

The Impact of Orientation Workshop on Postgraduate Students Awareness about Ethical Issues of Scientific Research

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Abstract

Background: Getting more attention from academic institutions as well as professional organizations all around the world has made research ethics a hot topic in recent years. Public trust in scientific research and ethical standards are interdependent. **Aim:** The actual research aimed to investigate the impact of orientation workshop on postgraduate students' awareness about ethical issues of scientific research. **Methods:** A quasi-experimental research design was carried out to accomplish the study aim by utilizing an electronic survey designed by the investigators containing 2 parts; participants demographics items as well as the Scientific Research Ethics Awareness Questionnaire used for gathering data through total counting as a sampling methods involving all convenient postgraduate students enrolled during the Academic year 2021/2022 in the preliminary course for master's degree at the Faculty of Nursing – Minia University, Egypt. **Results of the research:** Findings mentioned that most of the postgraduate nursing students exhibit an increased awareness about ethical issues of scientific research after implementing the workshop (post-test) than before its implementation (pre-test) with high statistical significance. **Conclusion:** Research ethics training positively effect on the development of postgraduate nursing research studies candidates' awareness about research ethical rules and regulations. **Recommendations:** Study findings bring attention to the significance of incorporating learning about research ethical rules and guidelines into both under and post graduate nursing curricula. Nursing faculties should emphasize the purpose and function of research ethics committees in setting institutional norms for research ethics.

Keywords: Scientific Research - Ethical Issues - Awareness- Workshop -Postgraduate Students- Impact.

Introduction

A crucial indicator of the productivity of academic professionals is scholarly publishing (Gao, 2017). As a result of research misbehavior and the absence of responsibility among biomedical researchers, society today are steadily losing faith. They are worried about the integrity of the research findings, the respect for the rights of patients, and the dignity and autonomy of people. Thus, adherence to ethical standards and public confidence in scientific research are interdependent. The public's confidence in medical research as well as its critical contribution to the expansion of scientific knowledge would be jeopardized by any research misconduct. The public's fear could be allayed by researchers becoming more knowledgeable about the ethics principles (Azakir et al., 2020).

The Difference Between Law and Ethics:

Laws are influenced by regional cultural norms and are regionally oriented. Every nation, state, and town is free to enact laws that permit or

prohibit any action. On the other hand, ethics represent the beliefs of a group—the population in the broadest sense, or a particular professional society or other group, depending on the situation. Ethics and local laws may or may not be compatible. Most civilizations used laws to uphold generally approved moral norms. Moreover, people can apply ethical ideas as well as precepts to judge, evaluate, suggested, or interpret legal legislations Alternatively, "Ethics is an adopted social behavior pattern" as well as "To be ethical indicates to uphold the law". (Weinbaum, 2019).

Many personnel gain moral standards from family, the circumstance of the school, or in different social settings. The development of moral concepts happens throughout life while humans go through different stages of growth as they mature since moral principles are so widely accepted. When we talk about ethics, we're talking about a set of guidelines or a set of moral precepts that help us distinguish between what is right and what is wrong. Moreover, it put the

standards of behavior that differentiate acceptable from inappropriate behavior. The most common definition of "ethics" is: standards of apply that set apart between acceptable as well as inappropriate actions(Md Ehsanul, 2022).

Standards of conduct that are suitable for particular objectives or goals can be presented across a wide range of disciplines, organizations, as well as professions. These standards also help practitioners in coordinating their actions or activities and in building the general's confidence in the work. For instance, ethical principles direct

behavior in business, law, engineering, as well as medicine. Ethical standards are acceptable to anyone who entered in scientific research and other scholarly or artistic endeavors. Such standards also, serve the objective or aim of research. Even more specifically, these guidelines are the main emphasis of the discipline of research ethics. (David, 2020).

At last, the following table adopted from (Weinbaum, 2019),summarized the most common ethical principles applying to scientific research as shown:

Ethical Principles for Scientific Research

Ethical Principle	Definition
Duty to society	Researchers and research must contribute to the well-being of society.
Beneficence	Researchers should have the welfare of the research participant in mind as a goal and strive for the benefits of the research to outweigh the risks.
Conflict of interest	Researchers should minimize financial and other influences on their research and on research participants that could bias research results. Conflict of interest is more frequently directed at the researcher, but it may also involve the research participants if they are provided with a financial or nonfinancial incentive to participate.
Informed consent	All research participants must voluntarily agree to participate in research, without pressure from financial gain or other coercion, and their agreement must include an understanding of the research and its risks. When participants are unable to consent or when vulnerable groups are involved in research, specific actions must be taken by researchers and their institutions to protect the participants.
Integrity	Researchers should demonstrate honesty and truthfulness. They should not fabricate data, falsify results, or omit relevant data. They should report findings fully, minimize or eliminate bias in their methods, and disclose underlying assumptions.
Nondiscrimination	Researchers should minimize attempts to reduce the benefits of research on specific groups and to deny benefits from other groups.
Nonexploitation	Researchers should not exploit or take unfair advantage of research participants.
Privacy and confidentiality	Privacy: Research participants have the right to control access to their personal information and to their bodies in the collection of biological specimens. Participants may control how others see, touch, or obtain their information. Confidentiality: Researchers will protect the private information provided by participants from release. Confidentiality is an extension of the concept of privacy; it refers to the participant's understanding of, and agreement to, the ways identifiable information will be stored and shared.
Professional competence	Researchers should engage only in work that they are qualified to perform, while also participating in training and betterment programs with the intent of improving their skill sets. This concept includes how researchers choose research methods, statistical methods, and sample sizes that are appropriate and would not cause misleading results.
Professional discipline	Researchers should engage in ethical research and help other researchers engage in ethical research by promulgating ethical behaviors through practice, publishing and communicating, mentoring and teaching, and other activities.

NOTE: *Research participant* refers to someone with an active role participating in research, whereas *research subject* could include someone whose data are used but who does not consent to participate.

In recent years, academic groups and professional organizations all around the world have given ethics, in general, growing amounts of attention. Additionally, there are hundreds or more, ethical scandals yearly, and current events involving significant corporations and unethical worker behavior have enhanced public as well as governmental awareness of this issue.

Governments as well as other organizations are therefore pressuring their staff to uphold a high standard of ethical behavior (Kamel& Al Athmay, 2014).

In conclusion, unethical activity is still documented among researchers notwithstanding the adoption of rules and declarations of medical

research ethics. Even though most medical schools have established ethical committees and covered themes linked to research ethics, unethical actions are occasionally still seen and there are still numerous challenges to following these rules. Due to serious concerns about the development of their ability and optimal operation, research ethics committees (REC) in developing nations also face numerous difficulties. These issues include inadequate training, a lack of diversity among the members, and scarce resources. (Azakir et al., 2020).

Moreover, it is crucial to recognize that errors in research can happen for a variety of causes and without malicious intent. The U.S. Department of Health and Human Services (HHS) Office of Research Integrity (ORI) defines misconduct as "falsification, fabrication, or plagiarism in offering, carrying out, or reviewing research, or in reporting research outcomes". Any violations of research ethics, such as failing to obtain informed permission, failing to disclose dangers, or abusing the influence of physicians, are nevertheless seen as misconduct in the field of science. It's still unclear how widespread research misconduct really is. Numerous possible causes for research misconduct have been put out, but the atmosphere in which the researchers work, including promotion pressures, rivalry, and—most importantly—a lack of training in research ethics, has received the most attention. (Kennedy et al., 2017).

Furthermore, evidence demonstrates that a variety of cultural, governmental, and educational factors can affect research ethics (Patwardhan, 2013). According to a study supported by the Committee on Publication Ethics, ethical misconduct is less common in nations where researchers are held accountable and respect for authority is given equal footing with healthy cultures of peer review. The study contends that the best safeguards for science and scientific publication are strong institutional policies, efficient training, and a culture of openness (Donald 2015).

Significance of the study:

To the best of our knowledge, there aren't many nursing research studies in that field, and there isn't much information available about the ethical climate in the Middle Eastern health care sector studies, as only one research assess the

attitudes as well as knowledge of Egyptian dental faculty related research ethics, and another study was applied by randomly selecting 331 Lebanese doctors throughout Lebanon in order to gauge their awareness of the subject. Furthermore, it's critical to recognize the importance of ethics in scientific study because errors can happen in research for a variety of reasons and without malicious intent.

Additionally, although there are several attempts to control how scientific research is conducted in Egypt, specific legislation involving research ethics are still being developed. In light of this, the researchers conducted this study to assess postgraduate nursing students' knowledge of ethical issues relating to scientific research before and after implementing an orientation workshop about ethical principles guiding scientific research conducts, illustrations of unethical research conducts, knowledge about informed consent for taking part in research studies, and knowledge about scientific REC.

Aim of the study:

The present study aimed to investigate the impact of orientation workshop on postgraduate students' awareness about ethical issues of scientific research.

Research Hypothesis:

Postgraduate students' awareness about ethical issues of scientific research will be higher after implementing the workshop than before implementation.

Subjects and methods

Research Design: A quasi-experimental pre/post research design was used to accomplish the purpose of the research.

Setting: The research was conducted at Faculty of Nursing – Minia University, Egypt.

Participants: A convenience sample that is non-probable and involved all postgraduate nursing students in the preliminary course for master's degree at the Faculty of Nursing – Minia University via the Academic year 2021/2022 (n= 50) were requested to share in the study. Participation in the study was voluntary as well as anonymous. As so the total number of 49 postgraduate students shared as well as returned the questionnaires with (98%) answer rate.

Data collection tool as well as the procedure:

The instrument used in this study was the Scientific Research Ethics Awareness Questionnaire created by the investigators depend on reviewing the relevant literature (Okonta & Rossouw, 2014; Shamoo & Resnik, 2015; Murphy, 2015; Weinbaum, 2019; Azakir et al., 2020; Md Ehsanul, 2022,). It involved 2 parts; the 1st part involve items regard to demographic characteristics of the postgraduate students as age, sex, work setting, years of work experience, and importance of research ethics; followed by 5 yes/no questions about previous knowledge about scientific research ethics and about research committee presence, role, or procedures. The second part is composed of a fifty items scale classified on a 4 sub domain scales such as (Knowledge of Ethical Principles Guiding Scientific Research, Knowledge of Unethical Research Conducts, Knowledge about Informed Consent, & Knowledge about Ethical Committee).

A 3-point Likert scale is used to rate each item on the scale as (1 indicate disagree, 2 indicate neutral, as well as 3 indicate agree). The total scores rated from fifty as the lowest to one hundred - fifty as the highest score; further classified into low, moderate and high level of awareness about ethical issues of scientific research.

Three professionals with expertise in nursing administration as well as education reviewed the tool's content and face validity before approving it. Cronbach was used to assess the scale's internal consistency across its 50 items, and the result was (0.895), which was statistically accepted.

Ethical issues: Official Approval from the Research Ethics Committee in the faculty of nursing- Minia university have been obtained, the postgraduate students who decided to take part in the study provided informed oral consent. Postgraduate students were assured that their participation in the study was voluntary and confidential and that they had the right to withdraw at any time. They were also informed that there were no right or wrong answers and that the data collected would only be used for scientific research and never be shared with them individually.

Procedure: The study was carried out through

three phases as follows:

1-Assessment and Planning Phase:

- In order to become familiar with the study problem and choose the instructional material for the workshop sessions, the investigators studied the relevant literature, which covered many elements of the research topic, utilizing the accessible journals and books.
- The investigators approached the postgraduate students for an oral explanation of the study's purpose and the steps to be taken in responding to the questionnaire after receiving official approval from the faculty's dean and vice dean for graduate studies and scientific research.
- The instrument was transformed by the researchers into an anonymous online version on Google Modules and posted between December 1 and December 15, 2021, in order to gather data for the Pre-test measure (before to implementing the workshop). The responses from the graduate students were then downloaded into an Excel spreadsheet, tallied, and statistically examined.

II- implementation Phase:

- Based on results of the pre-test and the extensive literature search the scientific content of the workshop as well as the timetable and teaching plan were prepared by the investigators.
- The workshop was held on December 22, 2021 through one day including four learning sessions separated by 30 Minutes break time in between; (the first session lasted for 1hr. covering theoretical learning content about scientific research ethics; session two lasted for 2 hrs. covering a learning content about research ethics committee structure, role, and responsibilities, in addition to an educational material about informed consent in scientific research; session 3 lasted for 1 hr. presenting a learning content about ethical principles guiding scientific research conducts.
- The last session of the workshop lasted for 2 hrs. during which the investigators presented a series of scenarios involving ethical aspects that might be encountered during conduction of some research study then the participated postgraduate students were classified into

small groups each small group asked to select one of presented scenario sand discuss with each other about ethical decisions and actions that should be considered in such situation, then all groups share their viewpoints with each other followed by commentary and conclusion by the investigators based on scientific knowledge presented in the preceding sessions.

- The theoretical sessions involved all the 49 post graduate students who participated in the study, while during the application session those students were divided into three subgroups each (the first group and the second group consisted of 16 student, while the third one included 17 student)each group was guided by one of the study investigators.
- Both theoretical and application sessions were carried out at the teaching theaters belongs to the administration department at the Faculty of Nursing – Minia University, Egypt, where each teaching room was supplied by suitable learning seats and the necessary teaching aids including data show, white board as well as an interactive screen.

III-Evaluation Phase:

- A change or direct effect brought about by an action is called an impact. These quick changes in health education may involve modifications in health-related awareness, knowledge, attitudes, beliefs, skills, or behaviors. Impact evaluation is the process of determining the direct results of health education initiatives on the individuals who have been exposed to these messages. So as the same online version of tool used in the pretest measure re-uploaded to the participated postgraduate students by the investigators to collect data for the post-test measure (immediately after workshop implementation)in the same day after conducting the workshop till December 31, 2021, for evaluating its impact on postgraduate students' awareness about ethical issues of scientific research.

Data analysis:

The SPSS (Statistical Package for Social Science) version 28 program was used to tabulate and statistically analyze the data that were downloaded into an Excel spreadsheet. The

definition of qualitative factors used frequency means and percentages. The information gathered was examined using a variety of statistical techniques. Between several groups, an independent t-test, Chi-square test, and correlation were run. At the 0.05 level, P-value is significant, while at the 0.01 level, it is extremely significant.

Results:

Regarding the demographics of the study participants as shown in **Table and Fig. 1**, many of postgraduate students are below 30 years old (89.8%) with mean age is 26.7 ± 9.3 yr.; while (69.4%) have work experience less than 10 yrs. with mean score 6.0 ± 3.7 yr., and (73.5%) working in academic\ educational institutions. As well, (95.9%) of them are females.

Considering postgraduate students' responses regarding structured yes/no questions at the pre and post-test measures about items presented in **Table (2)** results of the pre-test reveals that, (89.8%) of the participated students have no previous training about scientific research ethics. And (100.0%) have no prior knowledge about a research ethics committee presence or role and don't know the procedure steps followed to obtain ethical approval for research study plan.

While results of the post-test indicates that (100.0%) of postgraduate students become knowledgeable about ethical principles guiding scientific research conducts as well as being aware of research ethics committees' presence role and responsibilities as well as the steps that should be followed to obtain ethical approval for a research study plan.

When looking at postgraduate students' responses regarding the importance of knowledge about ethical issues of scientific research as shown in **Fig. 2**, at the pre-test it was apparent that (42.9%) of postgraduate students view that knowledge about ethical issues of scientific research is "moderately important", and (30.6%) view that it is "very important", while (26.5%) are "not sure" of its importance. Otherwise, at the post-test (100%) of postgraduate students respond as it is "very important".

For the distribution and comparison of the total level of awareness about ethical issues of scientific research and its domains among postgraduate students at pre and post-tests present

presented in Tables (3& 4) and in Fig.3, it is observed that in the pre-test measure, (91.8%) of postgraduate students have “Low” level of awareness about scientific research ethical issues, and (93.9%; 81.6%; 75.5%, & 83.7% respectively) have “Poor” knowledge level in all four domains of awareness with mean scores of the total awareness level and its domains (2.92; 2.94; 2.82; 2.76; 2.82 respectively).

While results of the post-test report that, (93.9%) of postgraduate students have “High” total awareness level and (83.7%; 81.6%; 85.7%, & 93.9% respectively) have “Good” knowledge level in all four domains on mean scores (2.94; 2.96; 2.78; 2.82; 2.86 respectively) with high

statically significant differences between the pre as well as post-test measures at p-value equals (0.000).

Finally, regarding differences in mean scores of the total level of awareness in relation to postgraduate students ‘demographics as shown in Table5, there is no statistically significant difference in the total level of awareness about scientific research ethical issues according to postgraduate students age, work setting, experience, and previous training about scientific research ethics either in the pre or post-test measure at p-value ((.534), (.166), (.210), (.624), & (.394), (.058), (.428), (.875) respectively).

Table (1): Demographics of study participants(n=49):

Demographic Characteristics		No.	%
Age	22 - 30 yrs.	44	89.8
	> 30 yrs.	5	10.2
	Mean + SD	26.7 ± 9.3 yr.	
Work Experience	≤ 10 yrs.	34	69.4
	11 - 20 yrs.	15	30.6
	> 20 yrs.	0	0.0
	Mean + SD	6.0 ± 3.7 yr.	
Work Setting	Academic\ Educational Institution	36	73.5
	Health Care Organization	13	26.5

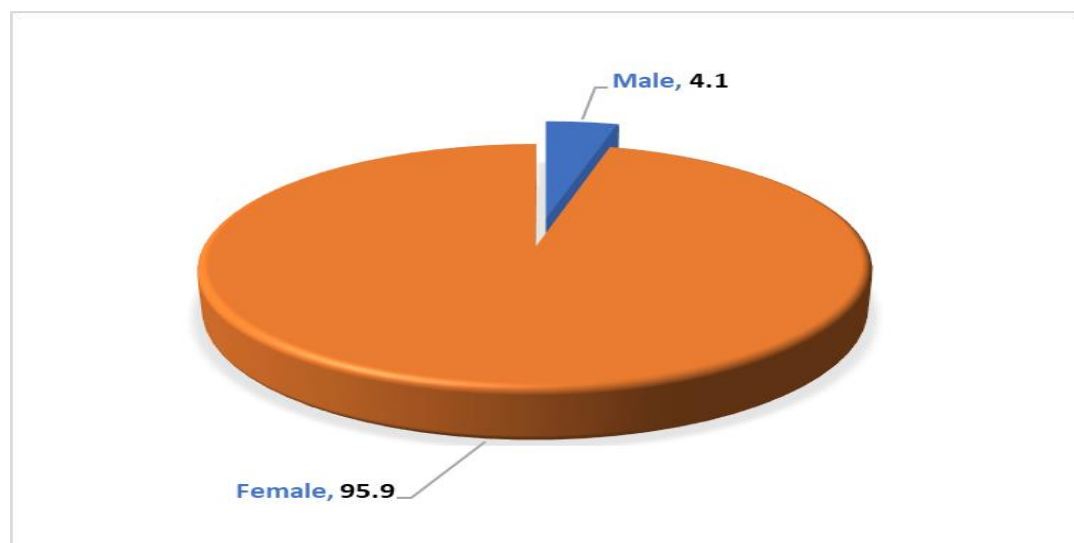


Figure (1): Gender distribution for postgraduate students (n= 49)

Table (2): Distribution of postgraduate students' responses for structured yes/no questions at the pre and post-test measures (n= 49).

Items		Pre workshop Implementation		Immediate post workshop	
		No.	%	No.	%
Previous training about scientific research ethics	Yes	8	16.3	49	100.0
	No	41	83.7	0	00.0
Prior knowledge about the presence of a research ethics committee	Yes	5	10.2	49	100.0
	No	44	89.8	0	00.0
Prior knowledge about the basic role of a research ethics committee	Yes	0	00.0	49	100.0
	No	49	100.0	0	00.0
Prior knowledge about the procedure followed to obtain ethical approval for a research proposal	Yes	0	00.0	49	100.0
	No	49	100.0	0	00.0

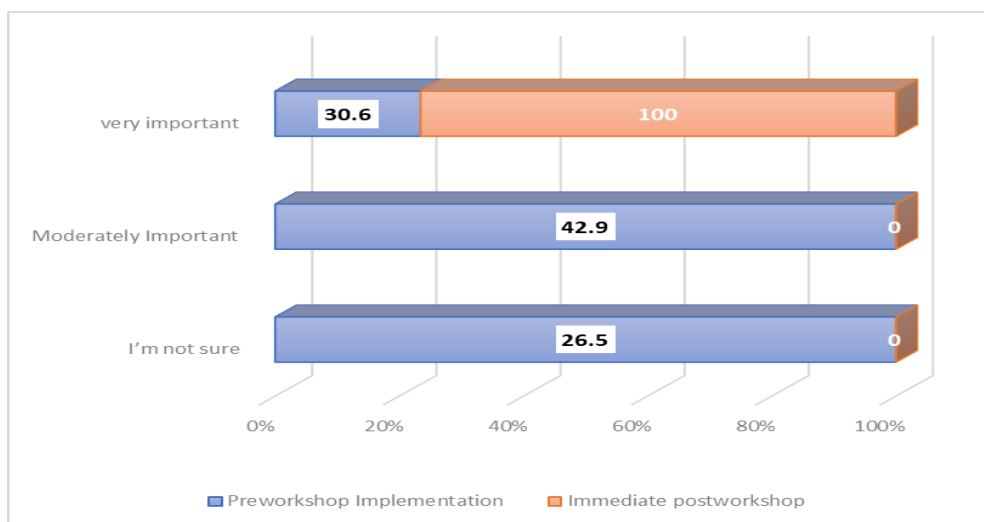


Figure (2): Postgraduate students' responses regarding importance of knowledge about ethical issues of scientific research at the pre and post-test measures (n= 49).

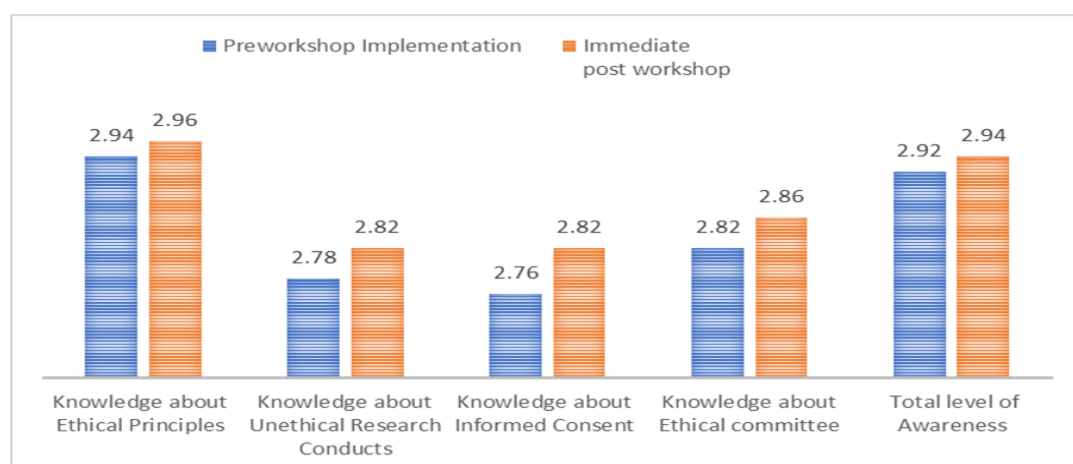


Figure (3): Mean scores distribution for the total level of awareness about ethical issues of scientific research and its domains at the pre and post-test measures (n=49).

Table (3): Comparison of the total level of awareness and its domains among students at the pre and post-test measures (n= 49).

Items		Pre workshop Implementation		Immediate post workshop	
		No.	%	No.	%
Knowledge about Ethical Principles	Poor	46	93.9	0	00.0
	Fair	3	6.1	2	4.1
	Good	0	00.0	47	95.9
X ² (p-value) df.		37.735 (.000) 1		41.327 (.000) 1	
Knowledge about Unethical Research Conducts	Poor	40	81.6	3	6.1
	Fair	9	18.4	5	10.2
	Good	0	00.0	41	83.7
X ² (p-value) df.		56.000 (.000) 1		19.612 (.000) 1	
Knowledge about Informed Consent	Poor	37	75.5	0	00.0
	Fair	12	24.5	9	18.4
	Good	0	00.0	40	81.6
X ² (p-value) df.		12.755 (.000) 1		19.612 (.000) 1	
Knowledge about Ethical Committee	Poor	41	83.7	0	00.0
	Fair	8	16.3	7	14.3
	Good	0	00.0	42	85.7
X ² (p-value) df.		22.224 (.000) 1		37.735 (.000) 1	
Total level of Awareness	Low	45	91.8	0	00.0
	Moderate	4	8.2	3	6.1
	High	0	00.0	46	93.9
X ² (p-value) df.		34.306 (.000) 1		25.000 (.000) 1	

Table (4): Paired comparison for the total level of awareness about ethical issues of scientific research and its domains at the pre and post - test measures (n=49)

Testing time	Preworkshop Implementation	Immediate post workshop	Paired Samples Posttest – pretest
Items	Mean ± Std. Deviation		Mean ± Std. Deviation paired t- test (P- value) df.
Knowledge about Ethical Principles	1.06 ± .242	2.96 ±.200	1.89 ± 0.420 31.590* (.000) 48
Knowledge about Unethical Research Conducts	1.18 ± .391	2.78 ±.550	1.592 ± .911 12.231 (.000) 48
Knowledge about Informed Consent	1.24 ± .434	2.82 ±.391	1.571 ± .791 13.914 (.000) 48
Knowledge about Ethical committee	1.16 ± .373	2.94 ±.242	1.776 ±.550 22.589 (.000) 48
Total level of Awareness	1.08 ± .277	2.86 ± .354	1.776 ± .587 21.179 (.000) 48

Table (5): Participants total level of awareness about ethical issues of scientific research relating to their demographics at the pre and post - test measures (n=49):

Testing measure		Pre workshop Implementation						Immediate post workshop					
		Low		Moderate		High		Low		Moderate		High	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Age	22 - 30 yrs.	41	91.8	4	8.2	0	0.00	0	0.00	7	14.3	38	85.7
	> 30 yrs.	4	8.2	0	0.00	0	0.00	0	0.00	0	0.00	4	8.2
X ² (p-value) df.		.387 (.534) 1						.726 (.394) 1					
Years of experience	≤ 10 yrs.	30	61.2	4	8.2	0	0.00	0	0.00	7	14.3	27	55.1
	11 - 20 yrs.	15	30.6	0	0.00	0	0.00	0	0.00	0	0.00	15	30.6
	> 20 yrs.	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
X ² (p-value) df.		1.922 (.166) 1						3.603 (.058) 1					
Work setting	Academic\ educational institution	32	65.3	4	8.2	0	0.00	0	0.00	6	12.2	30	61.2
	Service provider institution	13	26.5	0	0.00	0	0.00	0	0.00	1	2.0	12	24.5
X ² (p-value) df.		1.573 (.210) 1						.628 (.428) 1					
Previous training about scientific research ethics	Yes	7	14.3	1	2.0	0	0.00	0	0.00	7	14.3	1	2.0
	No	38	77.6	3	6.1	0	0.00	0	0.00	6	12.2	35	71.4
X ² (p-value) df.		.240 (.624) 1						.025 (.875) 1					

Discussion:

In nursing education, ethics is becoming a more important topic. Professionals can defend what is or is not ethically acceptable behavior by using ethical knowledge (Losa Iglesias, 2014). The current study aimed to investigate the impact of orientation workshop on postgraduate students' awareness about ethical issues of scientific research.

It was apparent from the findings that at the pre-test measure nearly half of postgraduate students view knowledge about ethical issues of scientific research as “moderately important”, and less than one third view it as “very important”, while about one quarter are “not sure” of its importance. Otherwise, at the post-test all postgraduate students respond that knowledge about of scientific research ethics is “very important”.

Results of this study also revealed that, most of the postgraduate nursing students exhibit an increased awareness about ethical issues of

scientific research at the post-test measure (after implementing the workshop) than at the pre-test measure (before workshop implementation) with high statistically significant difference between pre/posttest measures.

From the investigator’s perspectives, this finding could be attributed to as what is apparent from the demographic characteristics that most of the study participants are below thirty years old and have work experience less than ten yrs. which indicate that they were newly graduates with less experience about ethical rules and guidelines. This is also supported by the assumption that education and training would improve participants knowledge and awareness.

This finding of the current study was supported with the study of Azakir et al. (2020) which declared that the degree of awareness was correlated with greater education levels among participants with PhDs, higher jobs, attendance at research ethics training sessions, and prior research experience. This result is in accordance with a

Nigerian study conducted by (Ajuwon Kass, 2008) which showed that the implementation of research ethical concepts by physicians has improved as a result of a 3-day workshop in the subject. Like the result that was also reported in the other studies as (Dodan et al., 2009).

As regard postgraduate nursing students' awareness about scientific research ethics, findings of the pretest revealed that most of the participated students have no previous training about scientific research ethics and no previous knowledge about presence or role of a research ethics committee. Additionally, all of them don't know the procedure steps followed to obtain ethical approval for research study plan.

Moreover, it was observed that in the pre-test measure, majority of postgraduate students have low level of awareness about scientific research ethical issues, and many of them have poor knowledge level in all four domains examined in this study. While results monitored in the posttest indicated that awareness of the study participants about all these issues was improved with statistical significance between pre and post test results.

These findings are consistent with results in (Azakir et al., 2020) study which showed that doctors who attended research ethics workshops or seminars had statistically superior awareness of the norms and procedures for conducting research, notwithstanding the small mean difference. **In contrast**, this result is differed from Ogunrin et al., (2016) which findings study demonstrated that the participants' understanding did not significantly enhance as a result of attending a training or lecture on research ethics. It is noteworthy that no prior research has examined the type and duration of the impact of research trainings, which may account for the observed disparity between studies.

In concern to the variation in mean scores of the total level of awareness in relation to postgraduate students' demographic characteristics the study findings denoted that, there is no statistically significant difference in the total level of awareness about scientific research ethical issues according to postgraduate students age, work setting, experience, and previous training about scientific research ethics either in the pre or post-test measure. These findings were also in

accordance with (Azakir et al., 2020) as no connection was noted with age years of experience and prior research ethics training.

Conclusion:

The learning material provided in the workshop carried out within the context of the current study was beneficial to the group of participated students as most of the nursing students enrolled in postgraduate studies exhibited an increased awareness about ethical issues of scientific research after implementing the workshop than before its implementation. Also, research ethics training positively effect on the development of postgraduate nursing research studies candidates' awareness about research ethical issues, where majority of them declared being aware of research ethics guidelines as reflected by increased mean scores of knowledge about ethical principles, research ethics committee, informed consent as well as the unethical research conducts at the posttest measure than at the pretest. Lastly, no statistically significant difference in the level of awareness about scientific research ethical issues according to postgraduate students age, work setting or experience and previous training about scientific research ethics was found either in the pre or post-test measure.

Limitations of the study:

A brilliant limitation encountered during conduction of this study was the limited availability of similar studies in nursing field covering that research topic as most prior nursing research studies considered the professional ethical issues at clinical practice settings, despite only very old study conducted by (Tracy, 2001), as such, the investigators found difficulty in verifying the cover all study results with previous similar and contradicting studies. Despite they referred to nearly all relevant studies in biomedical field.

Other limitations include the small number of participants and that the implementation phase of the workshop was conducted through only one day with few learning sessions due to the overwhelming of the students with studying schedules of the first term among the preliminary master courses. So further larger program studies recommended to be carried out at the future.

Recommendations:

- Findings of the present study shed the light on the importance of incorporating learning about research ethical rules and guidelines into both under and post graduate nursing curricula.
- Considering the study findings, the investigators developed a guidebook outlining research ethical rules and guidelines and recommend it to serve nursing as guide for students furtherly enrolled to postgraduate studies in our faculty as well as to help in sustaining findings of this study.
- Nursing faculties should emphasize the function and role of REC in building institutional and national educational programs in research ethics, in accordance with international efforts to improve researchers' knowledge of research ethics principles.
- The investigators recommended conducting further program studies regarding ethical issues of scientific research at different academic nursing institutions and for large number of postgraduate students to verifies as well as comparing those studies findings with that of the current study.

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