

## THE CORRELATION BETWEEN RISK FACTORS AND THE INCIDENCE OF TRAUMATIC CATARACT DUE TO BLUNT TRAUMA IN SOETOMO GENERAL HOSPITAL SURABAYA APRIL 2017 – MARCH 2020

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### Abstract

Cataract is the cause of 51% of blindness in the world. Cataracts can be caused by eye trauma, where 55 million eye trauma incidences are recorded annually. The most common trauma is blunt trauma. Based on previous studies, there were different research results on risk factors for eye trauma, and there were still few studies on traumatic cataracts due to blunt trauma. This study aims to determine the correlation between risk factors and the incidence of traumatic cataracts due to blunt trauma. This study is an analytical study with a cross-sectional approach. The sampling technique used is total sampling with 52 samples of traumatic cataract patients in Dr. Soetomo General Hospital. The independent variables are the risk factors for age, gender, type of work, and location of trauma. The dependent variable is the incidence of traumatic cataracts due to blunt trauma. The data was collected with medical records and were analyzed using the chi-square test. A total of 21 patients (40.4%) had traumatic cataracts due to blunt trauma, and 31 patients (59.6%) had traumatic cataracts due to other trauma. The significance value of the correlation between age, gender, type of work, and location of trauma with the incidence of traumatic cataract due to blunt trauma respectively  $p=0.557$ ,  $p=0.675$ ,  $p=0.198$ , and  $p=0.512$ , which means  $p > 0.05$ , so there is no significant correlation. There is no correlation between the risk factors and traumatic cataracts due to blunt trauma.

**Keywords:** risk factors; health risks; traumatic cataract; blunt trauma

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# The Correlation Between Risk Factors and The Incidence of Traumatic Cataract Due to Blunt Trauma in Soetomo General Hospital Surabaya April 2017 – March 2020

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## Introduction

A cataract is the number two of eye diseases and the cause of 51% of blindness globally, with about 20 million people (WHO, 2014). In Indonesia, 77.7% of blindness is caused by cataracts (Ministry of Health, 2018). Data from the outpatient unit of Soetomo General Hospital showed an increase in cases of developmental, complicated, and traumatic cataracts to sixth in rank in 2005 (Fauzi, 2006). A total of 55 million eye trauma incidents are recorded annually, resulting in 750,000 hospital admissions and 1.6 million cases leading to blindness (Jovanovic et al., 2016). Cases of traumatic cataracts account for about 27-65% of the total incidence of trauma to the eye (Tabatabaei et al., 2017). Based on several previous studies regarding the types of eye trauma, the most common eye trauma was blunt trauma (Nofityari, Ilahi, and Ariani, 2019).

Cataracts mainly occur due to age, hereditary factors, systemic disease, smoking, and trauma (Eva and Augsburger, 2018). Pradana's (2017) research results showed that the age group of 21-30 years was the age group with the highest frequency of experiencing eye trauma, followed by the age group of 1-10 years. However, in a 2012 study in India, the age group with the highest frequency of experiencing eye trauma was 10-20 years (Pai et al., 2013).

In the United States, men are four times more likely to develop eye trauma than women (Lubis et al., 2018). Research by Maiya, Dharmesh, and Jayaram (2018), the ratio of occurrence of eye trauma between men and women is 4.5:1. Research by Oum, Lee, and Han (2004) in Korea, the ratio of male to female eye trauma is 2:1. The most common type of work for people with eye trauma is farmers (Maiya, Dharmesh, and Jayaram, 2018). While the research conducted by Nofityari, Ilahi, and Ariani (2019) that the most common occupation for people with eye trauma is students.

According to the United States Eye Injury Registry, 40% of eye injuries occur at home, 13% occur in industrial settings, and 13% during sports activities (Chang, 2012). On the other hand, in a study by Wahyuni, Sari, and Kartasasmita (2015), the location of most eye trauma incidence occurs outside the house.

Based on the results of different studies on risk factors for eye trauma and the lack of research on traumatic cataracts due to blunt trauma, as well as the increasing incidence of traumatic cataracts in Soetomo General Hospital Surabaya, it is necessary to conduct this research to determine the correlation between risk factors and the incidence of traumatic cataracts due to blunt trauma in Soetomo General Hospital Surabaya.

## Method

This type of research is a cross-sectional analytic study using medical records of traumatic cataract patients in the eye outpatient unit of Soetomo General Hospital Surabaya for the period April 2017 – March 2020. The independent variable in this study was the risk factor, and the dependent variable in this study was traumatic cataracts due

to blunt trauma. The data that has been collected is then carried out in data processing stages which include editing, coding, entry, and cleaning. The data in this study were analyzed using the chi-square test to determine the relationship between two variables and processed statistically through SPSS (Statistical Package for the Social Sciences).

**Results**

Fifty-two patient medical records have been obtained. The data recorded are the patient's age, gender, occupation, and location of eye trauma.

**Table 1**  
**Frequency Distribution of Age Based on Gender**

Age (Years)	Gender				Total	
	Male		Female		n	%
	n	%	n	%		
3-10	8	100	0	0	8	100
11-18	6	85.7	1	14.3	7	100
19-44	24	85.7	4	14.3	28	100
45-67	8	88.9	1	11.1	9	100

Based on age, the sample age ranged from 3 to 67 years, with the average age of the sample being 30 years with a standard deviation of 16 years. The highest frequency distribution is the age range of 19-44 years (adults) with a frequency of 28 people. In this range, it is dominated by men with a frequency of 24 people or 85.7%.

**Table 2**  
**Frequency Distribution of Age Based on Occupation**

Age (Years)	Type of work										Total			
	Work						Does not work							
	Farmer / Laborer		Civil Servants		Entrepreneur		Fisherman		Student		Unemployed		n	%
n	%	n	%	n	%	n	%	n	%	n	%			
3-10	0	0	0	0	0	0	0	0	7	87.5	1	0	8	100
11-18	1	14.3	0	0	0	0	0	0	6	87.5	0	0	7	100
19-44	22	78.6	0	0	3	10.7	1	3.6	1	3.6	1	3.6	28	100
45-67	6	66.7	2	22.2	0	0	0	0	0	0	1	11.1	9	100

Based on the occupation, table 2 shows that the highest frequency distribution in the age range of 19-44 years is farmers or laborers as many as 22 people or 78.6% and followed by entrepreneurs as many as three people or 10.7%. The subsequent highest frequency is students aged 3-10 years as many as seven people (87.5%).

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**Table 3**  
**Frequency Distribution of Gender Based on Occupation**

Gender	Type of work												Total	
	Work						Does not work							
	Farmer / Laborer		Civil Servants		Entrepreneur		Fisherman		Student		Unemploy ed		n	%
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Male	27	58.7	1	2.2	3	6.5	1	2.2	12	26.1	2	4.3	46	100
Female	2	33.3	1	16.7	0	0	0	0	2	33.3	1	16.7	6	100

The distribution of gender based on occupation in table 3 shows that the majority are men who work as farmers/laborers with a frequency of 27 people or 58.7%, followed by male students with a frequency of 12 people or 26.1 %.

**Table 4**  
**Frequency Distribution of Age Based on Traumatic Cataract Incidence**

Age (Years)	Traumatic Cataract Incidence				Total	
	Blunt Trauma		Other Trauma			
	n	%	n	%	n	%
3-10	4	50	4	50	8	100
11-18	3	42.9	4	57.1	7	100
19-44	9	32.1	19	67.9	28	100
45-67	5	55.6	4	44.4	9	100

Based on the age distribution in table 4, the highest age frequency is 19-44 years. There are 28 people with each frequency of 9 people (32.1%) in traumatic cataracts due to blunt trauma and 19 people (67.9%) in the incidence of traumatic cataracts due to other trauma.

**Table 5**  
**Frequency Distribution of Gender Based on Traumatic Cataract Incidence**

Gender	Traumatic Cataract Incidence				Total	
	Blunt Trauma		Other Trauma			
	n	%	n	%	n	%
Male	18	39.1	28	60.9	46	100
Female	3	50	3	50	6	100

Table 5 shows that the gender distribution is male primarily. There are 46 people with a frequency of 18 people (39.1%) in traumatic cataracts due to blunt trauma and 28 people (60.9%) in the incidence of traumatic cataracts due to other traumas.

**Table 6**  
**Frequency Distribution of Occupation Based on Traumatic Cataract Incidence**

Occupation	Traumatic Cataract Incidence				Total		
	Blunt Trauma		Other Trauma		n	%	
	n	%	n	%			
Work	Farmer / Laborer	11	37.9	18	62.1	29	100
	Civil Servants	1	50	1	50	2	100
	Entrepreneur	0	0	3	100	3	100
	Fisherman	0	0	1	100	1	100
Does not work	Student	7	50	7	50	14	100
	Unemployed	2	66.7	1	33.3	3	100

Based on the occupation in table 6, the highest frequency distribution is farmers or laborers. There are 29 people with a frequency of 11 people (37.9%) in traumatic cataracts due to blunt trauma and 18 people (62.1%) in the incidence of traumatic cataracts due to other trauma. In the incidence of traumatic cataracts due to blunt trauma, the occupation of entrepreneurs and fishers has a zero frequency, which means there is no data on patients who work as entrepreneurs or fishers.

**Table 7**  
**Frequency Distribution of Trauma Location Based on Gender**

Trauma Location	Gender				Total	
	Blunt Trauma		Other Trauma		n	%
	n	%	n	%		
Within the house	6	50	6	50	12	100
Outside the house	15	37.5	25	62.5	40	100

Based on the location of the incidence of trauma, the highest frequency distribution was patients with trauma incidence outside the house, 40 people with a frequency of 15 people (37.5%) in the incidence of traumatic cataracts due to blunt trauma and 25 people (62.5%) in the incidence of traumatic cataracts due to other trauma.

**Table 8**  
**Frequency Distribution of Age Based on Trauma Location**

Age (Years)	Trauma Location				Total	
	Within the house		Outside the house		n	%
	n	%	n	%		
3-10	5	62.5	3	37.5	8	100
11-18	2	28.6	5	71.4	7	100
19-44	4	14.3	24	85.7	28	100
45-67	1	11.1	8	88.9	9	100

Table 8 shows that the frequency distribution of the age of the sample based on the location of the incidence of trauma is mainly in the 19-44 years, which occurs outside the house with a frequency of 24 people (85.7%). Meanwhile, the location of the trauma at home at that age was four people or 14.3%.

**Table 9**  
**Frequency Distribution of Gender Based on Trauma Location**

Gender	Trauma Location				Total	
	Within the house		Outside the house		n	%
	n	%	n	%		
Male	9	19.6	37	80.4	46	100
Female	3	50	3	50	6	100

Table 9 shows that in the male gender, the location of the most trauma occurs outside the house with a frequency of 37 people (80.4%), while for females, the location of the trauma has the same frequency between the house and outside the house, namely three people (50%).

**Table 10**  
**Frequency Distribution of Occupation Based on Trauma Location**

Type of work	Trauma Location				Total		
	Within the house		Outdoors		n	%	
	n	%	n	%			
Work	Farmer / Laborer	3	10.3	26	89.7	29	100
	Civil Servants	0	0	2	100	2	100
	Entrepreneur	0	0	3	100	3	100
	Fisherman	0	0	1	100	1	100
Does not work	Student	7	50	7	50	14	100
	Unemployed	2	66.7	1	33.3	3	100

Table 10 shows that the frequency distribution of occupation based on the location of the trauma is mostly farmers/laborers, with the location of the trauma occurring outside the house with a frequency of 26 people (89.7%). It was followed by students with the same frequency within the house or outside the house, seven people (50%).

### 1. Correlation Between Age and Traumatic Cataracts Incidence Due to Blunt Trauma

**Table 11**  
**Correlation Between Age and Traumatic Cataracts Incidence Due to Blunt Trauma**

Age (Years)	Traumatic Cataract Incidence				Total		<i>p</i>
	Blunt Trauma		Other Trauma		n	%	
	n	%	n	%			
3-18	7	46.7	8	53.3	15	100	0.557
19-67	14	37.8	23	62.2	37	100	

This study aims to determine the correlation between age and the incidence of traumatic cataracts due to blunt trauma. In this research data, age categories were combined into two, namely 3-18 years and 19-67 years. After doing the chi-square test with a significant level of 5% (0.05), the p-value was 0.557 ( $p > 0.05$ ), which means that there is no significant correlation between age and the incidence of traumatic cataracts due to blunt trauma.

### 2. Correlation Between Gender and Traumatic Cataracts Incidence Due to Blunt Trauma

**Table 12**  
**Correlation Between Gender and Traumatic Cataracts Incidence Due to Blunt Trauma**

Gender	Traumatic Cataract Incidence				Total		<i>p</i>
	Blunt Trauma		Other Trauma		n	%	
	n	%	n	%			
Male	18	39.1	28	60.9	46	100	0.675
Female	3	50	3	50	6	100	

This study aims to determine the correlation between gender and the incidence of traumatic cataracts due to blunt trauma. The data of this study did not meet the requirements of the chi-square test, so an alternative test was carried out, namely the Fisher's Exact Test. After the Fisher's Exact Test was performed with a significant level of 5% (0.05), the p-value was 0.675 ( $p > 0.05$ ), which means that there was no significant correlation between gender and the incidence of traumatic cataracts due to blunt trauma.

### 3. Correlation Between Occupation and Traumatic Cataracts Incidence Due to Blunt Trauma

**Table 13**  
Correlation between Occupation and Traumatic Cataracts Incidence Due to Blunt Trauma

Occupation	Traumatic Cataract Incidence				Total		<i>p</i>
	Blunt Trauma		Other Trauma		n	%	
	N	%	N	%			
Work	12	34.3	23	65.7	35	100	0.198
Does not work	9	52.9	8	47.1	17	100	

This study aims to determine the correlation between occupation and the incidence of traumatic cataracts due to blunt trauma. After doing the chi-square test with a significant level of 5% (0.05), the *p*-value was 0.198 ( $p > 0.05$ ), which means that there is no significant correlation between the occupation and the incidence of traumatic cataracts due to blunt trauma.

### 4. Correlation Between Trauma Location and Traumatic Cataracts Incidence Due to Blunt Trauma

**Table 14**  
Correlation between Trauma Location and Traumatic Cataracts Incidence Due to Blunt Trauma

Trauma Location	Traumatic Cataract Incidence				Total		<i>p</i>
	Blunt Trauma		Other Trauma		n	%	
	N	%	n	%			
Within the house	6	50	6	50	12	100	0.512
Outside the house	50	37.5	25	62.5	40	100	

This study aims to determine the correlation between trauma location and the incidence of traumatic cataracts due to blunt trauma. The data of this study did not meet the requirements of the chi-square test, so an alternative test was carried out, namely the Fisher's Exact Test. After the Fisher's Exact Test was performed with a significant level of 5% (0.05), the *p*-value was 0.512 ( $p > 0.05$ ), which means that there was no significant correlation between the location of the trauma and the incidence of traumatic cataracts due to blunt trauma.

## Discussion

### 1. Traumatic Cataract Risk Factors

#### a. Age

In this study, the most traumatic cataract samples were in the age group 19-44 years, with a total of 28 people. Meanwhile, the average age of the sample was  $30 \pm 16$  years. In the incidence of traumatic cataracts due to blunt trauma, the age range of 19-44 years was nine people (32.1%), and the incidence of traumatic cataracts due to other trauma was 19 people (67.9%). It is in line with Qi et al.



(2016) research, which shows that the mean age of traumatic cataract patients is  $41 \pm 19.3$  years. Research conducted by Aroean et al. (2020) also showed that the average age of patients with traumatic cataracts was 38.25 years. In research on eye trauma by Moelook et al. (2019), it was found that most respondents were less than 45 years old, with a percentage of 69.2%. It can be caused because the age range includes the productive age range, which does a lot of activities or jobs that are at high risk of experiencing trauma to the eye (Moelook et al., 2019).

**b. Gender**

Of the 52 samples of this study, 46 samples (88.5%) were male, and six (11.5%) were female. The 46 incidences of traumatic cataracts were male, 18 or 39.1% traumatic cataracts due to blunt trauma, and 28 or 60.9% incidences of traumatic cataracts due to other trauma. Research by Mishra et al. (2016) showed that traumatic cataracts were more common in males than females, namely 54 (71.05%) males, and 22 (28.94%) females. It is also in line with research by Alem et al. (2019) regarding eye trauma which shows that the incidence of eye trauma in men is higher than women with a percentage of 71%. It can happen because men tend to do more physical activities or dangerous jobs that have a greater risk of causing trauma to the eye (Maiya, Dharmesh, and Jayaram, 2018).

**c. Occupation**

Of the total 52 samples of traumatic cataracts, the sample with the type of occupation is farmer or laborer, with the highest percentage of 29 people (55.7%), followed by 14 students (26.9%). It is also in line with Mishra et al.'s (2016) research, which shows that most cases of traumatic cataracts are in the work of farmers or agricultural industry workers as many as 35 people or 46.05% and followed by students as many as 18 people (23.68%). Research conducted by Tana (2010) on the farmer respondents mentioned that the possibility of blunt trauma to the eye was caused by being hit or hit by an object while farming. Farmers mostly use traditional tools such as hoes and rakes, and not many use standard protective equipment, causing tools or objects to hit the eyes directly. The occurrence of eye trauma in workers is also mainly related to their work activities where personal protective equipment is rarely or even not used.

**d. Trauma Location**

The location of eye trauma in respondents that can cause cataracts mainly occurs outside the home with a percentage of 76.9% or 40 people. The incidence of eye trauma outside the home in cases of traumatic cataracts due to blunt trauma was 15 people (37.5%). In comparison, the incidence of traumatic cataracts due to other trauma was as many as 25 people (62.5%). In this study, the occurrence of eye trauma outside the home was mainly related to the workplace. Research by Shashikala et al. (2013) in India shows that the workplace is the most common location for eye trauma. Research by Misra et al. (2013) also showed that the location of the occurrence of eye trauma was most closely related to agricultural work. The number of occurrences of eye trauma

outside the home, such as the workplace, can be caused by the intensity of time at work being higher, so the risk of being exposed to trauma is also high. In addition, workers are also often in contact with work tools that can risk causing eye trauma more often. In this study, the occurrence of eye trauma at home was related to children's playing activities. Eye trauma in children at home can be caused because children play more and have activities in the house and lack parental supervision (Pradana, 2017).

**e. Traumatic Cataract**

From 52 samples of traumatic cataracts in this study, samples of traumatic cataracts due to blunt trauma were 21 patients or 40.4%. Meanwhile, samples of traumatic cataracts due to other trauma (sharp and chemical) were 31 patients (59.6%). In this study, traumatic cataracts due to blunt trauma were mainly caused by bouncing or hitting various objects such as stones, bottle caps, wood, brooms, iron, ropes, and building ceilings. In addition, there are also those caused by the collision of doors and sports equipment such as badminton shuttlecocks. The incidence of cataracts due to other trauma is mainly caused by sharp objects such as razors, broken glass, and fishing hooks. In addition, it can also be caused by gunshots that hit the eye, explosions, and chemicals.

This research is in line with research by Memon et al. (2012) in Pakistan, which also showed that the most common cause of traumatic cataracts was penetrating sharp trauma as many as 28 people (68.3%) and blunt trauma as many as 13 people (31.7%). On research, Sharma et al. (2016) also showed that cataracts due to penetrating sharp trauma were more than blunt trauma by 54.2%, with the most common cause of penetrating sharp trauma being thorns, while the most common cause of blunt trauma was stones. Less incidence of traumatic cataracts due to blunt trauma may be because many patients with blunt trauma cannot remember the cause of the trauma. After all, it usually occurs suddenly, whereas patients with sharp trauma tend to remember the cause more because the trauma causes visible injuries to the eye (Du et al., 2018). Visual acuity outcomes tend to be better in cases of blunt trauma. It may be due to the more significant number of intraocular lens capsule bag fixations and fewer postoperative complications (Sharma et al., 2016).

**2. Correlation between Risk Factors and Incidence of Traumatic Cataracts Due to Blunt Trauma**

In this study, the risk factors of age, gender, type of work, and location of trauma did not statistically influence the incidence of traumatic cataracts due to blunt trauma. However, Pradana's (2017) research showed a relationship between age, gender, and location of trauma with eye trauma. It could be because the study was about the incidence of eye trauma, and not all trauma events to the eye could cause traumatic cataracts. Blunt trauma can cause cataracts if the trauma causes damage to the crystalline lens, thereby blocking light from entering the retina. The effects of eye

trauma, such as cataracts, retinal detachment, glaucoma, and others, can result in decreased or loss of vision can appear months or even years after the trauma occurs (Sukati, 2012).

Age, gender, occupation, and location of trauma were not statistically related to the incidence of traumatic cataracts due to blunt trauma. However, in this study, it can be seen that the age range of 19-44 years (adults) is the most common age experiencing traumatic cataracts due to blunt trauma. The incidence of traumatic cataracts due to blunt trauma in males is more significant than that in females, with a ratio of 6:1. This study also shows that farmers or laborers work with the most traumatic cataracts due to blunt trauma. The location of eye trauma outside the home is also more likely to experience traumatic cataracts due to blunt trauma than at home. These results can concern being more careful in daily activities and paying more attention to personal protective equipment to avoid health risks, namely trauma to the eye. In addition, it is advisable to immediately consult a doctor or eye clinic when experiencing eye trauma to avoid a worse prognosis (Sukati, 2012). Health campaigns are also needed for all levels of society to equally reduce the occurrence of trauma and its severity (Du et al., 2018).

## **Conclusion**

The study results concluded that the age range most experienced traumatic cataracts due to blunt trauma were 19-44 years (adults). The occupation that experienced the most traumatic cataracts due to blunt trauma was farmers/laborers. Men experienced more traumatic cataracts due to blunt trauma than women with a ratio of 6:1. The location of eye trauma in traumatic cataracts due to blunt trauma is mainly outside the home. The incidence of traumatic cataracts due to blunt trauma is 40.4%. Risk factors for age, gender, occupation, and location of trauma were not associated with the incidence of traumatic cataracts due to blunt trauma.

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