Arab American University – Palestine

Faculty of Graduate Studies

Prevalence and Associated Factors of Dry Eye Symptoms among Nurses in Palestine

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Approval form

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This thesis was defended successfully on 10 November, 2021 and approved by:

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DECLARATION

I declare that the thesis was submitted for a master's degree and has not been submitted to another hospital for a higher degree. The work presented in this thesis is based on my own efforts.

Student Name: Riyad Suliman Mohmmad Allayed

Sign _____

Date _____

DEDICATION

My study is dedicated to my loving parents, who have always been a source of motivation and inspiration for me, and who have given me the strength and commitment to work with enthusiasm and determination on every task. I dedicate my study to my supervisor and all of my family members as a mark of their support.

ACKNOWLEDGEMENTS

We would like to express here, our warm thanks to the Assistant Professor Dr. Ahmad Ayed, who kindly directed this thesis and give us the benefit of the most judicious remarks and advice, for more than two years and to this day.

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Also, we would like to thank all the people who contributed directly or indirectly to the development of this work. Through they be assured of our faithful friendship, love, and sincere appreciation.

Riyad Allayed

ABSTRACT

Background: Dry eye disease is caused by a reduction in tear production, an increase in tear evaporation, and inflammation. Working in hospital closed wards, night-time working shifts, and the use of electronic health records by nurses may increase the risk of dry eye symptoms.

Objective: The purpose of the current study was to assess the prevalence and associated factors of dry eye symptoms among the hospital's nurses in North West Bank, Palestine.

Methods: A cross-sectional descriptive study. Three hundred nurses from governmental hospitals in Palestine's North West Bank participated in the study. The prevalence of symptomatic dry eye disease was estimated using the Ocular Surface Disease Index (OSDI) questionnaire on dry eye symptoms.

Results: The percentage of dry eye symptoms prevalence among the study participants with mean age 34.6 years was 62 % with OSDI score > 13 (mild to moderate and severe OSDI status). Contact lenses wear, work shift and department were more likely to report significantly higher OSDI scores ($p < 0.05$). Furthermore, gender, smoking, and computer use was not statistically associated with dry eye disease ($p > 0.05$).

Conclusion

Symptomatic dry eye is one of common ocular disease among hospitals nursing in Palestine.

Keywords: risk factors, ocular surface disease index, dry eye disease, prevalence,

ABBREVIATIONS

Abbreviation	Explanation
AAUP	Arab American University Palestine
ANOVA	Analysis of Variance
DED	"Dry eye disease"
DES	"Dry eye syndrome"
DES	"Dry eye symptoms"
ICN	*International Council of Nurses*
MG	Meibomian gland
OSDI	"Ocular surface disease index"
SPSS	"Statistical Package for Social Sciences"
t-test	t student statistical test
VDT	Visual display terminals

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CHAPTER ONE

Introduction

Dry eye is referred to as a syndrome, a condition, or a disease, and it is also referred to by a number of other terms. The literature is confusing on this subject and often blurs the difference between the symptoms of dryness and clinical findings based on objective criteria (Whitcher, 2003). The term dry eye syndrome is sometimes used interchangeably with dry eye symptoms (Whitcher, 2004).

Dry eye disease (DED) has emerged as a major public health problem because the condition poses considerable amount of economic burden both to affected individual and society (Amparo, Schaumberg, & Dana, 2015). The symptoms of DED, such as, ocular discomfort, pain, grittiness, redness, dryness, foreign body sensation and visual disturbance can interfere with daily activities including reading, driving, using computer and watching TV (Miljanovic, Trivedi, Dana, Gilbard, Buring, & Schaumberg, 2005; Uchino, Schaumberg, Dogru, Uchino, Fukagawa, Shimmura, et al., 2008); thus, the disease can result in serious impairment of quality of life (Miljanovic, Dana, Sullivan, & Schaumberg, 2004; Miljanovic, et al., 2005; Uchino et al., 2008)

1.1. Background

Dry eye disease (DED) is “multifactorial chronic disorder in eye surface, that distinguishes lack of hemostasis in the tear film, in addition with variable clinical manifestation including discomfort or visual disturbance, tear film instability, hyperosmolarity, ocular surface inflammation and damage, and neurosensory abnormalities” (Craig, et al., 2017).

The tear film, which is made up of three layers: an outermost lipid layer, a middle aqueous layer, and an innermost mucin layer, is an important component of the ocular surface. The meibomian glands, lacrimal glands, and conjunctival goblet cells all contribute to the formation of these layers (Lemp & Chacko, 1997).

The tear film is necessary for lubricating the eye, maintaining nourishment and oxygenation of eye structures, and assisting in the removal of material from the ocular surface (Javadi, & Feizi, 2011).

The causes of dry eyes can be divided into two categories: tear deficiency and evaporation (Stern et al., 1998). Tear deficiency is classified as non-Sjogren syndrome or Sjogren syndrome, which is an autoimmune condition characterized by lymphocytic infiltration of the lacrimal and salivary glands. Tear evaporation is classified into two types: meibomian gland disease (MGD) and exposure-related dry eye (Moss, Klein, Klein. 2000; Schein et al., 1997).

Dry eye disease can cause a variety of ocular symptoms such as pain, foreign body sensation, redness, sensitivity to light, and reflex watering as a result of corneal irritation (Javadi, et al., 2011). Dry eye disease affects not only ocular health, but also general health and well-being, quality of life, and, to a slightly lesser degree, socioeconomic burden, and is thus becoming a serious health concern worldwide, with global prevalence ranging from 20% to 50% (Stapleton, Alves, Bunya, Jalbert, Lekhanont, Malet, et al., 2017).

The prevalence of dry eye in Arab populations was comparatively high, ranging from 10% in the United Arab Emirates to 69% in Palestine, according to various reports. (Aljarousha, Badarudin, Che Azemin, Aljeesh, Abuimara, 2021). Epidemiologic studies have shown that several related factors, such as age and sex, are strongly connected with the development of DED, and that the condition is more

prevalent in women (mostly post-menopause) and the elderly (Malet, Le Goff, Colin, Schweitzer, Delyfer, Korobelnik, 2014; Stapleton, Alves, Bunya, Jalbert, Lekhanont, Malet, et al., 2017).

At the same time, various risk factors such as current alcohol intake, prolonged visual display terminal usage such as computer and smartphone usage, contact lens wear, low humidity, and environmental pollution all contribute significantly to the increased prevalence of DES, despite the fact that these risk factors can be managed and organized in our daily lives (Long, Wang, Tong, Xia, & Shen, 2020). Sleep disruption causes increased and reduced tear production, which can all lead to the development of ocular surface disorders. As a result, sleep disruption can precipitate signs and symptoms in people with eye surface diseases (Kawashima et al., 2016).

Shift work affects circadian rhythms include physiological and behavioral changes such as changes in bodily vital indicators (blood pressure, temperature) so can causes many diseases, and it can effects on lifestyle habits as exercise and eating (Akerstedt T. 1990). Sleep disturbance is associated with changes in the autonomic and endocrine systems, such as increased blood pressure, decreased parasympathetic tone, and increased excretion of stress hormones such as norepinephrine and cortisol (Leproult, Copinschi, Buxton, Cauter, 1997). Because tear production is controlled by neural and hormonal signals, a loss of sleep can have an influence on tear quantity and quality.

1.2 Problem statement

Hospital personnel are exposed to work that requires a high level of concentration and a considerable amount of visual display terminal (VDT) work in a generally dry atmosphere in wards or operating rooms, which may increase the risk of getting dry eye symptoms (Hyon, Yang, & Han, 2019). Nighttime employees are a major source

of concern. Their circadian rhythms are disrupted regardless of their waking hours at night since they are exposed to light signals at work (Makateb & Torabifard, 2017).

In Palestinian governmental hospitals, the night-shift work hours are 10 hours from 9 p.m. to 7 a.m., therefore the nurse will be awake for ten hours. On the other side, when electronic health records became computerized, nurses began to spend more time on computers. Additionally, extended use of mobile phones, working in close wards at hospitals such as intensive care units, night-time working hours, and the use of electronic health records by nurses may increase the risk of dry eye symptoms. Nevertheless, to the best of our knowledge, no reports of dry eye symptoms among Palestinian nurses have been made. Therefore, the purpose of this study was to evaluate the prevalence and associated factors of dry eye symptoms among nursing in North West bank.

1.3 Significant of the study

In comparison to other health care workers, nurses spend a lot of time with patients. Because the quality of nursing care is a prominent topic in hospital care, nurse safety is a crucial concern.

This study is critical for nurses since the findings might aid in the development of effective treatments to increase and improve the quality of nursing care and services, as well as reduce missed nursing care.

This study can help nurses reduce errors and hazards while also improving their practice effect of quality of nursing care on patients.

Previous research has mostly focused on non-health professionals. The current study is to evaluate the prevalence and associated factors of dry eye symptoms among nursing in North West bank.

Finally, no research on this issue have been performed in Palestine or the Middle East, and very few have been conducted globally, so the information gathered would supplement the existing evidence.

1.4. Study objective

The general purpose of this study to evaluate the prevalence and associated factors of dry eye symptoms among nursing in North West bank.

1.5 Research questions

The following research questions were guided the study

1. What is the prevalence and the severity of dry symptoms among the participants?
2. Is there significant differences between mean of dry eye symptoms and nurses' demographic characteristics?
3. Is there significant differences between mean of dry eye symptoms and nurses' work related characteristics?

1.6 Variable of the study

Independent variables:

- Socio-demographic and work-related characteristics of the nurses: Age, gender, educational level, experience, work department, work shift, computer use, smoking, and contact lens use.

Dependent variables:

- Ocular surface disease index (OSDI)

1.7 Conceptual and operational definitions:

Conceptual definitions

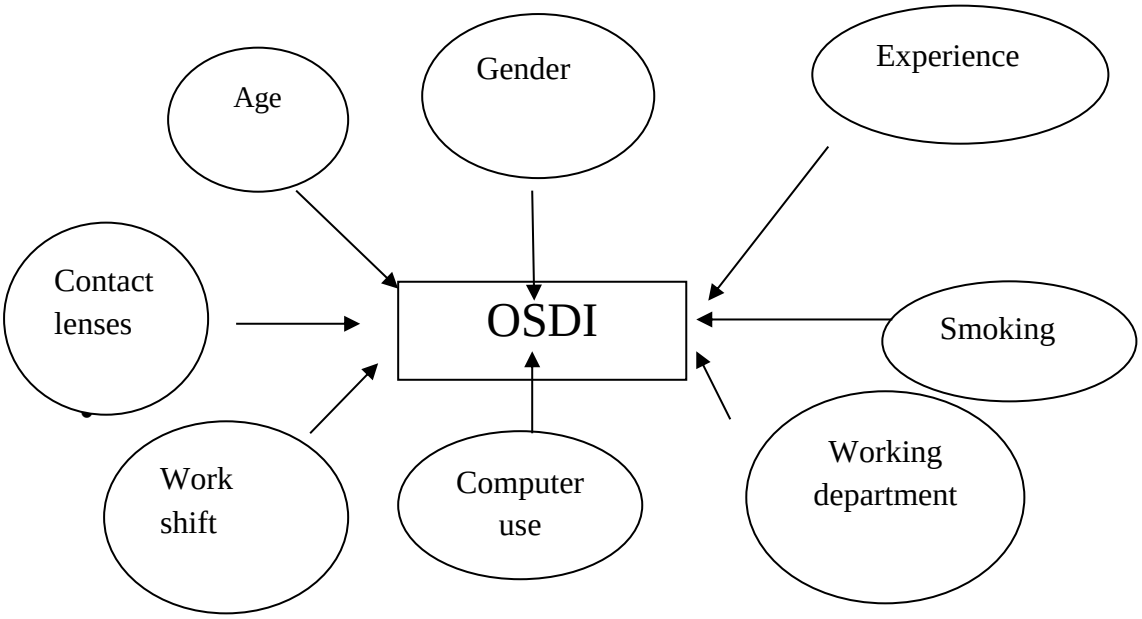
Nurse: International Council of Nurses (ICN) define the nurse as" a person who has completed a program of basic, generalized nursing education and is authorized by the appropriate regulatory authority to practice nursing in his/her country. Basic nursing education is a formally recognized program of study providing a broad and sound foundation in the behavioral, life, and nursing sciences for the general practice of nursing, for a leadership role, and for post-basic education for specialty or advanced nursing practice" (ICN, 1987).

Dry eye disease: is "multifactorial chronic disorder in eye surface, that distinguishes lack of hemostasis in the tear film, in addition with variable clinical manifestation including discomfort or visual disturbance, tear film instability, hyperosmolarity, ocular surface inflammation and damage, and neurosensory abnormalities" (Craig, et al 2017). The OSDI is an instrument for measuring the severity of dry eye disease, and it possesses the necessary psychometric properties to be used as an end point in clinical trials (Schiffman, Christianson, Jacobsen, Hirsch, & Reis. 2000).

Operational definitions

- Demographic and work-related characteristics: It involves Age, gender, educational level, experience, work department, work shift, computer use, smoking, and contact lens use.
- The Ocular Surface Disease Index (OSDI) survey instrument was used for the assessment of dry eye disease.

1.8 Conceptual framework of the study



- Figure 1: Conceptual Framework of “prevalence and associated factors of dry eye disease.

CHAPTER TWO

Literature Review

2.1 Introduction:

This chapter presented the studies about prevalence of dry eye symptoms in many setting (work offices, hospitals, universities and general population). Also, it presented the associated factors of dry eye symptoms.

2.2 Previous studies

2.2.1 Dry eye disease among health professionals

In a cross-sectional study conducted by Makateb and Torabifard (2017) to determine the effect of night-time working on dry eye signs and symptoms among hospital staff (medical and security staff) in Iran. The researchers' uses dry eye symptoms questionnaire and clinical exam including bulbar hyperemia, tear film stability, and basic Schirmir test. The results indicated that following the night shift, all dry eye symptoms were considerably worsened ($p=0.05$), and conjunctiva redness increased ($p=0.001$). Tear breakup time decreased considerably after the night-shift, and the basic Schirmer test rose after the night-shift compared to its pre-shift values, indicating that night-shift work can develop dry eye symptoms.

Another, cross sectional descriptive study conducted by Castellanos-Gonzalez et al. (2016) to determine the prevalence and severity of dry eye syndrome in a group of Mexican residents of different surgical specialties in Mexico. The study conducted on 125 residents by using the ocular surface disease index, with clinical exam as tear breakup time, oxford schema, Schirmers test, and meibomian gland dysfunction testing. The results viewed that 56% had mild to moderate /severe stages of the dry eye syndrome and the presence of surgical residents in the operating room renders

them susceptible to the development of dry eye disease as of the environmental conditions.

Also, a cross sectional study conducted by Tuladhar, Poudel, & SHahi (2019) to assess the prevalence of dry eye disease among medical students of Gandaki medical college in Nepal. The study was conducted on 200 students by using Schirmers test. The results showed that 46% of students had dry eye, 19.5% had mild dry eye, 13% had moderate dry eye, and 13.5 % had sever dry eye.

In addition, a cross sectional study conducted by Hyon, Yang, and Han (2019) to evaluate the prevalence and risk factors of dry eye disease among paramedical workers in Korea. The study involved 566 participants, and the researchers utilized a survey with three categories of questions: questions about dry eye symptoms, demographic data, and probable risk factors for dry eye illness, and questions about psychological stress. Dry eye illness was shown to be common among paramedical personnel, according to the findings. With increasing psychological stress, the risk of dry eye illness rose among females and employees. Additionally, computer use has been linked to dry eye illness.

Moreover, a cross sectional study conducted by Long, Wang, Tong, Xia, and Shen (2020) to assess the prevalence of dry eye symptoms (DES) among doctors and nurses in the period of novel coronavirus (COVID-19) outbreak in 2019, China. The study included 13 doctors and 40 nurses. The participants' average age was 32.43 (SD=5.15) years. Also, 64.15, 24.52, 7.54, and 3.77 % of the individuals had occasional, mild, moderate, and severe DES respectively, according to the OSDI scores. Age and length of using protective glasses were shown to be substantially linked with OSDI scores, suggesting that duration of wearing protective glasses may be a protective factor against dry eye symptoms. The findings revealed that the

majority of doctors and nurses who worked on the front lines of the COVID-19 combat did not develop DES, and that the symptoms of those who did may be alleviated by using protective glasses.

2.2.2 Dry eye disease among non-health professionals

Uchino, Schaumberg, Dogru, Uchino, Fukagawa, Shimmura, et al. (2008) conducted a cross-sectional research in Japan to assess the prevalence of dry eye disease and risk factors among young and middle-aged Japanese office workers using visual display terminals (VDTs). A total of 4393 people took part in the survey. The study's office workers filled out questionnaires and received e-mails with information on dry eye diagnosis and risk factors. The findings showed that 3549 participants (80.1%) completed the survey. Clinically diagnosed DED was found in 266 (10.1%) of 2640 male participants and 195 (21.5%) of 909 female participants. Severe DED symptoms were found in 711 men and 436 women who took part in the study. VDT usage of more than 4 hours was linked to a higher risk of DED.

Another, cross sectional study conducted by Kawashima, Uchino, Yokoi, Uchino, Dogru, Komuro, et al. (2016) to determine the relationship of dry eye disease with sleep quality among office workers who used visual display technology at a company in Japan. A total of 672 people took part in the study. Schirmer test, fluorescein and lissamine green staining, dry eye symptom, tear film break-up, and the Japanese version of the Pittsburgh sleep quality index were all employed by the researchers. According to the findings, 45% of dry eye disease participants reported poor sleep quality, compared to 34% of non-dry eye disease individuals. Furthermore, there was a statistically significant association between sleep quality and dry eye illness ($p=0.005$).

Also, a cross sectional study conducted by Shanti, Shehada, Bakkar, and Qaddumi (2020) to assess the prevalence of DED and potential risk factors in the northern west bank of Palestine. The study was conducted on 769 subjects whom were recruited from the general non-clinical population in the west bank. The study was conducted by using dry eye symptoms questionnaire and ocular clinical exam as tear film break-up time, fluorescein corneal staining and Schirmers test. The average age of the participants was 43.61(SD=18.57) years, with a range of 18 to 90 years. Females make up 52.7 % of the study's participants. The prevalence of DED was 64 % based on diagnostic criteria. DED was linked with female gender (p=0.001) and older age (p=0.001).

In addition, a cross sectional study conducted by Sherry, Aridi, and Ghach (2020) to estimate the prevalence of dry eye disease (DED) and investigate its associated risk factors in the Lebanese population. A total of 602 Lebanon inhabitants, aged 18 and over, took part in the survey. The prevalence of symptomatic DED was assessed using the Ocular Surface Disease Index (OSDI) questionnaire on dry eye symptoms. The findings revealed that 36.4 % of the research group (271 males and 331 females) had DED, with an OSDI score of >13. (mild to moderate and severe OSDI status). Sensitivity to light was the most commonly reported DED symptom in the general population. DED symptoms were more common in smokers than in nonsmokers. Significantly higher OSDI scores were reported by older and smoking groups (p 0.05). Furthermore, gender had no statistically significant relationship with DED (p> 0.05).

Moreover, a cross sectional study conducted by Ahn, Ryu, Song and Kim (2021) to evaluate the association between shift work and dry eye disease (DED) in the general population, in Korea. A total of 5872 people took part in the survey. The odds ratio (OR) of DED according to shift work did not exhibit significant findings

(adjusted OR = 1.230, 95% confidence interval 0.758–1.901). The OR of DED rose to 2.85 (95%, CI: 1.25–5.90) in shift workers under 40 years of age when data were stratified based on age older or younger than 40 years. In addition, the findings revealed a relationship between shift work and DED in a subgroup of younger people.

Summary

In this chapter the literature review focused on aspects which have to be considered in a study which aims to evaluate the prevalence of dry eye symptoms and related factors among hospital nursing in west bank. In next chapter methodology the research design and methodology will be discussed.

The findings from this review reveal a lack of extant literature on the DES among nurses for this research. More researches are needed about prevalence and related factors of dry eye symptoms among nurses. It is clear that of previous studies didn't focused on prevalence of DES and the factors that related to dry eye among hospitals nursing. In addition, no studies that conducted on nursing in Palestine. The studies revealed the need to conduct the study on nurses who work in hospitals in West Bank.

CHAPTER THREE

Methodology

Introduction

The methodology was presented in the following sections; study design, setting, population and sample, study instruments, data collection methods, data analysis, and ethical considerations.

3.1 Study design

This study is a cross-sectional, descriptive to evaluate the prevalence of dry eye symptoms and associated factors among hospital nursing in governmental hospitals at North West Bank.

3.2 Study setting:

The study was conducted on nurses who working in the governmental hospitals at the North West Bank districts (Jenin, Tubas, Talkarm, Qalqeliah, Nablus, and Salfeet). The study was conducted from March 2021 to October 2021.

. 3.3 Study population and sample

The targeted participants of the study were all nurses working in the North West Bank governmental hospitals. Non-probability convenient sampling was used to obtain the desired number of the participants.

According to nursing department in Palestinian Ministry of Health, the total number of nurses who work in governmental hospitals in the north region approximately 900 nurses.

The sample size was calculated using Raosoft program with confidence level 95%, margin of error 5%, and response rate 50%. A total sample of (270) participants was needed to conduct this study. Additional thirty participants were added to overcome participants' incomplete questionnaires and drop out. So, the final sample was 300 participants.

3.4 Inclusion criteria

* Nurses who have been at least 6 months of experience in nursing practice in the study setting.

* Nurses who approved to participate in the study.

* Nurses who provide direct care to patient.

3.5 Exclusion criteria:

- Nurses with active of ocular surface disease.
- Nurses who have eye surgery in the last 6 months.
- New apply of eye drops last 3 days.

3.6 Study Instrument

For the goal of the study, a self-administered instrument composed of two parts; demographic data and work conditions and OSDI tool was used to data collection.

1. Demographic data and work conditions: developed by the researcher and it includes age, gender, Education level, experience, working department, work shift, computer use, contact lenses use, and smoking.

2. Ocular Surface Disease Index (OSDI) questionnaire: The OSDI is a valid and reliable instrument for measuring dry eye disease (Schiffman, Christianson, Jacobsen, Hirsch, Reis, 2000). The OSDI is assessed on a scale of 0 to 100, with higher scores representing greater. Scores ≥13 indicate symptomatic dry eye, in which 13 to 22, 23

to 32, and 33 to 100 indicate mild, moderate, and severe presence of DES, respectively (Miller, et al., 2010). The OSDI graded on a scale of 0 to 4, where 0 indicates none of the time; 1, some of the time; 2, half of the time; 3, most of the time; and 4, all of the time. To calculate the OSDI score, total points multiplied by 25 and then divided by the total number of responses (Dougherty, Nichols, Nichols, 2011). The OSDI questionnaire is a reliable method that can be used to examine dry eyes symptoms (Javadi & Feizi, 2011).

3.7 Pilot study

Pilot study was conducted on 10% of the sample. Approximately 30 participants were included to get clear questions and to avoid lengthy & ambiguity of questions; they are all from different, age, gender, educational levels, and departments. All of them were provided with a clear explanation about the study and its objectives. The pilot study done to ask them about the difficulties, the average time to fill out the questionnaire, and their opinion of the questionnaire. The participants consider it clear, without comments, and the time range between 10-15 minutes to complete the questionnaire. The participants were excluded from the actual study.

3.8 Data collection

After obtaining the permission to conduct the study from Arab American University, and Ministry of health, the researcher visited the hospitals and met the head of nurses and departments head nurses. He explained to them the objectives of the study and asked them to prepare list names of nurses and the schedule duty to meet them. Also, the researcher explained the objectives of the study to the nurses. The nurse who agreed to participate assigned the informed consent and then completed the questionnaire.

3.9 Ethical consideration:

Ethical approval was obtained from Arab American University and Palestinian Ministry of Health. Consent form was provided for every participant prior to the study. Voluntary participation was explained. No names were mentioned or any personal information about the participant. All data was kept confidential and was used for study purposes only. No any harms of consequences due to participation refusal such as care quality or privileges. Clear explanation was given to each participant bout the study objectives and tool, enough time was given for questions.

3.10 Data analysis

Data were analyzed using the Statistical Package of Social Science (SPSS, Version 23; SPSS Inc., Chicago, Illinois). Descriptive statistics for all parameters included in this analysis were performed. These analyzes included distributions of frequencies, percentages, means, and standard deviations. Analysis of variance (ANOVA) or t test also were performed to verify if there is a significant difference between dry eye symptoms and various demographic and work-related characteristics.

Summary

In this chapter explained how the study was conducted. It covered the study design, population, inclusion and exclusion criteria, sampling, study setting, study period, study tool, data collection, data analysis, ethical considerations, and limitation of the study. The structure of the questionnaire and the technique of collecting data were also explained.

This descriptive cross-sectional study was centered on assessing the “prevalence of dry eye symptoms and associated factors among hospitals nurses in West Bank,

Palestine". The participants involved in this study were all nurses who are working at governmental hospitals. This study was conducted from March 2021 to October 2021.

CHAPTER FOUR

Results

Introduction

This chapter deals with the data collected for analysis. The statistical method allowed the investigator to deduce, analyze, coordinate, measure, evaluate and convey the numerical information. The aim of data analysis is to provide answers to questions about the study. The data analysis strategy comes directly from the question, the design and the data collection process and the level of measurement of the data. This chapter edits, tabulates, analyzes and interprets the data collected.

This chapter expresses the findings concerning to evaluate the prevalence and associated factors of dry eye symptoms among nursing in North West Bank. Statistical analyses were directed to explore three research questions:

1. What is the prevalence and the severity of dry symptoms among the participants?
2. Is there significant differences between mean of dry eye symptoms and nurses' work-related characteristics?
3. Is there differences between mean of dry eye symptoms and nurses' work-related characteristics?

4.1 Reliability

The Cronbach's alpha coefficient of OSDI dry eye symptoms was 0.74, indicating that the internal consistency reliability of the scale was relatively high.

4.2 Participants' Characteristics

The findings revealed that the mean age of nurses was 34.6 (SD= 8.3) years who 166 (55.3%) less than 35 years old. With regard to gender, more than half of the participants 174(58.0%) were males. Also, majority of the participants 230 (76.7%) have bachelor degree and 109 (63.7) of them were smokers, as seen in table (4-1).

Table 4-1: Demographic characteristics of the participants (N=300)

Characteristics		M (SD)	N (%)
Age		34.6(8.3)	
	less than 35 years old		166(55.3)
	more than 35 years old		134(44.7)
Gender	Male		174(58.0
	Female		126(42.0
Educational level	Diploma		34(11.3
	Bachelor		230(76.7
	Master and above		36(12.0
Smoking	Yes		109(36.3
	No		191(63.7

M= Mean, SD= standard deviation

Also, the findings revealed that the average years' experience of nurses was 10.9 (SD= 7.9) years. Approximately one third of them 98 (32.7%) have more than 15 years' experience. Arround half of the participants 144(48.0%) reported that they are working in medical and surgical wards. More than half of the participants 158(52.7%) reported that they are using computer more than 4 hours daily, as seen in table (4-2).

Table 4-2: Work related characteristics of the participants (N=300)

Characteristics		M (SD)	N (%)
Experience		10.9 (7.9)	
	less than 5 years		88(29.3)
	5-10 years		82(27.3)
	11-15 years		32(10.7)
	more than 15 years		98(32.7)
Work	Emergency room		42(14.0

department	Intensive care unit		61(20.3
	Operation room		32(10.7
	Medical and surgical wards		144(48.0
	Maternity		21(7.0
Computer use/ daily	less than 2 hrs		19(6.3
	2 -4 hrs		123(41.0
	more than 4 hrs		158(52.7

M= Mean, SD= standard deviation

According to work shift, the analysis revealed that more than half of the participants 178(59.3%) were working rotation shifts, as seen in figure 4-1.

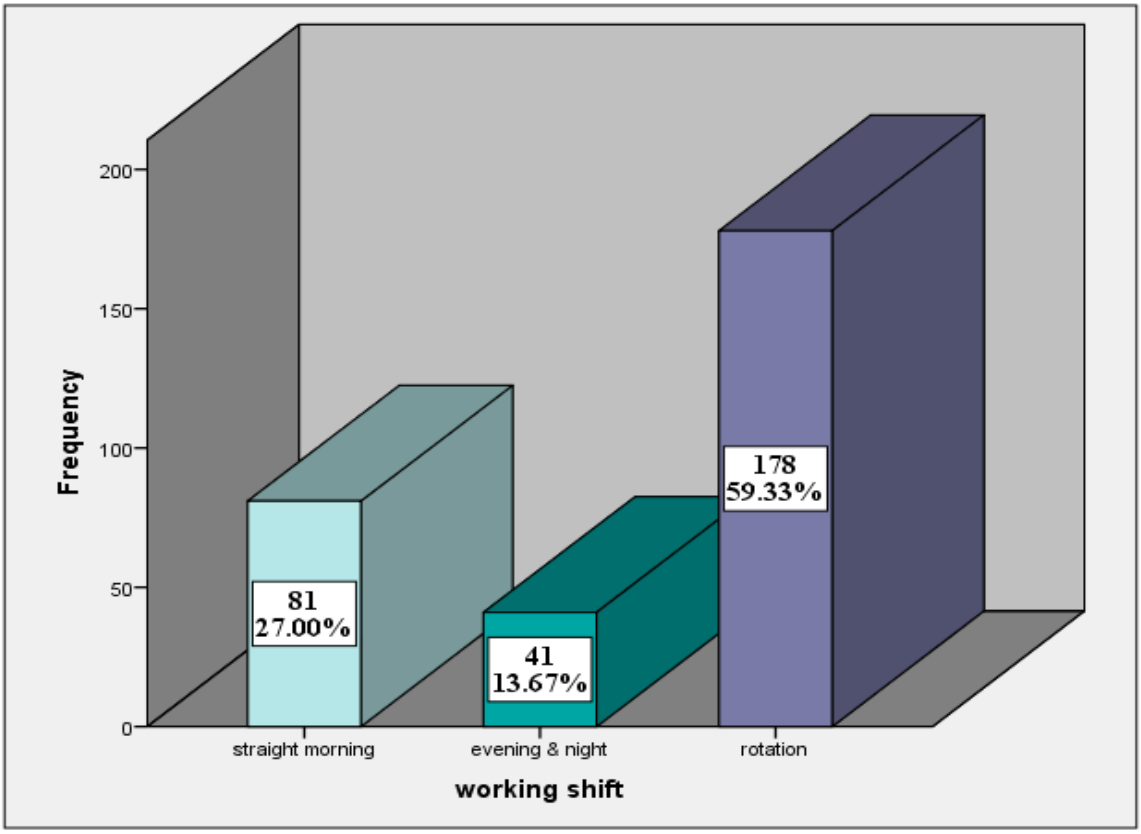


Figure 4-1: Distribution of the participants according to working shift (N=300)

Also, the analysis revealed that 48 (16.0%) of the participants reported that they wear contact lenses, as seen in figure (4-2).

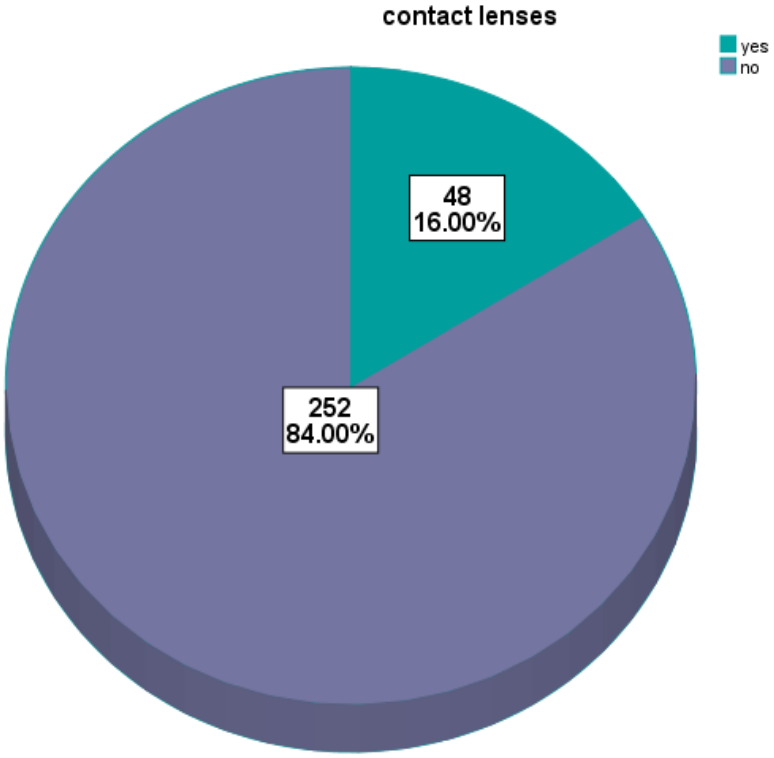


Figure 4-2: Distribution of the participants according to contact lenses (N=300)

4.3. Testing research questions

Research question 1: What is the prevalence and the severity of dry symptoms among the participants?

In this study, the frequencies and proportion were used to identify the extent of dry eye symptoms among the nurses.

The analysis in Table 4-3 revealed that 186 (62.0%) of the nurses have dry eye symptoms. The level of severity of dry eye symptoms indicated that 51(17.0%) were mild; 44(14.7%) were moderate, and 91(30.3%) were severe.

Table 4-3: Severity level of dry symptoms among the participants (N=300)

Severity Level	**N(%)**
Normal	114(38.0)
Mild	51(17.0)
Moderate	44(14.7)
Severe	91(30.3)

According to "Have you experienced any of the following during the last week?" the analysis revealed that 44.6% of the participants reported that their eyes that are sensitive to light half of the time, 39.8% Eyes that feel gritty some of the time, 43.5 % Painful or sore eyes some of the time, 38.2 % Blurred vision some of the time, and 25.3% poor vision some of the time.

Also, "have problems with your eyes limited you in performing any of the following during the last week" the analysis revealed that 34.9% of the participants reported Reading half of the time, 26.3% Driving at night some of the time, 25.3 Working with a computer or bank machine (ATM) some of the time, and 31.7% Watching TV some of the time.

In addition, "Have your eyes felt uncomfortable in any of the following situations during the last week?" the analysis revealed that 43.0% Windy conditions half of the time, 49.5% Places or areas with low humidity (very dry) some of the time, and 39.8% Areas that are air conditioned some of the time, as seen in table 4-4.

Table 4-4: percentage of the participants according to dry eye symptoms (N=186)

Item	none of the time	some of the time	half of the time	most of the time	all of the time
	n(%)	n(%)	n(%)	n(%)	n(%)
Have you experienced any of the following during the last week?					
1. Eyes that are sensitive to light?	0(0.0)	41(22.0)	83(44.6)	44(23.7)	18(9.7)
2. Eyes that feel gritty?	0(0.0)	74(39.8)	68(36.6)	33(17.7)	11(5.9)
3. Painful or sore eyes?	6(3.2)	81(43.5)	59(31.7)	25(13.4)	15(8.1)
4. Blurred vision?	46(24.7)	71(38.2)	41(22.0)	24(12.9)	4(2.2)
5. Poor vision?	93(50.0)	47(25.3)	20(10.8)	22(11.8)	4(2.2)
Have problems with your eyes limited you in performing any of the following during the last week?					
6. Reading?	24(12.9)	55(29.6)	65(34.9)	27(14.5)	15(8.1)
7. Driving at night?	91(48.9)	49(26.3)	30(16.1)	16(8.6)	0(0.0)
8. Working with a computer or bank machine (ATM)?	80(43.0)	47(25.3)	38(20.4)	15(8.1)	6(3.2)
9. Watching TV?	80(43.0)	59(31.7)	29(15.6)	14(7.5)	4(2.2)

Have your eyes felt uncomfortable in any of the following situations during the last week?					
10. Windy conditions?	6(3.2)	63(33.9)	80(43.0)	30(16.1)	7(3.8)
11. Places or areas with low humidity (very dry)?	1(0.5)	92(49.5)	60(32.3)	26(14.0)	7(3.8)
12. Areas that are air conditioned?	5(2.7)	74(39.8)	70(37.6)	30(16.1)	7(3.8)

Research question 2: Is there significant differences between mean of dry eye symptoms and nurses' demographic characteristic?

One-way ANOVA test was used to assess if there are differences between demographic characteristics of the nurses and mean of dry eye symptoms scores. Demographic nurse characteristics in this context involved: nurse's age, gender, level of education, smoking, and contact lenses. The results of ANOVA in Table 4.4 indicated that nurse's age, educational level, and contact lenses had statistically significant differences on scores of dry eye symptoms ($F(2, 183) = 39.1$, $p < 0.05$) ($F(3, 182) = 6.5$, $p < 0.05$) ($F(1, 184) = 5.0$, $p < 0.05$) respectively, as seen in table (4-5).

Table 4-5: The differences between mean of dry eye symptoms and demographic nursing characteristics (N=186)

Variable		N	M	SD	F	P. Value
Age	Less than 35 years	64	25.50	10.80	39.141	.000
	More than 35 years	122	44.21	22.59		
Gender	Male	102	36.22	19.31	1.212	.272
	Female	84	39.67	23.44		
Educational level	Diploma	27	50.96	24.53	6.528	.002
	Bachelor	128	35.90	20.76		
	Master and above	31	34.03	16.20		
Smoking	Yes	74	38.31	22.78	.078	.781
	No	112	37.42	20.34		
Contact lenses	Yes	35	44.91	25.19	5.0	.027
	No	151	36.12	20.01		

Research question 3: Is there significant differences between mean of dry eye symptoms and nurses' work-related characteristics?

One-way ANOVA test was used to assess if there are differences between nurses work related characteristics and mean of dry eye symptoms scores. Work related characteristics in this context involved: nurse's experience, departments, working shift, and using computer. The results of ANOVA in Table 4.6 indicated that nurse's experience, work department, and working shift had statistically significant differences on scores of dry eye symptoms ($F (3, 182) = 26. 1, p < 0.05$) ($F (4, 181) = 3.7, p < 0.05$) ($F (2, 183) = 35.6, p < 0.05$) respectively.

Table 4-6: The differences between mean of dry eye symptoms and nurses work related characteristics (N=186)

Variable		N	M	SD	F	P. Value
Experience	Less than 5 years	21	22.10	10.97	26.1	.000
	5-10 years	46	28.24	11.08		
	11-15 years	23	24.70	13.56		
	More than 15 years	96	48.91	22.16		
Department	Emergency room	22	46.23	27.70	3.7	.006
	Intensive care unit	46	30.83	16.94		
	Operation room	13	29.80	19.40		
	Medical and surgical wards	94	38.90	19.91		
	Maternity	11	49.73	26.59		
Working shift	Straight morning	75	51.01	22.29	35.6	.000
	Evening & night	30	34.80	16.99		
	Rotation	81	26.62	13.78		
Computer use	Less than 2 hrs	4	36.75	27.81	.391	.677
	2 -4 hrs	57	35.74	22.49		
	More than 4 hrs	125	38.74	20.63		

CHAPTER FIVE

Discussion, Recommendations, and Conclusion

5.1. Introduction

In this chapter, discussion, conclusions, and recommendations will be explained. The conclusion will be formulated according to the purpose of the study. The purpose of this study was to "estimate the prevalence of dry eye symptoms and investigate its associated risk factors among nurses in the North West Bank governmental hospitals, Palestine".

5.2. Discussion

Through of the previous studies had focused generally on non-health professionals. This study is the first study conducted on health professionals that regarding prevalence and risk factors of dry eye disease in Palestine. In the study, the OSDI questionnaire was used to estimate the presence of symptomatic DED.

Prevalence of dry eye symptoms

The prevalence of dry eyes reported by our study (62 %) was similar to that found in the population of the Eastern Province of Saudi Arabia (65.4 %) (Alkabbani, et al., 2021) and to the Jordanian population (59 %) (Bakkar, et al., 2016). Similarly, previous studies were conducted on health professionals showed that the prevalence of dry eye disease among residents of surgical specialties and paramedical worker were 56% and 42.7% respectively (Castellanos-Gonzalez et al., 2016; Hyon, Yang, and Han, 2019). In a study was conducted on non-health professionals in Palestine showed that the prevalence of dry eye disease among nonclinical population is high prevalent (68%).

However, this result is high comparing with other countries. Long, et al. (2020) reported that the prevalence of DED among nurses in china was (35.84%). The high prevalence might be attributed to several factors mainly related to the number of hours of working at night shift, and hospitals status (air condition, temperature, humidity). The various dry eye disease diagnostic methods that may depend on questionnaire or objective clinical tests, and selection of study population made comparisons among population-based studies estimating dry eye prevalence more complex.

Nurses demographic data and dry eye symptoms

The association between age and dry eye was also observed in this study. Aging is a significant risk factor for dry eye. Large epidemiological studies from the Women's Health Study and Physician's Health noted that dry eye prevalence increases in women and men every five years after the age of 50 (Schein et al, 1997; Paulsen, et al, 2014). As a result, a deep understanding of age-related dry eye and treatments customized to this group are required. Co-morbidities such as depression, type 2 diabetes, cardiovascular disease, glaucoma, and other ocular disorders are frequently associated with aging. Some of these co-morbidities, as well as the medications used to treat them, may have a negative secondary effect on the ocular surface. Diabetes mellitus, for example, affects the retina, lacrimal gland, and corneal nerves, and is frequently linked to dry eye (Achtsidis et al., 2014).

These results concordant with many previous studies. Castellanos-Gonzalez et al. (2016) indicated that surgical residents with dry eye had significant relationship with age. Also, Tuladhar et al. (2019) showed that dry eye disease was significant association with age among medical students. Similarly, in Japanese study by Uchino

et al. (2008) revealed that significant association between dry eye and age among the office workers. Additionally, in the study conducted by Shanti et al. (2020) in Palestine showed that dry eye disease was more prevalent in subjects older than 45 years.

According to gender and dry eye among nurses, the results of the current study showed that no association between gender and dry eye symptoms. These results were supported by Sherry et al. (2020) study results. However, Shanti et al. (2020) reported an association between dry eye disease diagnoses and female gender where females have 1.5 times higher risk of developing dry eye disease compared to males.

Also, Tuladhar et al. (2019) indicated that dry eye prevalence is more common among males' students than females' students. While, Castellanos-Gonzales et al. (2016) reported a higher prevalence of dry eye disease was found in female group. Further, Hyon et al. (2019) showed that female sex was associated with dry eye disease. These findings may be explained that consumption of contraception hormones or infertility in the middle-aged females' group and the effect of these hormones on the female's lacrimal gland, goblet cell function, meibomian glands and ocular surface sensitivity that may contribute to dry eye symptoms (Vehof et al., 2014). In the older-aged females' group, lower levels of estrogens and androgen may cause inadequate lacrimal gland secretion that associate with aqueous deficient DED (Sharma et al., 2014)

Smoking predisposes people to dry eyes by decreasing the tear film break up time (Thomas et al., 2012). However, no association between smoking and dry eyes was found in this study. This result supported by Shanti et al. (2020) who found no association between smoking habit and dry eye disease. Also, it was supported by

Castellanos-Gonzales et al. (2016) who found no association between dry eye disease and smoking among residents.

However, Sherry et al. (2020) reported an association between dry eye and smoking. Also, Al-Houqani et al. (2018) found a higher prevalence of smoking in the UAE (42 % of males, 6 % of females). This discrepancy can be explained by the study sample, which is limited to healthcare professionals who are less likely to smoke because of their health education. Our participants spent most of their time indoors and therefore had a low exposure to smoking, which might explain the absence of an association between smoking and dry eyes in the current study.

According to contact lenses, the results of the current study showed an association between contact lenses and dry eye symptoms. These results supported by large epidemiologic study including office workers in Japan revealed that contact lens wearers showed 2.38 times higher risk of having a diagnosis of dry eye than non–contact lens wearers (Uchino, Schaumberg, & Dogru, 2008). Also, Alkabbani et al. (2021) found that an association between contact lenses usage and the OSDI score among Arab population in Dubai. In addition, Uchino et al. (2008) revealed that contact lenses users who worked with video display terminals showed a significantly higher prevalence of clinically diagnosed DED and severe symptoms of DED compared with video display terminals workers who did not wear contact lenses.

However, the results of the study were contradicted with Al-Shamrani et al. (2017) who didn't find an association between contact lenses and dry eye symptoms among Saudi Arabian population. Also, another study result indicated no correlation between daily lens wear duration and dry eye syndrome (Lubis & Gultom, 2018).

Surprisingly, the study also found an association between working department and dry eye symptoms. This result was supported with Castellanos-Gonzales et al. (2016)

who found high prevalence of dry eye among surgical residents 56%, and suggested that working inside the operational room, in which the ventilation environment is closed and precise procedures with great concentration are performed, might increase the risk of DED. Also, Hyon et al. (2019) indicated that hospital worker might have increased risk of DED.

The environmental characteristics of hospital, such as, low indoor humidity, reduced indoor air flow and exposure to volatile organics might make individuals more prone to develop DED (Lopez-Miguel A, et al., 2014; Lu CY *et al.*, 2018).

The long-term effect of night-time working may be more highlighted after several years and might show more effects later in life because dry eye is an inflammatory process which over time damages the lacrimal glands and in the long run changes the quality and quantity of tear film and results in ocular surface disease (Makateb & Torabifard, 2017)

The results of the current study revealed that an association between shift working and dry eye symptoms. This result was supported by Makateb & Torabifard. (2017) who reported that all dry eye symptoms were aggravated significantly after the night shift. Conjunctival redness increased after the night shift. Also, the results were supported by Ahn et al. (2021) who concluded that there are an association between shift work and DED in a group of younger subjects.

Use of computers decreases the number of eye blinks, leading to incomplete blinking, evaporation of tears, and subsequently to dry eye disease (Portello, Rosenfield, & Chu, 2013).

The results of current study revealed that no association between computer use and dry eye symptoms. This result inconsistent with Akkaya, et al. (2018) who found that long-term computer usage may cause an evaporative-type dry eye disease. Also, Hyon

(2019) indicated that long duration of computer use was possibly associated with an increased risk of dry eye disease. In addition, Bayhan et al. (2014) reported that OSDI scores were significantly higher in the group using computers for a long time. Gajta, et al, (2015) concluded that visual display terminal use, more than 8 hours daily, has been identified as a significant risk factor for dry eye. It's been advised to all persons who spend substantial time using computers to use artificial tears drops in order to minimize the symptoms of dry eyes syndrome and prevents serious complications.

5.3. Recommendations of the study

Keeping in view of the results of the current study, the researcher recommends the following recommendations:

- The high prevalence of dry eyes indicates the need for early diagnosis and treatment before complications occur. This widespread prevalence emphasizes the role of the general practitioner to refer patients to ophthalmologists, especially if they have autoimmune diseases or are taking long-term medications.
- Improving the infrastructure of hospitals environment.
- Rotate the nurse between closed and open departments.
- Night-shift nurse need attention to prevent diseases as dry eye.
- Assessment the occurrence of dry eye disease signs among nurses and study its association with the symptomatic dry eye disease.
- The OSDI questionnaire can be combined with objective tests such as Schirmer's test.

5.4. Limitations of the study

The current study has some limitation:

- The current study was geographically limited and does not represent the entire population of Palestine.

- The questionnaire was self-reported questionnaire.
- The study also was based on respondent recall of events from the past week, which predisposes the results to recall bias.
- Diagnoses of dry eye disease was made only based on the presence of dry eye symptoms.

5.5. Strength of the study

This study has been estimated as first study on the prevalence of dry eye symptoms among hospitals nurses in Palestine. The study used the OSDI questionnaire, which is a standardized and reliable questionnaire that is used by many researchers. The OSDI provides a relatively objective evaluation of the symptoms of dry eyes, and it is used in clinical treatment trials, which helps to eliminate the possibility of survey bias.

5.6 Conclusion

The study confirmed that dry eye is highly prevalent among nurses in North West Bank hospitals (62 %). Also, the study confirmed that there is an association between dry eye symptoms and with both demographic characteristics of the nurses and work conditions such as age, contact lenses, work department, and shift of work while there isn’t an association with gender, smoking, and computer usage.

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Appendix A

Arab American University
College of Graduate Studies
Ophthalmic Nursing Master

Prevalence and associated factors of dry eye symptoms among nurses in Palestine.

Section One: Socio-demographic Data

1- Age …… Years

2- Gender a) Male b) Female

3- Educational level a) Diploma b) Bachelor c) master & more

4- Experience …… Years

5- Working department .....

6- Work shift a) Morning b) Evening & Night
c) Rotation between them

7- Computer use (hr. /day) a) < 2 h b) 2-4 h c) > 4 h

8- Smoker a) Yes b) No

9- contact lenses use (hr. /day) a) less than 4 h b) 4–5h c) ≥6h

Section Two: Please put X in the box that best represents each answer:

	Question	None of the time	Some of the time	Half of the time	Most of the time	All of the time
Have you experienced any of thefollowing during the last week?						
1	Eyes that are sensitive to light?					
2	Eyes that feel gritty?					
3	Painful or sore eyes?					
4	Blurred vision?					
5	Poor vision?					
Have problems with your eyes limited you in performing any of the following during the last week?						
6	Reading					
7	Drivingat night					
8	Working with computer or bank machine					
9	WatchingTV					
Have your eyes felt uncomfortable in any of the following situations during the last week?						
10	Windy conditions?					
11	Places or areas with lowhumidity (very dry)?					
12	Areasthat are air conditioned					

Appendix B

State of Palestine
Ministry of Health
General Directorate of Education in
Health and Scientific Research

دولة فلسطين
وزارة الصحة
الإدارة العامة للتعليم الصحي
والبحث العلمي

Ref.: .....
Date:.....

الرقم: ج.ص/١٣٨/١٤٤٢
التاريخ: ٢٠٢١/٠٥/٢٥

الأخ مدير عام الادارة العامة للمستشفيات المحترم ،،،
تحية واحترام...

الموضـــوع: تسهيل مهمة بحث

يرجى التكرم بتسهيل مهمة الطالب: **رياض سليمان محمد العايد، ماجستير تمريض العيون– الجامعة العربية الامريكية**، لعمل بحث بعنوان:

The Prevalence and associated factors of dry eye symptoms among "

"nursing in Palestine

حيث سيقوم الطالب بجمع معلومات من خلال تعبئة استبانة من قبل ألممرضين (بعد اخذ موافقتهم)، مع العلم أن مشرف الدراسة: د. احمد العايد.

وذلك في: **م. جنين – م. رفيديا – م. الوطني – م. طولكرم**

– م. قلقيلية – م. سلفيت – م. طوباس

على ان يتم الالتزام بجميع تعليمات واجراءات الوقاية والسلامة الصادرة عن وزارة الصحة بخصوص جائحة كورونا، وتحت طائلة المسؤولية.
على ان يتم تزويد الوزارة بنسخة PDF من نتائج البحث، التعهد بعدم النشر.

مع الاحترام...

د. عبد الله القواسمي
مدير التعليم الصحي والبحث العلمي

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حضرة د. عبد الله القواسمي المحترم
رئيس وحدة التعليم الصحي والبحث العلمي

تسهيل مهمة بحثية

تحية طيبة وبعد،

تهديكم كلية الدراسات العليا في الجامعة العربية الامريكية اطيب التحيات، وبالإشارة الى الموضوع أعلاه، تشهد كلية الدراسات العليا في الجامعة أن الطالب **رياض سليمان محمد العايد** والذي يحمل الرقم الجامعي 201820288 هو طالب ماجستير في الجامعة العربية الامريكية تخصص تمريض العيون، ويعمل على رسالة بعنوان " **The prevalence and associated factors of dry eye symptoms among nursing in Palestine.**" **تحت اشراف د. أحمد العايد.** نأمل من حضرتكم الايعاز لمن يلزم لمساعدته في الحصول على المعلومات اللازمة للدراسة، علما" ان المعلومات ستستخدم لغاية البحث فقط وسيتم التعامل معها بغاية السرية، وقد أعطيت هذه الرسالة بناء" على طلبه.

وتفضلوا بقبول فائق الاحترام

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الملخص

الخلفية: ينتج مرض جفاف العين عن انخفاض في إنتاج الدموع , او زيادة تبخر الدموع أو الالتهابات . نتيجة للعمل داخل الاقسام المغلقة في المستشفى ، مناوبات العمل الليلية ، واستخدام السجلات الصحية الإلكترونية من قبل الممرضين قد يزيد من خطر أعراض جفاف العين لديهم .

الأهداف: كان الغرض الرئيسي من الدراسة الحالية هو تقييم " انتشار أعراض جفاف العين والعوامل المرتبطة بها بين ممرضي و ممرضات المستشفيات الحكومية في شمال الضفة الغربية ، فلسطين.

المناهج: لقد تم عمل دراسة وصفية مقطعية. اشتملت على ثلاثة مائة ممرض وممرضة يعملون في المستشفيات الحكومية في شمال الضفة الغربية , فلسطين. تم استخدام استبيان مؤشر مرض سطح العين (OSDI) على أعراض جفاف العين لتقدير انتشار مرض جفاف العين المصحوب بأعراض. وتم استخدام اختبار ANOVA أحادي الاتجاه للتحقيق في الارتباط بين درجة أعراض جفاف العين و (الخصائص الديموغرافية والمتعلقة بالعمل للممرض).

النتائج: كانت النسبة المئوية لأنتشار أعراض جفاف العين بين المشاركين في الدراسة بمتوسط عمر 34.6 سنة 62٪ مع درجة OSDI> 13 (حالة OSDI خفيفة إلى متوسطة وحادة).

كان ارتداء العدسات اللاصقة , وردية العمل , والقسم أكثر عرضة للإبلاغ عن درجات OSDI أعلى بكثير (p <0.05). علاوة على ذلك ، لم يرتبط الجنس , التدخين , واستخدام الكمبيوتر إحصائيًا بمرض جفاف العين (p> 0.05).

استنتاج جفاف العين المصحوب بأعراض هو أحد أمراض العيون الشائعة بين التمريض في المستشفيات في فلسطين.

الكلمات المفتاحية: مرض جفاف العين ، مؤشر مرض سطح العين ، الانتشار ، عوامل الخطر