

Occupational Health Hazards among Workers in Marble and Granite Workshops in Benha City

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Abstract

Background: Occupational hazards, injuries and diseases are a major concern among marble and granite workers, as marble and granite workers are occupationally exposed to many occupational health hazards in their workplace. **Aim:** This study aimed to assess occupational health hazards among workers in marble and granite workshops in Benha City. **Research design:** A descriptive research design was utilized in this study. **Setting:** The study was conducted at 36 marble and granite workshops in Benha City, which presented at 13 settings. **Sample:** Convenience sample was used and included 162 workers. **Tools:** Two tools were used in this study. **Tool 1:** An interviewing questionnaire was used to assess socio-demographic characteristics of workers, health problems of workers during the last 6 months and worker's knowledge about occupational health hazards. **Tool 2:** Observational checklist to assess marble and granite workers' practices regarding prevention of occupational health hazards. **Results:** 52.5% of the studied workers aged from 30 to less than 40 years old with mean \pm SD 37.6 ± 10.98 and 51.9% of them had secondary education. In addition, 53.1% of them had poor total knowledge and 79% of them had unsatisfactory practices regarding prevention of occupational health hazards. **Conclusion:** There were a highly statistically significant correlation between studied workers total knowledge level and their total practices level. **Recommendations:** Health educational program for workers to improve their knowledge and practices regarding prevention of occupational health hazards.

Key words: Occupational Health Hazards, Workers, Marble and Granite, Workshops.

Introduction

Occupational health hazards refer to workplace activities that have the potential to cause and increase the risk of injury or illness, it is also experienced in the workplace and in many jobs workers are exposed to a combination of potential hazards, and workers in every occupation can be faced with multitude of hazards in their workplace (Selvi, 2020).

Occupational safety and health practice require the collaboration and participation of both employers and workers in health and safety programs that involve the consideration of issues relating to occupational health, industrial hygiene,

toxicology, education, engineering safety and psychology (Maier et al., 2020).

Marble and granite industry one of the most important sources of the Egyptian economy. Marble and granite have been commonly used in the sculpturing of statues, the construction of buildings and monuments since the ancient times. Marble workers are occupationally exposed to intense environmental marble dust in their workplace. Workers who quarry, grind, polish and install marble are exposed to the dust, which contains particles of calcium carbonate and silica. Prolonged exposure to respirable crystalline silica has been known to cause one of the oldest known industrial diseases, silicosis. In addition to silicosis, respirable crystalline silica has been associated

with autoimmune disease, non-malignant renal disease, cardiac overactive disease (COPD) and lung cancer (Carrieri et al., 2020).

Occupational Health Nurses (OHNs) play a multifaceted role in improving or maintaining marble and granite workers' daily workplace health as to observe and assess workers' health status with respect to job tasks and hazards. Using their specialized experience and education, they are also responsible for disease management, environmental health, emergency planning, workers' treatment, follow-up and referrals, emergency care for job-related injuries and illnesses and rehabilitation for return-to-work issues. OHNs provide occupational workers with instructional guidelines regarding occupational safety protective measures such as hand washing, good hygiene, and utilization of lifting assistive devices, workplace monitoring, vaccination, use of protective equipment and clothes as gloves, mask, gown, and eye protection (Aluko et al., 2018).

Significance of the study

In Egypt's marble and granite sector is very competitive and it plays a vital role globally in the socio-economic conditions such as providing employment to thousands of workers. The marble and granite industry in Egypt has grown and become highly competitive. The total number of marble and granite factories in Egypt is around 500 factories today, 400 or 70% of these factories is in "Shaq Al-Thu'ban" in Katameya, Cairo. The remaining factories are in the capital or the main cities of the governorates. At least there is around 2000 workshops with more than 55 thousands direct and indirect workers in this sector (Awad et al., 2019).

According to the latest estimates released by the International Labour Organization (ILO), 2.78 million workers world wide die

every year due to occupational accidents and work-related diseases. Some 2.4 million (86.3 per cent) of these deaths are due to work-related diseases, while over 380,000 (13.7 per cent) result from occupational accidents. Each year, there are almost a thousand times more non-fatal occupational injuries than fatal occupational injuries. Non-fatal injuries are estimated to affect 374 million workers annually, and many of these injuries have serious consequences for workers' earning capacity in the long term (Morgado et al., 2019).

Aim of the study

The aim of the study was to assess occupational health hazards among workers in marble and granite workshops in Benha City

Research questions:

- What are health problems facing marble and granite workers in the last six months?
- What are marble and granite workers' knowledge regarding occupational health hazards?
- What are marble and granite workers' practices regarding prevention of occupational health hazards?
- Is there a relation between marble and granite workers' socio-demographic characteristics and knowledge?
- Is there a relation between marble and granite workers' knowledge and their practices?
- Is there a relation between marble and granite workers' health problems and their practices related to safety measures for occupational health hazards?

Subjects and Method:

Research design:

A descriptive research design was used in carrying out this study.

Setting:

The study was conducted at 36 marble and granite workshops in Benha City presented at 13 settings namely: Elharas- elwatany, Ezbet-

elsouk, Ezbet- elzeraa, Elvelal, Ahram, Atreeb, Wasat-elbalad, Masaken-tabaa, Ezbet-elmeteny, Batta, Elshimout, Kafr-elshimout, Kafr-elshikh Ibrahim.

Sampling:

Convenience sample was taken from the previous mentioned settings in this study, Each workshop has from 4 to 5 workers. the total number of workers approximately 162 workers.

Tools of data collection:

Data were collected by using two tools:

The first tool: An interviewing questionnaire to assess the following parts: It comprised of three main parts.

The first Part:- a): It was concerned with socio-demographic characteristics of studied workers and included seven questions as (age, level of education, marital status, residence, family size, type of family and income).

Second part : It was concerned with health problems of studied workers acquired from marble and granite industry (e.g respiratory problems, gastrointestinal problems, eye problems, ear problems, bone problems skin problems).

Third part : It was concerned with knowledge of studied workers about occupational health hazards and included 8 questions as (meaning of occupational hazards, types of occupational hazards, types of physical, chemical, mechanical and biological hazards, high risk group for occupational hazards and prevention of occupational hazards).

Scoring system:-

The scoring system for workers' knowledge was calculated as follows: (2) score for a correct and complete answer , and (1) score

for a correct and incomplete answer, while (0) for don't know . For each area of knowledge , the score of the items was summed up and the total divided by the number of the items , giving mean score for the part . These scores were converted into a present score. **The total scores of knowledge = 32 points**

The total knowledge score was considered good if the score of total knowledge $\geq 75\%$ (≥ 24 point) and average if it $50\% < 75\%$ ($16 < 24$ point), While poor if it is $< 50\%$ (< 16 point).

Tool II: An observational checklist: It was adopted from (Colovic, 2018). It was concerned to observe studied workers practices and included (hand washing (5 steps), wearing protective equipment (6 steps), dealing with machine (5 steps), and body mechanics (12 steps).

Scoring system for workers' practices :

Each step of printing press workers observed practices has two level of answer. Done or not done: these were respectively 1,0. The scores of the items were summed-up and the total divided by the number of the items, giving a mean score for the part. These scores were converted into a percent score. The total practice score = 28 point. The total practices score were considered satisfactory if the score of the total practices $\geq 80\%$ (≥ 22 points) and unsatisfactory if it $< 80\%$ (< 22 points).

Content validity of the tools:

The validity of the tools was done by 5 experts of Community Health Nursing department Faculty of Nursing Staff, who reviewed the tool content validity. Also they were asked to judge the items for completeness, clarity, relevance, simplicity, accuracy, applicability and suggestion were considered.

Reliability of the tools:

The reliability of the tool was applied by the researcher for testing the internal consistency of the tool, by administration of the same to the same subjects under similar condition on one or more occasion. The reliability of tool was done by Cronbach Alpha test which revealed that which of the two tools consisted relatively homogeneous items as indicated by the moderate to high reliability of each tool. The internal consistency of the knowledge was 0.813% while practice was 0.841%.

Ethical considerations:

All ethical issues were assured, oral consent has been obtained from each worker before conducting the interview and given them brief orientation to the purpose of the study. They were also reassured that all information gathered would be treated confidentially and used only for the purpose of the study. Workers had the right to withdraw from the study at any time without giving any reasons.

Pilot study:

The pilot study was carried out on (16) workers who represented 10% of the sample size (162) . The pilot study aimed to assess the tool clarity, applicability and time needed to fill each sheet as well as to identify any possible obstacles that may hinder the data collection. No modification was done, so the pilot study sample was included to the total sample.

Data collection phase:

The actual field work was carried out through 6 months from the beginning of january 2022 to the end of june 2022. The investigator visited marble and granite workshops of Benha City, three days / week from 10 am to 1 pm, to collect data from

workers to assess their knowledge and their practices. The average number of interviewed workers at marble and granite workshops were between 4-5 worker /day. Each worker takes about 20-35 minutes to collect the needed data depending upon their understanding and response.

Statistical analysis:

The statistical analysis of data was done by using the computer software of Microsoft Excel Program and Statistical Package for Social Science (SPSS) version 25. Data were presented using descriptive statistics in the form of frequencies and percentage for categorical data, the arithmetic mean (X) and standard deviation (SD) for quantitative data. Qualitative variables were compared using chi square test (X^2). In addition, R- test were used to identify the correlation between the study variables.

Degrees of significance of results were considered as follows:

- Not significant (NS) P-value > 0.05
- Significant (S) *P-value < 0.05
- Highly Significant (HS)
P-value < 0.01

Results:

Table (1): Shows that; 52.5% of the studied workers aged from 30 to less than 40 years old with mean \pm SD 37.6 ± 10.98 , and 72.8% of them were married. Regarding educational level;51.9% of them had secondary education diplom or technical, While 71% of them were lived in rural areas. Concerning type of family;43.2% of them had extended family and 52.5% of them had 3-5 member.

Figure (1): Shows that;92.6% & 91.4% of the studied workers had respiratory and eye

problems, 75.8% of them had skin problems and 64.2% of them had bone problems.

Figure (2): Shows that;53.1% of the studied workers had poor knowledge about occupational health hazards. While 25% of them had average knowledge about occupational health hazards and only 22% of them had good knowledge about occupational health hazards.

Figure (3): Shows that; 79% of the studied workers had unsatisfactory observational practices regarding prevention of occupational health hazards. While 21% of them had satisfactory observational practices regarding prevention of occupational health hazards during work.

Table (2): Reveals that, there were highly statistically significant relation between total knowledge level among workers regarding occupational health hazards and their educational level ($P < 0.01$). While there was

statistically significant relation between total knowledge level among studied workers and their age and monthly income ($P = < 0.05$). While there were no significant relation between total knowledge among studied workers and their marital status and residence ($P = > 0.05$).

Table (3): Shows that; there were a highly statistically significant relation between total practices of the studied workers related to prevention of occupational health hazards and their health problems as respiratory problems, digestive problems, eye problems, skin problems, ear problems and bone problems ($P = < 0.01$).

Table (4): Reveals that; there were a highly statistically significant positive correlation between total knowledge about occupational health hazards and total practices related to prevention of occupational health hazards among studied workers ($P = < 0.01$).

Table (1): Frequency distribution of the studied workers regarding their socio-demographic characteristics (n=162).

Socio-demographic characteristics	No.	%
Age(years)		
20<30 years	40	24.7
30<40 years	85	52.5
40<50 years	25	15.4
≥ 50 years	12	7.4
Mean ± SD	37.6 ± 10.98	
Marital status		
Single	34	21
Married	118	72.8
Divorced	4	2.5
Widowed	6	3.7
Education level		
Illiterate	15	9.3
Read and write	20	12.3
Basic education	31	19.1
Secondary education / diplomor technical	84	51.9
University education	12	7.4
Residence		
Rural	115	71
Urban	47	39
Type of family members		
Nuclear family	35	21.6
Married family	57	35.2
Extended family	70	43.2
Number of family		
< 3	14	8.6
3 - 5	85	52.5
≥ 6	63	38.9

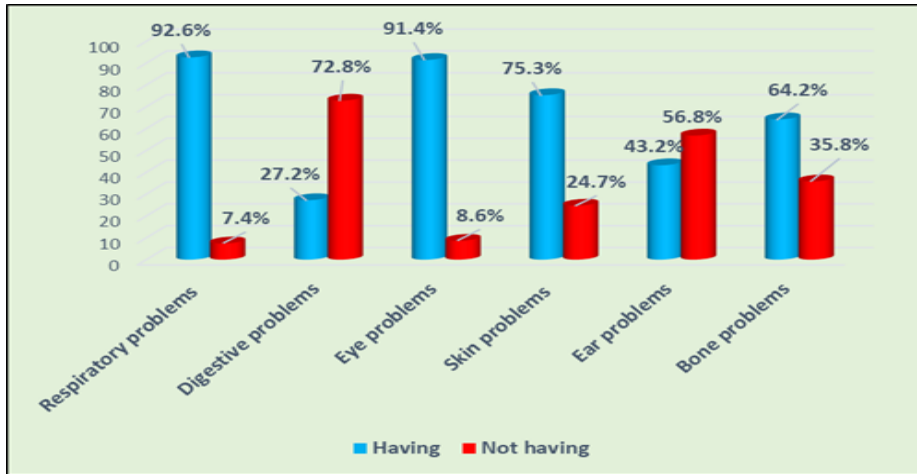


Figure (1): Percentage distribution of the studied workers regarding presence health problems (n=162).

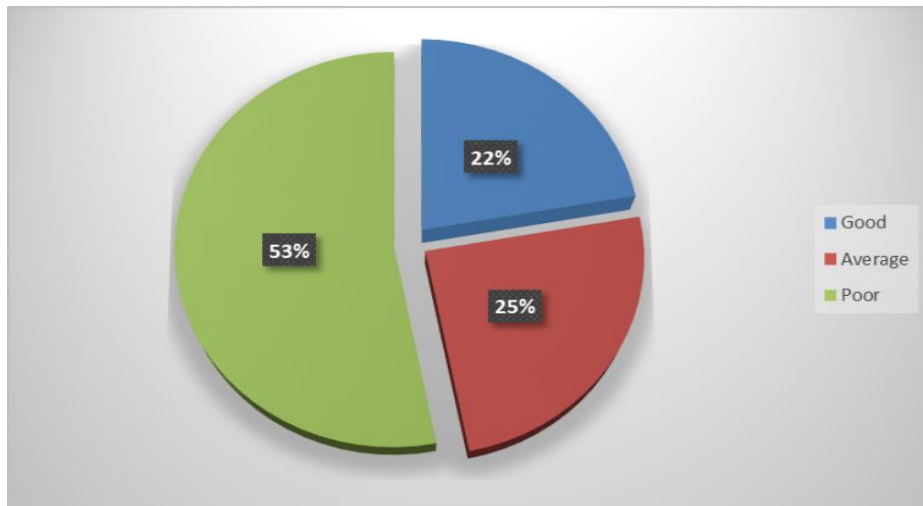


Figure (2): Percentage distribution of the studied workers regarding their total knowledge level (n=162).

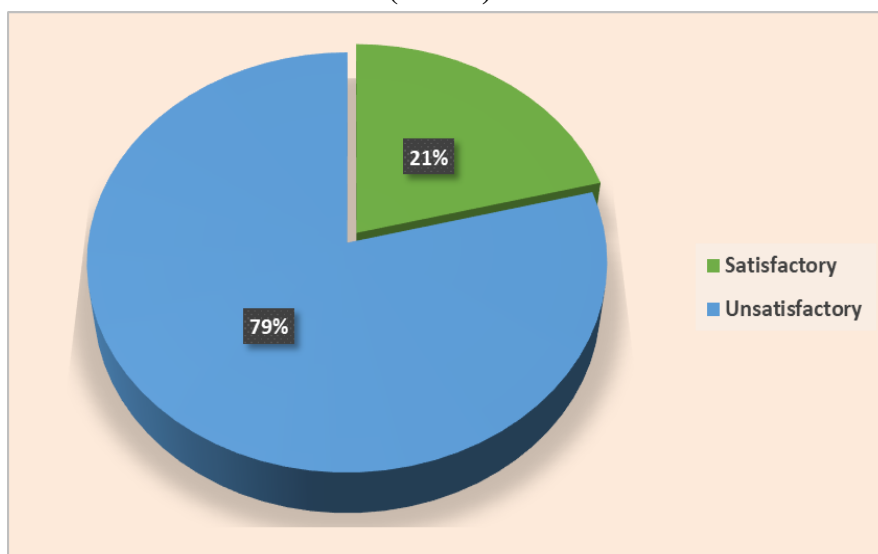


Figure (3) : Percentage distribution of the studied workers regarding their total practices regarding prevention of occupational health hazards (n=162).

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Table (2): Relation between socio-demographic characteristics and total knowledge level among studied workers regarding occupational health hazards (n=162).

Items	Total knowledge						X ²	P-Value
	Good (n=36)		Average (n=40)		Poor (n=86)			
	N	%	N	%	N	%		
Age (years)								
20-<30	0	0.0	10	25	30	34.9	9.500	0.018*
30-<40	16	44.4	28	70	41	47.7		
40-<50	18	50	2	5	5	5.8		
≥ 50	2	5.6	0	0.0	10	11.6		
Marital status								
Single	4	11.1	10	25	20	23.3	1.899	0.121
Married	30	83.3	28	70	60	69.8		
Divorced	1	2.8	1	2.5	2	2.3		
Widowed	1	2.8	1	2.5	4	4.6		
Educational level								
Illiterate	0	0.0	0	0.0	15	17.4	15.60	0.000**
Read and write	0	0.0	6	15	14	16.3		
Basic education	4	11.1	4	10	23	26.8		
Secondary education	20	55.6	30	75	34	39.5		
High education	12	33.3	0	0.0	0	0.0		
Residence								
Rural	21	58.3	32	80	62	72.1	1.900	0.136
Urban	15	41.7	8	20	24	27.9		
Monthly income								
Saving	21	58.3	0	0.0	0	0.0	10.02	0.011*
Enough	10	27.8	20	50	7	8.1		
Not enough	5	13.9	20	50	79	91.9		

Table (3): Relation between health problems of studied workers and total practices related to safety measures for prevention of occupational health hazards (n=162).

Items		Total practices levels				X ² FET	P- Value
		Satisfactory (n=34)		Unsatisfactory (n=128)			
		N	%	N	%		
Respiratory problems	Having	22	64.7	128	100	12.93	0.009**
	Not having	12	35.3	0	0.0		
Digestive problems	Having	0	0.0	44	34.4	15.99	0.000**
	Not having	34	100	84	65.6		
Eye problems	Having	20	58.8	128	100	12.81	0.009**
	Not having	14	41.2	0	0.0		
Skin problems	Having	0	0.0	122	95.3	14.88	0.000**
	Not having	34	100	6	4.7		
Ear problems	Having	0	0.0	70	54.7	15.82	0.000**
	Not having	34	100	58	45.3		
Bone problems	Having	0	0.0	104	81.3	15.53	0.000**
	Not having	34	100	24	18.7		

Table (4): Correlation between total knowledge and total practices among studied workers regarding occupational health hazards (n=162).

Variables	Total practices	
	r	p-value
Total knowledge	0.512	0.000**

Discussion

Regarding socio-demographic data of the studied workers, the current study showed that more than half of the studied workers aged from 30 to less than 40 years old with a mean age of 37.6 ± 10.98 , less than three-quarters of them were married. Regarding educational level; more than half of them had secondary education.

The current study showed that most of studied workers had respiratory problems. This finding disagreed with **Aleksandrova & Timofeeva, (2020)**, who clarified that less than one-fifth of the workers had respiratory problems.

Regarding total knowledge level of the studied workers about occupational health hazards, the present study showed that more

than half of the studied workers had poor total knowledge regarding occupational health hazards respectively. These findings agreed with **Avasthi & Chavda, (2018)**, who revealed that more than half of the studied workers had poor total knowledge regarding occupational health hazards. Also, these study findings agreed with **Selvi & Esaivani. (2021)**, who reported that more than half of studied workers had inadequate knowledge regarding occupational health hazards. However, these findings Incongruent with **Josephine et al. (2019)**, who concluded that level of awareness of occupational hazards was high among the workers. This might be due to most of the studied workers have secondary education.

As regards the studied worker's total practices level regarding prevention of occupational health hazards, the present study demonstrated that more than three quarter of the studied workers had unsatisfactory practices regarding prevention of occupational health hazards. These findings were on the same line with **Saad et al. (2016)**, who revealed that more than half of studied workers had unsatisfactory practices regarding prevention of occupational health hazards. This might be due to working under similar circumstances and showed the importance of providing a training program on practices to prevent occupational health hazards.

As regards the relation between socio-demographic characteristics of the studied workers and their total knowledge level regarding occupational health hazards, the present study showed that there was a highly statistically significant relation between total knowledge level among studied workers and their education level ($P = < 0.01$). Also, there were a statistically significant relation between the total knowledge level among studied workers and their age and monthly income

($P = < 0.05$). While, there was no statistically significant relation between the total knowledge among studied workers and their marital status and residence ($P = > 0.05$) (table 2). These findings agreed with **Ahmad (2019)**, who studied " Awareness of workplace hazards and preventive measures among sandstone mine workers in Rajasthan" in India (n=218), and found that there was a relation between workers' age and their awareness regarding occupational health hazards ($P = 0.001$). Also, These findings agreed with **Josephine et al. (2019)**, found that there was a relation between educational level and their awareness regarding occupational health hazards ($P = 0.001$). This might be due to advancing in age and educational level had a vital role in improving workers' awareness regarding occupational health hazards.

Regarding the relation between health problems of studied workers and total practices related to prevention of occupational health hazards, the present study showed that there was a highly statistically significant relation between total practices of the studied workers related to prevention of occupational health hazards and their health problems as respiratory problems, digestive problems, eye problems, skin problems, ear problems and bone problems ($P = < 0.01$) (table 3). This might be due to the importance of the correct practice for healthy life and prevention of occupational health problems.

Concerning the correlation between the total knowledge level of studied workers about occupational health hazards and their total practices, the present study illustrated that there was a highly statistically significant positive correlation between total knowledge about occupational health hazards and total practices related to the prevention of occupational health hazards among the studied workers ($P = < 0.01$) (table 4). These findings

disagreed with **Fahmy et al. (2019)**, who studied "Respiratory affection, alterations of some oxidative stress and autoimmune biomarkers among workers exposed to silica dust with and without silicosis in one of the factories for refractories in Alexandria, Egypt"(n=140) who reported that there was no statistically significant difference relation between the studied workers' total knowledge and their total practice. This might be due to the more correct information gained affect the performing of good practice.

Conclusion

Approximately most of the studied workers had respiratory and eye problems. In addition, more than half of them had poor total knowledge, and more than three quarters of them had unsatisfactory total practices regarding prevention of occupational health hazards. There were highly statistically significant relation between socio-demographic characteristics as educational level and total knowledge level among studied workers regarding occupational health hazards ($P < 0.01$). Also, There were highly statistically significant positive correlation between total knowledge about occupational health hazards and total practices related to prevention of occupational health hazards among studied workers ($P = < 0.01$). Moreover, There were a highly statistically significant relation between total practices of the studied workers related to prevention of occupational health hazards and their health problems as respiratory problems, digestive problems, eye problems, skin problems, ear problems and bone problems ($P = < 0.01$).

Recommendations

- Orientation program for newly workers before starting the work which should focus on work nature, requirement of the job,

types of occupational hazards and emergency plan.

- Perform training program should be provided for marble and granite workers to improve their knowledge and practices regarding prevention of occupational health hazards.
- Regular periodic checkup for all workers for early detection of any health problems and health needs.

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مخاطر الصحة المهنية بين عمال ورش الرخام والجرانيت في مدينة بنها

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تشكل الأخطار المهنية والإصابات والأمراض مصدر قلق كبير بين عمال الرخام والجرانيت ، حيث يتعرض عمال الرخام والجرانيت مهنيًا للعديد من المخاطر الصحية المهنية في أماكن عملهم. لذلك هدفت هذه الدراسة الى تقييم مخاطر الصحة المهنية بين عمال ورش الرخام والجرانيت في مدينة بنها. وقد أجريت الدراسة في 36 ورشة رخام وجرانيت قدمت في 13 مكانا في مدينة بنها على 162 عاملاً. حيث اسفرت نتائج الدراسة ن معظم العمال يعانون مشاكل في الجهاز التنفسي والعين. اكثر من نصفهم لديهم مستوي منخفض من المعلومات علاوة على ذلك ، كان لدى أكثر من ثلاثة أرباعهم ممارسات إجمالية غير مرضية فيما يتعلق بالوقاية من مخاطر الصحة المهنية. كانت هناك علاقة ذات دلالة إحصائية عالية بين مستوى المعرفة الكلي بين العاملين فيما يتعلق بمخاطر الصحة المهنية ومستواهم التعليمي أيضا ، كان هناك علاوة على ذلك ، كانت هناك علاقة ذات دلالة إحصائية عالية بين الممارسات الكلية للعاملين المدروسين فيما يتعلق بالوقاية من مخاطر الصحة المهنية ومشاكلهم الصحية مثل مشاكل الجهاز التنفسي ، مشاكل الجهاز الهضمي ، مشاكل العين ، مشاكل الجلد ، مشاكل الأذن ومشاكل العظام.ارتباط إيجابي ذو دلالة إحصائية عالية بين المعرفة الكلية حول مخاطر الصحة المهنية وإجمالي الممارسات المتعلقة بالوقاية من مخاطر الصحة المهنية بين العاملين الخاضعين للدراسة. كما أوصت الدراسة بان هناك حاجة الي توفير برامج التثقيف الصحي الدورية للعاملين في ورش الرخام والجرانيت، وتشمل التدريب على الوقاية من المخاطر المهنية، وإجراءات السلامة، واستخدام أجهزة الحماية الشخصية والتدريب على إجراءات الإسعافات الأولية.