

Occupational Health Hazards among Pregnant Nurses in Damietta and Khartoum General Hospitals: An Overview

Maha Moussa Mohamed Moussa⁽¹⁾, Naglaa Ibrahim Mohamed Gida⁽²⁾

Fatma Zaki Mohamed Farahat⁽³⁾

(1,2) Assistant Professor, Community Health Nursing, Faculty of Nursing, Port- Said University, Egypt

(3) Maternity, Gynecology and obstetrics, Faculty of Nursing, Port Said University, Port Said, Egypt

ABSTRACT

The pregnant nurses' exposure of the hazards daily during contact with sick patients, infectious agents, teratogenic chemicals, radiation and environmental risks. **Aim of the study:** To assess Occupational health hazards among pregnant nurses in Damietta and Khartoum of general hospitals: An overview. **Design:** A comparative descriptive research design was used to conduct this study. **Setting:** carried out in Damietta and Khartoum general hospitals (Egypt and Sudan). **Sample:** All pregnant nurses working in all departments of hospitals and outpatient clinics. It was 135 pregnant nurses in Damietta and 50 pregnant nurses in Khartoum. **Tools :** four tools were used for data collection, **tool I:** demographic characteristics for pregnant nurses, medical and obstetric history of nurses, nurses habits, nurses knowledge regarding occupational health hazed, **tool II-** physical assessment of studied nurses, **tool III :-** nurses practices regarding use of the personal protective equipment, **tool IV:** Assessment of work environment. **Result:** concerning nurses knowledge, shows that 40% of nurses had satisfactory knowledge regarding occupational health hazards in Damietta hospital, while, 70% of them had satisfactory knowledge in Khartoum hospital. Regarding nurses practices for use of personal protective equipment, shows that 70% of nurses had done practices regarding uses of personal protective equipment in Damietta hospital, while, 80% of them had done practices in Khartoum hospital. Concerning work environment it reveals a highly statistically significant differences regarding physical work environment, housekeeping, floors, stairs, mean of exit, employee facilities, fire protection, electrical, material handling, storage, machining guarding and clinic inside the factor. **Conclusion:** this study concluded that there were no statistically important correlation between total knowledge about occupational health hazards facing nurses in the workplace and total practices regarding use of PPE measures ($P < 0.05$). **Recommendation:** Continuing nurse health education program to reduce occupational health risk in the workplace.

Keywords: Occupational, health hazard, pregnant nurses and general hospitals

Introduction:

Occupational health hazards for pregnant nurses within the hospital environment can be of a physical, environmental hazards, musculoskeletal stressors, fatigue, chemical hazards, biological stressors, serious diseases, stress and Psychosocial hazards. (Mehrdad 2020 and Farhana 2020).

Physical and environmental hazards commonly found in hospitals include slippery floors, electrical hazards, noise, poor lighting, and inadequate ventilation. Among the best documented and most obvious occupational stress outcomes are accidents. Accidents most

frequently occur while personnel are manipulating clients or equipment. Another physical arena that particularly affects the hospital staff nurse is shift rotation. (Huei et al, 2020).

Musculoskeletal Stressors in many workplaces, back injuries are considered the most costly compensation problem for pregnant nurses. Occupational musculoskeletal disorders are the second-most common cause of disability in the general population especially pregnant nurses (Dehdashti et al., 2017).

Environmental factors lack of mechanical support for lifting, decreased availability of support staff to assist with lifts

and transfers, overcrowding and type of unit contribute to back injuries of nurses. Muscle flexibility, proprioceptive capacity, equal leg length, age, and aerobic exercise are physical aspects that may influence the incidence of back injury, although research results have been conflicting. (Elbejjani et al., 2020).

Rotational Shift Work in the work environment, another powerful stressor for nurses is shift work, especially rotational work. The problems that arise with rotational shift work occur because the function of most human physiological systems is based on rhythms that can be easily disrupted as they look after the patient for 24 hours shifts. (Farhana2020).

Fatigue As well as the fact that it is atypical to sleep during daylight, it can result from prolonged stress produced by the change. Sleep is often shorter and anxious during the light of day. Stress can also result psychologically from decreasing family time due to conflicting schedules or being unable to contribute to social functions. Selected research has shown that "morning" individuals (those who are alert and active early in the day) have the greatest difficulty adapting to shifts, while "night" individuals have the least difficulty adapting to rotating shift work. (Abdullah Alahmadi & Alharbi 2018).

Chemical hazards of hospital pregnant nurses' Chemical occupational risks to hospital staff nurses and female employees are among the most insidious. In hospitals, 179 known skin and eye irritants and 135 carcinogenic, mutagenic, or teratogenic agents were reported in a national occupational hazards survey. Hospital staffs nurses are most likely to be exposed to chemicals through waste and anesthetic agents. About 75,000 hospital workers are exposed to waste anaesthetic agents every year (nitrous oxide, halothane, and methoxy flurane). Although several epidemiological surveys have been published, many lack data on quantitative exposure and rely on questionnaires too heavily. (Chhabra 2016).

Biological stressors of hospital pregnant staff nurses. Nurses are constantly exposed to people suffering from infectious diseases. A survey of 5,916 hospitalized individuals and

over 300 clients in a tertiary-level hospital by the Centers for Disease Control found that 15% to 28% of clients had a potentially active infection. Most exposures to the workplace do not cause disease either because the biohazard is not spread by the airborne route or because the agent is currently in too much of Iowa (Baye et al., 2020).

Serious diseases can be transmitted by accidental needle stick injuries, such as syphilis, staphylococcal and streptococcal infection, herpes simplex, malaria, Rocky Mountain spotted fever, tuberculosis, varicella-zoster, hepatitis B and non-A/non-B hepatitis, and human immunodeficiency virus infection. Up to 50 % of people with hepatitis were unaware of the virus being contacted, (Yu et al., 2019).

In fact, as a major health problem, occupational stress has been mentioned. Pregnant nursing work stress, which identified four sources of nurse anxiety: patient care, decision-making, accountability and change. The role of the nurse has long been considered to be stress-filled based on the physical work, human suffering, working hours, staffing, and interpersonal relationships that are central to the work nurses do. The work stress of nurses has increased since the mid-1980s due to the increasing use of technology, continuing increases in health care costs, and turbulence in the work environment, (Croteau 2020).

Nursing is a profession that is rife with occupational risks. To name a few environmental risks, nurses come into contact with sick patients, infectious agents, teratogenic chemicals, and radiation on a daily basis. Nurses are also constantly on their feet, walking several thousand steps per shift. Several times a day, they are expected to help lift, move, and transfer patients and face many possible musculoskeletal injuries from strenuous physical labor. Many nurses are women of child-bearing age, and to keep herself and her growing baby safe, a pregnant nurse must take certain safeguards, (Azizoglu et al., 2019).

Pregnant nurses may need support through their pregnancies especially in the work, environmental hazard that affect the pregnant nurses. Nurses must understand the common types of hazards and stressors with

their socio-cultural aspects that are most related to women during pregnancy in order to consider these problems while providing care, counseling and health education and important role to help the pregnant nurse by discussing several key areas, including health promotion and maintenance; relations with husband and children; meaningful activities and interests; building social networks; (**kakemam et al. 2019**).

Significance of the study:

Occupational health hazards is one of the most frequently problem and highly percentage of the occurring in the health team and the serious consequences among pregnancy nurses and that direct or indirect mechanisms lead to pregnancy problems or adverse birth outcomes, (**Elsabagh & Eittah 2018**). The pregnant nurses can cause adverse outcomes directly, through fetal injury, preterm labor, and death. Pregnant nurses reported in a survey at Zagazig Hospital that 26% of low back pain and injury frequency occurred while drawing blood or urine (27%), recapping or corking needles (23%), and also giving an injection or infusion (22 %). Approximately 43.3% of pregnant nurses were more liable to abortion and likely to deliver by cesarean. However, 37.7% have premature rupture of membrane, and 27.7% have low-birth-weight, and 20.8% preterm births **Elsabagh ME & A Eittah FH.(2018)**. Recently, Occupational hazards a significant health care problem and effect on pregnant nurses. So, the study was conducted to explore workplace-related Occupational health hazards among pregnant nurses between Damietta and Khartoum General Hospitals.

Aim of the study

To assess the Occupational health hazards among pregnant nurses in Damietta and Khartoum of general hospitals: An overview through:

- 1- Assessing the pregnant nurses' knowledge regarding occupational health hazards according to nurse's needs.
- 2- Assessing the pregnant nurses' practices regarding use of personal protective equipment

- 3- Assessing the work environment among the studied nurses from Damietta and Khartoum of general hospitals

Research question:

1. What is the level of pregnant nurse's knowledge about occupational health hazards?
2. What are the nurses practices regarding use of personal protective equipment?
3. What is the availability of safety in the work environment?
4. Is there a relation between nurses' knowledge and practices about occupational health hazards?

Subject and Methods:

The present study was portrayed according to the following designs: Technical design, operational design, administrative design and statistical design

Technical Design:

Contain description of the research design used, the study setting, the subjects, and tools of data collection.

Research design: A comparative descriptive research design was used to conduct this study.

Setting: carried out in Damietta and Khartoum general hospitals (Egypt and Sudan) there was a 16 general hospitals in Damietta and 14 general hospitals in Khartoum and three hospitals was chosen randomly from each setting. This study was carried out pregnant nurses in Damietta Egypt of the three hospitals namely (El Asr, Farskour and El Amiry) and three hospitals in Khartoum Sudan namely (Al Baraha Medical City, Al Safa Specialized Hospital and El-Sheikh Hospital)

Target population:

For this study, the target population was all pregnant nurses working in all hospital departments and outpatient clinics.

Sample: A purposive sample. All pregnant nurses working in all departments of hospitals and outpatient clinics. It was 135 nurses in Damietta general hospital and 50

pregnant nurses in Khartoum general hospital respectively. This study was done on pregnant nurses in Damietta Egypt of the three hospitals (Farskour 36 ,El Asr 45 and El Amiry 54 pregnant nurses) and three hospitals in Sudan (Al Baraha Medical City12, Al Safa Specialized Hospital 20 and El-Sheikh Hospital 18 pregnant nurses).

According to the following criteria: the pregnant nurses was includes three stages of pregnancy (first , second and third trimester) , and who accepted to participate in the study.

Tools of the Study: Four tools were used for data collection:

The first tool: An interview questionnaire format, after reviewing relevant literature, was created by the researchers. The questionnaire was split into four sections:

Part I: It includes demographic characteristics of the sample studied, such as age, level of education, marital status, crowding index, monthly income, place of work, experience, and duration of daily work, long standing during work and exposure to heavy objects being lifted.

Note: The household crowding index (HCI) was defined as the total number of co-residents per household, excluding the newborn infant, divided by the total number of rooms, excluding the kitchen and bathrooms. The continuous variable was re-grouped into three distinct categories: (1) ,1, (2) 1–2, and (3) .2 residents per room

Part II: Medical and obstetric history among the studied sample such as: suffering from chronic diseases, menstrual history (age of menstruation, number of pads used during menstruation, regularity of menstruation, suffer from dysmenorrhea, obstetric history (suffer from pelvic inflammatory diseases , vaginal discharge , disturbed sex hormone , received treatment for infertility , obstetric history (sexually transmitted infections, others genital diseases, timing of the first pregnancy, number of pregnancy , number of deliveries , number of abortions , number of living children , follow up of pregnancy and

suffer diseases during pregnancy and types of diseases).

Part III: Nurses habits such as exposed to cigarette smoke, drink coffee, practice exercise, work for long durations, lifting heavy objects, exposed to accidents / injury and exposure to grief events.

Part VII: Nurses knowledge about occupational health hazards. It including question covered all types of occupational health hazards (mechanical, chemical, biological, stress, electrical, physical and environmental hazard).

Scoring system: for all knowledge items, correct answer was scored (1) and incorrect answers were scored (0).

Score for total knowledge were evaluated as:

- Satisfactory knowledge is considered at $\geq 70\%$
- Unsatisfactory knowledge is considered at $< 70\%$.

Tools II: Physical assessment of studied nurses such as body weight, body height, blood pressure, apical pulse, and temperature.

Tools III: Pregnant Nurses' practices regarding use of personal protective equipment (PPE) such as: wear apron over uniform, wear helmet overhead, noel mask. Wear eye goggles, were glasses, use ear plugs, use ear muffs, wear gloves, and were rubber boot, over shoes

Scoring system:

Measuring the score of nurses practices toward PPE: item (done) was scored one point (1), item (not done) was scored zero (0).

These scores were converted into percent score. The nurses' practices were considered done score was $\geq 70\%$, the score was considered not done if the percent was less than 70%

Tools V: Assessment of work environment in the study sample such as physical work environment, housekeeping, floors, stairs, employee facilities, fire protection, electrical, material handling, storage, machining guarding and clinic inside of the hospital.

2. Operational Design

2.1. Preparatory Phase Using books, articles, the internet, periodicals and magazines, a review of current, past, local and international literature and theoretical knowledge of several aspects of the study was carried out.

2.2. Validity of the tools: In order to determine relevance and completeness, content validity was carried out by five experts from faculty members of the Department of Obstetric Nursing and the Community Health Nursing Specialty.

2.3. Reliability: For questionnaire items, reliability coefficients were calculated. The alpha coefficient was 76.00% .

2.4. Pilot Study: A 10 % pilot study was conducted on 19 (Pregnant nurses) to test the clarity of the content and the time needed to fill out the instrument as a pre-test. There was no change, according to the pilot study. So, in the study sample, the pilot study sample was involved.

2.5. Ethical consideration: Each hospital director was told about the purpose of the study and then their written consent was received to conduct the study. After explaining the aim of this study and the importance of its involvement, as well as stressing the confidentiality of the collected information, verbal consent was obtained from each participant to be included in the study. It was the right of the participants to reject participation at any moment or get out of the study. No disciplinary action against them in the future has ensured this.

2.6. Fieldwork The objective of the study was explained to the selected subjects after

official permission to do the study. The study was conducted on 135 and 50 of pregnant nurses in Damietta and Khartoum respectively using an interview technique that was done for each nurse separately by the researchers and after taking their oral consent to conduct the study.

The study was conducted over a period of 6 months, beginning in early September 2019 and ending in February 2020. The average time it took to complete the tools was 30 minutes. The researchers visited the previously mentioned settings two days a week (Saturday and Thursday) from 10 a.m. to 2 p.m: Assessing: This phase included interviewing pregnant nurses to collect baseline data while attending inpatient and outpatient clinics in the waiting area. The researchers welcomed the pregnant nurses at the beginning of the interview and introduced themselves to each of them.

Statistical analysis

Data were coded and transferred into especially designed formats for data entry then data were analyzed and computed using the SPSS (statistical package of social sciences (version 23). Data were presented as frequencies and percentages (qualitative variables) and mean \pm SD (quantitative continuous variables). Chi-square χ^2 was used for comparison of categorical variables and was replaced by Fisher Exact Test or Mont Carlo Exact test if the expected value of any cell was less than 5. The student's t- test was used for comparison of continuous quantitative variables (two groups) and also Mann Whitney test Z was used comparison of two groups . The difference was measured significant at $p \leq 0.05$.

Results**Table (1):** Socio-demographic characteristics of the studied nurses from Damietta and Khartoum general hospitals

Socio-demographic characteristics	Damietta G. Hospitals (n=135)		Khartoum G. hospitals (n=50)		Significance
	No.	%	No.	%	
Age (years)					
≤30	50	37.0	18	36.0	t=0.205 P=0.838
31-40	72	53.3	26	52.0	
≥40-	13	9.7	6	12.0	
Min-Max	16.0-59.0		16.0-45.0		t=0.205 P=0.838
Man±SD	31.6±6.5		31.8±6.4		
Educational level					X ² =52.034 MCP<0.0001*
Nursing diploma	84	62.2	7	14.0	
Nursing institute	18	13.3	8	16.0	
Faculty of nursing	33	24.5	25	50.0	
Postgraduate studies	0	0.0	10	20.0	
Marital status					FEP=0.576
Married	131	97.0	50	100.0	
Not married	4	3.0	0	0.0	
Less than 1	10	7.4	2	4.0	Z=0.217 P=0.828
1-<2	92	68.2	37	74.0	
2 or more	33	24.4	11	22.0	
Min-Max	0.5-5.0		0.7-9.0		
Median (Q1-Q3)	1.5 (1.0-1.7)		1.5 (1.3-1.8)		
Sufficiency of monthly income					X ² =2.61 P=0.106
Enough	74	54.8	34	68.0	
Not enough	61	45.2	16	32.0	

X²: Chi-Square test MCP: Monte Carlo corrected P-value FEP: Fisher's Exact test
t: Student t-test Z: Mann Whitney test *significant at P≤0.05

Table 1: shows the Socio-demographic characteristics of the studied sample. It was found that the age ranged between less than 30 to more than 40 years with a mean of 31.6±6.5 and 31.8±6.4 respectively in Damietta and Khartoum. As regards educational level, this table also demonstrates that 62.2% of the studied sample in Damietta are at nursing diploma, while Khartoum were 50.0% had faculty of nursing. The majority 97.0% & 100 % of the studied sample are married in Damietta and Khartoum respectively. As regards crowding index, this table also demonstrates that the studied sample of crowding index alternated from one or more two the median of the 1.5 (1.0-1.7) and 1.5 (1.3-1.8) in Damietta Khartoum respectively. Also the table the monthly income revealed that 54.8% and 68.0% were enough in both Damietta and Khartoum respectively.

Table (2): Occupational characteristics of the studied nurses from Damietta and Khartoum general hospitals

Occupational characteristics	Damietta G. Hospitals (n=135)		Khartoum hospitals (n=50)		Significance
	No.	%	No.	%	
Place of working Departments					
Operations	7	5.2	0	0.0	
Emergency /reception /outpatient clinics	28	20.7	14	28.0	
Kidney	3	2.2	0	0.0	
Obstetrics	5	3.7	2	4.0	
Pediatrics	16	11.9	3	6.0	
Surgery	9	6.7	10	20.0	
Internal Medicine	12	8.9	6	12.0	
Dermatology	0	0.0	5	10.0	
Incubation	12	8.9	0	0.0	
Orthopedics	3	2.2	3	6.0	
ICU/CCU	23	17.0	3	6.0	
Blood bank	3	2.2	0	0.0	
Burn	1	0.7	0	0.0	
Maintenance/sterilization	8	5.9	0	0.0	
Other	1	0.7	4	8.0	
Renal surgery	4	3.0	0	0.0	
Duration of experience (years)					
1-<10	48	35.6	17	34.0	
10-<20	66	48.9	28	56.0	
20 or more	21	15.5	5	10.0	
Min-Max	1.0-40.0		2.0-29.0		t=1.218
Mean±SD	12.2±7.4		10.9±5.9		P=0.226
Duration of daily work					
6-8 hours	105	77.8	33	66.0	X ² =2.671
More than 8 hours	30	22.2	17	34.0	P=0.102
Long standing during work					
Yes	128	94.8	39	78.0	FEP=0.001*
No	7	5.2	11	22.0	
Exposure to lifting heavy objects					
Yes	97	71.9	18	36.0	FEP<0.0001*
No	38	28.1	32	64.0	

X²: Chi-Square test FEP: Fisher's Exact test t: Student t-test *significant at P≤0.05

Table 2: demonstrates that the departments 20.7% and 28.0% of study the studied sample were emergency / outpatient clinics in Damietta and Khartoum respectively. In relation to duration of experience ranged from one year to up 20 years with a mean duration was 12.2±7.4 and 10.9±5.9. Also, duration of daily work was 77.8 % and 66.0 % of studied sample from 6 to 8 hours per days in Damietta and Khartoum respectively. In addition, the nurses long standing during work were 94.8 % and 78.0% in Damietta and Khartoum respectively. Also, the table revealed 71.9 % of the pregnant nurses were exposure to lifting heavy objects in Damietta, while more than two thirds 64.0% were not exposure in Khartoum

Table (3): Medical and obstetric history among the studied nurses from Damietta and Khartoum general hospitals

Medical, menstrual and obstetric history	Damietta Hospitals (n=135)		Khartoum hospitals (n=50)		Significance
	No.	%	No.	%	
#Suffering from chronic diseases					
DM	19	14.1	4	8.0	P=0.266
Hypertension	27	20.0	4	8.0	P=0.052
Cardiovascular diseases	11	8.1	0	0.0	P=0.038*
Anemia	61	45.2	0	0.0	P<0.0001*
Menstrual history					
Age of menstrual(years)					
10-11	8	5.9	8	16.0	Z=3.325 P=0.001*
12-13	85	63.0	38	76.0	
14-15	39	28.9	4	8.0	
16-17	3	2.2	0	0.0	
Min-Max	11-17		10-14		
Median (Q1-Q3)	13 (12-14)		12 (12-13)		
Number of pads used during menstrual					
1-<5	128	94.8	30	40.0	Z=6.306 P<0.0001*
5 or more	7	5.2	20	60.0	
Min-Max	1-8		2-6		
Median (Q1-Q3)	3 (3-4)		4 (3-5)		
Regularity of menstrual					
Regular	99	73.3	47	94.0	X ² =9.370 P=0.002*
Irregular	36	26.7	3	6.0	
Suffer from dysmenorrheal					
Yes	79	58.5	7	14.0	X ² =29.069 P<0.0001*
No	56	41.5	43	86.0	
Obstetric history					
Suffer from pelvic inflammatory disease					
Yes	118	87.4	0	0.0	FEP=0.007*
No	17	12.6	50	100.0	
Vaginal discharge					
Yes	41	69.6	1	2.0	X ² =16.735 P<0.0001*
No	94	30.4	49	98.0	
Disturbed sex hormones					
Yes	7	5.2	0	0.0	FEP=0.192
No	128	94.8	50	100.0	
Received treatment for infertility					
Yes	33	24.4	2	4.0	X ² =9.942 P=0.002*
No	102	75.6	48	96.0	

X²: Chi-Square test FEP: Fisher's Exact test Z: Mann Whitney test *significant at P≤0.05 Q1-Q3: Interquartile range #Categories are not mutually exclusive

Table (3): reveals that, the prevalence of medical, menstrual and obstetric history among the studied nurses was 45.2%, 20% of suffering from anemia and hypertension in Damietta respectively. While in Khartoum 8% hypertension. Concerning menstrual history, the age of menstrual ranged 12 to 13 years was 63% and 76% in Damietta and Khartoum respectively. And also the number of pads used during menstrual was one to less 5 days 94.8% in Damietta, while 60 % have more than 5 days in Khartoum. This table also demonstrates that about regularity of menstrual was 73.3% and 94% had regular in Damietta and Khartoum respectively. Moreover 58.5% were suffer dysmenorrheal in Damietta, while 86% was not suffering in Khartoum. Concerning obstetric history, suffer from pelvic inflammatory disease was 87.4% in Damietta.

Meanwhile, the vaginal discharge was 69.6% in Damietta. As regards no received treatment for infertility were 75.6% and 96% in Damietta and Khartoum respectively p 0.002.

Table (4): Obstetric history among the studied nurses from Damietta and Khartoum general hospitals [CONT]

Obstetric history	Damietta G. Hospitals (n=135)		Khartoum G. hospitals (n=50)		Significance
	No.	%	No.	%	
Sexually transmitted infections					FEP=0.021*
Yes	56	41.5	0	0.0	
No	79	58.5	50	100.0	
Others genital diseases					FEP=0.038*
Yes	94	69.6	0	0.0	
No	41	30.4	50	100.0	
Timing of the first pregnancy					X ² =3.493 MCP=0.323
During 1 st year of marriage	101	74.8	42	84.0	
After 1-2 years of marriage	24	17.8	6	12.0	
After 2-5 years of marriage	4	3.0	2	4.0	
After more than 5 years	6	4.4	0	0.0	
Number of pregnancies					Z=6.418 P<0.0001*
Min-Max	1-9		1-12		
Median (Q1-Q3)	2 (2-3)		4 (3-5)		
Number of deliveries					Z=4.526 P<0.0001*
Min-Max	0-3		0-11		
Median (Q1-Q3)	2 (1-3)		3 (2-4)		
Number of abortions					Z=3.998 P<0.0001*
Min-Max	0-6		0-1		
Median (Q1-Q3)	0 (0-1)		0 (0-0)		
Number of living children					Z=4.156 P<0.0001*
Min-Max	0-5		0-11		
Median (Q1-Q3)	2 (1-3)		3 (2-4)		
Follow up of pregnancy					FEP=1.0
Yes	122	90.4	45	90.0	
No	13	9.6	5	10.0	
Suffer diseases during pregnancy					X ² =23.900 P<0.0001*
Yes	76	56.3	8	16.0	
No	59	43.7	42	84.0	
Types of diseases :					
DM	18	13.3	4	8.0	
Hypertension	23	17.0	0	0.0	
Genital infection	17	12.6	0	0.0	
Septicemia	3	2.2	0	0.0	
Pre-Eclampsia	12	8.9	0	0.0	
Cystitis	12	8.9	3	6.0	
Anemia	55	40.7	1	2.0	

X²: Chi-Square test MCP: Monte Carlo corrected P-value FEP: Fisher's Exact test t: Student t-test
Z: Mann Whitney test Q1-Q3: Interquartile range *significant at P≤0.00

Table 4: In this table it demonstrates that 41.5% of studied sample reported that they exposure to sexually transmitted infections in Damietta. 69.6% of studied sample were exposure others genital diseases in Damietta. Regarding timing of the first pregnancy during 1st year of marriage was 74.8 % and 84% in Damietta and Khartoum respectively. And also, 90.4% and 90% had followed up of pregnancy in Damietta and Khartoum respectively. This table also demonstrates that suffer from diseases during pregnancy was 56.3% and 16% in Damietta and Khartoum respectively P<0.0001.

Table (5): Nurses habits among the studied nurses from Damietta and Khartoum general hospitals

Nurses habits	Damietta G. Hospitals (n=135)		Khartoum G. hospitals (n=50)		Significance
	No.	%	No.	%	
Exposed to cigarette smoke					
Yes	91	67.4	0	0.0	X ² =21.382 P<0.0001*
No	44	32.6	50	100.0	
Drink coffee					
Yes	20	14.8	2	4.0	X ² =4.073 P=0.044*
No	115	85.2	48	96.0	
Practice exercise					
Yes	18	13.3	19	38.0	X ² =13.875 P<0.0001*
No	117	86.7	31	62.0	
Work for long durations					
Yes	80	59.3	7	14.0	X ² =30.002 P<0.0001*
No	55	40.7	43	86.0	
Lifting heavy objects					
Yes	72	53.3	8	16.0	X ² =14.509 P<0.0001*
No	63	46.7	42	84.0	
Exposed to accident/injury					
Yes	109	80.7	2	4.0	X ² =6.614 P=0.010*
No	26	19.3	48	96.0	
Exposure to grief events					
Yes	99	73.3	15	30.0	X ² =28.971 P<0.0001*
No	36	26.7	35	70.0	

X²: Chi-Square test

*significant at P≤0.05

Table 5: shows that, there was highly statistical obvious relation between personal habits and major events history among studied nurses from Damietta and Khartoum general hospitals. And also, It was noted that the nurses in, Damietta more exposure to cigarette smoke, work for long durations, lifting heavy objects, exposed to accident/injury and exposure to grief events, while practice exercise more among nurses in Khartoum than Damietta. P<0.000.

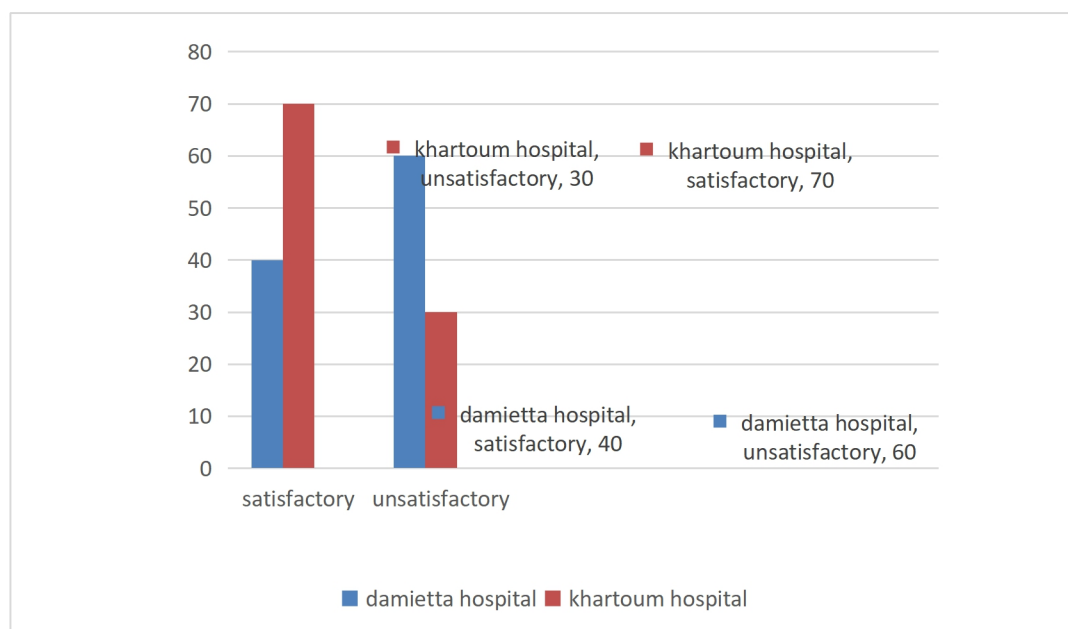
Figure (1): Nurses 'Total satisfactory knowledge about environmental health hazards.

Figure (2): shows that 30% of nurses had satisfactory knowledge regarding environmental health hazards in Damietta hospital, while. 70% of them had satisfactory knowledge in Khartoum hospital.

Table (6): Physical assessment of the studied nurses from Damietta and Khartoum general hospitals

Physical assessment sheet	Damietta G. Hospitals (n=135)		Khartoum G. hospitals (n=50)		Significance
	No.	%	No.	%	
Body weight					
Normal	33	24.4	40	80.0	X ² =4.868 MCP=0.001*
Less than normal	9	6.7	5	10.0	
More than normal	93	68.9	5	10.0	
Body height					
Normal	113	83.7	50	100.0	X ² =9.248 MCP=0.012*
Less than normal	18	13.3	0	0.0	
More than normal	4	3.0	0	0.0	
Blood pressure					
Normal	13	9.6	49	98.0	X ² =15.400 MCP=0.001*
Less than normal	24	17.8	1	2.0	
More than normal	98	72.6	0	0.0	
Apical pulse					
Normal	110	81.5	50	100.0	X ² =10.706 MCP=0.003*
Less than normal	20	14.8	0	0.0	
More than normal	5	3.7	0	0.0	
Temperature					
Normal	126	93.4	48	96.0	X ² =1.719 MCP=0.480
Less than normal	8	5.9	1	2.0	
More than normal	1	0.7	1	2.0	

X²: Chi-Square test MCP: Monte Carlo corrected P-value *significant at P≤0.05

Table 6: demonstrates a statistically significant differences between body weight, body height, blood pressure and apical pulse regarding Damietta and Khartoum. As well as there no statistically significant differences between temperatures with studied regarding Damietta and Khartoum. And also, It was noted that the nurses in , Damietta was 68.9 % and 72.6% had more normal in both body weight and blood pressure, while , in Khartoum was 80% and 98% had normal respectively .

Table (7): Nurses’ practices regarding use of the protective equipment by the studied nurses from Damietta and Khartoum general hospitals

Nurses practice by using the personal protective equipment	Damietta G. Hospitals (n=135)		Khartoum G. hospitals (n=50)		Significance
	No.	%	No.	%	
Wear apron over uniform					
Used	117	86.7	31	62.0	X ² =13.875 P<0.0001*
Not used	18	13.3	19	38.0	
Wear helmet over head					
Used	105	77.8	43	86.0	X ² =1.542 P=0.214
Not used	30	22.2	7	14.0	
Nasal mask					
Used	101	74.8	45	90.0	X ² =5.057 P=0.025*
Not used	34	25.2	5	10.0	
Wear eye goggles , wear glasses					
Used	62	45.9	11	22.0	X ² =8.743 P=0.003*
Not used	73	54.1	39	78.0	
Use ear plugs ,use ear muffs					
Used	54	40.0	10	20.0	X ² =6.450 P=0.011*
Not used	81	60.0	40	80.0	
Wear gloves					
Used	128	94.8	44	88.0	X ² =2.594 P=0.107
Not used	7	5.2	6	12.0	
Wear rubber boot , over shoes					
Used	100	74.1	45	90.0	X ² =5.461 P=0.019*
Not used	35	25.9	5	10.0	

X²: Chi-Square test ^{MCP}: Monte Carlo corrected P-value *significant at P≤0.05

Table 7: Concerning use of protective devices shows that, there was statistical obvious relation between wear aprons over uniform, nasal mask, wear eye goggles, and wear glasses, use ear plugs, use ear muffs, wear rubber boot and over shoes. Meanwhile, there was no statistical significant relation between studied nurse in Damietta and Khartoum wear helmet overhead and wear gloves.

Figure (2): Nurses total done practices regarding uses of personal protective equipment

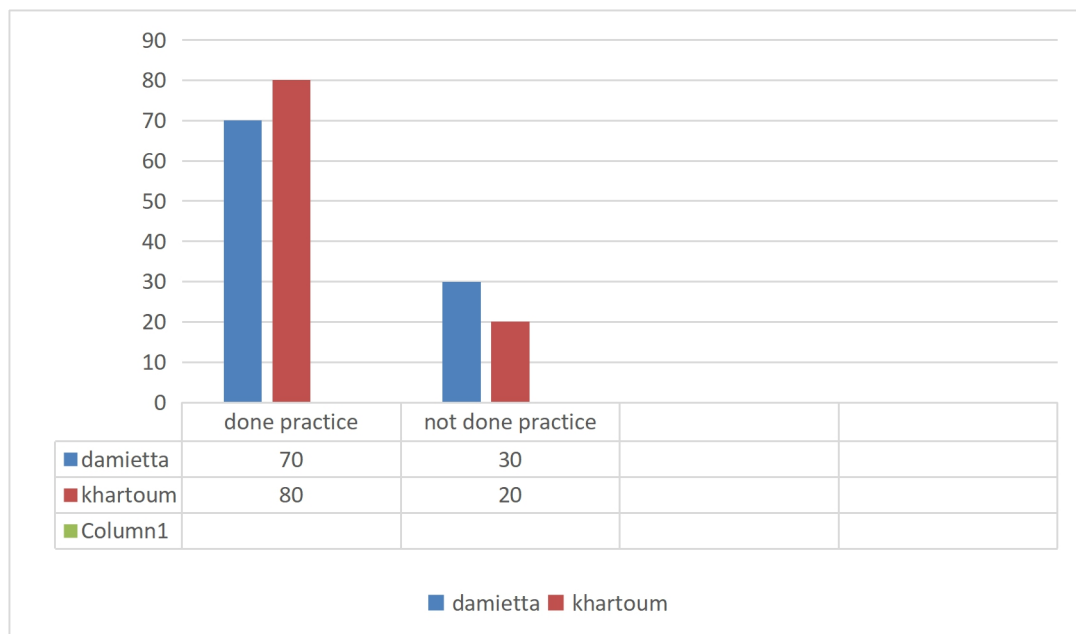


Figure (2): show that, 70% of nurses in Damietta general hospital don practices, while, 80% of nurses in Khartoum general hospital don practice.

Table (8): Assessed work environment among the studied nurses from Damietta and Khartoum general hospitals

Assessment of work environment	Damietta G. Hospitals (n=135)		Khartoum G. hospitals (n=50)		Significance
	No.	%	No.	%	
Physical work environment					
Light	102	75.6	50	100.0	P<0.0001*
Temperature	90	66.7	48	96.0	P<0.0001*
Noise	64	47.4	48	96.0	P<0.0001*
Dust	72	53.3	47	94.0	P<0.0001*
Ventilation	89	65.9	46	92.0	P<0.0001*
Vibration	83	61.5	47	94.0	P<0.0001*
House keeping					
Work area cleaning	94	69.6	48	96.0	P<0.0001*
Arranged and clean area	94	69.6	47	94.0	P=0.001*
Disposable waste	88	65.2	46	92.0	P<0.0001*
Floors					
Free from protruding nails & holes	106	78.5	47	94.0	P=0.013*
Clearly marked passages	102	75.6	45	90.0	P=0.031*
Clear passages	88	65.2	46	92.0	P<0.0001*
Stairs					
Stairs have hand rail	108	80.0	48	96.0	P=0.008*
Stair ways are strong enough	110	81.5	49	98.0	P=0.004*
Stair ways adequately illuminated	100	74.1	48	96.0	P=0.001*
Door opening guarded by rails	103	76.3	47	94.0	P=0.006*
Mean of exit					
Exits enough to allow prompt escape	88	65.2	45	90.0	P=0.001*
Exits clearly marked	80	59.3	45	90.0	P<0.0001*
Employee facilities:					
Facilities kept clean and sanitary	91	67.4	46	92.0	P=0.001*
Toilets kept clean and in good repair	75	55.6	46	92.0	P<0.0001*
Mosque kept clean and sanitary	81	60.0	45	90.0	P<0.0001*
Fire protection					
Fire extinguishers suitable for all types of fire	101	74.8	46	92.0	P=0.010*
Fire extinguishers enough	88	65.2	47	94.0	P<0.0001*
Fire extinguishers location near and clear marked	111	82.2	37	74.0	P=0.214
Fire extinguishers maintenance and inspection of each period	97	71.9	37	74.0	P=0.772
Electrical					
All machines properly grounded	88	65.2	49	98.0	P<0.0001*
Portable hand tools grounded and isolated	96	71.1	49	98.0	P<0.0001*
Material handling					
Tired materials are stacked ,inter blocked and limited to height to maintain stability	93	68.9	48	96.0	P<0.0001*
Storage					
Storage area kept free of tripping free from fire explosion	109	80.7	38	76.0	P=0.478
Proper drainage provided in storage area	108	80.0	37	74.0	P=0.379
Signs warning of clearance limits posted	97	71.9	38	76.0	P=0.573
Machining guarding					
Point of operation guards in place and working on all operating equipment	98	72.6	48	96.0	P=0.001*

Clinic inside the hospital					
Prepared with emergency equipment	115	85.2	47	94.0	P=0.107
Ambulance enough	100	74.1	39	78.0	P=0.583
Prepared with emergency facilities and first aid supplies	98	72.6	46	92.0	P=0.005*

P: significance level for Chi-Square test

*significant at $P \leq 0.05$

Table 8: shows assessment to acceptable levels of work environment among the studied nurses from Damietta and Khartoum general hospitals. It reveals a highly statistically significant differences regarding physical work environment, housekeeping, floors, stairs, mean of exit, employee facilities, fire protection, electrical, material handling, storage, machining guarding and clinic inside the factor

Table (9): Relation between total nurses 'knowledge and total practices regarding use of PPE.

Items			Total practices regarding use of PPE		Correlation	
	No	%	No	%	r	P value
Total knowledge	93	54.4	22	12.9	0.088	0.251

(*) Significant $P < 0.05$

R: Pearson coefficient correlation

Table (9): It shows that there was no statistically significant correlation between overall occupational health knowledge and overall practice with respect to the use of EPP measures ($P < 0.05$)

Discussion:

Occupational health and safety in general hospital settings for nurses. The reader is warned that, due to the complex nature of their work environment, nurses face many workplace risks (Diwe et al2016). In addition, personal factors related to the occupational risks of inpatient outpatient clinics and to the discussion of prevention strategies related to this issue. Although traditional occupational health and safety prevention strategies are provided in the hospital, personal measures such as risk management and hospital workforce health promotion programs will also be provided (Burbeck et al., 2019).

As regards demographic characteristics of nurses, the current study showed that the nurses age ranged between less than 30 to more than 40 year with a mean of age 31.6 ± 6.5 and 31.8 ± 6.4 respectively, this finding agreed with the study done by Altakroni et al., (2019): a study in Kingdom of Saudi Arabia about "Healthcare productivity, and its socio-demographic determinants, of Saudi female nurses: A cross-sectional survey, Al-Qassim, Saudi Arabia, 2017" found that, 55.0% of the nurses the age ranged between 30 to 45 years with mean age of $31.01 + 7.53$ Years

As regards nurses educational levels, less than two thirds of them had nursing diploma in Damietta general hospital compeer to slightly more than half of them had faculty of nursing in Khartoum general hospital this finding agreed with the study done by Dar etal (2015) a study conducted in(Lahore)Pakistan about "Factors Influencing Job satisfaction Of Nurses In Public Hospitals" found that, 192(49.87) nursing diploma and 60(15.58) of nurses was Bachelor degree.

Regarding to nurses marital status, the majority of nurses in Damietta general hospital and Khartoum general hospital are married, and more than half and more than two thirds of nurses in Damietta general hospital and Khartoum general hospital the enough monthly income. This finding agreed with the study done by Nejat & Mehrabi (2019) a study conducted in Iran about:" The Occupational Hazards of Exposure to Antineoplastic and Chemotherapy Drugs in Nurses." Found that, his majority of nurses are married, and, the monthly income enough.

Regarding to crowding index, more than two thirds of nurses in Damietta general hospital $1 \leq 2$, while, nearly three quarters of nurses in Khartoum general hospital $1 \leq 2$, Also, more than half of nurses in Damietta general hospital and Khartoum general hospital the years of experience $10 \leq 20$ years. This finding

agreed with the study done by **El-Feky et al., (2017)** :a study conducted in Tanta, Egypt about:” Safety measures among workers occupationally exposed to ionizing radiation in Tanta University Hospitals ”found that, 73% of nurses the crowding index $1 \leq 2$, and 75% of them the years of experience $10 \leq 20$.

Regarding to nurses duration of daily work, more than two thirds in Damietta general hospital, the duration of work 6-8 hours every day, Also , more than two thirds of nurses in Khartoum general hospital the duration of work 6-8 hours every day, the majority of nurses in all sitting of study the nurses long standing during work, Also, nearly three quarts of nurses in Damietta general hospital, exposure to lifting heavy objects, while , less than two thirds of nurses in Khartoum general hospital not exposure to lifting heavy objects, This finding disagreed with the study done by **Fesenko et al (2017)** a study conduct in Russian about ”Occupational reproductive system diseases in female workers employed at workplaces with harmful working conditions ”found that, 80% of nurses the duration of work 6-8 hours every day and the majority of them not long standing during work and not exposure to lifting heavy objects. On other hand, This is in contrast with **Villar et al., (2019)** Who mentioned that in Barcelona (Spain) more than 80 percent of workers were absent from work last month of pregnancy. The investigator's view is that the difference between the two studies is due to the different research locations and sample locations.

Regarding to medical history, less than half of them in Damietta general hospital complain anemia, while the minority of them in Khartoum general hospital complain of diabetic and hypertension, This finding agreed with the study done by **Aghilinejad et al., (2014)** a study conduct in Iran about “Role of occupational stress and burnout in prevalence of musculoskeletal disorders among embassy personnel of foreign countries in Iran “ found that the majority of nurse complain anemia, diabetics and hypertension . The researchers' point of view the nature of nurses' work and their exposure to constant pressure and stress during work leads them to suffer from many

diseases such as diabetes, and hypertension are common diseases among nurses.

Regarding to menstrual history, less than two thirds of nurses the age of menstruation between 12-13 years in the Damietta general hospital, while, the majority of nurses the age of menstrual between 12-13 years Khartoum general hospital, the majority of nurses the number of pads used during menstrual $1 \leq 5$ per days in Damietta general hospital, while, less than two thirds of nurses in Khartoum general hospital the number of pads used during menstrual 5 or more per days. This finding agreed with the study done by **Shahzad et al (2019)** a study conduct in Pakistan” about Nurses in double trouble: Antecedents of job burnout in nursing profession found that, 70% of the study sample the age of menstrual ranged between 12-14 years.

Regarding to regularity of menstruation nearly three quarter of nurses regular menstrual in the Damietta general hospital , and the majority of them regular menstruation in Khartoum general hospital, more than half of nurses suffer from dysmenorrheal in the Damietta general hospital and the majority of nurses not suffer from dysmenorrheal in Khartoum general hospital. Also, the most of nurses suffer from pelvic inflammation diseases in the Damietta general hospital and the majority of nurses not suffer from pelvic inflammation diseases in Khartoum general hospital. This finding agreed with the study done by **Sonika, (2020)** A study conduct in India about “Women Reproductive Health and Occupational Safety: A Literature Review.” Found that, the majority of nurses suffer from dysmenorrheal and pelvic inflammation diseases.

Regarding to nurses suffer from vaginal discharge, nearly three quarter of nurses suffer from vaginal discharge in the Damietta general hospital. And the majority of nurses in Khartoum general hospital not suffer from vaginal discharge, also, the majority of study sample not suffer from disturbed sex hormone and the minority of nurses receive treatment for infertility. This finding agreed with the study done by **Park et al(2017)** A study conduct in Korea about “Prevalence of abortion and adverse pregnancy outcomes among working

women in Korea: a cross-sectional study” found that, the majority of nursing in the study not suffer vaginal discharge, not complain disturbed sex hormones and not give treatment for infertility.

Regarding to obstetric history, about two fifth of them complain sexually transmitted diseases in the Damietta general hospital, and the majority of nurses not suffer from sexually transmitted infection in Khartoum general hospital, Also, nearly three quarter of pregnant nurses the timing of the first pregnancy during 1st year of marriage in the Damietta general hospital, and Khartoum general hospital. This finding agreed with the study done by **Markkanen, et al., (2017)** a study conduct in Massachusetts of the United States About “Safety risks among home infusion nurses and other home health care providers “found that, the majority of nursing not complain sexually transmitted infection and the majority of study sample the time of first pregnancy during 1st year of marriage.

Regarding to nurses number of pregnancy, the Min –Max 1-9 and 1-12 respectively in both hospital, regarding to number of deliveries Min –Max 0-3 and 0-11 in both hospital, regarding to number of abortion Min –Max 0-6 and 0-1 in both hospital. This finding agreed with the study done by **Agbonifo et al., (2017)** A study conduct in Cincinnati, Ohio in United States about “Occupational exposures of home healthcare workers” found that, the majority of the study sample the number of pregnancy the Min –Max 1- 10, Also, regarding to number of deliveries of the study sample Max 0-5.

Regarding to nurses number of abortion, the Min –Max 0-6 and 0-1 in both hospital, regarding too number of living children, the Min –Max 0-5 – 0-11 in both hospital, the majority of nurses in both hospital the pregnant nurses follow up of pregnancy and more than half of them suffer from diseases during pregnancy in the Damietta general hospital, about two fifth of them complain of anemia during pregnancy, while , the majority of nurses in Khartoum general hospital not suffering from diseases during pregnancy. This finding agreed with the study done by **Grajewski et al., (2016)** A study conducted in

United States about,” Will my work effect on my pregnancy? Resources for anticipating and answering patients' questions” found that, the majority of nursing suffering from anemia during pregnancy. The investigator point of view the nature of the nurse’s work and constant work pressure exposes her to many diseases, especially during pregnancy.

Regarding the nurses habits, more than two thirds of them exposed to cigarette smoke in the Damietta general hospital, and the majority of nurses not exposed to cigarette smoke in Khartoum general hospital. Also, the majority of them not drink coffee in both hospital, the majority of nurses not practice exercise in the Damietta general hospital, about two fifth of them practice exercise in Khartoum general hospital, more than half of nurses work for long duration in the Damietta general hospital, the majority of nursing not work for long duration in Khartoum general hospital. More than half of them lifting heavy objects during work in the Damietta general hospital, while. The majority of them not lifting heavy objects in Khartoum general hospital. This finding agreed with the study done by **Graeve et al., (2017)**. study conducted in Minnesota of United States about “Occupational exposure to antineoplastic agents and also the study done by **Park(2020)** study conducted in Korea about “Reproductive toxic agents in work environments and related cases in Korea “found them, the majority of nursing in the study sample exposed to cigarette smoke, work for long duration, lifting heavy objects and exposed to accidents. The researchers’ point of view the different between to study due to different setting.

Regarding to nurses knowledge regarding occupational health hazards, the current study showed that one third of nurses had satisfactory knowledge in Damietta Hospital, while. Nearly three quarter of nurses had satisfactory knowledge in Khartoum Hospital, This finding agreed with study conducted by **França et al., (2019)** in Portugal about “Occupational dermatoses among healthcare workers in a hospital center in Portugal” found that more than two third of the nurses had a satisfactory knowledge .Also this on the same line with the finding in study done in by **Henrotinet al., (2017)** who presented that more than two third

of nurses had a satisfactory knowledge about the occupational health hazards associated with their training. While high ratio presented in the study conducted by **Rim (2017)** which found the majority of the study samples had a good knowledge about occupational hazards. Also study conducted by **Hammeret al., (2019)** found that 86% nurses had satisfactory knowledge regarding disease and occupational health hazards which may occur. This finding disagreed with study conducted **Ogunnaike & Akinwaare (2019)** in Nigeria about, "Occupational hazard preventive measures among nurses in a Nigerian tertiary health institution" reported that the level of poor knowledge (39.9%). The researchers point of view, the difference in results between the two samples is due to the difference in the nature of work, the number of patients is large in Egypt, the number of nurses is few in Khartoum, in addition to the non-participation of many nurses in training programs for occupational safety due to the a shortage in the number of nurses and the lack of opportunity for training.

Regarding to physical assessment of studied nurse in Damietta and Khartoum general hospital, the current study showed that the majority of nurses more than normal body weight in Damietta general Hospital , while, the majority of nurses normal body weight in Khartoum general hospital, regarding body height, the majority of them in two study sample normal body height, regarding blood pressure, nearly three quarter of nurses in Damietta general Hospital more than normal blood pressure, while the majority of nurses in Khartoum general hospital normal blood pressure, regarding Apical pulse ,the majority of nurses in two study sample normal Apical pulse, and the majority of nurses in Khartoum general hospital normal temperature. This finding agreed with study conducted by **Mossburg et al., (2020 or 2019)**, conducted in sub-Saharan Africa about "Occupational Hazards among Healthcare Workers in Africa: A Systematic Review" found that, the majority of nurses complain of increased blood pressure, normal Apical pulse and temperature. The researchers' point of view high blood pressure among nurses in Egypt is due to constant work and life pressures.

Regarding to nurses practice regarding uses of the personal protective equipment (PPE) of studied nurse in Damietta and Khartoum general hospital, the current study showed that, the majority of nurses used wear apron over uniform in Damietta general hospital, while, less than two thirds in Khartoum general hospital wear apron over uniform, while the minority of them wear helmets overhead, wear gloves, wear rubber boot, over shoes and nasal mask during work in tow study sample, and about two fifth of nurses in Damietta general hospital uses ear plugs, use ear muffs during working, while, the majority of nurses in Khartoum general hospital not used ear plugs, use ear muffs during work. This finding is disagreed with the study conducted by **Ogunnaike & Akinwaare (2020)** Due to inadequate knowledge, negligence, inadequate organizational policies on the use of PPE, more than half of nurses found lack of training, non-availability of PPE and also poor accessibility. Also the finding in the study conducted by **Aguwa et al., (2016) and Garde et al., (2020)** found that the knowledge, attitudes and beliefs with use of PPE in Nigeria were remarkably poor. And also, the finding in the study conducted by **Linh et al., (2019)** found that during work, more than 90 percent of nurses use suitable PPE. In addition the finding in the study conducted by **Chughtai & Khan (2020)** reported that the face masks and gloves were the most commonly used PPE. Regarding the investigator's point of view, nurses wearing personal protective equipment is due to the application of infection control and the quality system in all hospitals, the application of the system of necessity to wear personal protective equipment during work and the provision of appropriate quantities of personal protective equipment in all hospitals.

Regarding to assessment of work environment in Damietta and Khartoum general hospital, the current study showed that, regarding physical work environment in all hospital adequate light, temperature, and ventilation available in each hospital, regarding house keeping the majority of all hospital work area cleaning, arrange and clean area and disposable waste, also, regarding to floors the majority of all hospital free from protruding nails& holes, clearly marked

passages and clear passages, regarding stairs the majority of all hospital stairs have hand rail, stair ways are strong enough, stair ways adequately illuminated and door opening guarded by rails, regarding exit the majority of all hospital Exit enough to allow prompt escape and exit clearly marked. This finding agreed with study conducted by **Jamshidi et al., (2020)** found that the most of hospital good light, temperatures, ventilation good cleaning safe stairs and exit. Also study conducted by **Joseph et al, (2019)** found that the most of hospital good light, temperatures, ventilation good cleaning safe stairs and exit.

Regarding to assessment of work environment of studied nurse in Damietta and Khartoum general hospital, the current study showed that, the majority of all hospital present the fire protection, fire extinguishers maintenance, electrical, material handling, and separate area of storage. Machining guarding point of operation guards in place and working on all operating equipment and clinic inside the hospital, this finding agreed with study conducted by **Jamshidi et al., (2020)** which reported that the majority of the work the fire protection , fire extinguishers maintenance, electrical, material handling , separate area of storage. Machining guarding point of operation guards in place and working on all operating equipment and clinic inside the hospital.

The relation between nurse's total knowledge and their practices regarding the use of PPE. The finding in the current study showed that there is no statistically significance relation between health hazards which face nurses during working and their practice for using PPE. This finding agreed with studies conducted by **Chughtai &, Khan (2020)** reported that there was no statistically significance relation between the use of PPE and exposure to hazards. The researchers' point of view compliance with PPE use is closely related with the professionals' perception about the risks they are exposed to and their susceptibility to these risks. It was obvious that the majority of studied sample were fully aware of using protective measures and also clear policies on the use of PPE available and accessible in order to avoid spread of infection.

Conclusion:

Concerning nurses knowledge, shows that two five of nurses had satisfactory knowledge regarding occupational health hazards in Damietta hospital, while, low than three quarter of them had satisfactory knowledge in Khartoum hospital. Regarding nurses practice for use of personal protective equipment shows that more than two third of nurses had done practice regarding uses of personal protective equipment in Damietta hospital, while, more than three quarter of them had done practice in Khartoum hospital. Concerning work environment it reveals a highly statistically significant differences regarding physical work environment, housekeeping, floors, stairs, mean of exit, employee facilities, fire protection, electrical, material handling, storage, machining guarding and clinic inside the factor.

Recommendation

In view of the present findings of the study, the following are recommended:

Continuing health education program on the reduction of occupational hazards in the pregnancy of nurses

Encourage training program to the nurses with used to mass media to create and more awareness about potential hazards and how to reduce the risk of injuries.

Future research will need to identify other issues during the workplace for early management of pregnant nurses.

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Conflicts of interest disclosure:

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

Authors' Contributions

Maha Moussa conceived the idea of the study, gathered data, designed the methodology of the review, conducted the critical evaluation of the studies and drafted the manuscript.

Naglaa Ibrahim developed the search strategies, conducted the searches, conducted the critical appraisal of the studies and prepared the final manuscript for publication.

Fatma Zaki collected data assisted in designing the review methodology. Conducted the critical appraisal of the studies and prepared the final manuscript for publication

All authors read and approved the final manuscript.

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