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Impact of Wearing a Medical Mask on Some Physiological Parameters in Men

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Abstract: Until recently, people did not get used to wearing masks in public places, and even workers in various institutions, few of them wear masks, especially those working in the medical field, after the Corona pandemic and the World Health Organization's call to wear masks, Many questions began to appear in the horizons about the feasibility of using the muzzle, or the psychological and health impact of wearing it, and for this reason a group of researches appeared that take care of this aspect, and due to the need for such research, the purpose of conducting this research was to shed some light on the effect of wearing the muzzle in some Physiological variables. The study was conducted outdoors and in a moderate atmosphere (to some extent) with the participation of (24) volunteers. At first, blood pressure, heart rate, and heart rate were measured. The percentage of blood oxygen saturation and breathing rate for each volunteer, then the volunteers were divided randomly into two groups of equal number, the first wore a regular medical mask and the second a special medical mask N95.Then, each volunteer in both groups was subjected to a continuous walking test on a treadmill at an average speed for a distance equivalent to 200 meters our current study showed a discrepancy in the results before and after wearing masks of both types, and some of these increases were statistically significant, and the correlation value showed a correlation between these variables and wearing masks, although this association was slight. It was concluded through the study that the N95 mask was the best in its lack of effect on the variables under study, as the study shows that wearing the N95 mask leaves a less severe physiological effect than wearing a regular medical mask.

Keywords: medical mask, physiological parameters, men

1. INTRODUCTION

On March 11, 2020, the World Health Organization declared that Covid-19 is a global pandemic at the time of the announcement, the global number of COVID-19 cases was increasing daily, and after five months, the curve of infections continued to increase upward, and all over the world, it entered many countries and in all parts of the earth. In a state of temporary or complete lockdown through a stay-at-home order ,As such, many residents have been instructed to stay in their homes and not go out except for essential things such as shopping or accessing health care, while allowing individuals working in health care and essential jobs to continue to work and perform their jobs. On April 3, 2020, the control center recommended The CDC recommends that individuals wear a face mask in public if they cannot stay at least six feet away from others, to help prevent transmission of the COVID-19 virus (WHO, 2020(It seems that this recommendation to use the mask was controversial among the general public, especially among workers in many professions that are not used to

using a mask while performing it.This includes grocery workers, restaurant service, teachers, and childcare providers. There are also many concerns among people, including that the muzzle is uncomfortable, cumbersome, or annoying, and that using it for a long time may be dangerous to health or lead to negative results.

Medical face mask

It is important to understand the different types of masks and what task they are designed to perform. Medical masks include regular surgical masks and special breathing masks licensed by the US National Institute for Occupational Safety and Health and write an acronym NIOSH, which purifies the air by 95%, and therefore the mask has been called N95 (Fig. 1) and some are equipped with a filter for ventilation,Primarily designed to protect the wearer from airborne particles, droplets, and other hazardous liquids, the US Food and Drug Administration (FDA) describes a surgical mask as a loose-fitting device that creates a physical barrier between the wearer's mouth and nose and potential contaminants in the immediate environment, and is disposable after each use , .The N95 is defined as a 'respiratory protective device' designed to achieve an optimal facial fit and achieve highly effective filtration of airborne particles (Smith et al., 2016(Among what the scientist Roberge and his group (2010) mentioned, it goes without saying that masks, whether medical or cloth, can be effective in reducing the transmission of viruses..However, we do not know whether there is a physiological effect behind wearing a mask. The first question that must be confirmed is: Are there any changes in breathing while wearing a mask?The second physiological question: Are there any changes in blood oxygen delivery while wearing a mask? Does it affect the oxygen saturation curve?Does exercise or simple exercises, and even movement during work, when wearing a mask, affect or be affected in some physiological indicators?In this paper, we discussed the effect of using two types of masks (surgical and N95) that are available for use on some physiological indicators among young people who participate in training and exercise.

Figure (1) Types of masks (WHO website https://www.who.int/ar).

Materials and methods

Instruments

Table (1): Laboratory devices and equipment that were used in the current study.

Origin	**MANUFACTURER**	device name	**No**
Germany	Rossmax	Digital pressure device	1
China	jzlki	The oximeter	2

China		Surgical mask (medical)	
China		N92 respirator	

Experiment procedure

The experiment was conducted in the quintet football arena belonging to Al-Yaqada Sports Club in Diwaniyah / Iraq. The experiment tested the effect of using two types of medical masks on (24) healthy volunteers, ages 25-30 years, and weights ranging between 69-91 kg.tests of all volunteers in the health center in the first - Diwaniyah sector for primary health care to ensure that they are safe from respiratory diseases, in addition to the information collected by the researcher on the volunteers, which confirmed that they do not suffer from chronic diseases and that they are non-smokers.

Study groups:

All volunteers underwent a test of the effect of the type of mask on some vital indicators as follows. The study was conducted outdoors and in a moderate atmosphere (to some extent) with the participation of (24) male volunteers,At first, blood pressure, heart rate, blood oxygen saturation and respiratory rate were measured for each volunteer, after which the volunteers were randomly divided into two groups (each group consisted of 12 volunteers).The first wore the regular medical mask and the second the special medical mask N95, and then each volunteer was subjected to a continuous walking test on the treadmill at an average speed for a distance of 200 meters. Before and after the mask for the purpose of confirming and dealing statistically with the rates of the three readings of the volunteer.

Pulse oximeter:

In this study, an oximeter device from the Chinese jzlki company was used. The way this device works is to place a sensor on a thin part of the patient's body (Picture No. 1), usually around one of the fingers or the earlobe.Or around the foot in the case of infants, and the device passes two waves of light through the photoreceptor body and the device measures the changing absorbance at each wavelength, which allows it to determine the absorbance by arterial blood pulse alone (in most cases) (Brand et al., 2002) .

Photo (1) Pulse oximeter (WHO website).

Digital Blood Pressure Monitor

The device used the German ROSMAX type, following the manufacturer’s instructions, and the volunteer’s seating position is as shown in (Picture . 2) so that the device is attached to the forearm and presses the device’s operating button, so the device selects the reading for high and low pressure, and the device can also read the number of heartbeats.

Photo (2) The digital pressure gauge

Statistical analysis:

Use the Spss V24 program to extract the average and standard deviation for age and weight, and extract the T value between the variables and between the experimental groups and the P value.

2. RESULTS

Table (2) indicates the number of participants in the test, their average age and weight, knowing that all participants were healthy males.

Table (2) Description of the study groups according to age and weight criteria.

Average weight / kg	average age/year	number	group
79.37±7.36	27.00±1.92	25	1

It is noted from Table (3) a slight increase in blood pressure among the individuals before and after the test and in the first group who used the regular medical mask, and this slight increase included the systolic and diastolic pressure,The regular mask had no significant effect ($p \geq 0.05$) on the pressure difference before and after the test, where the study recorded a significant value (0.011) for the effect of the mask on systolic pressure.The heart rate increased at an average of (3.75) beats per minute among the group members after conducting the test, and the relationship between wearing a mask and this increase in heart rate was not statistically significant and the correlation between the two workers changes at a rate of (0.043) in the direction of not wearing a muzzle, and at a significant level ($P \leq 0.05$) (Table 3). The difference in the breathing rate before and after the experiment was about (2.75) times per minute. The study showed an increase in the breathing rate after the test. This increase was significant at the level of significance $P \leq 0.05$,While the study recorded a positive correlation between wearing a mask and the increase in respiratory rate towards wearing a mask at a significant level ($P \leq 0.05$) (Table 3).The study indicated an increase in the percentage of oxygen saturation among individuals after the test by (97.125%).This increase was significant, at a significant level ($P \leq 0.05$), while the correlation between wearing a mask and the increase in saturation percentage was (0.003) towards wearing a mask and at a significant level ($P \leq 0.01$) (Table 3).

Table (3) Correlation and significance values between the variables of the first group (the usual sleeve).

significant value	T. test	after testing	before testing	variants
0.011[a]	**416.3-**	**12.375 ± 0.51755**	**11.7500 ± 0.46291**	systolic pressure
B	**B**	**8.25 ± 0.46291**	**8 ± 0.0**	diastolic pressure
[b]860.0	**2.00**	**82.5 ± 3.29502**	**78.75 ± 3.88219**	Heartbeat
0.001[a]	**8.775**	**23.625 ± 0.91613**	**20.875 ± 1.24642**	breathing rate
0.006[a]	**3.837**	**97.125 ± 2.41646**	**96.125 ± 3.39905**	Oxygen saturation

a. significant effect , b .effect is not significant ,B. Correlation cannot be calculated because one of the variables is constant

The study indicated that there was a negative correlation of (-3.146), meaning that the effect of wearing an N95 mask on systolic blood pressure was statistically significant.This was confirmed by the significance test, where its value was (0.011) at a significant level of P≤ 0.05. Also, the difference between the diastolic pressure between individuals before and after the test was not of significant value, Table (4).The heart rate increased at a rate of (3.5) times per minute among individuals after the test, and Table (4) shows that this increase was significant, and the correlation was positive and significant at a significant level of P≤ 0.05.The study proved that wearing a mask (N95) has an effect on increasing the respiratory rate, and this effect has a significant value, whereTable (4) recorded a significant value of (0.001), and at a significant level of P≤ 0.05,The study also showed an increase in the percentage of blood oxygen saturation among the group members after the test. The significance of this effect and the amount of correlation between wearing a mask and increasing oxygen saturation were recorded in Table(4).

Table(4) Correlation and significant values between the variables of the second group (N95 mask).

significant value	T. test	after testing	before testing	variants
0.011[a]	**416.3-**	**12.25 ± 0.46291**	**11.625 ± 0.51755**	systolic pressure
0.241[b]	**2.293**	**8.375 ± 0.51755**	**7.875 ± 0.35355**	diastolic pressure

0.035[a]	**2.6**	**82.5 ± 3.29502**	**79 ± 3.81725**	Heartbeat
0.001[a]	**6.67**	**22.75 ± 1.48805**	**20 ± 1.06904**	breathing rate
0.012[a]	**3.382**	**97.5 ± 0.75593**	**95.875 ± 2.41646**	Oxygen saturation

a. significant effect , b .effect is not significant

By comparing the results of the two groups, the study shows that the rate of systolic blood pressure among the individuals who wore a medical mask was higher than among the individuals who wore a (N95) mask, and this difference between the two values is not statistically significant, According to what is indicated in Table (5), which recorded a high correlation value towards the group of individuals who wore a (N95) mask, and although the rate of increase in diastolic pressure among individuals who wore a (N95) mask was the highest, the correlation value Do not fall in love with the values of this group (Table 5).The study indicated that the heart rate was equal between the individuals in the two groups, and this was confirmed by the high correlation value and the significant value, which indicates that there is no difference in the effect of using the two types of masks on the heart rate, (Table 5).The study showed that there was no significant difference between the respiratory rates in the two groups, and that the negative correlation value confirms the tendency towards the medical mask.Although the correlation value between the oxygen saturation ratios tends towards wearing the (N95) mask slightly, it is not significant (Table 5).

Table (5) Comparison of the effect of the type of mask on the study variables.

significant value	T. test	N95 mask	Medical mask	variants
0.619[b]	**0.509**	**12.25 ± 0.46291**	**12.375 ± 0.51755**	systolic pressure
B	**B**	**8.375 ± 0.51755**	**8.25 ± 0.46291**	diastolic pressure
0.866[b]	**0.172**	**82.5 ± 3.29502**	**82.5 ± 3.29502**	Heartbeat
0.154[b]	**1.054**	**22.75 ± 1.48805**	**23.625 ± 0.91613**	breathing rate
0.899[b]	**-0.130**	**97.5 ± 0.75593**	**97.125 ± 2.41646**	Oxygen saturation

a. significant effect , b .effect is not significant

3. DISCUSSION

Until recently, we have not seen research requiring the use of cloth or other face coverings in public, but the majority of research exploring the effect of masks on humans was conducted later in the past year and beyond on the impact of medical mask or N95 use (Scarano et al., 2020).Smith and cohort (2016) found no significant difference between N95 and medical respirators in terms of risks associated with respiratory infection in healthcare workers, although N95s had a higher filtration rate and lower leakage when compared to medical respirators. Roberge and co (2010) investigated the effect of wearing an N95 mask among healthcare workers while walking slowly on a treadmill (1.7 mph and 2.5 mph) for 1 hour, This study demonstrated that an hour of walking slowly while wearing the N95 did not affect breathing, specifically, there was no effect on respiratory rate and inspiratory and exhalation volume or total ventilation (total air flow per minute). The study also confirmed that there is no significant effect when conducting experiments in moderate or cold climates. On the other hand, another study found a 3% increase in inhalation and exhalation resistance, which is likely caused by the exhaled moisture retained by the mask This increased resistance means that more air force is required for air to pass through the muzzle, which could mean increased use of respiratory muscles. However, the authors conclude that these changes were relatively minor, and it is unlikely that the individual would be aware of these changes when Wearing a mask (Scarano et al., 2020). The body is very efficient at maintaining an oxygen saturation of around 98%, with normal ranges between 90-98% saturation for normal hemoglobin (Roberge et al., 2011),The precise regulation of oxygen levels is reflected in research examining the effect of wearing a mask on oxygen saturation levels, for example,A study of 52 surgeons wearing surgical masks revealed a decrease in arterial oxygen saturation from 98% before surgery to 96% after surgery, which ranged from 1-4 hours. In addition, It was accompanied by an increase in heart rate from 85 bpm before surgery to 90 bpm after surgery (Rebmann et al., 2013).Although changes in oxygen saturation and heart rate were statistically significant, they are not clinically significant.Considering that the postoperative oxygen saturation percentages remained in the normal range (90-98%) as well as the heart rate (normal resting: 60-100 bpm) (Kenney et al., 2020).

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