

# Jurnal Biomedika dan Kesehatan

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


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

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

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ORIGINAL ARTICLE

## Relationship Between Pterygium and Dry Eye Syndrome Among Delivery Motorbike Drivers


### Pterigium berhubungan dengan Sindroma Mata Kering pada Pengemudi Ojek Online


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#### ABSTRACT

##### Background

Dry eye syndrome (DES) is an eye disease caused by many factors involving the ocular surface, with characteristic damage to tear layer homeostasis accompanied by ocular symptoms due to tear layer instability, hyperosmolarity, damage and inflammation of the ocular surface, and neurosensory abnormalities. Delivery motorbike drivers are often on the streets where the role of environmental factors will be able to pose a risk of experiencing DES. This study aims to assess risk factors associated with the incidence of dry eye syndrome in delivery motorbike drivers. The benefit of this research is to improve public health, especially in preventive behavior against factors associated with dry eye syndrome.

##### Methods

This study used observational analytical methods with a cross-sectional research design. The selection of samples by consequential non-random sampling amounted to 124 with the criteria of inclusion of delivery motorbike drivers, exclusion of not using artificial tears eye drops, and not use of contact lenses. Data were collected by filling out a DES risk factor questionnaire and a Tear Break Up Time (TBUT) examination to assess DES. The research data were analyzed using the Chi-Square test.

##### Results

This study's results show that subjects with dry eye syndrome are dominated by adults aged 19–44 and male sex. Subjects who experienced DES 76.6%, adult age 78.2%, male 80.6%, no pterygium 66.1%, working period 2-5 years 62.9%, length of work  $\geq$ 8 hours 94.4%, always using a closed helmet 83.9%, not using protective glasses 39.5%, coffee consumption 71.8%, active smokers 66.1%, using gadgets >6 hours 91.9%. There is no significant relationship between subjects' characteristics and DES ( $p > 0.05$ ). The incidence of DES in pterygium showed significant results ( $p = 0.001$ ).

##### Conclusions

There is a significant relationship between the incidence of pterygium and DES.

**Keywords:** Dry Eye Syndrome; Pterygium; Risk Factor; Tear Break Up Time (TBUT)

## ABSTRAK

### Latar Belakang

Sindroma mata kering (DES) adalah penyakit mata yang disebabkan oleh banyak faktor yang melibatkan permukaan okular, dengan karakteristik rusaknya homeostasis lapisan air mata disertai dengan gejala okular diakibatkan ketidak-stabilan lapisan air mata, hiperosmolaritas, kerusakan dan inflamasi pada permukaan okular, serta abnormalitas neurosensoris. Pengemudi ojek online sering berada di jalanan di mana peran faktor lingkungan akan dapat menimbulkan risiko mengalami DES. Penelitian ini bertujuan untuk menilai faktor risiko yang terkait dengan kejadian sindrom mata kering pada pengemudi sepeda motor pengiriman. Manfaat dari penelitian ini adalah untuk meningkatkan kesehatan masyarakat, terutama dalam perilaku preventif terhadap faktor-faktor yang terkait dengan sindrom mata kering.

### Metode

Penelitian ini menggunakan metode analisis observasional dengan desain penelitian cross sectional. Pemilihan sampel secara konsekuensial non-random sampling berjumlah 124 dengan kriteria inklusi pengemudi ojek online, eksklusi tidak menggunakan tetes mata air mata buatan dan tidak menggunakan lensa kontak. Data dikumpulkan melalui pengisian kuesioner faktor risiko DES dan pemeriksaan Tear Break Up Time (TBUT) untuk menilai DES. Data penelitian dianalisis menggunakan uji Chi-Square.

### Hasil

Hasil penelitian ini menunjukkan bahwa subjek yang memiliki sindrom mata kering didominasi oleh orang dewasa pada usia 19-44 tahun dan berjenis kelamin laki-laki. Subjek yang mengalami DES 76.6%, dewasa usia 78.2%, laki-laki 80.6%, tidak ada pterygium 66.1%, masa kerja 2-5 tahun 62.9%, lama kerja  $\geq$  8 jam 94.4%, selalu menggunakan helm tertutup 83.9%, tidak menggunakan kacamata pelindung 39.5%, konsumsi kopi 71.8%, perokok aktif 66.1%, menggunakan gadget  $>6$  jam 91.9%. Tidak ada hubungan yang bermakna antara karakteristik subjek dan DES ( $p > 0.05$ ). Kejadian DES pada pterygium menunjukkan hasil yang bermakna ( $p = 0.001$ ).

### Kesimpulan

Ada hubungan yang bermakna antara kejadian pterygium dan DES.

**Kata Kunci:** Sindroma Mata Kering; Pterygium; Faktor Risiko; Tear Break Up Time (TBUT)

## INTRODUCTION

Dry eye syndrome (DES) is an eye disease caused by many factors involving the ocular surface, characterized by damage to tear film homeostasis accompanied by ocular symptoms due to tear film instability, hyperosmolarity, damage, and inflammation on the ocular surface, as well as neurosensory abnormalities.<sup>1-3</sup>

Symptoms of DES vary from mild irritation, burning sensation, itching, red eyes, gritty feeling in the eyes, sore eyes, tired eyes, and in severe cases can cause vision problems.<sup>1,4,5</sup> DES is the most common eye disease. In daily practice, with a prevalence of between 5-50% of the entire world population.<sup>2</sup> The prevalence of DES in Southeast Asia is around 20-52.4%.<sup>3</sup> The prevalence of dry eyes in Indonesia in 2017 was 26.5%.<sup>4</sup>

Several risk factors that are closely related to the incidence of DES include age, gender, race, connective tissue disorders, Sjogren's syndrome, estrogen replacement therapy, androgen hormone deficiency, use of drugs (antihistamines, antidepressants, anxiolytics, and isotretinoin), use of computers, use of contact lenses, environmental conditions (pollution, low humidity).<sup>1,2</sup> Probable risk factors include diabetes, rosacea, viral infections, thyroid disease, psychiatric conditions, pterygium, low fat intake, refractive surgery, and allergic conjunctivitis.<sup>2</sup>

Dry eyes are very common in older people, around 5-30% of the elderly population, and more often affect women than men.<sup>1</sup> The disparity in prevalence according to age ranges from 8.4% for those aged less than 60 years, 5% for those aged 70-79 years. and 20% over 80 years of age.<sup>1</sup>

Complications of DES that do not receive therapy or do not respond well to therapy can result in loss of visual acuity.<sup>1,2</sup> In severe cases of DES it can affect the patient's quality of life physically, socially, psychologically, and work productivity.<sup>4</sup>

Online motorcycle taxi driving is a relatively new profession in Indonesia and this profession helps community activities this profession is very popular and the number of online motorcycle taxi drivers is increasing. This job requires online drivers to always be on the road where environmental factors can pose a risk of experiencing DES.

Research conducted by Zsafidda and Kamellisha found that motorbike taxi workers in the city of Malang who had been exposed to smoke for more than 10 years experienced severe DES.<sup>6</sup> Currently there is not much research on online drivers, especially in the field of eye health, as well as the negative impacts that can arise. As a result of this work, researchers are interested in conducting research to assess the factors related to the incidence of DES in online motorcycle taxi drivers, for prevention efforts, especially in the field of eye health.

## METHODS

This research uses an analytical observational method with a cross-sectional design. This research was carried out at FK USAKTI, Jl. Kyai Tapa- Grogol, West Jakarta, in September 2022. The population in this study was online motorcycle taxi drivers, totaling 124 respondents. Sample selection used a non-random consecutive sampling technique. The inclusion criteria are online motorcycle taxi drivers, male and female. Exclusion criteria were using contact lenses and using artificial tears and eye drops.

Data was collected by filling out a questionnaire containing the respondent's identity and risk factors for dry eye syndrome. Then an anterior eye examination and Tear Break Up Time (TBUT) examination were carried out. TBUT examination shows whether there is a disturbance in the stability of the tear film. The examination is carried out using fluorescent strips. The inspection was carried out using a cobalt blue filter spotlight. Then the patient is asked to blink 3 times, then measure the time interval required after the last eye blink until a black spot appears on the cornea using a stopwatch. The measurement result is the time it takes for the tear film to break apart when the eye blinks. Normal TBUT results are 15-30 seconds. If  $TBUT \leq 10$  seconds indicates a disruption in tear film stability.

The statistical tests used were the Chi-square test and the Fisher Exact test with a significance level of  $p < 0.05$ . Data were analyzed univariately and bivariately using the SPSS (Statistical Package for Social Science) program version 23.0. The results are presented in the form of a frequency table of respondent characteristics and risk factors associated with dry eye syndrome.



## RESULTS

Table 1. Characteristics and Risk Factors for Dry Eye Syndrome

Variable	Respondent (n)	Percentage (%)
<b>Age</b>		
Adult (19-44 y.o)	97	78.2
Pre-elderly (45-59 y.o)	26	21.0
Elderly (> 60 y.o)	1	0.8
<b>Gender</b>		
Man	100	80.6
Woman	24	19.4
<b>Dry Eye</b>		
Yes	95	76.6
No	29	23.4
<b>Pterygium</b>		
Yes	42	33.9
No	82	66.1
<b>Years of service</b>		
< 2 years	1	0.8
2-5 2-5 Years	78	62.9
> 5 years	45	36.3
<b>Length of working</b>		
< 8 hours	7	5.6
> 8 hours	117	94.4
<b>Closed helmet</b>		
No	6	4.8
Rarely	14	11.3
Always	104	83.9
<b>Protective glasses</b>		
No	49	39.5
Rarely	36	29.0
Always	39	31.5
<b>Coffee Consumption</b>		
Yes	89	71.8
No	35	28.2
<b>Active smoker</b>		
Yes	82	66.1
No	42	33.9
<b>Gadgets/day</b>		
≤ 6 hours	10	8.1
> 6 hours	114	91.9

In table 1, most respondents were male (80.6%), mature age (78.2%), incidence of dry eye syndrome (76.6%), no pterygium (66.1%), working period 2-5 years (62.9%), working time ≥ 8 hours (94.4%), always using a closed helmet (83.9%), not using protective glasses (39.5%), consuming coffee (71.8%), active smoker (66.1%), using gadgets > 6 hours (91.9%).

Table 2. Relationship between respondent characteristics and risk factors for dry eye syndrome

Variable	Dry eye syndrome				p
	Yes		No		
	n	%	n	%	
<b>Age</b>					0.462 <sup>€</sup>
Adults (19-44 years)	72	74.23	25	25.77	
Pre-elderly (25-59 years)	22	84.62	4	15.38	
Elderly (> 60 years old)	1	100.00	0	0.00	
<b>Gender</b>					0.456 <sup>€</sup>
Man	78	78.00	22	22.00	
Woman	17	70.83	7	29.17	
<b>Pterygium</b>					0.001 <sup>b*</sup>
Yes	39	92.86	3	7.14	
No	56	68.29	26	31.71	
<b>Years of service</b>					0.440 <sup>€</sup>
< 2 years	1	100.00	0	0.00	
2-5 years	57	73.08	21	26.92	
> 5 years	37	82.22	8	17.78	
<b>Working hours/day</b>					0.482 <sup>b</sup>
< 8 hours	6	85.71	1	14.29	
> 8 hours	89	76.07	28	23.93	
<b>Closed helmet</b>					0.087 <sup>€</sup>
No	6	100.00	0	0.00	
Rarely	8	57.14	6	42.86	
Always	81	77.88	23	22.12	
<b>Protective glasses</b>					0.087 <sup>€</sup>
No	39	79.59	10	20.41	
Rarely	23	63.89	13	36.11	
Always	33	84.62	6	15.38	
<b>Coffee Consumption</b>					0.072 <sup>€</sup>
Yes	72	80.90	17	19.10	
No	23	65.71	12	34.29	
<b>Active smoker</b>					0.414 <sup>€</sup>
Yes	61	74.39	21	25.61	
No	34	80.95	8	19.05	
<b>Gadgets/day</b>					0.115 <sup>b</sup>
< 6 hours	10	100.00	0	0.00	
> 6 hours	85	74.56	29	25.44	

<sup>€</sup> = chi-square test

<sup>b</sup> = Fisher Exact Test

\* = p < 0.05

Table 2 shows that more adult respondents aged 19-44 years experienced dry eye syndrome at 74.2% (72 respondents). In the statistical test results, the value of p=0.087 (p>0.05) was obtained, which means there is no significant relationship between age and dry eye syndrome. In the gender variable, the results showed that men experienced more dry eye syndrome, namely 78% (78 respondents). The statistical test results obtained a value of p=0.456 (p>0.05), which means there

is no significant relationship between gender and dry eye syndrome. Respondents who did not have pterygium experienced dry eye syndrome at 68.3% (39 respondents). The statistical test results obtained a value of  $p=0.001$  ( $p<0.05$ ), which means there is a significant relationship between pterygium and dry eye syndrome. Respondents with 2-5 years of work experienced the most dry eye syndrome, namely 73.1% (57 respondents). The statistical test results showed that  $p=0.440$  ( $p>0.05$ ), which means that there was no significant relationship between work experience and dry eye syndrome. Working hours  $\geq 8$  hours per day most frequently experienced dry eye syndrome at 76.1% (89%). The statistical test results showed that  $p=0.482$  ( $p>0.05$ ) which means there is no significant relationship between working hours  $\geq 8$  hours per day and dry eye syndrome. Respondents who always used closed helmets experienced dry eye syndrome of 77.9% (81 respondents). The statistical test results obtained  $p=0.087$  ( $p>0.05$ ), which means there is no significant relationship between using a closed helmet and dry eye syndrome. Respondents who did not use protective glasses experienced dry eyes of 79.6% (39 respondents). The statistical test results obtained  $p=0.087$  ( $p>0.05$ ), which means there is no significant relationship between using protective glasses and dry eye syndrome. 80.9% of respondents who consumed coffee had dry eye syndrome (72 respondents). The statistical test results obtained  $p=0.072$  ( $p>0.05$ ), which means there is no significant relationship between coffee consumption and dry eye syndrome. Active smoker respondents who had dry eye syndrome were 74.4% (61 respondents). The statistical test results showed  $p=0.414$  ( $p>0.05$ ), which means there is no significant relationship between active smoking and dry eye syndrome. Respondents who used gadgets  $>6$  hours per day had dry eye syndrome of 74.6% (85 respondents). The statistical test results obtained  $p=0.115$  ( $p>0.05$ ), which means there is no significant relationship between using gadgets  $>6$  hours per day and dry eye syndrome.

## DISCUSSION

The results in Table 1 show that online motorcycle taxi drivers are dominated by adult men (19-44 years). This is because adult men mostly use two-wheeled motorized vehicles and are breadwinners to meet family needs.

The results in Table 1 show that 76.6% of motorbike taxi drivers experienced dry eye syndrome. This is because in this study there were risk factors that caused dry eye syndrome, including 94.4% having a history of working more than 8 hours, and 71.8% consuming coffee, 66.1% are active smokers, and 91.9% use gadgets for more than 6 hours.

Table 2 shows that more adult respondents aged 19-44 years experienced dry eye syndrome at 74.2% (72 respondents). These results are in accordance with research conducted by Zong JY, et al. which states that there is a change in tear production with increasing age and dry eye syndrome is mostly in the younger generation (18-49 years).<sup>7</sup> In this study, 78.2% were aged 19-44 years, where at this age the use of mobile phones is increasing, especially in this era. modern today. This causes the risk of dry eye syndrome to increase at a young age. In the statistical test results, the value of  $p=0.087$  ( $p>0.05$ ) was obtained, which means there is no significant relationship between age and dry eye syndrome. This is in line with research conducted by Paulsen AJ, et al. which states that there is no significant relationship between age and dry eye syndrome with a value of  $p = 0.06$ .<sup>8</sup> Older respondents are said to be more at risk of experiencing a decrease in tear production because they have a decrease in corneal sensitivity which is related to the mechanism of dry eye. With

increasing age, apart from decreasing tear secretion, there is also an increase in tear evaporation such as atrophy of the meibomian glands. The distribution of dry eye syndrome in the age range may vary, this is because the causes of dry eye syndrome are multifactorial.<sup>9</sup>

In the gender variable, the results showed that men experienced more dry eye syndrome, namely 78% (78 respondents). The statistical test results obtained a value of  $p=0.456$  ( $p>0.05$ ), which means there is no significant relationship between gender and dry eye syndrome. These results are in line with research conducted by Gierow JP, et al. which stated that no significant relationship was found between gender and dry eye syndrome with a  $p\text{-value} > 0.05$ .<sup>9</sup> In several epidemiological studies, the prevalence of dry eye syndrome was higher in women. This is due to low estrogen in menopausal women, whereas in this study it was dominated by men at 80.6%.

Respondents who did not have pterygium experienced dry eye syndrome at 68.3% (39 respondents). The statistical test results obtained a value of  $p=0.001$  ( $p<0.05$ ), which means there is a significant relationship between pterygium and dry eye syndrome. These results are in accordance with research conducted by Manhas A, et al. which states that there is a significant relationship between pterygium and dry eye syndrome with a value of  $p<0.001$ .<sup>10</sup> Research conducted by Gupta AK also states that there is a significant relationship between pterygium and dry eye syndrome with  $p<0.05$ .<sup>11</sup> Pterygium is a condition where the tissue under the conjunctiva experiences degeneration in the form of proliferation of fibrovascular tissue that invades the cornea. The causes of pterygium include environmental factors such as ultraviolet (sun exposure) and chronic inflammation (exposure to dust and wind).<sup>12,13</sup> Tear film abnormalities are also one of the factors causing pterygium. Disorders of the stability of the tear film (tear film) are generally caused by two factors, namely chronic inflammation of the ocular surface and changes in tear dynamics.<sup>12</sup> Dry cornea and conjunctiva trigger the growth of new tissue. Pterygium causes the surface of the eyeball to become abnormal, resulting in tear film dysfunction and dry eye syndrome.<sup>10</sup> Tear film dysfunction is a precursor to pterygium or whether pterygium causes tear film dysfunction is still unclear.<sup>11,14</sup> The results of research conducted by Thatee S in 2023 stated that pterygium causes dry eye syndrome where the higher the stage/degree of the pterygium, the more severe the degree of dry eye syndrome.<sup>15</sup>

Respondents with 2-5 years of work experience experienced the most dry eye syndrome, namely 73.1% (57 respondents). The statistical test results showed that  $p=0.440$  ( $p>0.05$ ), which means that there was no significant relationship between work experience and dry eye syndrome. The results of research conducted by Paudel N, et al. stated that drivers who worked for 5 years experienced dry eye syndrome due to air pollution and there was no significant difference between the length of work of 5-10 years and 10 years.<sup>16</sup> The impact of air pollution on the surface of the eyeball occurs after a cumulative process of many years.

Working hours  $\geq 8$  hours per day most frequently experienced dry eye syndrome at 76.1% (89%). In the statistical test results, it was found that  $p=0.482$  ( $p>0.05$ ) which means there is no significant relationship between working hours  $\geq 8$  hours per day and dry eye syndrome. Respondents who always used closed helmets experienced dry eye syndrome of 77.9% (81 respondents). The statistical test results obtained  $p=0.087$  ( $p>0.05$ ), which means there is no significant relationship between using a closed helmet and dry eye syndrome. Respondents who did not use protective glasses experienced dry eyes of 79.6% (39 respondents). The statistical test results obtained

$p=0.087$  ( $p>0.05$ ), which means there is no significant relationship between using protective glasses and dry eye syndrome. Working as a driver will involve environmental exposure such as pollution, high temperatures, sun, and wind. The longer you drive, the greater the risk of exposure to environments that cause dry eye syndrome. The use of helmets and protective glasses aims to reduce exposure to this environment. Research conducted by Liang K, et al. states that exposure to accumulated air pollution is significantly related to dry eye syndrome.<sup>17</sup> The many factors that cause dry eye syndrome cause dry eye syndrome to be found in respondents who always wear helmets or protective glasses, for example, because they have had pterygium for a long time, the weather is heat, and other influencing factors.

80.9% of respondents who consumed coffee had dry eye syndrome (72 respondents). The statistical test results obtained  $p=0.072$  ( $p>0.05$ ), which means there is no significant relationship between coffee consumption and dry eye syndrome. The caffeine contained in coffee can affect tear production because it has the effect of increasing the activation of sympathetic innervation in the lacrimal gland which causes a decrease in tear secretion.<sup>18</sup> Research conducted by Juddy AU, et al. shows that there is a significant relationship between caffeine and a decrease in tear production.<sup>18</sup> Likewise, research conducted by Fayola PA shows that there is a significant relationship between coffee and dry eye syndrome with  $p = 0.000$ .<sup>19</sup> Meanwhile, research conducted by Magno M. S, et al, in 2023, states that there is no significant relationship between caffeine and dry eye syndrome.<sup>20</sup> Caffeine reaches its maximum concentration in 20-120 minutes in plasma and is eliminated from the body after 4 hours.<sup>21</sup> Caffeine stimulates the parasympathetic by increasing acetylcholine which causes activation of water secretion, proteins, electrolytes and stimulation of tear secretion. The difference is in research conducted by Judy AU, et al. It uses experimental methods in collecting data. Research subjects were asked to consume caffeinated coffee and then had their tear production measured via the Schirmer test, before and after consuming coffee.

Active smoker respondents who had dry eye syndrome were 74.4% (61 respondents). The statistical test results showed  $p=0.414$  ( $p>0.05$ ), which means there is no significant relationship between active smoking and dry eye syndrome. Cigarette smoke irritates the surface of the eyeball, if it occurs continuously it will activate T cells which cause local inflammation and activation of cytokines which block sensory signals from the lacrimal gland resulting in a decrease in tear secretion.<sup>22</sup> Cigarette smoke on the surface of the eyeball causes disruption of the lipid layer. tear film which results in increased evaporation from the tear film.<sup>23</sup> Research conducted by Ibrahim AM, stated that there was a significant relationship with increasing degrees of dry eye syndrome in smokers compared to non-smokers with  $p=0.01$ .<sup>24</sup> This is different from research conducted by Attri S, who stated that there was no significant relationship between smoking, diabetes mellitus, hypertension, and dry eye syndrome.<sup>25</sup> Likewise, research conducted by Tariq MA, et al. stated that smoking was not indicated as a risk factor for dry eye syndrome.<sup>26</sup> In this study, although many respondents were smokers, more detailed and accurate data was still needed such as how to smoke, type of cigarette, duration of smoking, comorbidities, and other influencing factors.

Respondents who used gadgets >6 hours per day had dry eye syndrome of 74.6% (85 respondents). The statistical test results obtained  $p=0.115$  ( $p>0.05$ ), which means there is no significant relationship between using gadgets >6 hours per day and dry eye syndrome. Using a digital screen for more than 6 hours can increase the risk of dry eye syndrome.<sup>27</sup> Staring at a digital

screen for a long period can reduce the frequency of blinking which fails in the distribution of tears to lubricate the surface of the eye, so that tear evaporation will increase.<sup>27</sup> In research conducted by Mohtaseb ZA, et al. shows a significant relationship between the use of digital screens and a decrease in the blink reflex and the risk of developing dry eye syndrome.<sup>28</sup> Research conducted by Tawonkasiwattanakum P, et al. stated that there was no significant relationship between gadget use and dry eye syndrome in university students and staff.<sup>29</sup> In this study, the online driver profession will often use mobile phones in carrying out their work. The length of time you use a mobile phone depends on the length of work and the drivers' activities while working. If drivers often take breaks without using their mobile phones for a while or take short naps in their free time while working, this will reduce the risk of dry eye syndrome. Another thing that influences the results of this study is that there are many risk factors for dry eye syndrome, such as hot weather, cold rooms using air conditioners, wind, and other factors when using a mobile phone.

This research has the limitation of being carried out subjectively using a multifactorial questionnaire of risk factors for dry eye and the causes of dry eye syndrome, so a more detailed questionnaire is needed for each risk factor and adding other tests to confirm the diagnosis of dry eye syndrome and increasing the number of respondents studied more.

This research implies that it is hoped that preventive and educational measures regarding dry eye syndrome and pterygium can be carried out among online motorcycle taxi drivers so that the productivity of online motorcycle taxi drivers is optimal.

## CONCLUSION

The conclusion from the analysis of this research data is that there is a relationship between the incidence of pterygium and dry eye syndrome in online motorcycle taxi drivers.

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## AUTHORS CONTRIBUTION

Research concept and design: EK, data collection: EK, HA, AA, RW, NP, analysis and interpretation of results: EK, HA, manuscript preparation: EK, EM, Y, review of final manuscript results: EK, EM

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## CONFLICT OF INTEREST

Researchers have no conflict of interest regarding the results of this research.

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ORIGINAL ARTICLE

## Relationship Between Pterygium and Dry Eye Syndrome Among Delivery Motorbike Drivers

### Pterigium berhubungan dengan Sindroma Mata Kering pada Pengemudi Ojek Online

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#### ABSTRACT

##### Background

Dry eye syndrome (DES) is an eye disease caused by many factors involving the ocular surface, with characteristic damage to tear layer homeostasis accompanied by ocular symptoms due to tear layer instability, hyperosmolarity, damage and inflammation of the ocular surface, and neurosensory abnormalities. Delivery motorbike drivers are often on the streets where the role of environmental factors will be able to pose a risk of experiencing DES. This study aims to assess risk factors associated with the incidence of dry eye syndrome in delivery motorbike drivers. The benefit of this research is to improve public health, especially in preventive behavior against factors associated with dry eye syndrome.

##### Methods

This study used observational analytical methods with a cross-sectional research design. The selection of samples by consequential non-random sampling amounted to 124 with the criteria of inclusion of delivery motorbike drivers, exclusion of not using artificial tears eye drops, and not use of contact lenses. Data were collected by filling out a DES risk factor questionnaire and a Tear Break Up Time (TBUT) examination to assess DES. The research data were analyzed using the Chi-Square test.

##### Results

This study's results show that subjects with dry eye syndrome are dominated by adults aged 19–44 and male sex. Subjects who experienced DES 76.6%, adult age 78.2%, male 80.6%, no pterygium 66.1%, working period 2–5 years 62.9%, length of work  $\geq$ 8 hours 94.4%, always using a closed helmet 83.9%, not using protective glasses 39.5%, coffee consumption 71.8%, active smokers 66.1%, using gadgets >6 hours 91.9%. There is no significant relationship between subjects' characteristics and DES ( $p > 0.05$ ). The incidence of DES in pterygium showed significant results ( $p = 0.001$ ).

##### Conclusions

There is a significant relationship between the incidence of pterygium and DES.

**Keywords:** Dry Eye Syndrome; Pterygium; Risk Factor; Tear Break Up Time (TBUT)

## ABSTRAK

### Latar Belakang

Sindroma mata kering (DES) adalah penyakit mata yang disebabkan oleh banyak faktor yang melibatkan permukaan okular, dengan karakteristik rusaknya homeostasis lapisan air mata disertai dengan gejala okular diakibatkan ketidak-stabilan lapisan air mata, hiperosmolaritas, kerusakan dan inflamasi pada permukaan okular, serta abnormalitas neurosensoris. Pengemudi ojek online sering berada di jalanan di mana peran faktor lingkungan akan dapat menimbulkan risiko mengalami DES. Penelitian ini bertujuan untuk menilai faktor risiko yang terkait dengan kejadian sindrom mata kering pada pengemudi sepeda motor pengiriman. Manfaat dari penelitian ini adalah untuk meningkatkan kesehatan masyarakat, terutama dalam perilaku preventif terhadap faktor-faktor yang terkait dengan sindrom mata kering.

### Metode

Penelitian ini menggunakan metode analisis observasional dengan desain penelitian cross sectional. Pemilihan sampel secara konsekuensial non-random sampling berjumlah 124 dengan kriteria inklusi pengemudi ojek online, eksklusi tidak menggunakan tetes mata air mata buatan dan tidak menggunakan lensa kontak. Data dikumpulkan melalui pengisian kuesioner faktor risiko DES dan pemeriksaan Tear Break Up Time (TBUT) untuk menilai DES. Data penelitian dianalisis menggunakan uji Chi-Square.

### Hasil

Hasil penelitian ini menunjukkan bahwa subjek yang memiliki sindrom mata kering didominasi oleh orang dewasa pada usia 19-44 tahun dan berjenis kelamin laki-laki. Subjek yang mengalami DES 76.6%, dewasa usia 78.2%, laki-laki 80.6%, tidak ada pterygium 66.1%, masa kerja 2-5 tahun 62.9%, lama kerja  $\geq$  8 jam 94.4%, selalu menggunakan helm tertutup 83.9%, tidak menggunakan kacamata pelindung 39.5%, konsumsi kopi 71.8%, perokok aktif 66.1%, menggunakan gadget >6 jam 91.9%. Tidak ada hubungan yang bermakna antara karakteristik subjek dan DES ( $p > 0.05$ ). Kejadian DES pada pterygium menunjukkan hasil yang bermakna ( $p = 0.001$ ).

### Kesimpulan

Ada hubungan yang bermakna antara kejadian pterygium dan DES.

**Kata Kunci:** Sindroma Mata Kering; Pterygium; Faktor Risiko; Tear Break Up Time (TBUT)

## INTRODUCTION

Dry eye syndrome (DES) is an eye disease caused by many factors involving the ocular surface, characterized by damage to tear film homeostasis accompanied by ocular symptoms due to tear film instability, hyperosmolarity, damage, and inflammation on the ocular surface, as well as neurosensory abnormalities.<sup>1,3</sup>

Symptoms of DES vary from mild irritation, burning sensation, itching, red eyes, gritty feeling in the eyes, sore eyes, tired eyes, and in severe cases can cause vision problems.<sup>1,4,5</sup> DES is the most common eye disease. In daily practice, with a prevalence of between 5-50% of the entire world population.<sup>2</sup> The prevalence of DES in Southeast Asia is around 20-52.4%.<sup>3</sup> The prevalence of dry eyes in Indonesia in 2017 was 26.5%.<sup>4</sup>

Several risk factors that are closely related to the incidence of DES include age, gender, race, connective tissue disorders, Sjogren's syndrome, estrogen replacement therapy, androgen hormone deficiency, use of drugs (antihistamines, antidepressants, anxiolytics, and isotretinoin), use of computers, use of contact lenses, environmental conditions (pollution, low humidity).<sup>1,2</sup> Probable risk factors include diabetes, rosacea, viral infections, thyroid disease, psychiatric conditions, pterygium, low fat intake, refractive surgery, and allergic conjunctivitis.<sup>2</sup>

Dry eyes are very common in older people, around 5-30% of the elderly population, and more often affect women than men.<sup>1</sup> The disparity in prevalence according to age ranges from 8.4% for those aged less than 60 years, 5% for those aged 70-79 years. and 20% over 80 years of age.<sup>1</sup>

Complications of DES that do not receive therapy or do not respond well to therapy can result in loss of visual acuity.<sup>1,2</sup> In severe cases of DES it can affect the patient's quality of life physically, socially, psychologically, and work productivity.<sup>4</sup>

Online motorcycle taxi driving is a relatively new profession in Indonesia and this profession helps community activities this profession is very popular and the number of online motorcycle taxi drivers is increasing. This job requires online drivers to always be on the road where environmental factors can pose a risk of experiencing DES.

Research conducted by Zsafidda and Kamellisha found that motorbike taxi workers in the city of Malang who had been exposed to smoke for more than 10 years experienced severe DES.<sup>6</sup> Currently there is not much research on online drivers, especially in the field of eye health, as well as the negative impacts that can arise. As a result of this work, researchers are interested in conducting research to assess the factors related to the incidence of DES in online motorcycle taxi drivers, for prevention efforts, especially in the field of eye health.

## METHODS

This research uses an analytical observational method with a cross-sectional design. This research was carried out at FK USAKTI, Jl. Kyai Tapa- Grogol, West Jakarta, in September 2022. The population in this study was online motorcycle taxi drivers, totaling 124 respondents. Sample selection used a non-random consecutive sampling technique. The inclusion criteria are online motorcycle taxi drivers, male and female. Exclusion criteria were using contact lenses and using artificial tears and eye drops.

Data was collected by filling out a questionnaire containing the respondent's identity and risk factors for dry eye syndrome. Then an anterior eye examination and Tear Break Up Time (TBUT) examination were carried out. TBUT examination shows whether there is a disturbance in the stability of the tear film. The examination is carried out using fluorescent strips. The inspection was carried out using a cobalt blue filter spotlight. Then the patient is asked to blink 3 times, then measure the time interval required after the last eye blink until a black spot appears on the cornea using a stopwatch. The measurement result is the time it takes for the tear film to break apart when the eye blinks. Normal TBUT results are 15-30 seconds. If TBUT  $\leq$  10 seconds indicates a disruption in tear film stability.

The statistical tests used were the Chi-square test and the Fisher Exact test with a significance level of  $p < 0.05$ . Data were analyzed univariately and bivariately using the SPSS (Statistical Package for Social Science) program version 23.0. The results are presented in the form of a frequency table of respondent characteristics and risk factors associated with dry eye syndrome.

## RESULTS

Table 1. Characteristics and Risk Factors for Dry Eye Syndrome

Variable	Respondent (n)	Percentage (%)
<b>Age</b>		
Adult (19-44 y.o)	97	78.2
Pre-elderly (45-59 y.o)	26	21.0
Elderly (> 60 y.o)	1	0.8
<b>Gender</b>		
Man	100	80.6
Woman	24	19.4
<b>Dry Eye</b>		
Yes	95	76.6
No	29	23.4
<b>Pterygium</b>		
Yes	42	33.9
No	82	66.1
<b>Years of service</b>		
< 2 years	1	0.8
2-5 2-5 Years	78	62.9
> 5 years	45	36.3
<b>Length of working</b>		
< 8 hours	7	5.6
> 8 hours	117	94.4
<b>Closed helmet</b>		
No	6	4.8
Rarely	14	11.3
Always	104	83.9
<b>Protective glasses</b>		
No	49	39.5
Rarely	36	29.0
Always	39	31.5
<b>Coffee Consumption</b>		
Yes	89	71.8
No	35	28.2
<b>Active smoker</b>		
Yes	82	66.1
No	42	33.9
<b>Gadgets/day</b>		
< 6 hours	10	8.1
> 6 hours	114	91.9

In table 1, most respondents were male (80.6%), mature age (78.2%), incidence of dry eye syndrome (76.6%), no pterygium (66.1%), working period 2-5 years (62.9%), working time  $\geq$  8 hours (94.4%), always using a closed helmet (83.9%), not using protective glasses (39.5%), consuming coffee (71.8%), active smoker (66.1%), using gadgets > 6 hours (91.9%).

Table 2. Relationship between respondent characteristics and risk factors for dry eye syndrome

Variable	Dry eye syndrome				p
	Yes		No		
	n	%	n	%	
<b>Age</b>					0.462 <sup>€</sup>
Adults (19-44 years)	72	74.23	25	25.77	
Pre-elderly (25-59 years)	22	84.62	4	15.38	
Elderly (> 60 years old)	1	100.00	0	0.00	
<b>Gender</b>					0.456 <sup>€</sup>
Man	78	78.00	22	22.00	
Woman	17	70.83	7	29.17	
<b>Pterygium</b>					0.001 <sup>b*</sup>
Yes	39	92.86	3	7.14	
No	56	68.29	26	31.71	
<b>Years of service</b>					0.440 <sup>€</sup>
< 2 years	1	100.00	0	0.00	
2-5 years	57	73.08	21	26.92	
> 5 years	37	82.22	8	17.78	
<b>Working hours/day</b>					0.482 <sup>b</sup>
< 8 hours	6	85.71	1	14.29	
> 8 hours	89	76.07	28	23.93	
<b>Closed helmet</b>					0.087 <sup>€</sup>
No	6	100.00	0	0.00	
Rarely	8	57.14	6	42.86	
Always	81	77.88	23	22.12	
<b>Protective glasses</b>					0.087 <sup>€</sup>
No	39	79.59	10	20.41	
Rarely	23	63.89	13	36.11	
Always	33	84.62	6	15.38	
<b>Coffee Consumption</b>					0.072 <sup>€</sup>
Yes	72	80.90	17	19.10	
No	23	65.71	12	34.29	
<b>Active smoker</b>					0.414 <sup>€</sup>
Yes	61	74.39	21	25.61	
No	34	80.95	8	19.05	
<b>Gadgets/day</b>					0.115 <sup>b</sup>
< 6 hours	10	100.00	0	0.00	
> 6 hours	85	74.56	29	25.44	

<sup>€</sup> = chi-square test

<sup>b</sup> = Fisher Exact Test

\* = p < 0.05

Table 2 shows that more adult respondents aged 19-44 years experienced dry eye syndrome at 74.2% (72 respondents). In the statistical test results, the value of p=0.087 (p>0.05) was obtained, which means there is no significant relationship between age and dry eye syndrome. In the gender variable, the results showed that men experienced more dry eye syndrome, namely 78% (78 respondents). The statistical test results obtained a value of p=0.456 (p>0.05), which means there

is no significant relationship between gender and dry eye syndrome. Respondents who did not have pterygium experienced dry eye syndrome at 68.3% (39 respondents). The statistical test results obtained a value of  $p=0.001$  ( $p<0.05$ ), which means there is a significant relationship between pterygium and dry eye syndrome. Respondents with 2-5 years of work experienced the most dry eye syndrome, namely 73.1% (57 respondents). The statistical test results showed that  $p=0.440$  ( $p>0.05$ ), which means that there was no significant relationship between work experience and dry eye syndrome. Working hours  $\geq 8$  hours per day most frequently experienced dry eye syndrome at 76.1% (89%). The statistical test results showed that  $p=0.482$  ( $p>0.05$ ) which means there is no significant relationship between working hours  $\geq 8$  hours per day and dry eye syndrome. Respondents who always used closed helmets experienced dry eye syndrome of 77.9% (81 respondents). The statistical test results obtained  $p=0.087$  ( $p>0.05$ ), which means there is no significant relationship between using a closed helmet and dry eye syndrome. Respondents who did not use protective glasses experienced dry eyes of 79.6% (39 respondents). The statistical test results obtained  $p=0.087$  ( $p>0.05$ ), which means there is no significant relationship between using protective glasses and dry eye syndrome. 80.9% of respondents who consumed coffee had dry eye syndrome (72 respondents). The statistical test results obtained  $p=0.072$  ( $p>0.05$ ), which means there is no significant relationship between coffee consumption and dry eye syndrome. Active smoker respondents who had dry eye syndrome were 74.4% (61 respondents). The statistical test results showed  $p=0.414$  ( $p>0.05$ ), which means there is no significant relationship between active smoking and dry eye syndrome. Respondents who used gadgets  $>6$  hours per day had dry eye syndrome of 74.6% (85 respondents). The statistical test results obtained  $p=0.115$  ( $p>0.05$ ), which means there is no significant relationship between using gadgets  $>6$  hours per day and dry eye syndrome.

## DISCUSSION

The results in Table 1 show that online motorcycle taxi drivers are dominated by adult men (19-44 years). This is because adult men mostly use two-wheeled motorized vehicles and are breadwinners to meet family needs.

The results in Table 1 show that 76.6% of motorbike taxi drivers experienced dry eye syndrome. This is because in this study there were risk factors that caused dry eye syndrome, including 94.4% having a history of working more than 8 hours, and 71.8% consuming coffee, 66.1% are active smokers, and 91.9% use gadgets for more than 6 hours.

Table 2 shows that more adult respondents aged 19-44 years experienced dry eye syndrome at 74.2% (72 respondents). These results are in accordance with research conducted by Zong JY, et al. which states that there is a change in tear production with increasing age and dry eye syndrome is mostly in the younger generation (18-49 years).<sup>7</sup> In this study, 78.2% were aged 19-44 years, where at this age the use of mobile phones is increasing, especially in this era. modern today. This causes the risk of dry eye syndrome to increase at a young age. In the statistical test results, the value of  $p=0.087$  ( $p>0.05$ ) was obtained, which means there is no significant relationship between age and dry eye syndrome. This is in line with research conducted by Paulsen AJ, et al. which states that there is no significant relationship between age and dry eye syndrome with a value of  $p = 0.06$ .<sup>8</sup> Older respondents are said to be more at risk of experiencing a decrease in tear production because they have a decrease in corneal sensitivity which is related to the mechanism of dry eye. With

increasing age, apart from decreasing tear secretion, there is also an increase in tear evaporation such as atrophy of the meibomian glands. The distribution of dry eye syndrome in the age range may vary, this is because the causes of dry eye syndrome are multifactorial.<sup>9</sup>

In the gender variable, the results showed that men experienced more dry eye syndrome, namely 78% (78 respondents). The statistical test results obtained a value of  $p=0.456$  ( $p>0.05$ ), which means there is no significant relationship between gender and dry eye syndrome. These results are in line with research conducted by Gierow JP, et al. which stated that no significant relationship was found between gender and dry eye syndrome with a  $p\text{-value} > 0.05$ .<sup>9</sup> In several epidemiological studies, the prevalence of dry eye syndrome was higher in women. This is due to low estrogen in menopausal women, whereas in this study it was dominated by men at 80.6%.

Respondents who did not have pterygium experienced dry eye syndrome at 68.3% (39 respondents). The statistical test results obtained a value of  $p=0.001$  ( $p<0.05$ ), which means there is a significant relationship between pterygium and dry eye syndrome. These results are in accordance with research conducted by Manhas A, et al. which states that there is a significant relationship between pterygium and dry eye syndrome with a value of  $p<0.001$ .<sup>10</sup> Research conducted by Gupta AK also states that there is a significant relationship between pterygium and dry eye syndrome with  $p<0.05$ .<sup>11</sup> Pterygium is a condition where the tissue under the conjunctiva experiences degeneration in the form of proliferation of fibrovascular tissue that invades the cornea. The causes of pterygium include environmental factors such as ultraviolet (sun exposure) and chronic inflammation (exposure to dust and wind).<sup>12,13</sup> Tear film abnormalities are also one of the factors causing pterygium. Disorders of the stability of the tear film (tear film) are generally caused by two factors, namely chronic inflammation of the ocular surface and changes in tear dynamics.<sup>12</sup> Dry cornea and conjunctiva trigger the growth of new tissue. Pterygium causes the surface of the eyeball to become abnormal, resulting in tear film dysfunction and dry eye syndrome.<sup>10</sup> Tear film dysfunction is a precursor to pterygium or whether pterygium causes tear film dysfunction is still unclear.<sup>11,14</sup> The results of research conducted by Thatee S in 2023 stated that pterygium causes dry eye syndrome where the higher the stage/degree of the pterygium, the more severe the degree of dry eye syndrome.<sup>15</sup>

Respondents with 2-5 years of work experienced the most dry eye syndrome, namely 73.1% (57 respondents). The statistical test results showed that  $p=0.440$  ( $p>0.05$ ), which means that there was no significant relationship between work experience and dry eye syndrome. The results of research conducted by Paudel N, et al. stated that drivers who worked for 5 years experienced dry eye syndrome due to air pollution and there was no significant difference between the length of work of 5-10 years and 10 years.<sup>16</sup> The impact of air pollution on the surface of the eyeball occurs after a cumulative process of many years.

Working hours  $\geq 8$  hours per day most frequently experienced dry eye syndrome at 76.1% (89%). In the statistical test results, it was found that  $p=0.482$  ( $p>0.05$ ) which means there is no significant relationship between working hours  $\geq 8$  hours per day and dry eye syndrome. Respondents who always used closed helmets experienced dry eye syndrome of 77.9% (81 respondents). The statistical test results obtained  $p=0.087$  ( $p>0.05$ ), which means there is no significant relationship between using a closed helmet and dry eye syndrome. Respondents who did not use protective glasses experienced dry eyes of 79.6% (39 respondents). The statistical test results obtained



$p=0.087$  ( $p>0.05$ ), which means there is no significant relationship between using protective glasses and dry eye syndrome. Working as a driver will involve environmental exposure such as pollution, high temperatures, sun, and wind. The longer you drive, the greater the risk of exposure to environments that cause dry eye syndrome. The use of helmets and protective glasses aims to reduce exposure to this environment. Research conducted by Liang K, et al. states that exposure to accumulated air pollution is significantly related to dry eye syndrome.<sup>17</sup> The many factors that cause dry eye syndrome cause dry eye syndrome to be found in respondents who always wear helmets or protective glasses, for example, because they have had pterygium for a long time, the weather is heat, and other influencing factors.

80.9% of respondents who consumed coffee had dry eye syndrome (72 respondents). The statistical test results obtained  $p=0.072$  ( $p>0.05$ ), which means there is no significant relationship between coffee consumption and dry eye syndrome. The caffeine contained in coffee can affect tear production because it has the effect of increasing the activation of sympathetic innervation in the lacrimal gland which causes a decrease in tear secretion.<sup>18</sup> Research conducted by Juddy AU, et al. shows that there is a significant relationship between caffeine and a decrease in tear production.<sup>18</sup> Likewise, research conducted by Fayola PA shows that there is a significant relationship between coffee and dry eye syndrome with  $p = 0.000$ .<sup>19</sup> Meanwhile, research conducted by Magno M. S, et al, in 2023, states that there is no significant relationship between caffeine and dry eye syndrome.<sup>20</sup> Caffeine reaches its maximum concentration in 20-120 minutes in plasma and is eliminated from the body after 4 hours.<sup>21</sup> Caffeine stimulates the parasympathetic by increasing acetylcholine which causes activation of water secretion, proteins, electrolytes and stimulation of tear secretion. The difference is in research conducted by Judy AU, et al. It uses experimental methods in collecting data. Research subjects were asked to consume caffeinated coffee and then had their tear production measured via the Schirmer test, before and after consuming coffee.

Active smoker respondents who had dry eye syndrome were 74.4% (61 respondents). The statistical test results showed  $p=0.414$  ( $p>0.05$ ), which means there is no significant relationship between active smoking and dry eye syndrome. Cigarette smoke irritates the surface of the eyeball, if it occurs continuously it will activate T cells which cause local inflammation and activation of cytokines which block sensory signals from the lacrimal gland resulting in a decrease in tear secretion.<sup>22</sup> Cigarette smoke on the surface of the eyeball causes disruption of the lipid layer. tear film which results in increased evaporation from the tear film.<sup>23</sup> Research conducted by Ibrahim AM, stated that there was a significant relationship with increasing degrees of dry eye syndrome in smokers compared to non-smokers with  $p=0.01$ .<sup>24</sup> This is different from research conducted by Attri S, who stated that there was no significant relationship between smoking, diabetes mellitus, hypertension, and dry eye syndrome.<sup>25</sup> Likewise, research conducted by Tariq MA, et al. stated that smoking was not indicated as a risk factor for dry eye syndrome.<sup>26</sup> In this study, although many respondents were smokers, more detailed and accurate data was still needed such as how to smoke, type of cigarette, duration of smoking, comorbidities, and other influencing factors.

Respondents who used gadgets >6 hours per day had dry eye syndrome of 74.6% (85 respondents). The statistical test results obtained  $p=0.115$  ( $p>0.05$ ), which means there is no significant relationship between using gadgets >6 hours per day and dry eye syndrome. Using a digital screen for more than 6 hours can increase the risk of dry eye syndrome.<sup>27</sup> Staring at a digital

screen for a long period can reduce the frequency of blinking which fails in the distribution of tears to lubricate the surface of the eye, so that tear evaporation will increase.<sup>27</sup> In research conducted by Mohtaseb ZA, et al. shows a significant relationship between the use of digital screens and a decrease in the blink reflex and the risk of developing dry eye syndrome.<sup>28</sup> Research conducted by Tawonkasiwattanakum P, et al. stated that there was no significant relationship between gadget use and dry eye syndrome in university students and staff.<sup>29</sup> In this study, the online driver profession will often use mobile phones in carrying out their work. The length of time you use a mobile phone depends on the length of work and the drivers' activities while working. If drivers often take breaks without using their mobile phones for a while or take short naps in their free time while working, this will reduce the risk of dry eye syndrome. Another thing that influences the results of this study is that there are many risk factors for dry eye syndrome, such as hot weather, cold rooms using air conditioners, wind, and other factors when using a mobile phone.

This research has the limitation of being carried out subjectively using a multifactorial questionnaire of risk factors for dry eye and the causes of dry eye syndrome, so a more detailed questionnaire is needed for each risk factor and adding other tests to confirm the diagnosis of dry eye syndrome and increasing the number of respondents studied more.

This research implies that it is hoped that preventive and educational measures regarding dry eye syndrome and pterygium can be carried out among online motorcycle taxi drivers so that the productivity of online motorcycle taxi drivers is optimal.

## CONCLUSION

The conclusion from the analysis of this research data is that there is a relationship between the incidence of pterygium and dry eye syndrome in online motorcycle taxi drivers.

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## AUTHORS CONTRIBUTION

Research concept and design: EK, data collection: EK, HA, AA, RW, NP, analysis and interpretation of results: EK, HA, manuscript preparation: EK, EM, Y, review of final manuscript results: EK, EM

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## CONFLICT OF INTEREST

Researchers have no conflict of interest regarding the results of this research.

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