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Effect of Pulse Rate and Oxygen Saturation on the Duration of Wearing Mask among Nurses during the Pandemic of Coronavirus

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ABSTRACT

Objective(s): The aim of this study is to determine the effect of pulse rate and oxygen saturation on the duration of wearing mask among nurses during the pandemic of coronavirus, and to find out the relationship between the duration of wearing mask and the nurse demographic characteristic of age, gender, level of education, and marital status.

Methods: A quantitative descriptive study design was used in this study on 100 nurses worked at Wassit Province Hospitals at isolation units. A questionnaire used to collect the data of this study which consisted of two parts: (1) Sociodemographic characteristic of age, gender, level of education, marital status, Duration of wearying mask per time, and the type of mask they worn; and (2) Pulse oximetry to measure oxygen saturation and pulse rate. Data were analyzed by using SPSS version 23.

Results: The results revealed that most of the study participant were males with mean age of 30.66 years old, and most of them have bachelors' degree in nursing. All the study participants wear N95 face mask in which duration of wearing mask about 4.4 hours duration during working shift. Results also demonstrated that there were significant differences between the pulse rate and oxygen saturation before and after wearing masks at P=0.001, and a significant relation was presented between duration of wearing mask and oxygen level after wearing mask at P= 0.02.

Conclusions: The study concluded that pulse rate has significant effect on the duration of wearing mask among nurses during the pandemic of COVID 19.

Recommendations: The study recommends to minimize working shift time per day and limitation of the nurse movement at the isolation area except to necessary, so that to minimize their bodies' oxygen consumption.

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تأثير معدل النبض وتشبع الاوكسجين على فترة ارتداء الكمامة بين الممرضين اثناء جائحة فايروس كورونا

المستخلص

الاهداف: تهدف هذه الدراسة الى معرفة تأثير مستويات النبض والاوكسجين على فترة ارتداء الكمامة بين الممرضين اثناء جائحة فايروس كورونا ،وكذلك معرفة العلاقة بين فترة ارتداء الكمامة والخصائص الديموغرافية للممرضين (العمر والجنس ومستوى التعليم والحالة الزوجية).

المنهجية: تم استخدام تصميم الدراسة الوصفية الكمية في هذه الدراسة على ١٠٠ ممرض وممرضة عملوا في مستشفيات محافظة واسط بوحدات العزل. تم استخدام استبيان لجمع بيانات هذه الدراسة ويتألف من :(١) الخصائص الاجتماعية والديموغرافية للعمر والجنس والمستوى التعليمي والحالة الاجتماعية ومدة ارتداء الكمامة في كل مرة ونوع الكمامة الذي يرتديها. (٢) قياس تأكسج الدم ومعدل النبض. تم تحليل البيانات باستخدام الإصدار ٢٣ من برنامج الحقيبة الاحصائية .

النتائج: أظهرت النتائج أن معظم المشاركين في الدراسة من الذكور بمتوسط عمر ٣٠.٦٦ سنة ، ومعظمهم حاصل على درجة البكالوريوس في التمريض. يرتدي جميع المشاركين في الدراسة الكمامة N95 حين يتم ارتدائه بمتوسط وقت يبلغ ٤.٤ ساعات خلال وقت المناوبة في العمل. كما بينت النتائج وجود اختلاف معنوي بين معدل النبض ومستوى الاوكسجين قبل وبعد ارتداء الكمامة خلال فترة المناوبة (P = .000)، و وجود علاقة معنوية بين مدة ارتداء الكمامة و معدل الاوكسجين بعد ارتداء الكمامة (P = .02).

الاستنتاجات: خلصت الدراسة إلى أن معدل النبض والاوكسجين في الدم قد تاثرت بعد ارتداء الكمامة N95 اثناء نوبة العمل وان لمعدل الاوكسجين تأثير على فترة ارتداء الكمامة بين الممرضين اثناء جائحة فايروس كورونا .

التوصيات: : توصي الدراسة بضرورة تقليل ساعات المناوبة الواحدة خلال اليوم , كذلك تقليل حركة الممرضين داخل ردهات العزل (الا للضرورة) من اجل تقليل استهلاك اجسامهم للأوكسجين.

الكلمات المفتاحية: تاثير، معدل النبض، نسبة اوكسجين الدم، فترة ارتداء الكمامة، فايروس كورونا.

Introduction

The Pandemic of Coronavirus (COVID-19) represents the worldwide concern, it affects different sceneries of the life, especially human health and health care system [1]. World Health Organization (WHO) prepared an emergency meeting on 30th of Jan. 2020 declaring that the COVID-19 outbreak is a public health emergency of international concern [2]. COVID-19 is very infectious and is generally spread through human-to-human contact [3]. COVID-19 cases have rapidly increased since primary reports in December 2019 in China [4]. It spreads mainly through respiratory droplets and during close contact [5]. Globally, as of 2ed December 2022, there have been 640, 395, 651 Positive case of COVID-19, including 6,618,579 deaths [6]. The nursing care nature represents the dangerous occupational life threating [7]. The most exposed team of HCWs who cared for patients with COVID-19 are the nurses [8]. The alarming number of deaths among HCWs was 7,000 victim causing fear among HCWs as all [9]. Health promotion and disease prevention maintain Wellness [10]. No beneficial cure has been demonstrated to manage COVID 19 patients [11]. It is essential to keep all HCWs safe from being infected with COVID-19, thus, they should do a full set of Personal Protective Equipment (PPE) during caring of patients with COVID 19 [12].

The PPE should have a tight fit that prevents exposure to ensure the personal safety of HCWs [13]. Wearing comfort PPE and overall breathability decreases as the level of protection increase [14]. Wearing of PPE for a long duration by nurses may causes shortness of breathing and tachycardia [15]. Part of PPE requirements in all professional activities is the use of face mask by HCWs according to the required degree of protection level [16]. Face

mask will protect HCWs from breath in a small respiratory particle during caring of COVID-19 patients, thus, to minimize leakage around the mask they must fit closely to the face [17]. Prolonged facemask use can affect oxygen level of HCWs [18].

The Aims of the Study

The aim of this study is to find out the effect of pulse rate and oxygen saturation on the duration of wearing mask among nurses during the pandemic of coronavirus, and to find out the relationship between the duration of wearing mask and nurse demographic characteristic of age, gender, level of education, and marital status.

Research Method and Design

The design used in this study is a quantitative descriptive research design to accomplish objectives of the study. This type of research is used to represent and describe a problem in numerical data that can be altered into usable static. The descriptive study was used in the present study with the application of a questionnaire for the study sample.

Sample and Setting of the Study

Nurses are the target population of this research, whom work at the isolation units at all hospitals in Wassit province. The minimum sample size is (100 nurse) according to the population of (400) nurse, margin of error is (5) and confidence level of (85).

The Instrument of the Study

A questionnaire used to collect the data of this study which consisted of:

1. Sociodemographic characteristic of age, gender, level of education, marital status, Duration of wearying mask per time and the type of mask they worn.
2. Pulse oximetry to measure; a. Blood oxygenation. b. Heart rate.

Validity of the Study

The content validity of the constructed questionnaire was determined through the use of a panel of (10) experts to investigate the content of the questionnaire for the clarity of the instrument.

Data Collection Method

The researcher submitted a succinct protocol of the study as a first step of data collection plan, to the Ministry of Planning, Central Statistical Organization so that to get an official permission to initiate the study after the proposal was accepted by the Council of Nursing, University of Baghdad. The permission was released to Wassit Health Directorate later. The members of nurses gave their written consent to the researcher. Moreover, after getting College of Nursing approval of the report, go through the details with them. Of the study participants, the researcher outlined the study's general intent as well as how to complete the questionnaire. During and after their contribution in the study, the researcher assured participants that their data would be kept confidential closed.

A questionnaire was used for data collection. Date collection was achieved through the use of the study instruments. Each participant needs about (10-15) minutes to answer the study questionnaire. Data were collected from the period of 25 Jan. 2023 to 5 Feb 2023.

Ethical Considerations

At University of Baghdad, college of nursing the Institutional Review Board (IRB) approved the study to be initiated. The protocol of the study meets both the global and the committee on publication ethics (COPE) standards of respecting human subjects' rights. Next of the report's acceptance by the Council of Nursing, University of Baghdad, the researcher sent a concise protocol. To the Ministry of Planning and the Central Statistical Organization with the results of the research. So that to get

official approval to initiate the study. Next of that Wassit Health Directorate sent the permission. The researcher got the agreement of the nurses through the informed consent. Moreover, reviewing the study details with them after getting approval from College of Nursing for the study. The researcher clarified the study purposes and how to fill the questionnaire to the study participants. The researcher expressed participants that their data would be private during and after their contribution in the analysis.

Statistical Analysis

Data were analyzed through the use of Statistical Package of Social Sciences (SPSS) version 23. The statistical procedures, which were applied for the data analysis and assessment of the results, included the following: Descriptive statistics Frequency (F), Percentage (%), Mean Score and Standard deviation according to the mean scores. And inferential statistics including ANOVA test.

Results

Table 1. The Distribution of the Study Sample according to their Demographic Data.

Variable	**Groups**	**Study Sample**	
		Mean	***SD***
Age	**Mean ±*SD***	**30.66 ± 6.288**	
Variable	**Groups**	**F.**	**%**
Gender	Male	69	69
	Female	31	31
	Total	**100**	**100**
Educational level	Preparatory	17	17
	Diploma	39	39
	Bachelor's	44	44
	Total	**100**	**100**
Marital Status	Married	63	63
	Single	29	29
	Widowed	2	2
	Divorced	6	6
	Total	**100**	**100**
Duration of Wearing Mask continuously during working shift	**Mean ±*SD***	**Mean**	***SD***
		4.4	**.58**
Type of mask dressed daily	Surgical mask	0	0
	N95 mask	100	100
	Respirator Mask	0	0
	Total	**100**	**100**

F= frequency, **%** = percentage, **SD** = Standard deviation.

Table (1) showed that the mean age of the study sample was 30.66 years old. In addition, results revealed that 69 percent of the study sample were males, while the highest percent 44% have bachelors' degree in nursing. Moreover, results presented that 63 percent of the study sample were married. Also, a hundred percent of the study sample use N95 mask during their work in which the mean hours for dressing face mask during work shift was about 4.4 hours.

Table 2. The Distribution of the Pulse Oximetry

Variable	Study Sample	
	Mean	***SD***
Pulse Rate before wearing Mask*	81.45	8.3
Pulse Rate After wearing Mask	104.67	6.52
Oxygen level before wearing mask	97.34	1.16
Oxygen level after wearing mask	94.01	.64

SD = Standard Deviation.

Table (2) reflected that the mean pulse of the study sample before wearing mask was 81.45, while it was 104.67 (tachycardia) after wearing mask during work shift. Moreover, the mean of oxygen level before wearing mask was 97.34 and it was turned to be 94.01 after wearing mask during work shift which reflected development of hypoxia.

Table 3. Comparative Significant of pre and post test scores of pulse and oxygen levels of the study sample (N = 100).

Variables	M	*SD*	t	df	P value	Sig.
Pretest and Post-test pulse rate	81.45 104.67	8.3 6.52	20.54	99	.000	H.S
Pretest and Post-test oxygen level	97.34 94.01	1.16 .64	24.8	99	.000	H.S

M = mean, **SD**= standard deviation, **NS** =non-significant at P>0.05, S= significant at P<0.05.

Table (3) presented differences between the mean of score of pulse rate and oxygen levels of the study sample before and after wearing mask. Results revealed that there were highly significant differences of pulse rate and oxygen levels between the times of wearing mask during work shift at P = .000.

Table 4. Correlation between pulse oximetry parameters of the study sample with the Duration of wearing Mask (N = 100)

Pulse Oximetry Parameters	Duration of wearing mask (N=100)			
	df	**F**	**P value**	**Sig.**
Pulse rate before wearing mask	99	.774	.77	N.S
Pulse rate after wearing mask	99	1.56	.08	N.S
Oxygen level before wearing mask	99	1.16	.33	N.S
Oxygen level after wearing mask	99	4.07	.02	S

df= degree of freedom, **F** = fisher test, **NS** = non-significant at P>0.05, S=significant at P<0.05.

Table (4) showed that there was only a significant relationship between duration of wearing mask and oxygen level at P = .02.

Discussion

Results of the present study showed that the mean age of the study sample was 30.66 years old. In addition, results revealed that 69 percent of the study sample were males, and the highest percent 44% have bachelors' degree in nursing. Moreover, results presented that 63 percent of the study sample were married. Also, a hundred percent of the study sample use N95 type of mask during their work in which the mean hours for dressing mask during work shift was about 4.4 hours. A study stated that the mean age of nurses providing care for patients at ICU during COVID 19 was 30 years old [(19)]. in addition, most of nurses participated in this study were males who accounted for 62.9 percent and 40 percent of the study sample have bachelor's degree in nursing. Moreover, 65.7 percent of the study sample were married who worked at ICU.

Results in the present study also revealed that the mean pulse of the study sample before wearing mask was 81.45, while it was 104.67 (tachycardia) after wearing mask during work shift. Moreover, the mean of oxygen level before wearing mask was 97.34 and it was turned to be 94.01 after wearing mask during work shift which reflected development of hypoxia. Moreover, significant differences were presented between pulse rate before and after wearing mask, and between oxygen levels before and after wearing mask at P = .000. It has been reported in a previous study in a hospital in Africa that wearing facemask by HCWs can cause discomfort especially with dressing N95 mask, while no effect of wearing mask on the oxygen level of HCWs [(18)]. Another study also revealed that wearing different types of facemasks by HCWs do not have a significant effect on the pulse and oxygen levels except of causing restless and discomfort [(20)]. Moreover, it was reported in a study conducted to determine the effect of wearing mask on oxygen level during pandemic of COVID 19 that the level of oxygen have been significantly drooped from 96.9 percent to 95.8 percent after wearing masks for about 4 hours duration [(21)]. This could reflect that oxygen saturation could be affected after wearing facemask for a long time during a day.

In the present study, results showed that there was a significant relationship between duration of wearing mask and oxygen levels after wearing mask at P =.02. It was reported that gender has related to wearing mask during working shift, and oxygen level could be affected by wearing mask during work shift [(22)].

Conclusions

The recent study concluded that the duration of wearing mask has been affected by oxygen saturation.

Recommendations

The study recommends to minimize working shift time per day and limitation of the nurse movement at the isolation area except to necessary, so that to minimize their bodies' oxygen consumption.

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