandung by Muliani et al. (2020) showed a meaningful relationship between the level of smoking habit and the stage or severity of senilis cataracts. Statistical test results using *Chi-square* It yielded a value of p = 0.000 (p < 0.05), which indicates that there is a significant relationship between smoking levels and cataract severity. These findings indicate that the higher the level of smoking habit, the more severe the cataract stage the patient experienced.The results of the research conducted by Praja et al. (2023) at Dr. M. Djamil Padang Hospital also showed a significant relationship between smoking habits and the incidence of senilis cataracts. Statistical test results using *Chi-square* A value of p = 0.006 (p < 0.05), which suggests that there is a significant relationship between smoking habits and cataract incidence. Value *Odds Ratio* (OR) of 3.75 indicates that individuals with smoking habits have about 3.7 times higher risk of suffering from cataracts compared to non-smoking individuals.

The difference between the results of this study and previous research can be influenced by the characteristics of respondents based on gender, where most of the respondents in this study are women. In general, the prevalence of smoking habits in women is lower than in men, both in terms of frequency, duration, and number of cigarette consumption per day. This condition causes the distribution of smoking degrees to be uneven and the number of respondents in the smoker category is relatively small. The hormone estrogen in women can affect the formation of cataracts. Ovarian hormones increase radiation-induced cataracts. The main endogenous estrogen, ß-estradiol has mitogenic and anti-oxidative effects on physiological concentrations, while pharmacological levels induce oxidative stress and act proapoptosis in the lens. Experimental hormone supplements show that estrogen is responsible for the formation of cataracts (Damayanti & Christina, 2023).The large number of female patients compared to male patients is suspected to be due to the role of the hormone estrogen due to a sudden decrease in hormonal activity in women, while in men estrogen levels in the body do not change as in women. Estrogen hormone imbalance in postmenopausal women will decrease the protection of the lens against the formation of cataracts, because the hormone estrogen has an antioxidant role in the epithelial cells of the lens (Izzuddin et al., 2022).In addition to the characteristics of the respondents and the low number of active smokers, this study also has limitations because it does not measure exposure to cigarette smoke passively (passive smokers).

Exposure to secondhand smoke in non-smokers can cause a number of toxic effects through mechanisms similar to active smoking, including increased oxidative stress and exposure to free radicals that have the potential to affect the tissues of the eye as well as the lens of the eye that ultimately contribute to the formation of cataracts. Although the risk of cataracts for passive smokers is not as clear as the evidence for active smokers, the World Health Organization (WHO) states that people who live with smokers have an increased risk of eye conditions and vision impairments and that the majority of these smoke exposures contain thousands of harmful compounds that can damage body tissues including the eyes (World Health Organization, 2022).

The relationship between UV exposure and the incidence of senile cataracts

Based on the results of the bivariate analysis in Table 4.5, it shows that there is no significant relationship between exposure to ultraviolet (UV) rays and the incidence of senilized cataracts. Of all respondents who experienced senile cataracts (n = 71), most had exposure to moderate-severe ultraviolet rays, namely 42 people (59.2%), while respondents with mild exposure were 29 people (40.8%). Meanwhile, in the group of respondents who did not experience senile cataracts (n = 11), the proportion of respondents with exposure to moderate-severe ultraviolet light was 6 people (59.2%), and respondents with mild exposure were 5 people (40.8%). The results of the statistical test showed a *p-value* = 1,000 (p > 0.05) which means that there was no significant relationship between exposure to ultraviolet light and the incidence of senile cataracts. The *Prevalence Ratio* (PR) value was 1.026 with *a 95% Confidence Interval* (CI) of 0.861–1.223, indicating that respondents exposed to moderate-to-severe ultraviolet light had almost the same risk of developing senile cataracts compared to respondents with mild ultraviolet light exposure. The results of the research are in line with the research conducted at the Lampung Eye Center Eye Hospital by Salsabila (2024). Exposure to ultraviolet light had no meaningful association with the incidence of senile cataracts. This is indicated by the value *p-value* 0.057 (p > 0.05), so that statistically there was no statistically significant relationship between exposure to ultraviolet light and the incidence of senile cataracts in the respondents of this study.

In addition, the results of the analysis also show that the *Odds Ratio* (OR) of 0.441, which means that respondents who are not exposed to ultraviolet light (sun) have a lower risk of developing senile cataracts than respondents who are exposed to ultraviolet light. An OR value of less than 1 indicates that exposure to ultraviolet light does not act as a risk factor in this study population, and even tends to be protective, although statistically the association is not significant.Inversely proportional to the results of research at the Bangkinang Hospital Eye Polyclinic by Virgo (2020) It is known that of the 23 respondents who were exposed to a large number of ultraviolet rays, there were 2 respondents (8.7%) who did not suffer from senile cataracts, while most of the other respondents experienced senile cataracts. Meanwhile, out of 7 respondents who were not exposed to a large number of ultraviolet rays, there was 1 respondent (14.3%) who suffered from senile cataracts. Statistical test results using the test *Chi-square* Shows value *p-value* 0.000 (p ≤ 0.05), which means that there is a significant relationship between the duration of exposure to ultraviolet rays and the incidence of senilized cataracts at the Bangkinang Eye Poly.

Thus, long-term exposure to ultraviolet light has been shown to be significantly associated with an increased incidence of senile cataracts. In addition, the results of the analysis also show that the *Prevalent Odds Ratio* (POR) of 63, which means that respondents who were exposed to ultraviolet light for a long time had a 63 times greater chance of developing senile cataracts compared to respondents who were not exposed to ultraviolet light for a long time. This very high POR value indicates that exposure to ultraviolet light is a very strong risk factor for the occurrence of senile cataracts in the study population.The absence of a meaningful relationship between exposure to ultraviolet (UV) light and the incidence of senile cataracts in this study can be explained by several factors. Most of the respondents were in the elderly group, where in this phase individuals are generally no longer actively productive at work and spend more time at home resting. This condition caused the daily exposure to ultraviolet light received by respondents at the time of the study to be relatively low and tended to be homogeneous between groups, so the variation in exposure required to show statistical relationships was limited. In addition, the ultraviolet light exposure reported by respondents in this study generally only reflected exposure in recent years, not cumulative exposure over a

lifetime or during a time when respondents were still actively working outdoors. In fact, the process of cataracts due to exposure to ultraviolet light is cumulative and develops slowly over a long period of time, so that the damage to the eye lens is the result of decades of accumulated exposure.

IV.   CONCLUSION

Based on the results of the study, it can be concluded that:

1. The characteristics of the respondents showed that most of the respondents were female, namely 44 people (53.7%), while the male respondents were 38 people (46.3%). Based on age group, the majority of respondents were in the age range of 60-69 years as many as 39 people (47.6%), followed by 50-59 years old as many as 26 people (31.7%), 70-79 years old as many as 13 people (15.9%), and 80-85 years old as many as 4 people (4.9%). Based on occupation, most of the respondents worked as farmers as many as 37 people (45.1%), followed by housewives as many as 30 people (36.6%), retirees as many as 10 people (12.2%), and civil servants as many as 5 people (6.1%).

2. There was a significant relationship between the history of hypertension and the incidence of senilized cataracts at the Praya Regional General Hospital (p-value = 0.007; PR = 1,369; 95% CI = 1,021–1,836).

3. There was no significant association between the degree of smoking and the incidence of senilis cataracts at the Praya Regional General Hospital (p-value = 0.316; PR = 0.897; 95% CI = 0.767–1.050).

4. There was no significant association between exposure to ultraviolet (UV) rays and the incidence of senile cataracts at Praya Regional General Hospital (p-value = 1,000; PR = 1.026; 95% CI = 0.861–1.223).

V.   ACKNOWLEDGMENTS

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