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Factors Related to Eye Fatigue in Tailor Workers at Kwala Bekala Inpres Market Medan City in 2025

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ABSTRACT

Introduction: Eye fatigue is a visual response due to intensive and continuous eye use, which is not only experienced by formal computer users but also informal workers such as tailors. Sewing work that requires continuous close visual focus is the basis for this study. This study aims to determine the factors related to eye fatigue in tailors at the Kwala Bekala Inpres Market, Medan City in 2025. **Methods**: This study is a quantitative study with a cross-sectional approach. The population and sample consisted of all 35 tailors at the study location who were selected using a total sampling technique. Eye fatigue data were measured using the ASQ-17 questionnaire. Data collection of age, history of eye refraction, and length of work was carried out through interviews, while the distance to see objects was measured using a tape measure and lighting was measured using a Multifunction environment meter Krisbow 4 in 1 KW06-291. Data analysis used the Fisher exact test. **Results**: The results showed that 26 tailors (74.3%) experienced eye fatigue, with dizziness or headaches being the most common symptoms. Statistical tests showed a relationship between the history of eye refraction (p = 0,050), viewing distance of objects (p = 0,015), length of work (p = 0,030), and lighting level (p = 0,001) with eye fatigue. **Conclusion**: There is a relationship between the history of eye refraction, viewing distance of objects, length of work, and lighting level with eye fatigue in tailor workers at the Kwala Bekala Inpres Market, Medan City in 2025. Tailors are advised to use glasses that suit their eye refraction when working, adjust the working distance, do eye relaxation, adjust the layout of the sewing work table, and can add lighting sources to the work stall to reduce the risk of eye fatigue.

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INTRODUCTION

The issue of occupational health occupies a crucial position in the context of the implementation of the Sustainable Development Goals (SDGs), especially the 3rd goal to achieve good health and well-being. This goal is to prevent the onset of work-related diseases and create a healthy work environment. Every work activity and working environment conditions have the potential to cause occupational diseases (PAK) or work accidents. These accidents are generally caused by various problems in the workplace, one of which is caused by human factors, namely fatigue. High levels of fatigue can affect any worker in any form of work that can have an impact on occupational safety and health (NIOSH, 2024). One type of fatigue that directly affects an individual's visual system is eye fatigue, a condition that arises from excessive activity that overloads the visual system (Kroemer and Grandjean, 1997). Seeing with close points in any job requires intense visual concentration, so poor vision can reduce performance and productivity, as well as increase the risk of workplace accidents (Anshel, 2005).

In 2020, it was recorded that around 143 million individuals in the working-age population experienced moderate to severe visual impairment. It is estimated that around 13 million people of the working age groups worldwide suffer from visual impairment triggered by work activities (ILO, 2023). Symptoms of eye fatigue appear in response to strain on the visual system due to excessive use of the eyes while working, which can cause subjective complaints in the form of discomfort (Wirgunatha and Adiputra, 2019). A WHO report in 2014 showed that the prevalence rate of *asthenopia* (incidence of eye fatigue) reached a range from 40% to 90% (Irma et al., 2019). Furthermore, NIOSH reports that about 90% of workers who interact with computer screens for more than three hours per day have the potential to cause eye fatigue (Rathore, 2017). In Indonesia, the prevalence rate of *severe low vision* was recorded at 1,49% in the productive age group of 15-45 years (Riskesdas, 2013). The term *severe low vision* refers to a condition that indicates the occurrence of eye fatigue (Conrad, 1992).

Eye fatigue is a serious problem that can be experienced by anyone, especially workers, because it has the potential to reduce productivity levels (Rohmawati et al., 2023). This problem is not only limited to formal sector workers, but can also be experienced by informal sector workers such as in the sewing field. Sewing activities without pause for a long duration of time can cause *eyestrains* accompanied by symptoms such as eye pain, headaches, and excessive sleepiness. If it occurs in the long term, this condition can trigger refractive diseases in the eyes and accelerate eye fatigue (Fatmayanti et al., 2022).

Tailors are one of the informal business sectors that dominates using the sense of sight. Sewing activities require skills that are supported by precision, focus, and a complex level of precision for each element of a small object as well as at a very close distance. Visual attention has to go the extra mile because it requires seeing at a very close distance and at one point continuously. So, health problems are often found experienced by tailors, in the form of work-related diseases such as eye fatigue. This symptom is often ignored, even though it can have a serious impact because it has the potential to reduce the level of work productivity (Pabala et al., 2021).

A study by Wirgunatha and Adiputra (2019) on 43 tailors in Denpasar City found that 41 people (95,3%) of them experienced eye fatigue. A study conducted by Purwati and Muzakir (2024) also found that tailors were at high risk of experiencing eye fatigue where 76,5% of the 85 Convection X tailors experienced symptoms of dry eyes, headaches, and watery eyes. The findings of eye fatigue in this tailor are certainly caused by multiple factors.

The difference between this study and previous studies is the location of the research in Kwala Bekala Medan City and a sample of 35 tailors of women's clothing with a variety of ages. Inpres Market located in Kwala Bekala Village, Medan Johor District, is a traditional market where one of the main livelihoods is the sewing business. Tailors of women's clothing at the Inpres Market usually make clothes such as women's kebaya, songket, sequins, dresses, skirts, and camisoles. The tailors have a place to work in a row with small stalls measuring 2,75 x 3 meters. The daily work system that is carried out is to serve according to the orders of customers who want to make clothes, measure and record body size, make lines, drawings, and patterns according to the size and model of clothing that the customer wants, cut fabrics, sew the main parts of clothes, do embroidery, if using sequin, the tailor will do additional sewing sequins, until the final stage (*finishing*) until the clothes are ready to be worn.

Based on the results of an initial survey conducted on 10 tailors, it was found that three tailors worked between five and seven hours per day. Meanwhile, seven other tailors worked for eight hours or more. In a situation of increased orders, generally tailors continue to work until the evening with erratic overtime. However, they usually take a break of about 30 minutes or an hour for the purpose of eating and praying. Tailor workers at the Inpres Market are female and male with an age group of 21-55 years. Some have refractive disorders so they wear glasses and some do not.

Through initial surveys, it was known that the lighting for work came from the lights placed in the middle and front of the stalls, as well as natural light from the end of the aisle. However, the intensity of natural lighting received is uneven and limited. As a result, the lighting on each tailor's workbench shows significant variation. When doing work activities, the position of the tailor's body also tends to be closer to the sewing machine so that the lighting will be closed. From initial observations of 10 tailors, it was found that 8 people experienced eye fatigue with symptoms of headache, eye pain, and throbbing sensation. Blurred and double visual symptoms were experienced by 7 people, while watery eyes were experienced by 5 tailors.

The incidence of eye fatigue is influenced by a number of aspects, both from the inside (age, gender, work experience, refractive conditions, viewing distance) and from outside the individual (lighting intensity, duration of work). From preliminary studies, there are studies that show things that are not in line, such as a study by Mindayani et al. (2019) which stated that lighting intensity is not related to eye fatigue. The varied results of this study show that eye fatigue is not caused by a single factor. Therefore, more research is needed to understand the factors that cause eye fatigue in the tailoring sector. Based on this description, the researcher is interested in researching factors related to eye fatigue in tailor workers at the Kwala Bekala Inpres Market, Medan City in 2025.

LITERATURE REVIEW

Eye Fatigue

According to Pheasant (1991), eye fatigue is a condition of tension experienced by the eyes. This condition arises due to excessive use of the muscles inside and around the eyes when performing short-distance work tasks for a long time. Eye fatigue is generally accompanied by discomfort in vision. When performing work that requires a heavy level of visuals, the ciliary muscles are used in accommodation, the orbital muscles (*corrugator supercilii* and *orbicularis oculi*), and the facial expression muscles are involved. The muscles involved will perform eye movements quickly so that if done excessively and continuously, there will be the potential for eye fatigue. Factors such as age, eye refractive history,

distance of viewing objects, length of work, and lighting level are also involved in the onset of eye fatigue (Pheasant, 1991).

Symptoms of Eye Fatigue

According to Pheasant (1991), there are several symptoms that indicate the occurrence of eye fatigue that causes strain on the eyes. These symptoms include:

1. Pain or throbbing sensation felt inside, around, and behind the eyeball, as well as visual disturbances that can appear blurred and double vision, and difficulty maintaining focus of the gaze.
2. Inflammation of the eyes and eyelids, which is characterized by a sensation of heat in the eyes, redness, soreness, and watery eyes.
3. The appearance of complaints of headaches that is often followed by dizziness or nausea, as well as feelings of tiredness and emotional irritability.

Age

As we age, the lens of the eye naturally becomes stiffer and less elastic. As a result, this condition demands greater accommodative efforts from the ciliary muscles to maintain focus on nearby objects, which can eventually trigger the onset of eye fatigue. Especially at the age of >40 years, individuals experience a decrease in the ability to accommodate their eyes, so they are less able to focus small objects at close ditances optimally. When reading or viewing at a distance of 25 cm, the eyes will increase the muscular effort required for near focus, making it feel heavier and causing discomfort as the eye muscles compensate for the loss of lens flexibility (Kroemer and Grandjean, 1997). (Kroemer and Grandjean, 1997).

History of Eye Refraction

Individuals with refractive disorders tend to have a higher risk of eye fatigue. This is due to the increased need for visual accommodations that must be made compared to individuals who have normal vision (Pheasant, 1991). A history of eye refraction is associated with the occurrence of eye fatigue. According to Ilyas and Yulianti (2015), refractive abnormalities that cannot be corrected correctly result in eye fatigue (*asthenopia*). History of eye refraction includes myopia, hypermetropia, and astigmatism.

Viewing Distance of Objects

In general, for viewing comfort, the display used should be placed within 15^0 of the normal line of sight. This means that the display position should ideally be between the horizontal line to 30^0 down, as well as within 15^0 to the left or right of the straight forward view. This determines the comfort of viewing at the object and considering the accepted angle, so lowering the head less than an angle of about 15^0 does not cause much of a bad impact or is not very dangerous, locations up to an angle of 45^0 are considered still acceptable. The shorter the viewing distance of the object, the greater the effort of the muscles to make accommodation, the more-stiff the head and neck. Therefore, the viewing distance of the object must be appropriate so that it remains in a comfortable condition. People with normal vision tend to view objects at a distance of about 40 cm (Pheasant, 1991).

Length of Work

According to Pheasant (1991), any heavy activity or visual task that overloads the eye muscles with vision over a long period of time has the potential to be a source of eye fatigue (*eyestrain*). Work that is not too heavy or not too light will experience a decrease in productivity after doing the work for 4 hours. According to Suma'mur (2013), a person generally has the ability to work effectively for approximately 8 hours per day. Extending

working hours beyond this limit can trigger fatigue, health problems, and accidents, which ultimately decreases efficiency, effectiveness, and productivity, and negatively impacts the quality of work results.

Lighting Level

The more detailed the visual task being performed, the more light is needed. The level of lighting itself can affect work safety, especially in high-risk jobs, where hazards can be avoided if they are clearly visible. After getting a adequate level of lighting to work optimally, if there is additional lighting too much or too high, it will not make a person's performance work better or more comfortable because it can create glare that causes discomfort to the eyes. Poor and inadequate lighting in during work activities often makes a person unconsciously bring their gaze closer so that they can see more clearly so that the eyes will work harder to mantain focus. If done continuously, it can lead to eye fatigue (Pheasant, 1991).

METHOD

This study is a quantitative study with *a cross-sectional* design. The research was carried out at the Kwala Bekala Inpres Market, Medan City because there were complaints of eye fatigue from tailors, so it was necessary to research the risk factors. The research period lasted from May to June 2025. The study population was 35 tailors who worked at the Kwala Bekala Inpres Market, Medan City. Using *the total sampling* method, the entire population was used as a research sample.

The variables in this study consist of dependent and independent variables. The dependent variable of this study is eye fatigue which is measured using an adoption and modification of the *Asthenopia Survey Questionnaire* (ASQ-17). The ASQ-17 questionnaire has been tested for the accuracy of the questionnaire for its validity and reliability so that it can be used in different populations or groups (Lin et al., 2023). In Indonesia, this questionnaire has been used on informal sector worker training participants at the Rumah Gemilang Indonesia (RGI) Depok Informal Training Institute to find cases of eye fatigue, where it was found that the occurrence of *asthenopia* (eye fatigue) was based on the symptoms that occurred through the *Asthenopia Survey Questionnaire* questionnaire (ASQ-17), one of which is for fashion design participants with sewing activities (Nuraini et al., 2024). ASQ-17 contains a combination of 17 questions about the symptoms of eye fatigue which are divided into dimension A (A1 – A7) regarding symptoms in the eyes or organic ocular symptoms, dimension B (B8 – B13) regarding symptoms in functional vision, and dimension C (C14 – C17) regarding systemic and psychological symptoms. This variable is categorized as Yes, experiencing eye fatigue if the total score is >12.5 and No, not experiencing eye fatigue if the total score is ≤12.5.

Meanwhile, the independent variables in this study were age, history of eye refraction, distance of viewing objects, length of work, and lighting level. Age was calculated from the time the respondents were born to the research conducted through interviews by filling out questionnaires and was categorized into ≥40 years and <40 years. A history of eye refraction was carried out by interviewing the tailor whether they suffered from refractive disorders such as myopia (nearsightedness), hypermetropia (farsightedness), and astigmatism (cylindrical) by filling out a questionnaire that was categorized as having a history of eye refraction and not having a history of eye refraction. The distance of viewing object is measured using a *tape measure* to measure the viewing distance from the outer edge of the tailor's eye (lateral canthus) to the surface of the object that is commonly seen during work based on each main work activity being performed,

namely while making lines, drawings, and patterns, as well as during sewing and embroidery processes, and while performing sequin work. The measurement results of the three work processes were then calculated on average to obtain the value of the distance of viewing the object and categorized into <40 cm and ≥40 cm. Length of work was measured by interviews using questionnaires related to the total length of time tailors did work in a single working day in units of hours and categorized according to the median as the cut-off point. Lighting level measurement is carried out at each sewing worktable using *the Multifunction environment meter krisbow 4 in 1 KW06-291*, on the local lighting criteria where the measurement is carried out in accordance with the Indonesian National Standard 7062:2019 concerning Measurement of Lighting Intensity in the Workplace, then the measurement is carried out three times to see the average lighting used by the tailor in daily work. The measurement results were recorded on the Local Lighting Intensity Measurement Result Recording Form and in accordance with the context of sewing work and the use of machines that require precision and special attention to small and delicate objects for a long duration, the recommended lighting level in the Regulation of the Minister of Manpower Number 5 of 2018 is between 200-500 lux so that after the average measurement results are obtained it is categorized as <200 lux or >500 lux (not up to standard) and 200-500 lux (compliant with standards).

The data analysis method includes univariate and bivariate analysis conducted with SPSS *Statistics Version 27*. Univariate analysis is carried out by providing a presentation of data in the form of distribution and frequency in the form of a table containing numbers (n) and percentages (%) and bivariate analysis is carried out using *fisher exact tests* to determine the relationship between independent and dependent variables with the determination of statistical test results on independent and dependent variables with a value of $p<0.05$ means that there is a significant relationship, and Odds *Ratio* (OR) is used to see how much the probability or risk opportunity of independent variables to the occurrence of dependent variables with a 95% confidence interval.

RESULTS AND DISCUSSION

The location of this research is at the Inpres Kwala Bekala Market in Medan City which is located in the area of Medan Johor District, Medan City, North Sumatra Province where the location of tailors in the Inpres Market is collected in a row of aisles with several stalls. Based on the results of a study on 35 tailor workers at the Kwala Bekala Inpres Market, Medan City, the frequency distribution of the variables studied through univariate analysis presented in Table 1 was obtained.

Table 1. Characteristics of Tailor Workers (N=35)

Variable	Categories	Frequency (n)	Percentage (%)
Age	≥40 years old	10	28.6
	<40 years old	25	71.4
History of eye refraction	Yes, have a history of eye refraction	22	62.9
	Have no history of eye refraction	13	37.1
Viewing distance of objects	<40 cm	24	68.6
	≥40 cm	11	31.4
Length of work	≥8 hours	26	74.3
	<8 hours	9	25.7
Lighting level	Not up to standard	27	77.1
	Compliant with standards	8	22.9

Table 2. Frequency Distribution of Eye Refractive History Types in Tailor Workers

History of Eye Refraction	Frequency (n)	Percentage (%)
Myopia (nearsightedness)	15	68.2
Hipermetropia (farsightedness)	7	31.8

Table 3. Distribution of Eye Fatigue Symptoms in Tailor Workers (N= 35)

Questions	Never		Sometimes (Light)		Frequent (Moderate)		Always (Weight)	
	n	%	n	%	n	%	n	%
Did you feel discomfort around your eyes?	3	8.6	32	91.4	0	0	0	0
Did your eyes feel dry?	21	60	14	40	0	0	0	0
Did your eyes feel pain like tingling and twitches?	6	17.1	27	77.1	2	5.7	0	0
Did your eyes feel like hot, sore, red, stinging, and watery eyes?	7	20	21	60	7	20	0	0
Did your eyelids feel heavy?	13	37.1	22	62.9	0	0	0	0
Do your eyes feel strained?	22	62.9	12	34.3	1	2.9	0	0
Were your eyes sensitive to light (glare, dark)?	30	85.7	5	14.3	0	0	0	0
When working with a sewing machine or otherwise, did the level of light brightness cause discomfort to the eyes?	9	25.7	24	68.6	2	5.7	0	0
Did you squint at work?	4	11.4	20	57.1	11	31.4	0	0
Did your eyes feel heavy when doing activities or working in close proximity, such as when working with a sewing machine or observing work details?	12	34.3	23	65.7	0	0	0	0
Did your vision blur and shadow when your eyes work at close range?	2	5.7	24	68.6	9	25.7	0	0
Did your vision impairment make you feel slower or more difficult to work and observe the details of your work?	7	20	24	68.6	4	11.4	0	0
Did your eyes feel uncomfortable when looking at moving objects or things?	27	77.1	7	20	1	2.9	0	0
Did you have difficulty focusing or losing concentration when your eyes are used in activities or work?	8	22.9	23	65.7	4	11.4	0	0
Did you find it difficult to remember the steps or details of the work that you have just seen and done?	31	88.6	4	11.4	0	0	0	0
Did you experience dizziness or headache (around the forehead or behind the eyes) when your eyes are being used for activities or work?	0	0	17	48.6	18	51.4	0	0
Did the discomfort in your eyes make you feel anxious and depressed?	13	37.1	20	57.1	2	5.7	0	0

Based on Table 1, the results of the study show that of the 35 tailor workers at the Kwala Bekala Inpres Market, it is known that the highest frequency of age among tailors is tailors under 40 years old (<40 years) with a total of 25 tailor workers (71.4%). It is known that of the 35 tailor workers, more have a history of eye refraction than those who do not have a history of eye refraction with a total of 22 tailor workers (62.9%) with the highest

frequency of the type of refractive history suffered by tailors, namely as many as 15 tailor workers (68.2%) have a history of eye refraction myopia (nearsightedness) while 7 other tailor workers (31.8%) have a history of hypermetropia eye refraction (Table 2). It is known that of the 35 tailor workers, the highest frequency of more tailor workers who see work objects with a distance of <40 cm, which is 24 tailors (68.6%). As for the length of work of tailors in one day, the highest frequency was that tailors who worked for ≥8 hours were recorded higher than tailors who worked for <8 hours, which was as many as 26 tailor workers (74.3%). It is known that more tailors work at sewing desks with non-standard lighting levels (<200 lux or >500 lux) compared to tailors who have a sewing desk with a standard lighting level (200-500 lux), namely 27 sewing workers (77.1%).

The measurement of eye fatigue symptoms was carried out with a questionnaire containing 17 questions. Referring to Table 3, the most common symptoms felt by tailor workers are dizziness or headache felt by 18 tailor workers (51.4%), squinting the eyes while working by 11 tailor workers (31.4%), blurred and shadowy vision by 9 tailor workers (25.7%), and painful eye symptoms such as red, hot, stinging, and watery eyes by 7 tailor workers (20%) are symptoms often felt by tailor workers.

Table 4. Distribution of Eye Fatigue in Tailor Workers (N= 35)

Eye Fatigue	n	Percentage (%)
Yes (if ASQ-17 > 12,5)	26	74.3
No (if ASQ-17 ≤12,5)	9	25.7

Referring to Table 4, it can be seen that out of a total of 35 tailor workers at Kwala Bekala Inpres Market, Medan City, as many as 26 tailors (74.3%) experienced eye fatigue.

Tabel 5. The Bivariate Analysis (N=35)

Variables	Eye Fatigue				Total		*P-value*	OR	95% CI
	Yes		No						
	n	%	n	%	N	%			
Age (Years)									
≥40	8	30.8	2	22.2	10	28.6	1.000	1.556	0.263 – 9.211
<40	18	69.2	7	77.8	25	71.4			
History of Eye Refraction									
Yes	19	73.1	3	33.3	22	62.9	0.050	5.429	1.059-27.833
No	7	26.9	6	66.7	13	37.1			
Viewing Distance of Objects									
<40 cm	21	80.8	3	33.3	24	68.6	0.015	8.400	1.543 – 45.737
≥40 cm	5	19.2	6	66.7	11	31.4			
Length of Work									
≥8 hours	22	84.6	4	44.4	26	74.3	0.030	6.875	1.266 – 37.342
<8 hours	4	15.4	5	55.6	9	25.7			
Lighting Level									
Not up to standard	24	92.3	3	33.3	27	77.1	0.001	24.000	3.247 – 177.405
Compliant with standards	2	7.7	6	66.7	8	22.9			

The Relationship Between Age and Eye Fatigue in Tailor Workers

It can be seen that of the 26 tailor workers who experienced eye fatigue did not only occur in tailor workers who are ≥40 years old but also occur in tailor workers who are <40 years old. This can be seen from the number of tailors who experience more eye fatigue than those who do not, both in tailor workers over 40 years old (≥40 years) and those under 40 years old (<40 years). Tailor workers aged 40 years and above (≥40 years) and suffer from

eye fatigue amounted to 8 tailor workers (30.8%). This percentage is lower than for tailor workers under 40 years old (<40 years), which is 18 tailor workers (69.2%). Based on the results of *the statistical analysis of fisher exact test* on the data that has been collected, the results of the value p = 1,000 (*p value* > 0.05) with the *value of Odds ratio* = 1.556 (95% CI 0.263 – 9.211). In the *range of this Confidence Interval* includes a value of 1, which shows that statistically, there is no significant relationship between age and eye fatigue in tailor workers at the Kwala Bekala Inpres Market, Medan City (Table 5).

Age has a profound impact on the ability to accommodate as the lens of the eye will gradually lose its elasticity. As a result, the near-point of vision will gradually recede, while the distant point generally remains, or only undergoes a slight change to be shorter. Especially at the age of ≥40 years, individuals experience a decrease in the ability to accommodate the eyes (Kroemer and Grandjean, 1997). The findings made by Pabala et al. (2021) also strengthen this theory. In their study of tailors in Kuanino Village, Kupang, it was reported that there was a statistically significant relationship (p = 0.011) between the age variable and the incidence of eye fatigue with the result that most of the ages found in tailors in Kuanino Village, Kupang were more than 40 years old and older who experienced more eye fatigue. In this age group, a phase of decline in immunity occurs, including a decrease in the ability to accommodate the eyes. The decline causes tailor workers to actually feel a reduction in the function of visual accommodation, which has an impact on the onset of eye fatigue. In contrast, in the younger age group, those under 40 years old, eye fatigue is felt lower or less compared to the age group of ≥40 years.

However, when viewed from the actual conditions in the field based on the data collected by the researcher on tailor workers at Kwala Bekala Inpres Market, it is known that most of the tailor workers at Kwala Bekala Inpres Market in Medan City are <40 years old more than tailor workers with the age of ≥40 years and above and tailor workers with the age of <40 years also experience eye fatigue with a greater number of workers than tailors aged ≥40 years with the most commonly reported percentage of symptoms are dizziness or pain (pain) in the head, squinting the eyes while working, blurred and shadowy vision, and eyes that feel pain such as red, hot, sore, and watery eyes so that based on the results of statistical tests there is no significant relationship between age and eye fatigue. The absence of a statistically significant relationship between age and eye fatigue in these findings is consistent with previous studies conducted by Maulina and Syafitri (2019) on tailors in Banda Sakti District (p = 0.101) and studies by Chandraswara and Rifai (2021) on batik workers in Srikuncoro (p = 0.26) resulting in the same analytical conclusion, namely that there is no significant relationship between age and eye fatigue. In particular, research by Chandraswara and Rifai (2021) highlights that many workers are less than or under 40 years old who also experience eye fatigue conditions. This proves that age is not the dominant risk factor. Thus, the results of a study conducted on tailor workers at the Kwala Bekala Inpres Market in Medan City indicate that variables other than age have a more significant role in causing eye fatigue. This is due to work-related factors that show a more dominant influence in causing eye fatigue compared to the influence caused by age factors.

The Relationship Between History of Eye Refraction and Eye Fatigue in Tailor Workers

The result showed that of the 26 tailor workers who experienced eye fatigue with a history of eye refraction, as many as 19 tailor workers (73,1%) were more than 7 tailor workers (26,9%). Based on the results of *the statistical analysis of the fisher exact test* on the data that has been collected, the result was obtained with a value of p = 0,050 (*p value* ≤ 0,05) which proves that there is a significant relationship between history of eye refraction and

eye fatigue in tailor workers at the Kwala Bekala Inpres Market, Medan City. *Odds ratio* = 5,429 (95% CI 1,059 – 27,833) indicates that tailor workers with a history of eye refraction are 5,429 times more likely to experience eye fatigue than tailor workers who do not have a history of eye refraction. The significance of this finding is also strengthened by the *Confidence Interval* range that does not exceed the number 1 (Table 5).

The findings of this study reinforce the evidence that a history of refractive abnormalities is an important risk factor for eye fatigue. In line with a study by Utami et al. (2018) as well, where it was reported that there was a relationship between refractive history and eye fatigue. In the study, it was found that there was an increased risk of eye fatigue in workers with hypermetropia 19 times greater than in workers with normal eyes. Based on the results of the interview, it was found that the types of eye refraction history in tailor workers at the Kwala Bekala Inpres Market included myopia (nearsightedness) and hypermetropia (farsightedness). The most common eye refractive history found in tailor workers at the Kwala Bekala Inpres Market is myopia (nearsightedness), which is as many as 15 tailors. Based on the results of observations at the research site, there were as many as 16 tailor workers with a history of refraction known to not use glasses regularly according to their visual needs. Myopia itself is a refractive disorder that causes focused rays in front of the retina. In the context of their work, this causes individuals with myopia to be able to see close objects clearly or even too closely, but have difficulty in distance vision, this condition can trigger symptoms such as headaches and give rise to the habit of squinting at work (Ilyas and Yulianti, 2015).

People with vision impairments (eye refraction) are more prone to eye fatigue than people with normal eyes. Therefore, for tailor workers who have a history of refraction, it is important to use glasses at work that are in accordance with the right correction which must be in accordance with the history of refraction suffered and can also perform regular eye examinations.

The Relationship Between Viewing Distance of Objects and Eye Fatigue in Tailor Workers

Out of the 26 tailor workers who experienced eye fatigue, the majority or as many as 21 tailor workers (80,8%) worked with an object viewing distance of less than 40 cm (<40 cm). This number is much higher than for tailor workers who look at work objects from a distance of ≥40 cm, which only amounts to 5 tailor workers (19,2%). Based on the results of *the statistical analysis of fisher exact test* on the data that has been collected, the result was obtained with a value of p = 0,015 (*p value* ≤ 0,05) which proves that there is a significant relationship between the object viewing distance and eye fatigue in tailor workers at the Kwala Bekala Inpres Market, Medan City. Odds *ratio* = 8,400 (95% CI 1,543– 45,737) with a *Confidence Interval* range that does not exceed 1 indicates that tailor workers who work with an object viewing distance of <40 cm have an 8,4 times greater chance of experiencing eye fatigue than tailor workers who work with an object viewing distance of ≥40 cm (Table 5).

These findings are in line with the results of previous studies that reinforce the results of the study. This is in line with a study by Nurhayati et al. (2022) who found a significant relationship in sewing operators at PT X (p = 0.004). Further support is also in line with research by Utomo et al. (2023) who researched sequin craftsmen in Dukuh Cemani and reported the same conclusions regarding the significant relationship between eye distance to work objects and eye fatigue. Physiologically, the human eye has optimal visibility to be able to function naturally without being subjected to excessive stress. When the distance between the eye and the work object is closer than the ideal distance, the ciliary muscles of the eye will be forced to perform continuous accommodation. Working conditions that demand continuous contraction of the eye muscles for a long duration are

what directly contribute greatly to the onset of eye fatigue. To work on seeing small work objects or objects, people with normal vision tend to see at a distance of about 40 cm (Pheasant, 1991). The shorter the distance in looking at the object, the greater the effort of the eye muscles to make accommodations and the stiffer the head and neck. As found in this study, tailor workers at the Kwala Bekala Inpres Market in Medan City who worked at an object viewing distance of <40 cm were more prone to experiencing eye fatigue compared to workers whose object viewing distance was ≥40 cm. This tendency to work at close quarters is not without cause, but rather is driven by the nature of the job itself which demands a high level of precision, concentration and observation of detail. The demands of completing orders on time often leave tailors working with less than ideal posture and visibility. The impact of this prolonged close vision can cause a shift in the near-eye point, so that the visual accommodation system is forced to work more frequently and more intensively. This excess activity causes tension (*strain*) in the ciliary muscles, which is the root cause of eye fatigue. This tension then gives rise to a series of symptoms, where symptoms often reported by workers range from dizziness and blurred vision to a stinging, hot, and watery sensation in the eyes.

Therefore, it should be the right thing to do, setting the appropriate and ideal viewing distance of objects. However, if the tailor is used to the distance of seeing objects that is usually done at work, another recommendation that can be done by the tailor is to do the 20-20-20 technique to reduce the risk of eye fatigue where every 20 minutes, stop sewing, look up, and stare at something 20 feet away for 20 seconds.

The Relationship Between Length of Work and Eye Fatigue in Tailor Workers

Out of the 26 tailor workers who experienced eye fatigue, the majority were 22 people (84.6%) with a working time of ≥8 hours. This number is higher when compared to tailor workers who work <8 hours, which only amounts to 4 tailor workers (15.4%). Based on the results of *the statistical analysis of fisher exact test* on the data that has been collected, the result was obtained with a value of p = 0.030 (*p value* ≤ 0.05) which proves that there is a significant relationship between the length of work and eye fatigue in tailor workers at the Kwala Bekala Inpres Market, Medan City. Odds *ratio* = 6.875 (95% CI 1.266 – 37.342) with a *Confidence Interval* range that does not exceed 1 indicates that tailors who work ≥8 hour have a 6.875 times greater chance of experiencing eye fatigue than tailors who work <8 hours (Table 5). In line with these findings, relevant research by Arum (2024) also identified a significant relationship between working time and eye fatigue in sewing workers at CV Jodion Unggul Perkasa. Statistical analysis in the study resulted in a p value = 0.014, which confirms that the majority of workers who experience eye fatigue are those who have >8-hour working hours. The consistency of these results strengthens the findings of the current research.

Excessive working duration (length of work) is a major factor that contributes to decreased productivity and the onset of fatigue. If workers extend their working hours by more than 8 hours, fatigue, health problems, and work accidents will arise which can have an impact on work effectiveness and productivity (Suma'mur, 2013). Through the findings of the research obtained, from 35 tailor workers, it was found that 22 tailors who worked ≥8 hours and tailor workers who worked <8 hours also experienced eye fatigue, namely as many as 4 tailor workers. The incidence of eye fatigue can occur in workers who work more than or equal to 8 hours and those who work less than 8 hours, especially in the sewing and sequin work process because these two processes require a focused and detailed process in close distances. In this study, an interesting finding was found, where four tailors who worked less than 8 hours per day still reported that they experienced eye fatigue. An in-

depth analysis of this group showed a strong interaction between the tailors' internal conditions and the external demands of their work. The four tailors are known to have a history of eye refraction (myopia/hypermetropia), which physiologically becomes an initial burden on their visual system. This burden on the eye is then compounded by the nature of sewing and sequining work which essentially demands precision and focus on very fine details so that in order to compensate for the condition of their eyes while also meeting the demands of precision in the work, the tailors naturally work with a close viewing distance of less than 40 cm.

To reduce the risk of eye fatigue, interventions in the form of paying attention to and utilizing the duration or time in work with regular eye rest and relaxation are highly recommended for tailor workers. One effective method is to implement scheduled breaks from visual activities. Taking a look away from work for 15-20 minutes every two hours, or giving a shorter break of 10 minutes after an hour of work, or 5 minutes every 30 minutes of work (Firdani, 2020). In addition to taking a break from rest, eye strain can be reduced by giving a gentle massage to the eyelid area and around the eyes, as well as compressing the eyes using a cloth soaked in warm water, can help reduce the risk of strain on the eye muscles that can cause eye fatigue (Amin et al., 2019).

Relationship Between Lighting Level and Eye Fatigue in Tailor Workers

Out of a total of 26 tailor workers who experienced eye fatigue, as many as 24 people (92.3%) worked in lighting conditions that were not in accordance with the standard (<200 lux or >500 lux). This number is much larger than only 2 tailor workers (7.7%) working in standard lighting conditions (200-500 lux). Based on the results of *the statistical analysis of fisher exact test* on the data that has been collected, the result was obtained with a value of p = 0.001 (*p value* ≤ 0.05) which proves that there is a significant relationship between the level of lighting and eye fatigue in tailor workers at the Inpres Kwala Bekala Market, Medan City. Odds *ratio* = 24,000 (95% CI 3,247 – 177,405) with a Confidence Interval range that does not cross 1 indicates that tailors working under lighting levels that do not meet the standard have a 24 times higher chance of experiencing eye fatigue compared to tailors working under lighting levels that meet the standard. The results of the measurement of the lighting level in the work area of 35 tailor workers showed that 27 respondents worked in non-standard conditions, consisting of 25 workers with lighting less than 200 lux and 2 workers with lighting above 500 lux. The high lighting conditions that do not meet these standards are directly proportional to the findings of eye fatigue that occurred, where 24 of the 27 workers in the group were identified as experiencing symptoms of eye fatigue (Table 5).

The results of this study are in line with several previous studies that also found a relationship between lighting and eye fatigue. One of them is Arum (2024) research on sewing workers at CV Jodion Unggul Perkasa. The study found that workers with lighting that does not meet the standard experienced more eye fatigue and showed a statistically significant relationship with the result of a p = 0.009 value. Lighting levels that pass the standard value (too high) will not make a person work better as well as it can cause discomfort to the eyes as well. On the other hand, when working with poor and inadequate lighting, it will force the worker to unconsciously bring his gaze closer so that he can see more clearly so that the eyes will work harder in adjusting their focus and can increase the tension of the eye muscles.

Data collected through objective measurements at the research site proved that the average lighting level was not in the ideal range of 200-500 lux, as required by Indonesian Ministry of Manpower Regulation Number 5 of 2018. The incompatibility of the work environment with the occupational health and safety standard is the main cause of the

finding of a significant relationship between lighting and the high incidence of eye fatigue in tailor workers. Based on the results of observations in the field, sunlight contributes to the natural lighting that enters through the ends of the aisles that are open at the front and back, but the intensity of natural lighting received is uneven and limited due to the location and position of each stall and the condition of the market that is covered by the roof so that the more reliable lighting is through artificial lighting (*artificial lighting*). Therefore, the lighting obtained at each tailor's workbench is in accordance with the standard and some is not in accordance with the standard.

Thus, it is important to take efforts to improve the conditions of the work environment to reduce the risk of eye fatigue. Efforts that can be made include adding locally made lighting around the sewing table and rearranging the position of the sewing workbench so that workers get lighting according to the recommended standards, and not obstructing (backing) the arrival of light sources both from artificial light, namely lights and natural light that enters the tailor's stall during work.

CONCLUSION

Referring to the findings in this study, the conclusion obtained through univariate analysis was that as many as 26 tailor workers (74.3%) at the Kwala Bekala Inpres Market experienced eye fatigue. This study revealed that 25 out of 35 tailor workers (71.4%) at the Kwala Bekala Inpres Market, Medan City, were individuals who were less than 40 years old. Furthermore, it was found that 22 tailor workers (62.9%) of the total sample had a history of eye refractive disorders, of which myopia (nearsightedness) was the most dominant. The results of *the fisher exact* statistical test in bivariate analysis indicated a statistically significant relationship between several factors (variables) and eye fatigue, namely history of eye refraction (*p-value* = 0.050), viewing distance of objects (*p-value* = 0.015), length of work (*p-value* = 0.030), and lighting level (*p-value* = 0.001). It is important and recommended to use glasses that are suitable for eye refraction when working, adjusting the distance in working, relaxing the eyes, adjusting the layout of the sewing workbench, and being able to replenish the lighting source at the work stall to reduce the risk of eye fatigue.

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