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Nurse's Performance and Attitudes Regarding Infected and Deceased Cases with Coronavirus at Zagazig' Quarantine Hospitals

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Abstract: **The nurses, as members of the medical team, are considered the first line of defense against Coronavirus (COVID-19). They are in direct contact with infected cases for long hours and exposed to psychological distress, occupational burnout, and physical violence. There is a paucity of literature on the study of nurses' performance toward the pandemic COVID-19. Thus, the present study was aimed to assess the performance and attitudes of nurses toward infected and deceased cases with Coronavirus. A cross-sectional descriptive study was conducted in three quarantine hospitals in Zagazig city, among 289 male and female nurses using a self- administered questionnaire to assess their Knowledge, Attitudes, and Practices (KAPs). Consequently, collected data was coded, analyzed using SPSS version 20 with various statistical models to find the significance of data and achieve the aim of the study. The results showed that the majority of nurses have correct knowledge except for Emergency' nurses with a mean score of 47.0±3.79, an absolute majority of nurses had good preventive practices, especially in ICU with a mean score of 24.68 ± 2.28. Moreover, a positive statistical relationship was found between total knowledge score, preventive practices, and attitudes (P<0.001). The study concluded that the majority of nurses' knowledge was correct and their preventive practices were good. We recommended continuous provision of training of all nurses on proper infection preventive measures with a focus on emergency' nurses.**

Keywords: **Attitude, Coronavirus, COVID-19, Cross-sectional, Deceased Case, Infections, Pandemics, Questionnaires, Quarantine.**

I. INTRODUCTION

Coronavirus disease is a rapidly, spreading, global pandemic virus in the world. It is spread through respiratory drops and the period of its incubation varies between 2-14 days **(CDC, 2020)**. COVID-19 transmitted from one person to another via close contact by the respiratory secretions in sneezes and coughs or touching contaminated objects or surfaces. COVID -19 is a type of Coronavirus family and the first infection case with it was in Wuhan, China in December 2019 **(Hussain, Garima, Singh, & Ram, 2020).**

The World Health Organization (WHO) defined it, as an overall health disaster on January 30, 2020. It was confirmed pandemic on 11th march 2020 **(Bhagavathula, Aldhaleei, Rahmani, Mahabadi, & Bandari, 2020)**. The Egyptian' ministry of health and population (EMoHP) reported the first case of COVID-19 in Egypt was on 8th February 2020 and on the 2nd April, (EMoHP) report showed, the total number of cases in Egypt was 868 cases (61.3% males and 38.7% females) with 59 deaths and 154 recovered. While, on the 10th of April 2020, the total number of reported cases was 1,794, and 135 deaths. The bed occupancy rate in the quarantine centers in Egypt ranged from 11% to 89%, with a mean of 53**% (Hasab, El-Ghitany, & Ahmed, 2020)**.

The manifestations of COVID-19 infection are described by different researches as: it ranging from mild symptoms with fever, sore throat, dry cough, dyspnea, loss of smell, and taste up to severe with pneumonia. It can outspread toward life-threatening complications as acute respiratory distress (ARDS), sepsis, septic shock, and organ dysfunction. It can be fatal in about 2% of cases. The Diagnosis of this virus is confirmed by Reverse Transcription polymerase chain reaction (RT-PCR) of SARS Cov -2 (Ribonucleic acid) RNA first from the isolated patients' nasopharyngeal swabs **(World Health Organization, 2020a)**. Furthermore, an old age, patients with chronic illnesses, and immunocompromised patients have been identified as high-risk groups for severe disease and mortality from COVID-19 **(Li et al., 2020).**

The infection control and preventive measures generally involve hand hygiene, social distancing, covering nose and mouth while coughing or sneezing, quarantines, isolation and wearing suitable PPE. Health Care Workers (HCWs) as physicians and nurses are at the first front defense' lines. They play an essential role in providing care for patients and directly contacted with infected cases. In the context of COVID-19 and during routine health services, they provide critical care to patients and ensure that infection prevention and control (IPC) measures are implemented and adhered to in healthcare facilities in order to limit healthcare-associated infections **(World Health Organization, 2020b)**. In addition, nurses are exposed to not only infect with COVID-19 related to their frequent exposure to infected cases, but also, long duty hours, psychological distress, fatigue and physical and social violence **(Gan, Lim, & Koh, 2020).**

WHO reported on 8th April 2020, 22073 cases of COVID-19 among Health care workers (HCWs) from 52 countries **(World Health Organization, 2020a)**. The priorities of the countries emphasize on protecting the HCWs. But, lack of awareness, training, availability of health protection equipment and diagnostic tests for early detection of infection among them are important factors contributing to the spread of infection among them **(Chirico, Nucera, & Magnavita, 2020).** Late recognition of COVID-19 in patients, working in higher-risk departments, overcrowding, contaminated environment, insufficient knowledge and awareness of infection control practice, in adherence to regular hand hygiene practices, and improper use of personal protective equipment (PPE) increase the infection rate among nurses **(Ran et al., 2020)**. Planning for such disasters is a vital step to effectively deal with actual health crises as in the case of developing countries like Egypt. Limiting transmission in Egypt was difficult without the extenuation procedures of the government because the household and social contact high. Readiness for combating infectious diseases such as COVID-19 begins with better understanding, positive thinking, and safe and best practices **(Bhagavathula et al., 2020)**.

Shortage in the instruction and unclear guidance to the common people as well as to the Health Service Providers regarding infectious disease may result in global health emergency and urgency **(Alanzi et al., 2019)**. The WHO' recommendations in order to prevent infection in healthcare centers are: the use of contact and airborne droplet precautions by HCWs caring for patients with COVID-19, correct use and the wearing of PPE, adhering to hand hygiene **(World Health Organization, 2020b)**. When these precautions are applied correctly and consistently, alongside standard precautions, administrative and environmental controls, the risk of infections among HCWs is substantially reduced or avoided altogether. As the rate of infection is spreading vigorously among the nurses who are exposed to the COVID-19 patients, there is a crucial demand for a comprehensive assessment of awareness and practices regarding COVID 19 among the nurses **(Alanzi et al., 2019)**

1.1. SIGNIFICANT OF THE STUDY:

The international council of nursing (ICN) reported over 90.000 healthcare workers have been infected with COVID-19 and 360 of them were nurses. Until now, there is no specific cure for this infection except the supportive and symptomatic treatment. Because the nature of this virus is rapidly changing and unclear information about it, updating knowledge and training for nurses is very necessary **(Mantovani 2020)**. Until the start of this study in the end of February and during data collection, no such study had been conducted in Egypt to assess nurses ' performance or to know their attitudes regarding covid-19.

1.2 AIM OF THE STUDY:

The present study was designed to assess the performance and attitudes of nurses toward infected and deceased cases with Coronavirus. This aim achieved through an instruments used for assessing the nurses' knowledge, attitudes and their preventive practices toward the pandemic Coronavirus.

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1.3. RESEARCH QUESTIONS:

- What are the nurses' knowledge, preventive practices and attitudes regarding Coronavirus?
- Is there a relation between nurses' characteristics and their knowledge?
- What is the relation between nurses' characteristics and their preventive practices?
- What is the relation between nurses' characteristics and their attitudes?
- What is the relation among nurses' Knowledge, preventive practices and attitudes?

1.4. OPERATIONAL DEFINITIONS:

Performance: an action or type of behavior that involves a lot of attention to detail based on Knowledge and Practice.

Knowledge: Appropriate answers from nurses about COVID-19 through the structured knowledge questionnaires. Who answered (<12 correct response from 19 knowledge questions) were considered incorrect knowledge and those response (≥12-19) Knowledge questions were considered correct knowledge**.**

Preventive Practices: the practices of nurses toward patients infected with COVID-19 virus and the cases that died. Appropriate practice of nurses about COVID-19 assessed through the structured practice questionnaires. Those answered by < 9 correct response from 12 Practice questions were considered poor Practice**,** and those response ≥ 9-12 Practice questions were considered good Practice**.**

Attitudes: A mature way of thinking or feeling about something or someone, it divides into: positive, neutral or negative. Participants with score of < 8 attitude questions were consider negative attitude and those who scored ≥ 8 to 11 attitude questions were considered positive toward COVID-19.

Deceased' Cases: Newly-reported death cases of Coronavirus.

Quarantine' Hospital: is a hospital equipped to receive peoples that might have an communicable disease to keep them away from other people for a period of time so that the disease cannot spread.

II. METHODOLOGY

2.1. TECHNICAL DESIGN:

Research design: cross-sectional descriptive research design was utilized among a group of nurses from 3 Quarantine Hospitals at Zagazig City. This design was used to determine nurses' knowledge, attitudes, and preventive practices and answer the research questions.

Setting: This study was carried out on Bedside nurses, who are giving direct care for COVID-19' patients and work in 3 hospitals (Al-Ahrar, Chest, and Fever Hospital) at Zagazig City, Sharkia Governorate.

Subjects: Based on the information from the Department of Health Affairs, in Sharkia Governorate. The total study' population (Nurses) who is working at the previously mentioned 3 hospitals was 830 distributed into (450 nurses at Al-Ahrar Hospital, 230 nurses at the General Fever Hospital, and 150 Nurse at Chest Hospital). The study's sample size was calculated through Rao-soft based on a response rate of 50 %, at a confidence level 95% with a 5% margin of error and design effect 1 to be 263 (http://www.raosoft.com/samplesize.html). Then, the sample size increased by 10% to be 289 for overcoming non-response. Finally, the nurses included in the study were selected from Al-Ahrar H 156 (54.2%), Fever H 80 (27.7%), and Chest H 52 (18.1%). For selecting the study participants after the proportional allocation of study subjects to each hospital, the researcher used a simple random sample technique. Confidentiality precautions were ensured during the process of collecting data. Exclusion criteria: nurses who are on Annual, Private, and sick leave at the time of data collection were excluded from the study. Sample size Equation: $n = \frac{\mathrm{N\ x\ P\ (1-P)}}{[\mathrm{N-1x}\ (d^2 \div z^2)]+P(1-P)}$ **(Steven K. Thampson, 2012)**

Study' Variables:

Independent variables: Demographic characteristics as: age, gender, marital status, educational level, experience years, hospital name, working area, source of information on COVID-19, and training courses about Coronavirus.

Dependent variables: participants' performance that include Knowledge, Preventive practices inaddition to their Attitudes regarding COVID-19.

Tools for data collection: The following tools were used in the current study:

A structured self-administered questionnaire, developed by the researcher based on literature review, visiting the EMoHP and WHO' websites for the most frequently asked questions and preventive Protocols. The questionnaire was prepared in Arabic Language to be understandable, after that retranslated professionally into English. The tools were consisting of 4 parts**.**

Part (1) Demographic sheet includes (9 Q)for asking about: age, gender, residence, marital status, education, experience years, hospital's name, area, source of knowledge on COVID-19, and training session.

Part (2) Knowledge data sheet contained (19) items in closed-end questions to assess the participants' knowledge about causes of Covid-19, incubation period, risk factors, the mood of transmission, clinical symptoms, diagnostic tests, fatality of it, etc. It adopted from **(Zhang et al., 2020)**. Each item scored (0) for incorrect and (I) don't know while, correct answer toked (2). Total grade ≥ 60 % of the maximum score considered correct knowledge. Incorrect knowledge was < 60% of the maximum score.

Part (3) Preventive practice's tool developed from **EMoHP and WHO** web site. It included (12) items as washing hands with soap, water, and alcohol rub; using PPE; keeping distance at least 1 meter; putting on N95 mask; washing deceased case according to the lawful shroud and covering them with 3 protective layers; and allowing relative to kiss deceased case, etc.. The nurses' responses were always done took 3, occasional response took (2), and never response took 1. A good practice for a total score ≥ 60 %, and poor practice < 60% of the maximum score **(http://www.mohp.gov.eg ; https://www.who.int/ar).**

Part (4) attitude Part: included 11 statements assessed using 3 Likert scale and adopted from **(Goni et al., 2020)** after modification. For example your worriedness is about: dangerous of disease, social isolation, risk to family and friends; I am afraid of getting disease; do you think the available information from MOH is sufficient, etc.), the score for response were 1 for disagree, 2 for somewhat, 3 for agree. A positive attitude for a total score ≥ 60 % , and negative attitude < 60% of the total score.

2.2. OPERATIONAL DESIGN: Included the preparatory phase, content validity, pilot study, fieldwork, and limitations of the study.

Preparatory phase: Developing a structured questionnaire and the review of related literature which carried out from January 2020 to February 2020. A period of approximately two months was used to develop the questionnaire.

Data Quality control:

Content validity: Tools were checked and revised by a panel of five experts from the Medical-Surgical Nursing specialty with over 5 years' experience and modifications were done based on their opinions.

Tools' reliability: The proposed tools' reliability was done with Cronbach's alpha tests. The values were 0.75 for the knowledge section, 0.72 in the practice section, and 0.81 for the attitude section. The collected data were checked daily for its clarity, competence, and accuracy before data entry. In addition, it was kept in the form of a file in a private secured place.

Pilot study: prior to start the actual study, a pilot sample was administered on 10% (28) nurses to check the clarity, applicability and fitness of the tools for the study sittings. The pilot study also wanted to estimate the time needed for every participant to fill within the questions. Based on the pilot study's results some confusing questions were modified for more clarity and consistency. Those that shared within the pilot study were excluded from the most study samples.

Fieldwork: The definite fieldwork started from March 2020 to May 2020. A formal letter was obtained after obtained acceptance to the directors of the 3 hospitals (Al-Ahrar, Chest, and Fever) to approve for conducting this study. The researchers highlighted strongly that the information collected would be used for scientific research only, confidentiality will be assured. The researcher gave the questionnaire sheet to the participants and asked them to write their responses. The time consumed to fill the sheet was from 15-20 minutes. The date was collected before lockdown time.

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Administrative design: An official permission was obtained from the director of the 3 mentioned Hospitals. Before conducting the study the aim of the study was explained to obtain permission for data collection**.**

Ethical considerations: Oral consent was taken from the nurses who participated in the study after an explanation of the purposes and nature of the study, and the right to withdraw at any time or refuse to answer the specific questions without giving any reason. The respondent identifier wasn't recorded in a sheet to ensure confidentiality and the collected data was used for the research purpose only.

Data processing and Statistical analysis:

Data collected throughout previous tools and outcome measures coded, entered, and analyzed using Microsoft Excel software. Data were imported into the Statistical Package for the Social Sciences (SPSS version 20.0) for analysis. The qualitative data represent as number and percentage, quantitative continues group represented by mean ± SD. Difference and association of qualitative variable tested by Chi-square test (X2). The difference between quantitative independent groups was tested by t-test, correlation by Pearson's correlation. The P - value was set at 0.05 for significant results & 0.001 from the highly significant result.

III. RESULTS

The present study included 289 nurses. According to their demographic data, the study's results showed that their mean-age was 31.71(SD 6.21) with a median of 30.0 and ranged between 19-42 years. The nurses' mean experiences were 12.94±5.41 with a median of 13.0. Regarding sex, 46 (15.9%) of them were male and 243 (84.1%) were females. It was shown that 80.3% of the participants were married, 8% divorced, 6.2% single, and 5.5% widow. Regarding education, 75.4% of nurses had a Diploma, 18.7% had a median institute, and 5.9% had bachelors. The nurses' worked areas were outpatient, inpatient, ER, and ICU (17.0%, 26.3%, 18.3% & 38.4%) respectively. The nurses have been distributed to hospitals, AlAhrar, Fevers, and Chest (54.2%, 27.7% & 18.1%) respectively. It was clear that, the Ministry of Health represented 54.6% of nurses' information sources, the Social Media represented 34.6%, and WHO/CDC represented 10.8%. The majority of the nurses hadn't any training session (51.2%).

Regarding Knowledge, it was clear that 56.7% of nurses were considered to have correct knowledge regarding COVID-19. Their knowledge score ranged from 35-59 and the mean knowledge score was 47.0 ± 3.79, **Table** 1. There was no statistical relationship between demographic data and knowledge score of the nurses except, A statistically significant relationship was found between nurses who work in the ER and their level of the incorrect knowledge score, P=0.039. Also, a statistically significant relationship showed between the group that has a correct knowledge score and WHO as a source of information, p= 0.031,

Table 2.

In relation to preventive practices among nurses toward COVID-19, the results showed that overall; up to 90% of the nurses had a good preventive practice with a mean score of 24.68±2.28, median 25, and ranged (19-29), **Table** 1: Participants' knowledge, preventive practices, and attitudes toward Coronavirus. Also, there was no statistical association between the demographic data and preventive practices' level except, the nurses with a diploma and medium institute (90.4% & 94.4%) were significantly at (P 0.013) to have a good preventive practice. Moreover, the nurses at ICU and outpatients (93.3% & 98.2%) were significantly at (P=0.00) more likely to have a good preventive practices. In addition, the nurses that working on AlAhrar H were having good preventive practices, **Table 3**.

Regarding the nurses' attitudes toward COVID-19, the results clarified, 57.8% of the participants were having a positive attitude with a mean score of 13.79±1.81, the median 14 and ranged from 9-17, **Table** 1. There was no statistical association between the demographic data and the participants' attitudes score except, the male, singles' nurses, and the information from the **WHO** (71.9%, 88.9% & 83.9%) were statistically significantly associated with positive attitudes at (P 0.037, 0.007 & 0.008) respectively, **Table 4**.

Regarding the relation between participants' KAPs toward COVID-19, the results showed, the Knowledge score was a statistically significant correlation with preventive practices' score and attitudes' score. Also, the preventive practices' score was a statistically significant correlation with attitudes' scores. (P 0.00), **Table 5.**

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Table 1: Participants' knowledge, preventive practices, and attitudes toward Coronavirus.

Item		N=289	%	Mean ± SD	Median/Range
Knowledge	incorrect <60%	125	43.3	47.0±3.79	47.0 (35-59)
	correct ≥60%	164	56.7		
Preventive practices	Poor practice <60%	29	10.0	24.68±2.28	25.0 (19-29)
	Good practice ≥60%	260	90.0		
Attitude	Negative < 60%	122	42.2	13.79±1.81	14.0 (9-17)
	Positive ≥ 60%	167	57.8		

Data presented in Number, Percentage, and mean ± SD (Standard Deviation), Median & Range.

Table 2: Relation between Demographic data and Nurses' knowledge about Covid-19 (N=289)

Variable		incorrect		Correct		t/X^2	P
		N	%	N	%		
Sex	Male	19	41.3%	27	58.7%		
	Female	106	43.6%	137	56.4%	0.08	0.77
Marital	Single	12	66.7%	6	33.3%		
	Married	92	39.7%	140	60.3%		
	Divorced	13	56.5%	10	43.5%	7.19	0.066
	Widow	8	50.0%	8	50.0%		
Education	Diploma	97	44.5%	121	55.5%		
	Institution	21	38.9%	33	61.1%	0.58	0.74
	Bachelors	7	41.2%	10	58.8%		
Area	Outpatient	28	57.1%	21	42.9%		
	Inpatient	36	47.4%	40	52.6%		
	ER	16	30.2%	37	69.8%	8.39	0.039*
	ICU	45	40.5%	66	59.5%		
information' Source	EMoH	76	48.1%	82	51.9%		
	Social Media	42	42.0%	58	58.0%	6.97	0.031*
	WHO/CDC	7	22.6%	24	77.4%		
Training	NO	67	45.3%	81	54.7%		
	Yes online	56	43.8%	72	56.2%	4.37	0.11
	Yes class	2	15.4%	11	84.6%		
Hospital	Alahrar Hospital	64	40.8%	93	59.2%	0.86	0.64
	Fever hospital	37	46.2%	43	53.8%		
	Chest Hospital	24	46.2%	28	53.8%		
Age		31.83±6.48		31.62±6.01		0.284	0.776
Experience		13.20±5.71		12.74±4.85		0.593	0.554

Data presented in number, percentage, mean±SD, t-test for the difference between quantitative independent groups. X^2 Chi- square. * Significant at p <0.05.

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Table 3: Relation between demographic data and participants' preventive Practices about Covid-19 (N= 289)

Variable		Poor Practice		Good Practice		t/X^2	P
		N	%	N	%		
Sex	Male	4	8.7	42	91.3%		
	Female	25	10.3	218	89.7	0.10	0.74
Marital	Single	1	5.6	17	94.4		
	Married	22	9.5	210	90.5		
	Divorced	4	17.4	19	82.6	1.96	0.58
	Widow	2	12.5	14	87.5		
Education	Diploma	21	9.6	197	90.4		
	Institution	3	5.6	51	94.4	8.31	0.013*
	Bachelors	5	29.4	12	70.6		
Area	Outpatient	3	6.1	46	93.9		
	Inpatient	14	18.4	62	81.6	19.66	0.00**
	ER	10	18.9	43	81.1		
	ICU	2	1.8	109	98.2		
information' Source	EMoH	17	10.8	141	89.2		
	Social Media	6	6.0	94	94.0	4.87	0.087
	WHO/CDC	6	19.4	25	80.6		
Training	NO	12	8.1	136	91.9		
	Yes online	15	11.7	113	88.3	1.42	0.49
	Yes class	2	15.4	11	84.6		
Hospital	Alahrar H	9	5.7	184	94.3		
	Fever H	10	12.5	70	87.5	8.62	0.01
	Chest H	10	19.2	42	80.8		
Age		31.58±5.44		31.72±6.30		-0.115	0.908
Experience		12.51±4.87		12.98±5.32		-0.371	0.711

Data presented in number, percentage, mean±SD. t-test for the difference between quantitative independent groups. X^2 Chi square. * Significant at p <0.05

Table 4: Relation between demographic data and participants' Attitudes about Covid-19 (N=289)

Variable		Negative		Positive		t/X^2	P
		N	%	N	%		
Sex	Male	13	28.3	33	71.7		
	Female	109	44.9	134	55.1	4.36	0.037*
Marital	Single	2	11.1	16	88.9		
	Married	98	42.2	134	57.8		
	Divorced	15	65.2	8	34.8	12.14	0.007**
	Widow	7	43.8	9	56.2		
Education	Diploma	96	44	122	56.0		
	Institution	19	35.2	35	64.8	1.39	0.49
	Bachelors	7	41.2	10	58.8		
Area	Outpatient	19	38.8	30	61.2		
	Inpatient	30	39.5	46	60.5		
	ER	23	43.4	30	56.6	0.86	0.84
	ICU	50	45.0	61	55.0		
information' Source	EMoH	72	45.6	86	54.4		
	Social Media	45	45.0	55	55.0	9.69	0.008**
	WHO/CDC	5	16.1	26	83.9		
Training	NO	66	44.6	82	55.4		
	Yes online	54	42.2	74	57.8	4.18	0.12

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	Yes class	2	15.4	11	84.6		
Hospital	Alahrar Hospital	65	41.4	92	58.6		
	Fever hospital	34	42.5	46	57.5	0.13	0.93
	Chest Hospital	23	44.2	29	55.8		
Age		32.43±5.87		31.18±6.41		1.693	0.091
Experience		12.41±5.32		12.41±5.62		1.608	0.109

Data presented in number, percentage, mean±SD. t-test for the difference between quantitative independent groups. X^2 Chi square. * Significant at p <0.05.

Table 5: Correlation between total knowledge, preventive Practices, and attitudes score

Variable		Preventive practices	Attitudes
Total knowledge score	r	.301	.488
	P	.000**	.00**
Total preventive practice score	r	1	.298
	P	-	.000**
Total attitudes score	r	.298	1
	P	.000**	-

r, Pearson's correlation , ** highly significant at (p < 0.001)

IV. DISCUSSION

The nurses among all the HCWs are considered key persons in the front lines of caring for the infected and deceased cases with Covid-19. Several studies conducted on assessing knowledge of HCWs but the present study are one of the few studies that targeted only nurses for assessing their knowledge, preventive practices, and attitudes. Therefore the present study was designed to assess the performance and attitudes of nurses toward infected and deceased cases with Coronavirus. Our results tried to answer about the nurses' knowledge, preventive practice, and attitudes toward COVID-19. Also, the study tried to clarify the relationship between the nurses' knowledge, preventive practice, and attitudes ' score.

The study' results clarified that, more than half of the nurses had correct knowledge regarding different aspects of COVID-19 and the mean knowledge score was 47.0±3.79. The researchers explain this correct knowledge that it may be due to the media focus on this pandemic and the government's aggressive response to this pandemic disease. This result comes in accordance with the study conducted among nurses in Iran, they reported (56.5%) of the participants had a good knowledge **(Nemati, Ebrahimi, & Nemati, 2020)**. In addition, these results were higher than the results conducted in Nepal and revealed the majority of respondents had a moderate level of knowledge (44.8%) **(Kafle et al., 2020)**. In contrast, these results were lower as compared with the results of the study conducted in Ethiopia; they reported that, level of good knowledge among nurses was 84.9% **(Feleke, Tassew, & Chanie, 2020)**. This difference may contribute to different sample sizes, settings, demographic data, preventive policies, and media effect in different countries.

Our results showed a statistically significant relation between incorrect knowledge scores among nurses who are working in the ER. In the researchers' opinion, that may be due to heavy work and in the availability of Emergency' nurses to take sufficient training. This is supported by our results that showed the majority of the participants hadn't any training session (51.2%). These results in the same line with the study conducted in Pakistan that showed 50% of the nurses hadn't undergone any training **(Khan et al., 2020)**. Contrary to those results, research conducted in Pakistan reported that 73.07% of nurses have received training to combat Corona infection **(Alwani et al., 2020)**.

Also, the results highlighted a statistically significant relationship between the participants that has a correct knowledge score and WHO as a source of information. This means the participants' tray to seek the information from confident sources as WHO& MOHP' websites, in spite of the social media represented 34.6% of the information' sources. Our results endorsed by various studies that stated, the WHO is the primary source of information regarding COVID-**19 (Abdel Wahed, Hefzy, Ahmed, & Hamed, 2020)**. This was unlike another study where social media is the main source **(Saqlain et al., 2020).**

The results of the current study showed that the absolute majority of nurses had good covid-19 preventive practices, with a mean score of 24.68±2.28. The researchers explain this; nurses follow preventive measures to implement strict health procedures and continuous follow-up to implement these measures to reduce the spread of the virus by state agencies. Also, a statistically significant relation was found between the nurses with a diploma and medium institute who are working at ICU and their good preventive practice. This result may explained by the fact that, the nurses who are graduates of diploma and intermediate institutes are appointed early and they are more dealing with sick cases, especially in intensive care, where the maximum preventive measures are applied. In addition, the nurses who were working on AlAhrar H were having good preventive practices. The explanation of this result is due to the increase in the number represented by the hospital, the hospital is modern and receives many cases and has strict control in the application of preventive measures. Similar results showed in different studies carried out in Uganda on HCWs, and in China. They showed HCWs have good practice, following infection prevention, and control practice recommendation **(Olum, Chekwech, Wekha, Nassozi, & Bongomin, 2020; Zhang et al., 2020)**.

In the current study, it showed that, the knowledge score was a statistically significant relationship with the preventive practices score. The researchers ' interpretation of this result is due to deal with Pandemic infectious disease, make the nurses more motivated to know about the disease, search for scientific materials and guidelines. This explanation supported by **(Zhang et al., 2020)**, they stated that HCPs with good knowledge and practice save themselves and show good message of awareness to the community.

Regarding the level of the nurses' attitudes, the results showed the majority of the participants had positive attitudes toward COVID-19 (57.8%) with a mean score of 13.79±1.81. This result comes in accordance with the study's results conducted by (**Feleke et al., 2020**), they revealed that the level of favorable attitude among nurses who work in South Gondar Zone Hospitals, Northwest Ethiopia was 63.3%. However, the Chinese's study, clarified that 85% of the participants were feared from self-infection which affects their attitude **(Zhou et al., 2020)**. Contradictory, those findings were higher as compared with the research done in Iran health care professionals that were having good attitudes 21% of health persons. The possible explanation for this difference contributes to the different target population and the period of the study.

In the present study, a statistically significant relationship between positive attitude and single, males' nurses. From our point of view, the explanation for this may be because unmarried males think rationally and don't get emotionally affected by such crises. Also, the results showed a statistically significant relation between knowledge score and attitudes. This result parallels several studies that found a significant association between the knowledge level of HCWs about COVID-19 and their attitudes **(Abdel Wahed et al., 2020; Saqlain et al., 2020; Zhou et al., 2020)**. It is well known that acquiring correct knowledge affects the coping strategies to such events, promote a positive attitude, and correct false beliefs. The results of this study reflect the KAPs of nurses in the study setting and not reflect the entire country's nurses' KAPs.

V. CONCLUSION

Based on the results, we found overall, the nurses' knowledge, preventive practices and attitudes towards covid-19 were correct, good and positive. Furthermore, the emergency nurses had insufficient knowledge, diploma and intensive care nurses had good preventive practices, nurses in AlAhrar hospital were good in preventive practices, and the attitudes of male and single nurses were more positive. An official source of correct knowledge to the nurses was from the EMoHP and the WHO websites. Moreover, the relationship between the nurses' knowledge, preventive practices, and the attitudes towards covid-19 was a positive with statistically significant relationship.

VI. RECOMMENDATIONS

Based on the conclusion of the study, we recommend continuous provision of training of all nurses on proper infection preventive measures with focus on emergency' nurses. Encourage nurses in fever and chest' hospitals to follow more preventive practices. In addition, conduct further qualitative research for large sample and in all over the country. After the Egyptian Government official report about increasing the number of infected and deceased cases among Nurses and Doctors, shall we provide economic, administrational and social support for them.

Limitation and Strength of the study

The limitation was inadequate of representation of all nurses in all governmental Hospitals in Zagazig City. So, the results can't be generalized. Leaving questionnaires with nurses to fill out represents biased.

Abbreviation' List: CDC: Communicable Diseases Control; COVID-19: Coronavirus 2019, CI: Confidence Interval, HCWs: Health Care Workers, IP: Incubation Period, KAP: Knowledge, Attitude, Practice, EMOHP: Egyptian Ministry of Health and Publication, SPSS: Statistical Package for Social Sciences, WHO: World Health Organization.

Data and materials' availability: All Data will be available upon demand from the corresponding author.

Conflict of interests: The authors declare that they haven't any competing interests.

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