

Knowledge and Safety Practices of Workers about Occupational Health Hazards in Butane Gas Tubes Packing Plant Factory

Rofida Ahmed Mohammed¹, Safaa Rashad Mahmoud² & Ragaa Abdallah Ahmed³

¹ Demonstrator of Family and Community Health Nursing, Faculty of Nursing, Sohag University, Sohag, Egypt

² Professor of Family and Community Health Nursing, Faculty of Nursing, Assiut University, Assiut, Egypt

³ Lecture of Family and Community Health Nursing, Faculty of Nursing, Sohag University, Sohag, Egypt

Abstract

Background: The workers in butane gas tubes packing plant factory are usually exposed to various occupational health hazards due to the nature of work so, they need support to overcome this hazards. **Aim:** to assess knowledge and safety practice of workers about occupational hazards in butane gas tubes packing plant factory. **Design:** Descriptive design was carried out. **Setting:** In the factory of butane gas tubes packing plant factory in Akhmim city at Sohag Governorate. **Sample:** (Total coverage) all numbers of the workers was chosen to carry out the study. **Tools:** Two tools were used for data collection. **Tool (I)** divided into four parts; **part (1):** personal data of the subject, **part (2):** medical history, **part (3):** the workers exposure in workplace, Part (4): Knowledge of the workers about the occupational health hazards and preventive measures. **Tool (II)** An observational checklist that included preventive measure & safety practice. **Results:** 62.8% of the studied subjects were exposed to health hazards, 53% of them had a poor knowledge about the health hazards, 62.2% of them incompetent with the safety practice and preventive measures. **Conclusion:** The workers had a poor knowledge about the occupational health hazards. Also, they had unsatisfactory report about safety practice and preventive measures. So, most of them were exposed to the occupational health hazards. **Recommendation:** Training and educational program about the preventive measure in the factory to eliminate the hazards in workplace.

Keywords: *Knowledge, Safety practice, preventive measures, workers in butane gas tubes packing plant factory & Occupational Health Hazards.*

Introduction

The petroleum and gas sector is an essential part of the world economy which is expanding quickly and creating a large number of new job opportunities. (Darwish et al., 2020) liquid petroleum gas (LPG) is composed of propane, butane, isobutene, propene and butenes, this gas is leading to many risks such as fire and explosion (Thompson et al., 2021). Occupational hazards can be happened in gas factories due to various risk factors such as physical risk, which lead to several health issues as noise, irritability, hearing impairment and physical anxiety. Additionally, workers are exposed to chemical hazards as exposure to chemical resulting intoxication of digestive tract and airway, biological hazards as exposure to bacteria and virus leading to respiratory complications, mechanical hazards such as monotonous movement, poor posture and prolonged working hours that can hurt the limb and cervical spine (Mohsin et al., 2022).

The study by Nwankwo et al., (2022) founded that there were 54 fetal fatalities and accidents in America in 2015, with 40 accidents recording fetal fatalities, and 29 accidents recording 50 fatalities in 2016. These findings show that the rate of fetal accidents is rising, rising from 1.5 in 2015 to 1.7 in 2016. This

suggests that fewer accidents resulted in more fatalities in 2016 than in 2015.

One of the main goals of the World LPG Association is to promote safety among workers who handle liquid petroleum gas. Safety measures are crucial actions to protect, maintain, and promote the health, safety, and wellbeing of their workforce both inside and outside of the workplace. Using personal protective equipment (PPE) is crucial to minimizing exposure to health hazards in the workplace; examples of personal protective equipment (PPE) include boots, aprons, gloves, masks, goggles, earplugs, and uniforms in the gas industry that are suitable for continuous use of these devices. Other safety measures include understanding the fire triangle, using fire extinguishers, cylinder safety, and worker and workplace-related safety. (Joshua et al., 2020).

Occupational health nurses also handle disease management, environmental health, emergency planning, employee treatment, follow-up, and referral, emergency care for work-related illnesses and injuries, and rehabilitation for return-to-work issues to observing and evaluating employees' health status in relation to job tasks and hazards, They also give occupational workers instructions and guidelines

regarding occupational safety and protective measures like the use of personal protective equipment, hand washing, good hygiene, workplace monitoring, and vaccinations. (Kamel et al., 2023).

Significance of the Study:

The gas business has grown significantly in recent years; during this time, the mortality rate was seven times more than the combined rate of all other industries in the US. In 2015, the gas industry accounted for 74% of all mining-related deaths, compared to just 26% in other mining-related businesses. At least 275 of the 1189 documented deaths in the US gas sector between 2003 and 2015 were related to process safety. Of the 161 additional deaths that took place between 2015 and 2017, 55 were related to process safety. (Sattari., et al 2021).

According to the world health organization and the international labor organization, around 59 million gas industry workers are exposed to occupational hazards each day, also, around 10 millions workers are injured and killed yearly due to work-related accidents, apparently, these individuals were found to be more at risk to dangerous conditions. (Serquina & Benig., 2023).

The World Health Organization and the International Labor Organization estimate that over 10 million people are killed and injured in work-related accidents each year, and that approximately 59 million workers in the gas sector are exposed to occupational dangers on a daily basis. These people were apparently shown to be more vulnerable to hazardous situations. (Mengesha et al., 2023).

According to the study of (Nyabuto., et al 2021) in kiambu country, Kenya : 77% of participants were unaware of the risks to their health and safety at work in the retail business of liquid petroleum gas cylinders. Likewise, 71% of those surveyed said they did not use proper workplace safety and health procedures.

While in Egypt; According to the central agency of public mobilization and statistics 2021, the prevalence of workplace injury in factories is 19.3% from total injury, the largest number of workplace injuries in 2020 according to causes was as following: 29% resulting from falls, 22.9% resulting from errors and collision with objects and 0.2% resulting from explosions. (The central agency of public mobilization and statistics (CAPMAS), 2021).

Aim of the study:

To assess knowledge and safety practice of workers about occupational hazards in butane gas tubes packing plant factory.

Research question:

- What is the knowledge level and safety practice of workers in butane gas tubes packing plant factory regarding occupational hazards?

Subjects and Methods:

Research design:

Descriptive research design was used in this study.

Setting:

This study will be conducted at factory of butane gas tube packing plant factory in Akhmim city at Sohag Governorate.

This factory composed of two sections, one of them for administration and the other for refilling and distribution.

Time of work is composed of two shifts: morning shift (8Am to 2Pm), afternoon shift (2 pm to 8pm).

Sample: A total coverage of workers in butane gas tubes packing plant factory (500 workers) were participate in the current study

Tools of the study:

Two tools were used for data collection after reviewing the recent literature:

First tool: A modified interviewing questionnaire sheet that composed of four parts. It adapted from (Elsayed et al., 2018) and modified by the investigators after reviewing the recent literature.

Part I: personal data of workers: Which included: age, educational level, marital status, working years, work system, health insurance, periodic examination.

Part II: Medical history which included: Chronic disease (diabetes, hypertension, heart disease, renal disease) and follow up for medical examination.

Part III: Workers' Exposure history of occupational health hazards which included: physical hazards, chemical hazards, biological hazards, agronomical hazards, psychological hazards.

Scoring system:

It contains 32 points by score 1 for yes and zero for no. The total score for health status was from 0-32 points the responses of the butane gas packing plant factory workers regarding the assessment of health status were distributed by the number and percentage for every signs and symptoms, it considered exposed if $\geq 50\%$ (16-32) and unexposed if $< 50\%$ (0-15).

Part IV: Workers' knowledge about the type occupational health hazards occurred in work place: included if the workers had a knowledge about the occupational health hazards or not(2 items), definition of occupational hazards(4 items), types of occupational hazards (2 items) such as physical hazards(6 items), chemical hazards(9 items), biological hazards(6 items), psychological hazards(6 items), the meaning of safety measures and occupational health(5 items), how to protect yourself during the work(10 items), types personal protective equipment(11 items), importance of personal protective equipment(3 items), causes that make workers do not wearing the personal protective equipment(6 items), causes of occupational accidents(7 items).

Scoring system:

It included (77) items regarding workers' knowledge about safety practice and health hazards of butane gas packing plant factory workers. Each correct answer was given (1 point), incorrect and don't know was given (zero point).. The total score ranged from 0-77 degree, score of each item summed up and then converted into percent which be categorized as following:

- Poor knowledge <50% (<39point) of total knowledge score.
- Moderate knowledge 50-75 % (39-58 point) of total knowledge score.
- Good knowledge > 75% (>58point) of total knowledge score.

Second tool: An observational checklist that included:

Preventive measure & safety practice: it adopted and modified from (Elsayed, et al., 2018), to assess preventive measure and safety practice of workers. It includes (wearing protective devices such as: apron, gloves, boot and the following of hygiene measures as are they changing clothing at the end and at beginning of shift?, are they wash their hands, face and leg periodically?).

Scoring system:

It included (11) items on workers' practices regarding health hazards of butane gas packing plant factory workers. Each done action was given (2 point), not done was given (1 point). The total score ranged from 11-22, score of each item summed up and then converted into percent score it was categorized as following:

- Incompetent practice <75% (nearly <17 point) of total practice.
- Competent practice \geq 75% (nearly \geq 17 point) of total practice score.

Validity

The face validity of the tool was reviewed by five (7) experts in community health nursing, Assiut University to evaluate the validity of the tools. Every member was asked to review the tool content and its structural design to ascertain, completeness and clarity of the items of questions. All comments and suggestions were considered and reworded and sequence of some statements was carried out accordingly.

Reliability: The reliability of the tools was assessed using the Cronbach alpha test.

As showed in the following table:

Tools	No. of items	Cronbach Alpha Test
Personal characteristic, Knowledge	88	0.903
Practice	11	0.793

Methodology:**Administrative phase**

An official letter of approval was obtained from the Dean of the faculty of nursing at Sohag University to director of butane gas tubes packing plant factory in Akhmim city at Sohag Governorate, this letter included permission to carry out the study after explaining the purpose and the nature of the study

Pilot study:

A pilot study was carried out on (10 %) of workers in factory which included in the study to test the clarity of the sheet and estimate the time needed for filling the sheet. According to the result of a pilot study and the opinion of experts, the necessary modification was done in the clarity and sequence of some questions which included in the study.

Data collection phase:**Ethical considerations:**

Research proposal was approved by the Ethical Committee in the Faculty of Nursing, there was no risk for the study subject's further application of the research, the study followed common ethical principles in clinical research, oral consent was obtained from workers in butane gas tube packing plant who were willing to participate in the study, after explaining the nature and purpose of the study, Study subjects was assured that the data of this research will not be reused without second permission, confidentiality and anonymity was assured, study subjects had the right to refuse to participate and or withdraw from the study without any rationale at any time

Field of work:

Data collection for this study was done for a period of 4 months from the beginning of January to the beginning of April 2024 after an official acceptance to carried out the study which was taken from Minister of the Ministry of petrol to the administrator of butane gas packing plant factory at sohag governorate including a brief clarification of the aim of the study. After taking the approval, the purpose of the study was clarified to the administrator of the factory to gain their cooperation.

The investigator came to the factory two days per week on Tuesday and Wednesday from 9.00 Am to 2.00 Pm at factory official time and data was collected for workers in butane gas packing plant factory during break and free time. Also, the investigator came to the factory most days in the evening from 3.00 Pm to 7.00 Pm to collect data from the workers who take night shift. In each interview, the investigator interviewed 15-16 workers daily.

The approximate time was spent with each worker during the interview to complete the interview was (25-30) minutes depending on the response of the workers.

Statistical Analysis:

Data entry and data analysis were done using statistical package for the social science (SPSS) version 26. Data were presented as number, percentage means and standard deviation. Chi-square test was used to show relation and correlation between variables. P-value considered statistically significant when $p < 0.05$.

Results:**Table (1): Distribution of the studied workers according to their personal data (n=500)**

Personal data	No.	%
Age in years		
▪ 20 - <30	15	3.0
▪ 30 - <40	121	24.2
▪ 40 - <50	272	54.4
▪ 50 - 60	92	18.4
(mean±SD)	34.2±6.45	
Level of education:		
▪ Read and write	39	7.8
▪ Basic education	172	34.4
▪ Secondary school	184	36.8
▪ University education	105	21.0
Area of residence:		
▪ Rural	395	79.0
▪ Urban	205	21.0
Are taking a regular periodic examination?		
▪ Yes	380	76.0
▪ No	30	6.0
▪ If necessary	90	18.0
Attending any training course?		
▪ Yes	412	82.4
▪ No	88	17.6
Types of course taking:		
▪ Occupational safety	322	78.2
▪ First aids	240	58.3
▪ Maintenance course	72	17.3
Presence of health clinics or health services in the factory?		
▪ Yes	484	96.8
▪ No	16	3.2
Types of the health services that provided in the factory:		
▪ First aids	400	82.6
▪ Health education	13	2.7
▪ Providing some medications	71	14.7

Table (2): Distribution of the studied workers according to their medical history (n=500):

Medical history	No.	%
Have any medical history?		
▪ Yes	302	60.4
▪ No	198	39.6
If yes?		
▪ Before employment	58	19.2
▪ After employment	244	80.8
Types of the medical disease:		
▪ Hypertension	85	28.1
▪ Diabetes(Hypoglycemia)	85	28.1
▪ Renal failure	50	16.5
▪ Heart diseases	12	3.9
▪ Respiratory diseases	34	11.2
▪ Parasitic diseases	8	2.6
▪ Muscuskeletal diseases	25	8.2
▪ *others	3	0.9
Pre-employment:(N=58)		
▪ Hypertension	35	60.3
▪ Diabetes	10	17.2
▪ Renal failure	13	22.4
After the employment:(N=244)		
▪ Muscuskeletal diseases:	25	10.2
▪ Hypertension	50	20.49
▪ Diabetes	75	34.7
▪ Renal failure	37	15.1
▪ Heart diseases	12	4.9
▪ Respiratory diseases	34	13.9
▪ Parasitic diseases	8	3.27
▪ *Others	3	1.22

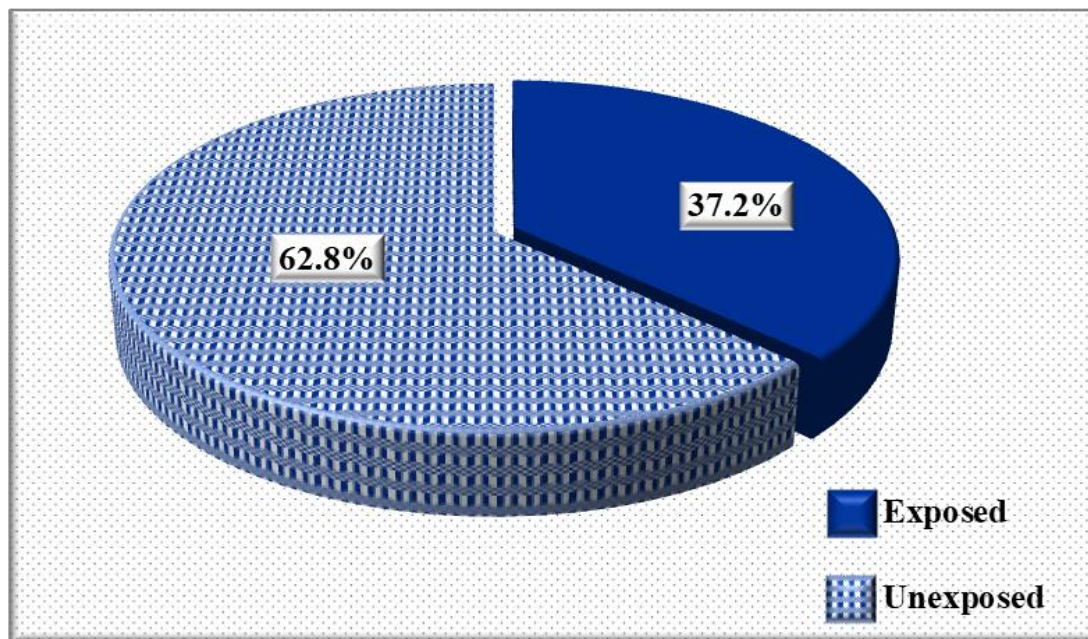


Figure (1): Distribution of the studied workers according to their exposure to health hazards in workplace

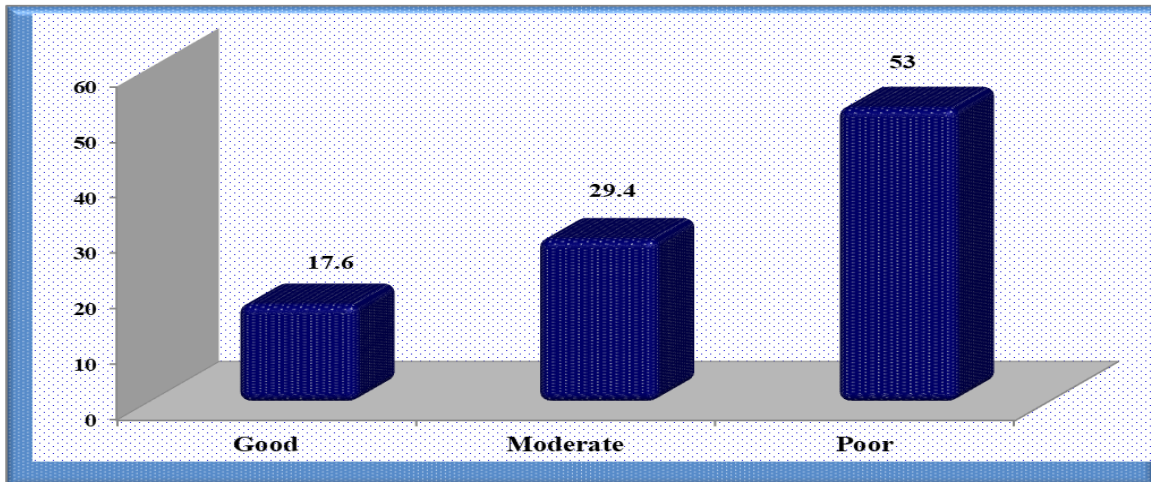


Figure (2): Total knowledge score of the studied workers regarding occupational hazards and health protective measures

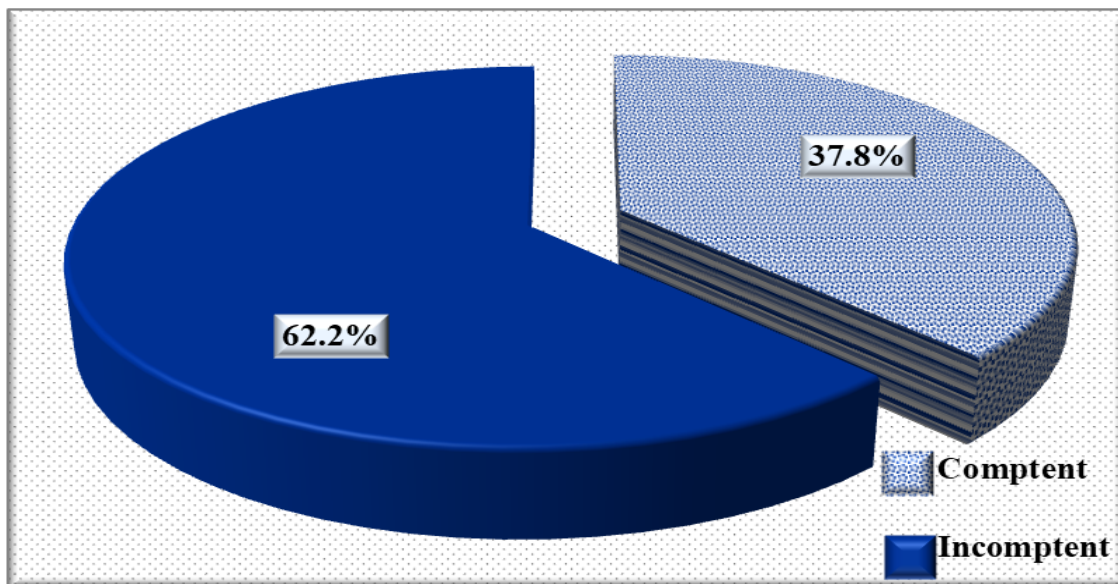


Figure (3): Total score of safety practices and preventive measure of work environment of the studied workers (n=500)

Table (3): Relationship between the personal data of the studied workers and their knowledge about occupational hazards (n=500)

Personal characteristics	Total knowledge about occupational hazards						X ²	P-value
	Good (88)		Moderate (147)		Poor (265)			
	N	%	N	%	N	%		
Age in years							44.234	0.001**
▪ 20-<30	9	10.2	0	0.0	6	2.3		
▪ 30-<40	17	19.3	50	34.0	54	20.4		
▪ 40-<50	53	60.3	59	40.1	160	60.3		
▪ 50-60	9	10.2	38	25.9	45	17.0		
Level of education:							28.284	0.001**
▪ Read and write	8	9.1	4	2.7	27	10.2		
▪ Basic education	18	20.5	42	28.6	112	42.3		
▪ Secondary school	41	46.5	65	44.2	78	29.4		
▪ University education	21	23.9	36	24.5	48	18.1		

Personal characteristics	Total knowledge about occupational hazards						X ²	P-value
	Good (88)		Moderate (147)		Poor (265)			
	N	%	N	%	N	%		
Marital status:								
▪ Single	6	6.8	3	2.0	22	8.3	25.956	0.001**
▪ Married	59	67.0	120	81.6	216	81.5		
▪ Widower	16	18.2	22	15.0	23	8.7		
▪ Separated	7	8.0	2	1.4	4	1.5		
Years of experiences:								
▪ < 5 years	0	0.0	7	4.8	0	0.0	98.004	0.001**
▪ 5-<10 years	15	17.0	35	23.8	42	15.8		
▪ 10-<15 years	16	18.2	12	8.2	112	42.3		
▪ 15-<20 years	24	27.3	81	55.1	62	23.4		
▪ 20 or more	33	37.5	12	8.2	49	18.5		
Receive a training course related to work?								
▪ Yes	63	71.6	125	85.0	63	84.5	75.434	0.013*
▪ No	25	28.4	22	15.0	25	15.5		

Chi-square test

(**) highly statistical significant difference

(*) statistical significant difference

Table (4): Relationship between the personal data of the studied workers and the total practices scores regarding safety practices and preventive measure of the work place (n=500):

Personal characteristics	Total practices regarding occupational hazards				X ²	P-value
	Competent (189)		Incompetent (311)			
	N	%	N	%		
Age in years						
▪ 20-<30	4	2.1	11	3.5	25.165	0.001**
▪ 30-<40	24	12.7	97	31.2		
▪ 40-<50	125	66.1	147	47.3		
▪ 50-60	36	19.0	56	18.0		
Level of education:						
▪ Read and write	19	10.1	20	6.4	3.372	0.338
▪ Basic education	59	31.1	113	36.4		
▪ Secondary school	68	36.0	116	37.3		
▪ University education	43	22.8	62	19.9		
Marital status:						
▪ Single	2	1.1	29	9.3	32.076	0.001**
▪ Married	145	76.7	250	80.4		
▪ Widower	39	20.6	22	7.1		
▪ Separated	3	1.6	10	3.2		
Years of experiences:						
▪ < 5 years	1	0.5	6	1.9	22.957	0.001**
▪ 5-<10 years	29	15.3	63	20.3		
▪ 10-<15 years	41	21.7	99	31.8		
▪ 15-<20 years	64	33.9	103	33.1		
▪ 20 or more	54	28.6	40	12.9		
Receive a training course related to work?						
▪ Yes	139	73.5	273	87.8	16.429	0.001**
▪ No	50	26.5	38	12.2		

Chi-square test

(**) highly statistical significant difference

(*) statistical significant difference

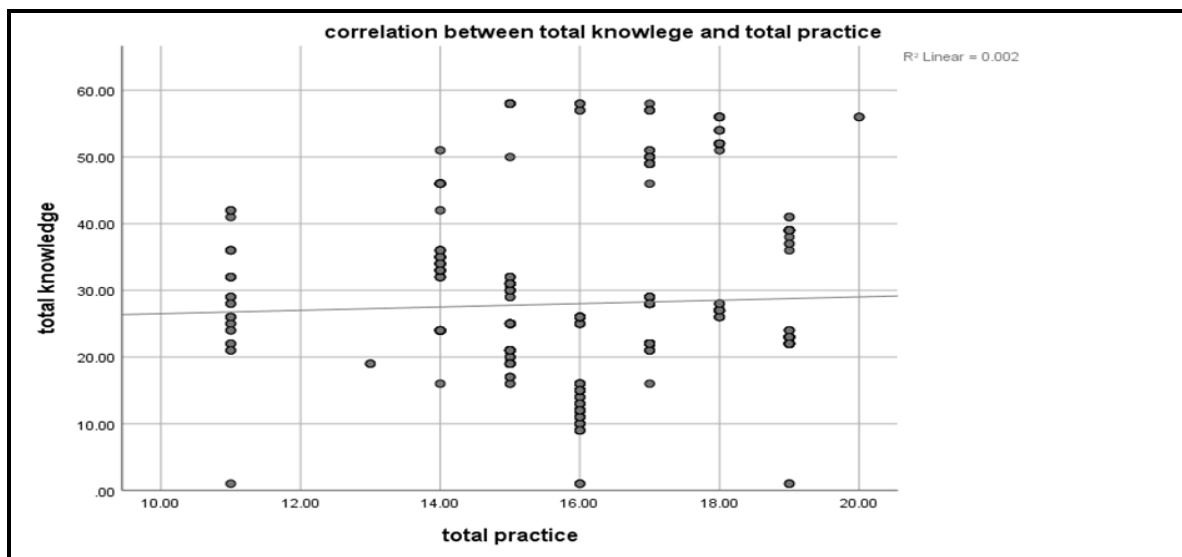


Figure (4): Correlation between total knowledge and total practice regarding occupational hazards of the studied workers (n=500)

Table (1): Clarifies that 54.4% of the studied workers age was 41<50years with mean \pm SD (34.2 ± 6.45) and 3% of them were 20 -30 years, it was observed that 34.4% of them had the basic level of education, while 21% of them had a university level of education. Additionally, it was observed that 93.8% of the studied workers had a pre-employment examination, Moreover, 82.4% of the studied workers had a training course and 72.8% of them had an occupational safety as a training course, most of them (96.8%) reported that they had a health clinic in workplace, 82.6% of them reported that the health clinic health services which were provided in the factory was first aids.

Table (2): Indicates that 60.4 % of the studied workers had a medical history, where 80.8% of them had the disease after working in factory and 19.2% of them had the disease before working in factory, indeed, 60.3% of them had a hypertension disease before the employment. While, 10.2% of them had a musculoskeletal disease after the employment.

Figure (1): States that 62.8% of the studied workers were exposed to health hazards in the workplace.

Figure (2): Indicates that 53% of the studied subjects had a poor knowledge about occupational hazards and health protective measures.

Figure (3): State that 62.2% of the workers were incompetent to practices and preventive measure of work environment.

Table (3): Clarifies that there were a highly statistical significant difference between year of experience, marital status, level of education, age and the total knowledge about occupational hazards P-value=(0.001, 0.001,0.001. 0.001) respectively, also there were a statistical significant difference between

receive a training course related to work and total knowledge about occupational hazards (P-value= 0.13) .

Table (4): Clarifies that there were a highly statistical significant difference between age , marital status, year of experience, receive a training course related to work, and total practices regarding occupational hazards P-value=(0.001, 0.001,0.001. 0.001) respectively, while there were no statistical significant different between level of education and total practices regarding occupational hazards (P value = 0.338).

Figure (4): Illustrates that there was a highly positive statistical significant correlation between total knowledge and total practice.

Discussion:

Gas industry sector is one of the most hazardous work environments as workers in this sector are exposed to various types of occupational hazards such as chemical and biological agent as well as agronomical and psychological hazards, resulting in globally, 2.9 billion workers are exposed to potential risks at workplace so, workplace hazards continue to be a major source of concern for workers in this sector. In addition, occupational illnesses and injuries causing loss 4% of the gross domestic production (GDP) each year and are responsible for two million fatalities annually. **Benson et al., (2021).**

The current study aimed to assess knowledge and safety practice of workers about occupational health hazards in butane gas tubes packing plant factory.

Although the occupational health hazards is a worldwide problem, the researcher could not access any study about knowledge and safety practice in butane gas tubes packing plant factory in Egypt, So it's necessary to study this point.

Regarding Personal data of the studied workers: it was observed that more than half of workers' age were between 41<50 years old with mean \pm SD 34.2 \pm 6.45, this result may be due there had been no appointments for a long time in the butane gas tubes packing plant factory, so worker's age were in between(41<50) years old .this study were in line with **Adedayo et al (2023)** study who carried out a study in Nigeria entitled in "knowledge about the occupational hazards and safety practice among petrol station" which stated that the age of workers ranged between (29-55) years old. While , disagreed with **Nyabuto et al (2021)** study who conducted a study In Kiambu entitled in "Assessment of Occupational Safety and Health Issues in Liquefied Petroleum Gas Retail Business" which reported that, less than half of studied sample in the age group from 31<40 years old. Also, disagreed with **Okafoagu et al.,(2017)** study who carried out a study in Nigeria entitled in "knowledge of occupational hazards and safety practices among petrol station attendant" which revealed that more than half of the studied sample were in the age group between 20-29 years old.

According to level of education of the studied workers, the current study founded that about one third of the studied workers had a basic level education and less than one quarter of them had a university level of education, from the investigator point of view this result may be due to working in this factory does not require high level qualifications, highly qualified graduates working in this factory due to the economic conditions, this finding disagreed with **Nyabuto et al (2021)** and **Goda, et al .,(2023)** study who conducted a study in Assuit about "the Environmental Safety, Stress Levels and Gas Stations Workers Knowledge, Attitude and practices Regarding Occupational Health Hazards" who founded that nearly half of the studied workers had a secondary education. While, agreed with **Abd El Aziz & Abd- El Aal (2012)** study who conducted a study in Ain shams entitled in "occupational program for improving the health of gasoline workers" which observed that more than half of the studies sample had a basic level of education. **According to area of residence,** this study demonstrated that more than three quarters of the studied workers living in a rural area. This result may be as the result of nature of sohag governorate as most of it's area is rural.

Concerning to their marital status, the current study revealed that more than half of workers were married, from the investigator point of view, this

result may be due most of workers were older than the marriage age as their age ranged between (41<50) years old. this finding in the same line with **Elsayed et al.,(2018)** study who conducted a study in Ain shams about "the Occupational Hazards among Gas Station Workers" which founded that more than half of the workers were married .on the other hand, disagreed with **Johnson & Umoren., (2018)** study who conducted a study in Uya, Nigeria entitled in "assessment of occupational hazards, health problems and safety practices of petrol station attendants in Uya, Nigeria" which showed that most of the studied sample were single.

According to the total exposure of the studied workers to health hazards in workplace, the current study demonstrated that more than half of the workers were exposed to health hazards in the workplace, this finding may be due to poor knowledge of the workers about the occupational health hazard and the negligence of workers to wear the personal protective equipment, incompetent of the workers to the safety practice and the preventive measures. This finding came in agreement with **Adedayo et al (2023)** study which verified that most of the studied subject exposed to occupational health hazards as a result of negligence of workers to commit to safety measures . **Regarding the total knowledge of the studied workers about occupational hazards and health protective measures ,** the current study clarified that more than half of the workers had a poor knowledge score about occupational hazards and health protective measures, this result may be due to negligence of workers in attending the training course and the health education lecture which provided in the factory, this results was supported by **Goda, et al.,(2023)** study which revealed that more than one third of them had a poor knowledge about occupational hazards and the protective measures. While, disagreed with **Mukhtar et al., (2020)** study who carried a study in Malaysia to "assess knowledge, attitude and practice on occupational safety and health among workers" which viewed that most of their studied workers had high knowledge score. Additionally, disagreed with **Nicholas et al., (2019)** who conducted a study in Nigeria to "assess attitude and practices regarding occupational hazards and safety measure among oil and gas workers" which revealed that the majority of workers have a good knowledge of occupational hazards and protective measures.

Concerning the total practices and preventive measure of work environment of the studied workers, the current study illustrated that more than half of the workers were incompetent to practices and preventive measure of work environment this result may be due to negligence of workers in how to

perform the preventive measure, this finding contradicted with **Mukhtar et al., (2020)** study who showed that half of respondents had a satisfactory practices score of the safety measures. While, agreed with **OE and QM,(2018)** study who carried a study in Uyo Nigeria about "assessment of occupational hazards, health problems and safety practices of petrol station attendants in Uyo Nigeria" which reported that only 7% of studies sample used the personal protective equipment and the safety measures.

Relationship between the personal data of the studied workers and their knowledge about occupational hazards: the current study stated that there were a highly statistical significant difference between year of experience, marital status, level of education, age and total knowledge about occupational hazards. Additionally, there were a statistical significant difference between receiving a training course related to work and total knowledge about occupational hazards, on the investigator point of view, this result may be due to effecting of year of experience, level of education and the training course whose leading to increase the awareness of the studied workers about the occupational hazards .This finding was similar with **Elsayed et al., (2018)** study who showed that it was a highly statistical significant association between the knowledge of gas station workers and their age, educational levels and marital status. However, this study disagreed with **Abd El Aziz & Abd-El Aal (2012)** study who stated that there was no significant relation regarding knowledge of workers and their education. Also, disagreed with **Abdel Monem et al (2020)** study who conducted a study about " Exposure of gasoline station workers to leaded gasoline in the gaza strip: Awareness and self-reported symptoms " which showed that the workers education had no significant influence on their knowledge.

Relationship between the personal data of the studied workers and the total practices regarding occupational hazards: The current study demonstrated that there were a highly statistical significant difference between total practices and age, marital status, year of experience, receive a training course related to work about occupational hazards. From the investigator point of view, this finding due to presence of health clinic in the factory that providing a health education courses regarding the occupational hazards and safety measures which lead to increase knowledge leading to improve the safety practices. Additionally, there were no statistical significant different between level of education and total practices regarding occupational hazards this result in the line with **Quaigrain et al (2022)** study who carried out a study in Ghana about" occupational health and safety orientation in the oil and gas

industry of Ghana: Analysis of knowledge and attitudinal influences on compliance" which reported that the year of experience of the workers promotes their safety practice. In addition, this finding was in agreement with **Goda, et al., (2023)** study who founded that there were no statistical significant different between level of education and total practices regarding occupational hazards. however, disagreed with **Nkrumah et al., (2020)** study who conducted a study in Ghana entitled in" improving the safety – performance nexus: A study on the moderating and mediating influence of work motivation in the causal link between occupational health and safety management (OHS) practices and work performance in the oil and gas sector"which stated that workers level of education affects their health and safety practice.Also, disagreed with **Goda et al., (2023)** study who stated that there were no statistical significant different between age, year of experiences and total practices regarding occupational hazards.

Correlation between total knowledge and total practice regarding occupational hazards of the studied workers: the current study illustrates that there were a highly positive statistical significant correlation between total knowledge and total practice, this result may be due to as the knowledge increase leading to increase the awareness about the safety practice resulting in improve the safety practice about the occupational hazards, this finding agreed with **Bandery et al., (2024)** study that conducted a study in Ain shams entitled in "Occupational Health Hazards among Workers in Chemical Factories" which showed that there were a statistical significant correlation between the total knowledge about occupational hazards and total practices.

Obstacles of the study:

- There is no accessibility to reach the factory, because it is in a remote and deserted place.
- -Facing difficulty in obtaining permission to enter the factory by the factory manager
- It is difficult to collect information on the subject, as there is not enough research on this topic.

Conclusion:

The worker in butane gas tubes packing plant factory had a poor knowledge about the occupational health hazards .Also, the worker had incompetent about safety practice and preventive measures. So, most of the studied worker were exposed to the occupational health hazards.

There were a highly statistical significant difference between year of experience, marital status, level of education, age and total knowledge about occupational health hazards, there were a highly statistical significant difference between age, marital

status, year of experience, receive a training course related to work, and total practices regarding occupational hazards.

Recommendations:

In the light of the study's finding, the investigator is recommended that:

- Conduct a training and educational program regarding safety procedures and preventive measures in the butane gas packing plant.
- Develop further study to evaluate and enhance the well-being of workers in butane gas tubes packing plants factory to minimize work-related risks.
- Booklets about safety precaution such as handling gas cylinders, dealing with emergencies in the event of fire or accident, and work-related tasks involving the use of personal protective equipment for factory workers.

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