

Knowledge of Female Health Care Workers Regarding the Effect of Occupational Hazards on the Reproductive Health

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1.ABSTRACT

Background: Some jobs are possible cause for reproductive problems. The female reproductive health is strongly depending on behavioral and biological health condition. **This study aimed** to explore the knowledge of female health care workers regarding the effect of occupational hazards on reproductive health. **Study design:** A descriptive cross sectional study design was utilized. **Setting:** The units in the Oncology Center at Mansoura University. **Study subject:** A purposive sample of 113 female health care workers who prepared and administered chemotherapy. Laboratory and radiology technicians are also included in the study. **Tools:** A structured interview questionnaire included **three parts**; **Part one and two:** included general and reproductive characteristics of female health care workers. **Part three:** female health care workers' knowledge about occupational hazards. **Results:** Showed that 68.1% of the studied female health care workers had good knowledge level regarding occupational hazards, and 65.5% of them had correct knowledge about the effect of occupational hazards on female reproductive health. Also, 61.15% of the studied female health care workers reported that they need more educational training courses. **Conclusion:** The study concluded that more than two thirds of the studied female health care workers had correct knowledge regarding occupational hazards and so for the effect of occupational hazards on female reproductive health. **Recommendations:** Stress on the importance of having knowledge about occupational hazards to reduce exposure to health hazards by providing appropriate educational training courses.

Keywords: *Female health care workers, occupational hazards, reproductive health*

2.Introduction

Reproductive health (RH) is a state of whole physical, social, and mental well-being that includes both the presence of sickness and problems with the reproductive system's structure, function, and procedures. Unfortunately, sexual health and hygiene, often known as RH, are not frequently mentioned in the context of good health (Nordqvist., 2017). Despite the fact that it accounts for 14% of men's and 20% of women's global burden of illness (WHO., 2017).

The goal of the newly revised 2030 Agenda for Sustainable Development is to lower maternal

mortality worldwide by ensuring that everyone has access to SRH services, information, and education (Starrs et al.,2018). Maintaining SRHRs empowers women and contributes to lifesaving (Gwatimba, Raselekoane& Nwafor., 2020). Additionally, according to WHO (2019), sexual and reproductive health can lead to achieve sustainable development.

Workplace hazards, also known as occupational hazards (OHs), have the potential to injure employees and have a negative impact on everyone (Yadhav & Bansal, 2016). Chemical,

biological, physical, ergonomic, and psychosocial risks are only a few of the many sorts of dangers that exist (Canadian Centre for Occupational Health and Safety (CCOHS), 2020; Mehrdad, 2020). In every environment, there is a possibility that an accident will occur at work (El-Naji et al., 2019; Al-aslami et al., 2018).

Even though many people may not consider their employment as potential causes of reproductive issues, they should be aware of some issues. Whether someone plans to have children or not, reproductive risks are always essential (NIOSH, 2019). Hazards at work may affect a woman's ability to conceive as well as the health of her unborn child. Hospitals are particularly dangerous since they are the main locations where health care services are provided throughout health systems (NIOSH, 2020; Wu et al., 2018). Infertility, abortion, and malformations in foetuses were a some of the reproductive side effects that exposed nurses can encounter (Easty., 2018).

Workers in the health care field, health care workers (HCWs), are thought to be particularly vulnerable to occupational illness exposure (Al-aslami et al., 2018). Work-related illnesses and accidents affect millions of HCWs (International Labor Organization (ILO), 2019). The female reproductive system is designed in such a way that exposures that may affect her fertility may also affect her overall health. The woman's RH and the health of her unborn child during pregnancy make up the female RH, respectively (NIOSH, 2017).

Occupational health and safety (OHS) aims to maintain the best possible level of workers' physical, mental, and social well-being in all jobs and prevent health problems among them. It was covered because the management of ANDs by nurses could be affected by their knowledge of chemotherapy exposure, which could have an impact on their behavior or achievement (NIOSH, 2019). Yet, there is a gap between nurses' understanding of chemotherapy and their act around ANDs (Saker, Zrek, Taha., 2022). Although there are safe handling guidelines available, suggested practises are not always followed by HCWs, and there is little perceived risk of exposure, therefore it is not required for them to constantly wear protective gloves and gowns (Orujlu, et al., 2016).

Poor health outcomes and negative effects on women's sexual and reproductive experiences can result from ignorance and misinformation (Rahman., 2018). When a person's sexual and RH needs are not addressed, they lose the ability to control important decisions about their bodies and

destinies, which has a ripple effect on the welfare of their families and future generations. Denying these rights in total makes poverty and gender inequity worse (Desrosiers et al, 2020).

Significance of the study

According to the World Health Organization (WHO, 2016), there are 217 million cases of occupational illnesses worldwide. Health care facilities (HCFs) are categorized as hazardous and high-risk workplaces because they employ more than 59 million people worldwide and provide a range of services to clients and patients (Albejaidi, Nair., 2019). Nearly 80% of health care professionals are women (CDC, 2017). HCWs are also regarded as being in a risk group for occupational disease exposure to the associated dangers (Al-aslami et al., 2018). Additionally, according to the International Labor Organization (ILO), millions of HCWs experience occupational illnesses and accidents (International Labour Organization (ILO), 2019). Given the makeup of the female reproductive system, exposures that may affect her fertility may also have a negative effect on her overall health (NIOSH, 2017).

Female workers' RH may be at risk from occupational exposure to chemicals, which can lead to decreased libido and potency, menstrual problems, early menopause, delayed menarche, ovarian malfunction, and infertility (temporary and permanent). Changes in ovarian function or hormonal changes may cause such results. Some medications directly affect an embryo or foetus (NIOSH, 2016). The prevalence of the disease is significant in Egypt, and despite a rise in patient volume, there is a shortage of nurses, particularly those who are certified in oncology. This overwhelms and frustrates nurses. An earlier study conducted in Egypt revealed poor adherence to safe-handling recommendations by HCWs (Muhammad., 2015). Therefore, it's critical to evaluate FHCWs' knowledge of how OHs affect RH in order to attain the standardized type of care from women's point of views.

2.2 Aim of the study

The aim of the current study is to explore the knowledge of female health care workers regarding the effect of occupational hazards on reproductive health.

2.3 Research question:

Are female health care workers have sufficient knowledge about occupational hazards and its effect on reproductive health?

3. Subjects and Method

3.1 Research design:

This study used a descriptive cross-sectional study design to achieve the current research's goal. It's an observational research in which the state and possibly related factors of a particular population are monitored at a given period.

3.2 Setting:

The data of current study was collected from the departments of the Oncology Center at Mansoura University (OCMU). After the National Cancer Institute (NCI) in Cairo, OCMU is regarded as one of the largest and newest medical institutions with a focus on this field of medicine in the Egyptian Republic. OCMU is specialized in the field of oncology diagnosis, and management (medical, and surgical treatment), and the center serves about 40% of the population of the Arab Republic of Egypt represented in the population of the Delta governorates.

3.3 Study Subjects:

A purposive sample of female health care workers (FHCWs) who prepared or administered chemotherapy was used in the study. Laboratory and radiology technicians who work at OCMU were also included in the study according to the following criteria:

Inclusion criteria:

- All female health care workers are either married or single.
- Having minimum work experience of 6 months in OCMU.
- No diagnosed physical and mental problems.

Sample size calculation

Based on data from literature (**El Hosseini, D. M., Ghanem, E. A., & Gamal, D. A. (2019)**), to calculate the sample size with precision/absolute error of 5% and type 1 error of 5%:

$$\text{Sample size} = [(Z_{1-\alpha/2})^2 \cdot P(1-P)]/d^2$$

Where,

$Z_{1-\alpha/2}$ = is the standard normal variate, at 5% type 1 error ($p < 0.05$) it is 1.96.

P = the expected proportion in population based on previous studies.

d = absolute error or precision.

$$\text{So, sample size} = [(1.96)^2 \cdot (0.157) \cdot (1 - 0.157)] / (0.067)^2 = 113.3$$

According to the formula above, the sample size needed for the study is 113.

3.4 Tools of Data Collection:

For data collection, a **structured interview questionnaire** was used.

A structured Interview Questionnaire:

The researcher developed a structured interview questionnaire after reviewing the scientific literature (**Lebni et al., 2021; DM et al., 2019**), it consisted of three parts:

Part One: General Characteristics

which included age, residence, marital status, educational level, income, job description, the name of the unit, workload hours per day, years of work experience in their workplace units and having additional/private jobs.

Part Two: Reproductive Characteristics of FHCWs which included: regularity of menstrual cycle, duration and causes of irregularity, previous obstetric history of abortion, premature labor, still birth, low birth weight, neonatal death, and mode of previous deliveries.

Part three: FHCWs' knowledge about occupational hazards which included: the definitions of workplace and occupational safety, occupational hazard, occupational hazard awareness, the types of occupational hazards, possible exposure routes, the effects of occupational hazards on the body in general, their effects on the reproductive health, the protection provided by PPE, sources of information about occupational hazards and the notification of workplace hazards.

3.5 Validity of the study tools:

Data collection tools were tested and juried for the content's validity by three specialists in woman health nursing and one specialist in oncology medicine. The tools were assessed for its clarity, comprehensive, relevance, and applicability. Changes were considered according to their comments as certain sentences were simplified to be easily understood by the studied women. Modifications were made in the final version of English based on expertise's suggestions, and a translated to Arabic tool was employed for data collecting.

3.6 Reliability of the study tools:

The Cronbach's alpha value (internal consistency) of the knowledge regarding effect of occupational hazards on the reproductive health was (0.871).

3.7 Ethical Considerations

The Faculty of Nursing at Mansoura University's Research Ethics Committee granted

ethical permission for the study's implementation. All participants gave their informed consent before to the study after being informed of its scope and objectives. Each participant had the option to leave from the study at any moment, and participation was completely voluntary. Throughout the entire study, anonymity, privacy, safety, and secrecy were fully guaranteed. The outcome was used as part of the research required for a master's degree, as well as for publications and educational purposes.

3.8 Data Collection Procedure

It was divided into two phases: preparatory phase, and operating phase. Preparatory phase included reviewing literature, developing the study tools and pilot study, while the operating phase included data collection and data analysis.

1. Preparatory Phase .

Reviewing literature: regarding the various aspects of the study, the researcher evaluated relevant national and international literature as well as theoretical knowledge.

Developing tools: the researcher prepared articles, books, and journals in order to construct a data collection instrument. The preliminary

Day	Setting
Tuesday	Data collected from inpatient units
Thursday	Outpatient chemotherapy administration, laboratory, and radiology units.

- The researcher introduced herself to FHCWs and obtained their agreement to participate in the study after a brief description of the study's objectives.
- An individual interview was conducted by the researcher using the tools, and firstly the researcher asked the women about general characteristics and reproductive history that would initiate communication with the FHCWs and question that would facilitate transition to the main topic.
- In the second part, the researcher asked FHCWs question to explore their knowledge regarding the effect of occupational hazards on RH and recorded their responses.
- Individual interviews with each woman were conducted to allow for unrestricted conversation.
- Participants were permitted to ask for any interpretation and explanation.
- Data was gathered by the researcher until the end of data collection period.

questionnaire was written in English and then translated into Arabic.

A pilot study was performed on 10% of the study subjects (11 FHCWs). The purpose of the pilot study is to ascertain the applicability and clarity of the study tool and to determine the time required to complete the form. Considering the results of the pilot study, the essential modification was performed before data collection; It was 68 questions have been reduced to 52 only. The FHCWs who took part in the pilot study were not included in the study sample. This process took around a month from early of November 2021 to early December 2021.

2. Operating phase

Data collection phase

- The researcher attended OCMU two days (Tuesday and Thursday) per week from 9 am to 2 pm until the target sample size (113 FHCWs) was attained.
- The current study was completed between early December 2021 and the end of March 2022.

3.9 Statistical Analysis

SPSS for Windows version 20 was used to conduct all statistical analyses (SPSS, Chicago, IL). Continuous data were normally distributed and were expressed in mean ±standard deviation (SD). Numbers and percentages were used to express categorical data. The reliability (internal consistency) test for the questionnaires used in the study was calculated. Statistical significance was set at p<0.05.

4. Results

This descriptive cross-sectional study included 113 FHCWs included nurses, laboratory, and radiology technicians, clinical pharmacists who prepared chemotherapy, and cleaners work OCMU.

Table one shows that 53.1% of the studied female health care workers (FHCWs) were aged between 20-29 years old, with Mean ±SD 29.9 ±7.7 years. Regarding residence 75.2% were from rural areas, and 69.9% of them were married. Regarding education, 48.7% had technical nursing institute and 76.1% reported insufficient income.

Table two shows that among 113 studied FHCWs, 77.9% of them were nurses and 65.5% of

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them worked in the inpatient hospital departments. Regarding to workload; 59.3% of the studied FHCWs reported that they worked for more than eight hours a day, and 40.7% of them reported that they had less than five years of experience. The table highlighted that the majority (88.5%) of the studied FHCWs had no private jobs, while only 11.5% of them had private jobs.

Table three reveals that 64.6% of the studied FHCWs reported regular menstrual cycle. On the other hand, 35.4% of the studied FHCWs reported irregular menstrual cycle, and 67.5% of those who had irregular menstrual cycle reported that the irregularity was less than 6 months, and anemia was the cause of irregularity with 42.5% of them. Regarding previous obstetric history, 11.4% of the studied FHCWs reported abortion, and premature labor, respectively. Concerning the mode of the last delivery, 62% of them reported cesarean section.

Table four presents that 73.5% of the studied sample received educational training courses and 88% of them received these courses at the hospital. Regarding regularity of this educational training courses at the hospital, 63% of them reported that they were irregular and insufficient courses, and 61.15% of them reported that they need more educational training courses. Regarding the causes of needing more educational training courses, 37.7% of them reported need the courses to gain more experience in dealing with

occupational hazards, and 36.2% of them reported to become aware of all the occupational hazards.

Figure1. The most common type of occupational hazards exposure at the unit (multiple answers are possible).

Table five describes that 76.1% of the studied sample had correct knowledge regarding occupational safety definition. While 87.6% of the studied sample had correct knowledge regarding occupational hazards awareness, and 77.9% of them regarding occupational hazards definition. Concerning the types of occupational hazards, 61.9% of the studied sample had correct knowledge, on the other hand, 52.2% of the studied sample reported correct knowledge about possible exposure routes. Regarding occupational hazards' effect on the body in general, 77% of studied sample had correct knowledge, and 65.5% of them regarding their effect on the reproductive health. Among 113 FHCWs, (83.2%) of them reported correct knowledge about the preventive measures of working hazards, and 61.9% had correct knowledge about the policy of notification of workplace hazards.

Figure 2. Distribution of total knowledge level regarding occupational hazards among the studied female health care workers.

Figure3. Distribution of source of knowledge regarding occupational hazards among the studied female health care workers.

Table 1. Distribution of the socio-demographic characteristics of studied female health care workers

	No. (113)	%
Age (Years)		
20 – 29	60	53.1
30 – 39	41	36.3
40 – 49	12	10.6
Mean ±SD	29.9 ±7.7	
Residence		
Urban	28	24.8
Rural	85	75.2
Marital Status		
Single	34	30.1
Married	79	69.9
Educational Level		
Nursing diploma	22	19.5
Technical Nursing Institute	55	48.7
Bachelor Degree	31	27.4
Intermediate Diploma	5	4.4
Income		
Insufficient	86	76.1
Sufficient	27	23.9

Table 2. Distribution of the Job characteristics of the studied female health care workers:

	No. (113)	%
Job description		
Nurse	88	77.9
Lab/analysis technician	7	6.2
Radiology technician	6	5.3
Clinical pharmacist	7	6.2
Worker	5	4.4
Name of the unit		
Inpatient hospital departments	74	65.5
Outpatient clinics	24	21.2
Laboratory unit	9	8.0
Radiology unit	6	5.3
Workload (hours/day)		
6 – 8	46	40.7
>8	67	59.3
Mean ±SD	9.2±2.1	
Years of work experience		
< 5	46	40.7
5 – 10	24	21.2
>10	43	38.1
Mean ±SD	8.9±4.2	
Having additional/ private jobs		
No	100	88.5
Yes	13	11.5
If yes, what is its type? (n=13)		
Private hospital	7	53.8
Private laboratory	3	23.1
Private radiology center	1	7.7
Pharmacy	2	15.4

Table 3. Number and distribution of the reproductive characteristics among studied female health care workers

	No.	%
Menstrual cycle regularity (n=113)		
Regular	73	64.6
Irregular	40	35.4
Duration of irregular menstrual cycle (n=40)		
> 6 months	13	32.5
< 6 months	27	67.5
Cause of irregularity (n=40)		
Polycystic ovary syndrome (PCOS)	9	22.5
Anemia	17	42.5
Endocrinal disorders	14	35.0
Previous obstetric history among the married female health care workers (n=79)		
Abortion	9	11.4
Premature labor	9	11.4
Still birth	4	5.1
Low birth weight	8	10.1
Neonatal death	1	1.3
Mode of the last deliveries (n=79)		
Normal vaginal	30	38.0
Cesarean	49	62.0

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Table 4. Number and distribution of the educational training courses among studied female health care workers

	No.	%
Receiving educational training courses (n=113)		
No	30	26.5
Yes	83	73.5
If yes, the setting of the courses (n=83)		
At the hospital	73	88.0
Private course	2	2.4
Both	8	9.6
Regularity of the educational training courses at the hospital (n=73)		
Regular and sufficient	27	37.0
Irregular and insufficient	46	63.0
Do you need more educational training courses?		
No	44	38.9
Yes	69	61.1
The causes of needing more educational training courses (n=69)		
To provide comprehensive health education and care	18	26.1
To be aware of all the occupational hazards	25	36.2
To gain more experience in dealing with occupational hazards	26	37.7

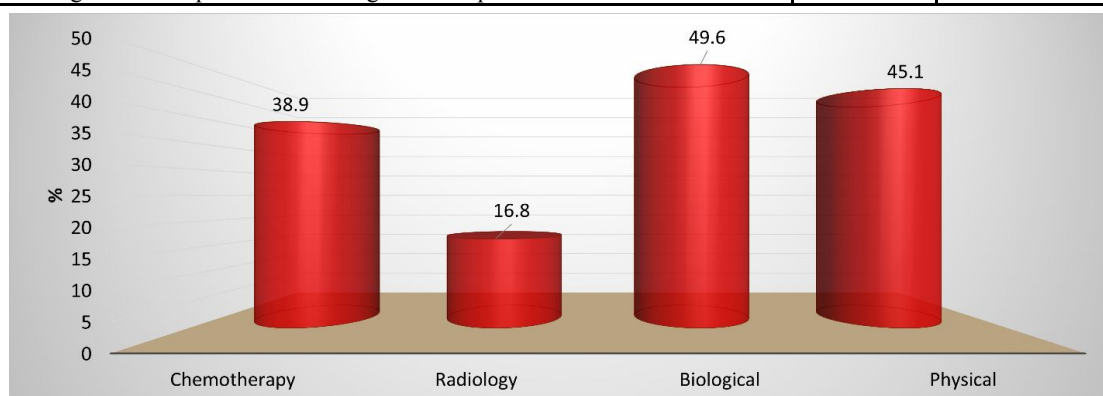


Figure 1. The most common type of occupational hazards exposure at the unit (multiple answers are possible)

Table 5. Number and distribution of the studied female health care workers (N=113) according to the knowledge about occupational hazards

Items	Correct		Incorrect	
	N	%	N	%
Occupational safety definition	86	76.1	27	23.9
Occupational hazards awareness	99	87.6	14	12.4
Occupational hazard definition	88	77.9	25	22.1
Types of occupational hazards	70	61.9	43	38.1
Possible exposure routes of occupational hazards	59	52.2	54	47.8
Occupational hazards' effects on the body in general	87	77.0	26	23.0
Occupational hazards' effects on the reproductive health	74	65.5	39	34.5
Preventive measures toward working hazards	94	83.2	19	16.8
Policy of notification of workplace hazards	70	61.9	43	38.1

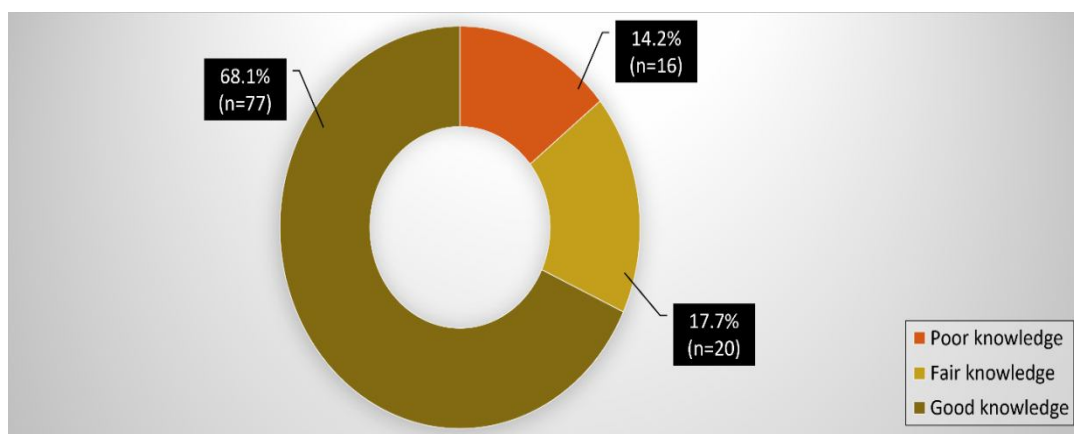


Figure 2. Distribution of total knowledge level regarding occupational hazards among the studied female health care workers

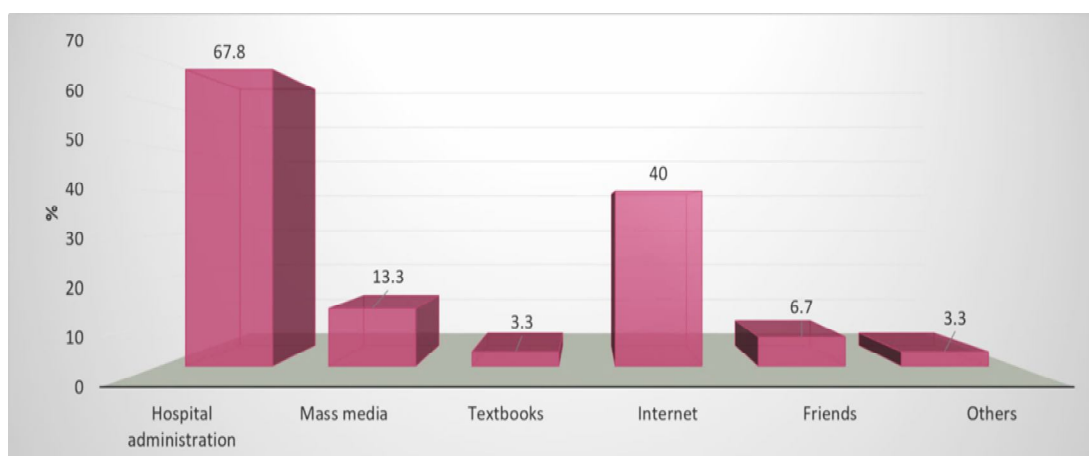


Figure 3. Distribution of source of knowledge regarding occupational hazards among the studied female health care workers

5. Discussion

The current study aimed to explore the knowledge of FHCWs regarding the effect of OHs on reproductive health. Concerning the knowledge about OHs among the studied FHCWs, the current study findings revealed that, more than three-quarters of them had correct knowledge regarding workplace safety definition, OHs definition, and occupational hazards' effect on the body, respectively. Also, the majority of them had correct knowledge regarding OHs awareness and nearly two thirds of them had correct knowledge concerning the types of occupational hazards, and their effect on the RH.

Concerning the knowledge regarding the possible exposure routes of OHs, the current study findings revealed that, more than half of the studied FHCWs reported correct knowledge about possible exposure routes. This finding is in consistent with **Benoist et al., (2022)**, they found that the majority of HCWs had correct knowledge of the possible

routes of ANDs contamination. This confirms the necessity of the providing regular appropriate educational training courses about OHs and the possible exposure routes to them to avoid OHs exposure.

In relation to the knowledge regarding the preventive measures of working hazards, the current study findings revealed that, the majority of the studied FHCWs reported correct knowledge and nearly two thirds of them had correct knowledge about the policy of notification of workplace hazards. Inversely, these current study findings are in a disagreement with **Tahira et al., (2020)**, they found that the reporting rate of workplace injuries as well as adopting safety measures laboratory personnel was low which may be due to the lack of HCWs' awareness or knowledge about the value of reporting and conducting safety measures.

The current study findings revealed that more than two thirds of the studied FHCWs reported good total knowledge level regarding

occupational hazards. In addition, more than two thirds of them reported that hospital administration was the main source of knowledge. The good knowledge level particularly on “methods of exposure” and “preventive measures”.

As regard to the educational training courses among studied FHCWs, nearly three-quarters of them received educational training courses, and the majority of them received these courses at the hospital which were irregular and insufficient courses as reported by almost two thirds of them. Also, more than half of the studied FHCWs reported that they need more educational training courses and nearly one third of those mentioned that they need more educational training courses to gain more experience in dealing with occupational hazards, and to become aware of all the occupational hazards, respectively. These findings are in consistent with the Egyptian study by **HA et al., (2019)** which aimed to assess the knowledge, attitudes, and practices (KAP) of oncology nursing staff working at Tanta University Hospitals towards the safe handling of CDs. and found that more than half of the nurses had previous training program on the handling of ANDs at their workplaces. These results can be explained as the awareness of the importance of training courses for oncology HCWs about the OHs and dealing with them.

On the other hand, the current study findings are in disagreement with a French study conducted by **Benoist et al., (2022)**, aimed to assess the perception, knowledge, and practice regarding the risk of exposure to ANDs in oncology units, and found that the majority of FHCWs had not initial training in ANDs handling practices, and more than three-quarters of them expressed a desire in receiving training about good handling practices of ANDs. This could be because almost half of them thought that their risk of exposure to ANDs was very low, and the majority was not afraid of working with or near Ads; they put the welfare of the patients above their own.

In addition, these current findings are also in disagreement with the findings of Ethiopian study conducted by **Asefa et al., (2021)**, which aimed to assess knowledge and practices on the safe handling of CDs among oncology nurses and found that more than two thirds of nurses reported the lack of training program on the handling of CDs at their workplaces. This could be due to variations in hospitals’ policies, guidelines and procedures related to the handling of CDs. Also, limited resources for the training of HCWs could be the cause of this difference (**Asefa et al., 2021**).

A Philippine study conducted by **Faller et al 2018** to identify the occupational health hazards among healthcare workers in the Philippines confirmed the necessity of strengthening the safety and security manual, providing training to new employees, and retraining of workers to improve compliance and overcome challenges in complying with OHS (**Faller et al., 2018**).

Regarding the most common type of OHs exposure at the unit; the current study findings revealed that nearly half of the studied FHCWs reported biological hazards as the most common type of exposure, followed by physical hazards, chemotherapy hazards then the minority of the studied FHCWs reported for radiological hazards. These findings are in consistent with Taiwanese study by **Che Huei et al., (2020)**, who used systematic reviews and meta-analyses review strategy, aimed to assess the OHS hazards, injuries, and diseases affecting healthcare professionals working in hospitals, and found that the biological hazards were the most commonly faced. This could be due to insufficient educational training course received by the HCWs regarding biological hazards, inefficient biohazard control plans in the workplace, and/or not reporting of other non-biological hazards exposures.

The previous finding was contradicted with Pakistani study by **Tahira et al., (2020)** aimed to explore the frequency and types of occupational health hazards in medical laboratory employees and found that the non-biological hazards were the most common type of OHs exposure. Furthermore, Iranian study conducted by **Ghahremani et al. (2018)**, aimed to determine the level of OHs and related factors in HCWs in military hospitals, they found that ergonomic hazards were the most common type of OHs in such hospitals. These current findings are also in disagreement with the findings of a study conducted by **Lebni., (2019)**, which showed that the highest mean scores of OHs were related to ergonomic hazards. This disharmony can be related to the passive role of managers and operating room staff for providing the required equipment and observing ergonomic principles.

It is worth noting that this study is the first Egyptian study conducted to explore the knowledge of female health care workers (FHCWs) regarding the effect of occupational hazards on reproductive health within the scope of Dakahlia Governorate.

6. Conclusion

The study concluded that more than two thirds of the studied FHCWs had correct

knowledge regarding occupational hazards and so for the effect of occupational hazards on female reproductive health.

7.Recommendations

Based on the study finding, the current study recommended the following:

- Stress on the importance of having knowledge about OHs to reduce exposure to health hazards by providing appropriate educational training course, and distribution of simple Arabic brochures among FHCWs containing updated evidence-based guidelines.
- Establish hospital policy that help guide FHCWs during providing patient care and administration of hazardous drugs.
- Encourage FHCWs to submit a report of any occupational hazard exposure through having clear policies, reporting mechanisms, supporting non-punitive attitudes, and protecting worker privacy.

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