

Overview and Correlation Between Work Stress and Dry Eyes Syndrome among Nurses in Indonesia

Rondhianto^{1*}, Siswoyo¹, Annisa Putri Zalsabila¹

¹Faculty of Nursing, Universitas Jember, Indonesia; rondhianto@unej.ac.id (Corresponding Author)

Article Info:

Submitted:
07-10-2023
Revised:
25-01-2024
Accepted:
30-01-2024

DOI:

<https://doi.org/10.53713/nhsj.v4i1.300>



This work is licensed
under CC BY-SA License.

ABSTRACT

Exhausted nurses in providing nursing care can impact work stress. Many factors cause work stress. Work stress is the type of psychological stress that reduces the lacrimal gland's activity, affecting dry eye syndrome. The study aims to analyze the correlation between work stress and nurses' dry eye syndrome in Nganjuk General Hospital. The study was a descriptive correlative observational with a cross-sectional design. The sample was 84 nurses, taken by simple random sampling. Data were collected using Health and Safety Executive (HSE) and Ocular Surface Disease (OSDI) questionnaires. The study showed nurses experienced mild stress (96.43%) and moderate dry eye syndrome (36.90%). There was a positive correlation between work stress and dry eye syndrome in nurses in the weak category ($r=0.356$; $p=0.001 < 0.05$). There were no significant differences in work stress by age, gender, working period, and marital status ($p=0.388$; $p=0.687$; $p=0.730$; $p=0.839 > \alpha 0.05$). There was a significant difference in work stress based on education ($p=0.033 < \alpha 0.05$). There were no significant differences in dry eye syndrome with age, gender, working period, and marital status ($p=0.644$; $p=0.436$; $p=0.865$; $p=0.072$; $p=0.719 > \alpha 0.05$). The study conclusion is that work stress is related to dry eyes syndrome. Apart from that, work stress is also influenced by the level of education. Therefore, interventions to reduce work stress in nurses should pay attention to education level to reduce the risk of dry eyes syndrome.

Keywords: nurses; work stress; dry eye syndrome

INTRODUCTION

Nursing is one type of work that has a high level of stress. Work stress can occur because nurses get high pressure and demands from the workplace, which causes physical and mental health to deteriorate (Khamisa et al., 2015; Bardhan et al., 2019; Riyanti and Rahmandani, 2020). Cannon's stress theory explains that damage to biological systems will occur when nurses experience prolonged contact with stress, disrupting physical symptoms (Khamisa et al., 2015). The Health and Safety Executive states that nursing is one type of stressful work. Nurses are ranked 27th out of 130 kinds of work with high-stress levels. A survey from PPNI in 2007 shows that 50.9% of nurses in Indonesia experience work stress, which causes fatigue, dizziness, and inability to rest. A previous study showed that 52.6% of nurses experienced moderate work fatigue, and 63. % % experienced excessive workloads (Hutama, Wilda and Ristiani, 2019). The incidence of dry eye syndrome is one of the most common eye diseases, reaching 10%-30% worldwide (Hyon, Yang and Han, 2019). In general, in Indonesia, the incidence of dry eye syndrome is around 30.6% (Kementerian Kesehatan RI, 2019).

Based on Callista Roy's 1964 adaptation theory, humans must be able to adapt to stress so that they can get health and quality of life. The incidence of work stress can be associated with dry eyes syndrome. When a person is under pressure, the amygdala (midbrain) signals that they are under stress and then activates the Hypothalamus-Pituitary Gland-Adrenal axis. Stimulation of the hypothalamus causes an increase in the secretion of corticotropin-releasing hormone (CRH). It will stimulate the pituitary gland to produce adreno-corticotropin hormone (ACTH), then trigger the adrenal cortex to secrete the glucocorticoid hormone (cortisol). Stress also affects the sympathetic nervous system (SNS), stimulating the autonomic nervous system, which will cause vasodilation, increased pulse rate, respiratory rate, blood pressure, Etc. Stimulation of the SNS also caused the adrenal medulla to produce catecholamines hormone (Kovanur Sampath et al., 2015; Chester, 2021; Golden, M. I., Meyer, J. J., & Patel, 2022). The hormones catecholamine and cortisol will increase in the blood and interfere with blood flow in the eyes, reducing eye function and even causing damage to the eyes with dry eyes. Dry eyes will have a physical impact, such as uncomfortable vision, blurred vision, tired eyes, red conjunctivae, such

as a foreign object in the eye, unstable tear film due to excessive tear evaporation, and damage to the eye surface (O'Neil et al., 2019; Rouen & White, 2018). Based on the literature review, several studies in Indonesia discussed dry eye syndrome in nurses, its relationship with work stress and other causal factors. Therefore, the study aimed to investigate the overview of dry eyes syndrome and its correlation with work stress among nurses.

METHOD

The study was a descriptive correlative observational study with a cross-sectional design. The study was conducted in April 2022 in Nganjuk Regional Hospital, East Java, Indonesia. The population of this study was nurses working at Nganjuk Regional Hospital, East Java, Indonesia. The sample were nurses working at Nganjuk Regional with inclusion criteria: 1) worked at Nganjuk Regional Hospital, 2) willing to be a respondent, and 3) filled out the informed consent form. The sample size was 84 respondents, calculated using G*Power software ($f^2 = 0.3$, β power = 0.80, and $\alpha = 0.05$). Samples were taken using simple random sampling. The researcher compiled a list of prospective respondent names according to the research criteria and then randomized them using an online wheel of names. The variables of this study are work stress and dry eyes syndrome in nurses.

The instrument used in this study was a questionnaire, namely: (1) Sociodemographic questionnaire, which consists of several questions including age, gender, marital status, years of service, and level of education; (2) Work stress questionnaire adapted from the HSE Work Related Stress Scale – Indonesian Version (Grasiaswaty, Pradita and Sadida, 2022), which consists of 33 items with a Likert scale (1: Never, 2: Rarely, 3: Occasionally, 4: Frequently, and 5: Always). The results of the validity and reliability tests were $r = 0.670 - 0.820$, with Cronbach's alpha = 0.864. This questionnaire has been re-tested for the validity and reliability of nurses, resulting in 24 valid and reliable items with $r = 0.375 - 0.879$ and Cronbach alpha = 0.945 (Deviana and Novitayani, 2018). This questionnaire consists of 3 indicators, namely physical symptoms (8 items), psychological symptoms (9 items), and behavioral symptoms (7 items). Likert scale (1 = never; 2 = rarely; 3 = often, and 4 = always). Nurses' work stress was categorized into three categories, namely mild (≤ 47), moderate (48 – 71), and severe (≥ 72); (3) Dry eyes syndrome questionnaire adapted from the Ocular Surface Disease Index questionnaire (Eylül, 2020). This questionnaire consists of 20 items with a Likert scale of 1 = never, 2 = Rarely, 3 = Often, and 4 = Always), with three indicators, namely ocular surface conditions (10 items), individual activity (4 items), and environmental conditions (6 items). The results of the validity and reliability tests obtained the results of $r = 0.440 - 0.794$ and Cronbach alpha = 0.920. Dry Eyes Syndrome was categorized into four categories, namely normal (≤ 12), mild (13 – 22), moderate (23 – 32), and severe (≥ 33).

Data were collected using an online questionnaire using the Google Form application. The researcher explained the study to prospective respondents, including a general description, objectives, benefits, and possible dangers. Prospective respondents who have understood and agreed to become research respondents were asked to sign a consent form. The researcher analyzed the data descriptively and statistically. Descriptive statistics use central tendency and dispersion, while inferential statistical tests use the Kruskal-Wallis-Wallis Test, Mann-Whitney U Test, and Somers' D test ($\alpha = 0.05$). This study has received approval from the Health Research Ethics Committee with number 023/UN25.1.14/KEPK/2022.

RESULT

The results showed that most of the respondents were in the range of 31-35 years (20.24%), female (73.81%), married (80.95%), worked as a nurse for 1-5 years (28.57%), and have an associate degree education level (50%) (Table 1). Based on Table 2. It can be seen that most of the respondents experienced work stress in the mild category (96.43%), with the dominant indicator of work stress variables being physical symptoms. In addition, most respondents experienced dry eye syndrome in the moderate category (37.81%), with the dominant dry eye syndrome indicator being the work environment condition. The results of the Correlation Test with Somers D showed a significant correlation between work stress and dry eyes syndrome among nurses at Nganjuk Regional Hospital with weak correlation strength. The direction of the correlation between work stress and nurses' dry eye syndrome is positive, which means that severe work stress will make nurses experience more severe dry eye syndrome (Table 2).

Table 1. Characteristics of Respondents (n = 84)

Variable	n (%)	Mean±SD	Min - Max
Age (years)			
20-25	7 (8.33%)	37.12±8.477	22 – 54
26-30	16 (19.05%)		
31-35	17 (20.24%)		
36-40	13 (15.48%)		
41-45	15 (17.86%)		
46-50	9 (10.71%)		
51-55	7 (8.33%)		
Gender			
Male	22 (26.19%)		
Female	62 (73.81%)		
Marital Status			
Married	68 (80.95%)		
Unmarried	15 (17.86%)		
Widow/widower	1 (1.19%)		
Working Period (years)		2.92 ± 1.659	1 – 6
1 – 5	24 (28.57%)		
6 – 10	13 (15.48%)		
11 – 15	18 (21.43%)		
16 – 20	12 (14.29%)		
21 – 25	9 (10.71%)		
>25	8 (9.52%)		
Education Level			
Associate degree	42 (50.0%)		
Bachelor of Applied Sciences	9 (10.71%)		
Bachelor degree	33 (39.29%)		

Table 2. Nurse's Work Stress and Dry Eyes Syndrom (n = 84)

Variable	n (%)	Mean±SD	Min – Max	Somers D correlation test	
				r	p-Value
Nurse's Work Stress		33.81±7.648	24 – 72		
Mild	81 (96.43%)				
Moderate	1 (1.19%)				
Severe	2 (2.38%)				
Variable indicator					
Physical Symptoms		12.58±2.156			
Psychological Symptoms		11.84±3.059			
Behavioral Symptoms		9.44±2.420			
Dry Eyes Syndrome		23.56 ± 10.728	5 – 60	0.356	0.001
Normal	14 (16.67%)				
Mild	25 (29.76%)				
Moderate	31 (36.90%)				
Severe	14 (16.67%)				
Variable indicator					
Ocular surface condition		7.54±6.322			
Individual activity		6.33±3.554			
Environmental conditions		9.69±4.466			

Table 3. Differences of Nurse's Work Stress and Nurse's Dry Eyes Syndrome Based on Sociodemographic (n = 84)

Sociodemographic	Nurse's Work Stress		Nurse's Dry Eyes Syndrome	
	Kruskal-Wallis Test or Mann-Whitney U Test		Kruskal-Wallis Test or Mann-Whitney U Test	
	Mean Rank	p-Value	Mean Rank	p-Value
Age (years)				
20 – 25	47.79	0.388	35.93	0.644
26 – 30	40.66		44.09	
31 – 35	50.35		51.50	
36 – 40	40.23		37.31	
41 – 45	47.13		42.77	
46 – 50	31.83		35.50	
51 – 55	30.36		41.64	
Gender				
Male	44.30	0.687	45.98	0.436
Female	41.86		41.27	
Marital Status				
Married	41.87	0.839	42.01	0.719
Unmarried	44.67		43.47	
Widow/widower	53.00		61.50	
Working Period (years)				
1 – 5	40.31	0.730	42.67	0.865
6 – 10	44.85		49.77	
11 – 15	37.47		38.67	
16 – 20	44.33		41.88	
21 – 25	42.72		43.83	
>25	53.56		38.25	
Education Level				
Associate degree	41.87	0.033	39.42	0.072
Bachelor of Applied Sciences	44.67		59.83	
Bachelor degree	53.00		41.70	

The results of the Kruskal-Wallis and Mann-Whitney U test in Table 3 showed there were no significant differences in work stress based on age, gender, marital status, and working period ($p=0.388$; $p=0.687$; $p=0.839$, and $p=0.730 > \alpha = 0.05$). There was a significant difference in work stress based on education ($p=0.033 < \alpha = 0,05$). There were no significant differences in dry eye syndrome based sociodemographic ($p=0.644$; $p=0.436$; $p=0.719$; $p= 0.865$; $p=0.072$; $> \alpha=0.05$).

DISCUSSION

Nurse's Work Stress

The study results showed that most nurses working at the Nganjuk Regional Hospital were in early adulthood, female, had a working period of 1 - 5 years, had an associate degree education, and were married (Table 1). The results of this study align with previous studies; most nurses who work in hospitals are in early adulthood, female, married, have working experience of fewer than five years, and have an associate degree education (Nurcahyani, Widodo and Rosdiana, 2016; Shahrour and Dardas, 2020). The study showed that most respondents experienced work stress in the mild category (Table 2). It indicates that nurses can cope with stress at work so that it is expected not to interfere with the performance of nurses in providing nursing services to patients. The results align with the previous study that states most nurses experienced mild stress (Nurcahyani, Widodo, and Rosdiana, 2016). Mild stress work generally does not affect a person's performance; it only interferes with performance in minutes to hours.

Nevertheless, no matter how mild the stress is, it must be addressed as soon as possible because it can accumulate and cause more severe stress, the impact on decreasing the performance of nurses. Stress can interfere with physical and psychological conditions, thus threatening the nurse's ability to adapt to work. Even in some severe cases, nurses can not work anymore and quit their jobs. Stress that occurs continuously and increases frequently will make nurses feel frustrated, emotionally and physically tired, anxious, depressed, and not eager to work (Faizi & Kazmi, 2017; Putu et al., 2021).

Work fatigue for a long time will result in uncontrolled stress. It can cause impaired function of the prefrontal cortex. The disorder can cause a decrease in the ability of abstract reasoning, work motivation, communication, high-level decision-making, and insight. Besides that, it can also reduce the ability to face challenges at Work (Harrad & Sulla, 2018). Based on indicators of work stress, the dominant indicator is physical symptoms (Table 2). Some respondents experienced heart palpitations every day while treating or receiving critical conditions. Patients in critical condition need assistance with comprehensive and close monitoring, medication administration, and support from all health staff to maintain normal bodily functions (Shen et al., 2020). Nurses must provide patients care, compassion, comfort, and goodness so families can trust nurses. The high demands can pressure nurses to care for patients, causing work stress and physical symptoms. As a result, the hormone cortisol will offer the body additional energy reserves to increase in response to existing stressors.

Body energy reserves can be depleted, causing nurses to experience fatigue (Nathania, Krisna Dinata and Adiartha Griadhi, 2019). Exhaustion makes the muscles of the body also weak. One of them is the muscles in the eye (Hyon, Yang and Han, 2019). As a result, the blood vessels in the sclera dilate so that more blood can flow and avoid damage to the blood vessels. If the blood vessels are damaged, the conjunctiva turns red, one sign of dry eye syndrome (Iskandar, 2020). Based on the indicators of psychological symptoms, some respondents stated every day, they experienced disturbances in their sleep patterns; for example, they often woke up at night when they were not working or had trouble sleeping. Poor sleep quality in nurses can be due to the shift work system, the burden of thoughts, feelings of worry, and depression, so fatigue and physical fatigue make the eyes have signs of fatigue. Tired eyes are signs of someone experiencing work stress, which can reduce tear secretion, causing dry eyes syndrome (Iskandar, 2020). Adequate rest with sleep duration (7 to 8 hours/day) is necessary to concentrate well and do a good job (Golden, M. I., Meyer, J. J., & Patel, 2022).

The results showed differences in work stress based on age, gender, working period and marital status, but they were insignificant. The difference in work stress is significant only based on the level of education (Table 4). The results of this study are different from several previous studies. Younger nurses are more susceptible to psychological stress than older (Shahrour and Dardas, 2020). Early adulthood is the peak of human changes in the stages of development of body health and changes in the strength of physical and psychological energy. Nurses who do not experience work stress can adapt to changes. It is in line with the theory of Hurlock (1980), which explains that early adulthood gives individuals the conditions to adjust to ideals, new lifestyles, and search for identity (Ajhuri, 2019). Therefore, Nurses must continue developing and thinking to keep up with changing conditions.

Women have a higher susceptibility to work stress than men. It can happen because women have a dual role, namely the status of workers and homemakers, so physiological and psychological stressors are higher (Noviandita & Nafiah, 2021; Starc, 2018). Most women need social support to deal with their problems, but not all women can get it. As a result, this condition can make women feel emotional pressure higher (Budiyanto, 2019). Emotional stress is related to work stress because women prioritize feelings over rationality, which will drain their energy and make them tired, resulting in work stress. Mild work stress occurs in most female respondents because women can balance feelings (emotional) and rationality at work. The work period of nurses at Nganjuk Regional Hospital is the same as from previous research, which is 1-5 years. Length of working time is related to work stress. Working time is adjusted to their psychological and physical condition, how to treat problems, and the length of time used (Khamisa et al., 2015; Deviana and Novitayani, 2018; Bardhan et al., 2019). Nurses who feel happy with their work can make good use of their time, such as not procrastinating on caring for patients, feeling enjoyed, and not being pressured when working even though they have worked for years, which will create a low level of perceived work stress.

The results of this study are consistent with previous research, which showed that most respondents had a diploma in nursing education (Nurchayani, Widodo and Rosdiana, 2016). High education and knowledge will make it easier for nurses to find information and improve their ability to make decisions, making it easier to adapt to the stressors they face when there are problems in the world of Work (Mulyani, M and Ulfah, 2017). Training and education are needed to increase nurses' knowledge at work, thereby minimizing work fatigue leading to work stress (Harrad & Sulla, 2018). Marital status can affect work stress. A married person can find support from families to cope with problems at work in a way that is available to access and rely on so that psychological support can be fulfilled (Budiyanto, 2019). Nurses at Nganjuk Hospital do not feel work stress or are in a mild category, possibly because most respondents are married. It can happen because they have received good family support. Concrete family support in emotional support, appreciation, and advice support strongly influences the job satisfaction of nurses in marriage (Riadi, 2020). On behavioral symptom indicators, some respondents answered that they used drugs daily, such as tranquilizers, stamina recovery drugs (vitamins), or other drugs when feeling tired, dizzy, or unable to sleep. Many people do not know that sleeping pills or hypnotics can have side effects in the form of residual taste the next day, for example, in the benzodiazepine group (Lestari, 2016). Residual taste the next day away can tire the body of doing activities, and even the mind becomes disturbed (Nanda et al., 2021). Fatigue is one of the factors that cause someone to experience work stress. Nurses need to manage work stress to prevent work stress

from developing in the long term, or called chronic stress (Bardhan et al., 2019). Nurses can make changes to individual factors and work environment factors. For example, they are doing relaxation techniques such as yoga and massage, doing physical activities such as swimming, jogging, running, cycling, or other types of sports in less than 1 hour (Zhang et al., 2021; Kolehmainen & Sinha, 2014). Physical activity regularly will make psychological and behavioral changes. There is a strong correlation between physical activity and social behavior, where increased physical activity will make social behavior change to be friendly, pleasant, brave, and obedient. Physical activity also effectively reduces fatigue (Naczenski et al., 2017; Cendra and Gazali, 2019).

Nurse's Dry Eyes Syndrome

Most respondents in the moderate category had dry eyes syndrome. Based on indicators of dry eyes syndrome, the dominant indicator is the work environment (Table 2). There was no significant difference between dry eye syndrome based on age, gender, marital status, work period as a nurse, and education level (Table 3). This study's results are inconsistent with previous research, which stated that dry eye syndrome mainly occurs at the age above 50 and the gender is female (Hyon, Yang and Han, 2019). In this study, dry eyes syndrome respondents were more common at 31 -35 years and in men, although the difference was insignificant. Factors that contribute to the incidence of dry eyes syndrome include personal factors (female and over 50 years old), psychological stress, poor sleep quality, using an electronic device, air-conditioning room or fans, and air pollution (example: cigarette smoke exposure) (Rouen & White, 2018; Hyon et al., 2019; Simanjuntak et al., 2020; Latupono et al., 2021). Most nurses at the Nganjuk Regional Hospital are in early adulthood and belong to the productive age, so they do not have the potential to experience dry eye syndrome. The previous study showed that the elderly potentially experience dry eye syndrome 18 times (Golden, M. I., Meyer, J. J., & Patel, 2022).

The female gender is more susceptible to having dry eyes. This study is inconsistent with previous studies, which showed that females experienced more dry eyes (Hyon, Yang and Han, 2019). Females may be 1.33 to 1.74 higher to have dry eye syndrome. It can happen due to changes in the balance of estrogen and androgen hormones that work to maintain the balance of tears, where these hormones can make the eyes dry due to decreased lip production (Casey and Marina, 2021). Getting older, a person will experience changes in structural and physiological functions that impact decreasing body functions, one of which is the function of androgen hormones to regulate sexual and reproductive organs. This hormone is present in females and males, although to a lesser extent in females. The decrease in the activation function of these hormones can reduce the role of the water glands (fluid in the front and back chambers of the eye are distributors of nutrients to the eye tissue), so dry eye syndrome has the potential to occur (Rahman, 2016). Nursing rooms at Nganjuk Regional Hospital have air ventilation, such as windows. Windows will reduce the chances of nurses experiencing dry eyes syndrome because air can circulate properly. Air circulation that does not exist will make the air only spin in place. Even a fan turned on in a closed room will absorb dust, creating poor air quality. Even though there is a window, the possibility of experiencing dry eyes can still occur because all nursing rooms at Nganjuk Regional Hospital have air conditioning, so the windows must be closed to make rooms can be cooled maximum. As a result, the room temperature becomes humid and can put nurses at risk for moderate levels of dry eye syndrome. Low air humidity can activate tear evaporation and cause dry eyes syndrome (Golden, M. I., Meyer, J. J., & Patel, 2022). Reducing the symptoms of dry eyes syndrome by making the eye layer awake using eye drops, eating foods containing omega-3 fats, and blinking exercises (Putu et al., 2021; Chester, 2021).

Nursing rooms at the Nganjuk Regional Hospital have computers to record and access patient information. Using electronic devices in the long term, usually following the nurse's work shift, can increase exposure to the eyes, increasing the risk of dry eye syndrome. The results showed that of all the questions in the activity indicators carried out by nurses, there were respondents who answered that every day for the past week, they always used a computer, laptop, cell phone, or other gadgets. Dry eyes syndrome with mild levels experienced by respondents who use laptops <2 hours a day, while moderate and severe degrees are 2 hours a day. The prolonged use of electronic devices will make the eyes tense, so the maximum required limit is 2 hours with a break every 20 minutes (Latupono et al., 2021). Eye strain is one of the signs of dry eyes syndrome. The increase in the incidence of dry eyes in nurses at Nganjuk Hospital is because nurses underestimate the eyes' health at a mild level with signs of itching and red eyes, which can gradually become severe. Nurses' self-awareness to maintain eye health is essential to the level of eye occurrence.

The Correlation between Nurse's Work Stress and Nurses' Dry Eyes Syndrome

There was a positive correlation between work stress and dry eyes syndrome (Table 2). Psychological stress decreases the eyes' performance and causes unexpected problems such as dry eyes. Psychological stress is an indicator that leads to work stress. Psychological stress belongs to mental health involved in the work of the autonomic nervous system (ANS). When a person is under pressure, the amygdala (midbrain) signals that they are under stress and then

activates the Hypothalamus-Pituitary Gland-Adrenal axis. Stimulation of the hypothalamus causes an increase in the secretion of corticotropin-releasing hormone (CRH). It will stimulate the pituitary gland to produce adreno-corticotropin hormone (ACTH), then trigger the adrenal cortex to secrete the glucocorticoid hormone (cortisol). The hormone cortisol, which is released in large quantities, can damage the eyes and brain and disrupt blood flow in the body. Stress also affects the sympathetic nervous system (SNS), stimulating the autonomic nervous system, which will cause vasodilation, increased pulse rate, respiratory rate, blood pressure, Etc. Vasodilation of the pupil will make more light enter the eyes. As a result, potential threats are increasingly visible, and eyes look blurry, which is one sign of experiencing dry eyes. Stimulation of the SNS also caused the adrenal medulla to produce catecholamines hormone (Kovanur Sampath et al., 2015; Dankis et al., 2021). The hormones catecholamine and cortisol will increase in the blood and interfere with blood flow in the eyes, reducing eye function and even causing damage to the eyes with dry eyes. It is known to reduce the activities of the body's glands, like the lacrimal gland located in the eyelids, which produces tears. It decreases the number of tears. There will be dry eyes syndrome (Iskandar, 2020; Dankis et al., 2021).

The increase of cortisol hormone also will increase body energy reserves to respond to existing stressors. An increase in energy can occur as glucose moves into the bloodstream. However, over time, the energy reserves in the body can be depleted even when used when stressed, causing a person to experience fatigue (Nathania, Krisna Dinata and Adiartha Griadhi, 2019). Fatigue can weaken the body's muscles, including the muscles in the eyes (Nathania et al., 2019; Hyon et al., 2019). As a result, the blood vessels in the sclera widen so that more blood can flow and avoid damage to the blood vessels. If the blood vessels are damaged, the conjunctiva turns red, a sign of dry eye syndrome. Weakening of the eye muscles also causes increased evaporation (surface tear loss) due to dysfunction of the meibomian glands, which helps reduce tear evaporation. Eventually, the number of tears will decrease, one characteristic of dry eye syndrome (Dankis et al., 2021; Golden, M. I., Meyer, J. J., & Patel, 2022).

The findings show a weak correlation between work stress and dry eyes syndrome at Nganjuk Hospital because most respondents suffer from mild work stress and only experience moderate dry eyes syndrome—the lower the results of each variable, the lower the correlation between both variables. According to Callista Roy's adaptation theory, nurses aim to help a person adapt to physiological changes, self-concept, role function, and interdependence (mutual dependence). Only some people can adapt to these changes because of other influential factors. Before adaptation, someone will get a stimulus from both internal and external sides that makes them experience dry eyes syndrome. If more aspects are experienced or perceived by the individual, they will suffer from a higher level of dry eyes syndrome. The stimulus that causes dry eyes syndrome will make an individual adopt coping mechanisms to resolve a threatening situation (Starc, 2018; Molina-Torres et al., 2019). The problem-solving involves regulators or body systems such as chemical, nervous and endocrine, and cognition forms (perception, learning, emotion, and decision). The coping mechanism using regulators is seen in behavioral symptoms experienced by respondents every day. They start to consume drugs like sedation, stamina restoration (vitamins), or others to cure fatigue, headache, or insomnia. Drug consumption causes dry eye syndrome. Systemic drugs will affect the Work of G-protein (which regulates acinar cell activity) located in the lacrimal gland and the functions of epithelial cells (mucus-producing). The effects will reduce tear production, mucus, and stability. It can be concluded that drugs to relieve work stress can cause dry eyes syndrome (Dankis et al., 2021). The use of cognates (perception, learning, emotion, and decision) can be seen when the respondents choose a different perception in answering each indicator of the work stress questionnaire and dry eyes syndrome. The authors assume that their answers affect the strength of the correlation between work stress and nurses' dry eyes syndrome. The ability to solve and make decisions using further analysis of each person will also result in different problem-solving methods. These research findings show the difference between work stress and dry eyes syndrome, where most respondents experience mild work stress and moderate dry eyes syndrome. The uses of different coping mechanisms influence their effectors (behaviors) to solve problems. Behavioral changes include physiological, self-concept, role, and interdependence (mutual dependence). Physiological changes in individuals experiencing work stress can include dizziness or headaches, cold sweats and tension, palpitations, tightness in the chest, difficulty breathing, and stiff neck, back, or shoulder muscles (Molina et al., 2019). Physiological changes in dry eyes syndrome include sandy eyes, sore eyes accompanied by soreness and fatigue, blurred vision, dry and irritated eyes, itchy eyes, red eyes, and a burning sensation (Iskandar, 2020).

Self-concept changes will remain effective if individuals do not experience disruptions in their beliefs or feelings about themselves. Role functions will still apply if an individual has a good pattern of interactions with others and can adjust to their roles in both the family and society. Interdependence will be effective if an individual can get or give affection and love to others (Stults-Kolehmainen and Sinha, 2014). Everyone has different behaviors and coping mechanisms when dealing with problems. Everyone will experience physiological, self-concept, role functions, and interdependencies when experiencing work stress and dry eyes syndrome. The differences determine the level of work stress and dry eyes

syndrome. When facing a problem, the behavioral outputs can be adaptive and ineffective responses, and adaptive responses will make a person responsible in the social environment related to conditions that threaten them, such as work stress and dry eyes syndrome (Starc, 2018; Molina-Torres et al., 2019). There will be an ineffective response when someone cannot solve the problem, so he feels that he is not responsible in his social environment. The correlation between work stress and dry eyes syndrome when interacting with Callista Roy's adaptation theory consists of four main elements: human, environmental, healthy, and the role of nurses in providing nursing care. Nurses must provide care to patients, but nurses who experience work stress, dry eyes syndrome, and dry eyes syndrome caused by work stress will automatically affect the quality of health services. Poor service quality will occur if nurses cannot overcome the problems, but it is possible for nurses who have integrated nursing to use adapted coping mechanisms.

In the environmental element, the nurse's uncomfortable workplace conditions, such as air pollution and hot room temperatures, can cause work stress. Air pollution can have severe neurocognitive and mental health effects, such as depression (Rouen and White, 2018). Depression is one sign when nurses experience work stress. Stress conditions can make nurses end up experiencing visual disturbances in the form of dry eyes syndrome. Over time, visual impairment can decrease nurses' quality of life due to reduced self-ability to carry out daily activities (Rouen and White, 2018; Dankis et al., 2021). It is necessary to have a comfortable environment following health standards to minimize the incidence of work stress and dry eyes syndrome. In the healthy element, integrated care is needed so that the health of patients and nurses themselves can improve by increasing their adaptive responses: not avoiding stressors, coping with stressors, thinking positively, and asking for help from others to solve the problem. Physical stress that can interfere can result in tiredness and decreased body functions (Vahedian, 2019; Rointan, 2018). The muscles in the eye organs can also experience fatigue and reduced role in the form of a sense of tension, which is one sign of experiencing dry eyes syndrome.

CONCLUSION

The results showed that there was no difference in work stress based on age, gender, working period and marital status. A significant difference in work stress is based on education level. There was no significant difference for the dry eye syndrome variable based on age, gender, working period, education level, and marital status. Different levels of education determine differences in work stress, so efforts to reduce work stress can be carried out by considering the level of education aspects. Lower education is more at risk of experiencing work stress than higher education levels. The results showed a positive relationship between work stress and dry eye syndrome. Therefore, nurses need to pay attention to physical and psychological health at work and can face challenges in their work to reduce work stress and ultimately prevent dry eye syndrome. Further research can be carried out by exploring other factors related to work stress, such as psychosocial factors. In addition, interventions developed to reduce work stress and dry eyes syndrome in nurses can also be carried out by considering the sociodemographic aspects of nurses.

ACKNOWLEDGEMENTS

We want to express our special thanks to all the respondents who were involved in this study. We want to thank the Faculty of Nursing, Universitas Jember, for providing the opportunity to conduct this study—special thanks to all respondents who participated. In addition, we would also like to thank the Director of the Nganjuk Regional Hospital, who permitted the study and all those who assisted in this study.

REFERENCES

- Ajhuri, K.F. (2019). *Psikologi Perkembangan: Pendekatan Sepanjang Rentang Kehidupan, Psikologi Perkembangan Pendekatan Sepanjang Rentang Kehidupan*. Edited by Lukman. Penebar Media Pustaka. Available at: [http://repository.iainponorogo.ac.id/489/2/LAYOUT Buku Kayyis_cetak.pdf](http://repository.iainponorogo.ac.id/489/2/LAYOUT%20Buku%20Kayyis_cetak.pdf).
- Bardhan, R. et al. (2019). A cross-sectional study evaluating psychosocial job stress and health risk in emergency department nurses. *International Journal of Environmental Research and Public Health*, 16(18). <https://doi.org/10.3390/ijerph16183243>.
- Casey, A. and Marina, S. (2021). Klasifikasi, diagnosis, dan pengobatan saat ini untuk penyakit mata kering: tinjauan pustaka. *Intisari Sains Medis*, 12(2), 640–644. <https://doi.org/10.15562/ism.v12i2.998>.
- Cendra, R. and Gazali, N. (2019). Intensitas Olahraga Terhadap Perilaku Sosial. *Media Ilmu Keolahragaan Indonesia*, 9(1), 13–17. <https://doi.org/10.15294/miki.v9i1.20529>.
- Chester, T. (2021). A Single-center Retrospective Trial of a Blink-assisted Eyelid Device in Treating the Signs and Symptoms of Dry Eye. *Optometry and Vision Science*, 98(6), 605–612. <https://doi.org/10.1097/OPX.0000000000001711>.

- Dankis, M. et al. (2021). Acute Inhibitory Effects of Antidepressants on Lacrimal Gland Secretion in the Anesthetized Rat. *Investigative ophthalmology & visual science*, 62(7), 8. <https://doi.org/10.1167/iov.62.7.8>.
- Deviana, M. and Novitayani, S. (2018). The Correlation between Stress in Workplace and The Nurses ' Performance in Aceh Mental Hospital. *Idea Nursing Journal*, IX(3), 32–36.
- Eylül, E.Z. (2020). Impact of Epiphora on Modified Ocular Surface Disease Index Questionnaire. *Medicine & Health*, 15(2), 236–345. <https://doi.org/10.17576/mh.2020.1502.21>.
- Faizi, N. and Kazmi, S. (2017). Universal health coverage - There is more to it than meets the eye. *Journal of Family Medicine and Primary Care*, 6(1), 169–170. https://doi.org/10.4103/jfmpc.jfmpc_13_17.
- Golden, M. I., Meyer, J. J., & Patel, B.C. (2022). *Dry Eye Syndrome* - StatPearls - NCBI Bookshelf. Available at: <https://pubmed.ncbi.nlm.nih.gov/29262012/> (Accessed: 12 March 2022).
- Grasiaswaty, N., Pradita, L. and Sadida, N. (2022). Health and Safety Executive Work Related Stress Scale - Indonesian Version: Reliability and Convergent Validity. *The Indonesian Journal of Occupational Safety and Health*, 11(3), 402–411. <https://doi.org/10.20473/ijosh.v11i3.2022.402-411>.
- Harrad, R. and Sulla, F. (2018). Factors associated with and impact of burnout in nursing and residential home care workers for the elderly. *Acta bio-medica : Atenei Parmensis*, 89(7-S), 60–69. <https://doi.org/10.23750/abm.v89i7-S.7830>.
- Hutama, F.H., Wilda, L.O. and Ristiani, W.H. (2019). Hubungan Beban Kerja dengan Burnout Perawat di Instalasi Gawat Darurat RSUD Nganjuk. *Jurnal Sabhanga*, 1(1), 74–82.
- Hyon, J.Y., Yang, H.K. and Han, S.B. (2019). Association between Dry Eye Disease and Psychological Stress among Paramedical Workers in Korea. *Scientific Reports*, 9(1), 1–6. <https://doi.org/10.1038/s41598-019-40539-0>.
- Iskandar, F. (2020). Diquafosol Tetrasodium : Tatalaksana Terkini untuk Dry Eye Disease (DED)? *Cermin Dunia Kedokteran*, 47(7), 542–546. <https://doi.org/10.55175/cdk.v47i7.604>.
- Jundillah, Z., Ahmad, L. and Saktiawan, L. (2017). Analisis Kejadian Stres Kerja Pada Perawat Di Kabupaten Konawe Kepulauan Tahun 2017. *Jurnal Ilmiah Mahasiswa Kesehatan Masyarakat Unsyiah*, 2(6), 198301. <https://doi.org/10.37887/jimkesmas>.
- Kementerian Kesehatan RI. (2019). *Laporan Nasional RISKESDAS 2018*. Lembaga Penerbit Badan Penelitian dan Pengembangan Kesehatan. Available at: <https://repository.badankebijakan.kemkes.go.id/id/eprint/3514/>.
- Khamisa, N. et al. (2015). Work-related stress, burnout, job satisfaction and general health of nurses. *International Journal of Environmental Research and Public Health*, 12(1), 652–666. <https://doi.org/10.3390/ijerph120100652>.
- Kovanur Sampath, K. et al. (2015). Measureable changes in the neuro-endocrinal mechanism following spinal manipulation. *Medical Hypotheses*, 85(6), 819–824. <https://doi.org/10.1016/j.mehy.2015.10.003>.
- Latupono, S., Tualeka, S. and Taihuttu, Y. (2021). Hubungan Penggunaan Media Elektronik Visual Dengan Kejadian Sindroma Mata Kering Di Fakultas Kedokteran Universitas Pattimura. *Molucca Medica*, 14(April), 22–35. <https://doi.org/10.30598/molmed.2021.v14.i1.22>.
- Molina-Torres, G. et al. (2019). Stress and the gut microbiota-brain axis. *Behavioural Pharmacology*, 30(2 and 3-Spec Issue), 187–200. <https://doi.org/10.1097/FBP.0000000000000478>.
- Mulyani, Y., M, E.R. and Ulfah, L. (2017). Hubungan Mekanisme Koping Dengan Stres Kerja Perawat Igd Dan Icu Di Rsud Ulin Banjarmasin. *AL-ULUM : Jurnal Ilmu Sosial dan Humaniora*, 3(2), 513–524. <https://doi.org/10.31602/alsh.v3i2.1200>.
- Naczenski, L.M. et al. (2017). Systematic review of the association between physical activity and burnout. *Journal of Occupational Health*, 59(6), 477–494. <https://doi.org/10.1539/joh.17-0050-RA>.
- Nathania, A., Krisna Dinata, I.M. and Adiartha Griadhi, I.P. (2019). Hubungan stres terhadap kelelahan pada mahasiswa Fakultas Kedokteran Universitas Udayana. *Intisari Sains Medis*, 10(1), 134–138. <https://doi.org/10.15562/ism.v10i1.400>.
- Noviandita, P. and Nafiah, H. (2021). Prosiding Seminar Nasional Kesehatan 2021 Lembaga Penelitian dan Pengabdian Masyarakat Uji Perbandingan Aktivitas Penyembuhan Luka Prosiding Seminar Nasional Kesehatan 2021 Lembaga Penelitian dan Pengabdian Masyarakat Universitas Muhammadiyah Pekajangan. Prosiding Seminar Nasional Kesehatan 2021 Lembaga Penelitian dan Pengabdian Masyarakat Universitas Muhammadiyah Pekajangan Pekalongan, pp. 562–569.
- Nurchayani, E., Widodo, D. and Rosdiana, Y. (2016). Hubungan Tingkat Stres Kerja Dengan Kinerja Perawat. *Jurnal Care*, 4(1), 42–50.
- O'Neil, E.C. et al. (2019). Advances in dry eye disease treatment. *Current Opinion in Ophthalmology*, 30(3), 166–178. <https://doi.org/10.1097/ICU.0000000000000569>.
- Putu, P. et al. (2021). Asthenopia: Diagnosis, Tatalaksana, Terapi. *Ganesha Medicina Journal*, 1(2), 97–102. <https://doi.org/10.23887/gm.v1i2.39551>.
- Riadi, N.A. (2020). Pengaruh kepribadian big five, dukungan keluarga dan sabar terhadap kepuasan pernikahan pada istri berprofesi sebagai perawat yang bekerja shift malam. UIN Syarif Hidayatullah Jakarta. Available at: <https://repository.uinjkt.ac.id/dspace/handle/123456789/53769>.
- Riyanti, F.E. and Rahmandani, A. (2020). Hubungan Antara Hardiness Dengan Stres Kerja Di Rumah Sakit Umum Daerah Banyumas. *Jurnal Empati*, 8(3), 15–24. <https://doi.org/10.14710/empati.2019.26491>.
- Rouen, P.A. and White, M.L. (2018). Dry Eye Disease: Prevalence, Assessment, and Management. *Home Healthcare Now*, 36(2), 74–83. <https://doi.org/10.1097/NHH.0000000000000652>.
- Shahrour, G. and Dardas, L.A. (2020). Acute stress disorder, coping self-efficacy and subsequent psychological distress among nurses amid COVID-19. *Journal of Nursing Management*, 28(7), 1686–1695. <https://doi.org/10.1111/jonm.13124>.

- Shen X et al. (2020). Psychological stress of ICU nurses in the time of COVID-19. *Critical Care*, 24(200), 2–4. <https://doi.org/10.1186/s13054-020-02926-2>.
- Simanjuntak, K., Putri, D.H. and Farah, N.M. (2020). Paparan Asap Rokok terhadap Sindrom Mata Kering Pada Mahasiswa UPN “Veteran” Jakarta. *Jurnal Envivscience*, 4(1), 23. <https://doi.org/10.30736/4ijev.v4iss1.133>.
- Starc, J. (2018). Stress factors among nurses at the primary and secondary level of public sector health care: The case of Slovenia. *Open Access Macedonian Journal of Medical Sciences*, 6(2), 416–422. <https://doi.org/10.3889/OAMJMS.2018.100>.
- Stults-Kolehmainen, M.A. and Sinha, R. (2014). The effects of stress on physical activity and exercise. *Sports Medicine*, 44(1), 81–121. <https://doi.org/10.1007/s40279-013-0090-5>.
- Zhang, M. et al. (2021). Physical relaxation for occupational stress in healthcare workers: A systematic review and network meta-analysis of randomized controlled trials. *Journal of Occupational Health*, 63(1), 1–16. <https://doi.org/10.1002/1348-9585.12243>.

