Assessment of Knowledge and Self-Reported Practices of Iron Mines’ Workers about Pneumoconiosis in Baharia Oasis, Giza Governorate

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Abstract

Background: Pneumoconiosis (silicosis) is the most common occupational lung disease in Egypt.

Aim of the Study: Was to assess knowledge and self-reported practices of Iron Mines’ workers about pneumoconiosis. A descriptive exploratory research.

Design: Was utilized in this study.

Setting: The study was conducted at El Gedida Iron Mine area at Bahariya Oasis, Giza Governorate. A sample of 240 workers representing 50% of all workers in the mine was chosen at random. The investigator developed a four-part tool to collect data for this study. Part I: Demographic characteristic of the workers such as: Age, education, occupation, etc., Part II: Medical history such as: Medical problems, chronic illness, etc., Part III: Workers’ knowledge regarding pneumoconiosis such as: Definition, causes, signs and symptoms, etc. and Part IV: Workers’ self-reported practices about prevention of pneumoconiosis such as: Personal protective measures, environmental measures, and hygienic measures.

Results: Indicated that 17.9% and 22.9% of workers had unsatisfactory total scores regarding knowledge and self-reported healthy practices about pneumoconiosis respectively, more than two third (70.8%) of workers had partially satisfactory scores regarding their knowledge and 72.5% regarding self-reported practices about pneumoconiosis. There was a statistically significant positive correlation between total knowledge scores and total self-reported healthy practices scores of workers about pneumoconiosis.

Conclusion: That, more than two third (70.8%) of workers had partially satisfactory scores regarding their knowledge and 72.5% regarding self-reported practices about pneumoconiosis. Based on study results, it is recommended to develop health education programs tailored to improve knowledge and healthy practices of workers about the occupational safety measures and prevention of pneumoconiosis in iron mines.

Key Words: Mining – Workers – Knowledge and self-reported practices.

Introduction

WORK is viewed as important to one’s life experience; most adults spend about one third of their time at work. Workers expose themselves to different hazards, which may have tremendous harmful effects on their health. Work hazards may result from physical, chemical or mechanical agents [1]. The primary pneumoconiosis is asbestosis, silicosis, and coal workers’ pneumoconiosis. As their names imply, they are caused by inhalation of asbestos fibers, silica dust, and coal mine dust [2].

Mining is a dangerous industry, there are many dangers that miners face every day that they are on the job. Those risks include injuries and fatalities from falls, fires, explosions, electrical accidents, toxic dust and noise. There are short term risks from accidents and explosions that might result in an acute injury or fatality. There are also long term effects from dust and noise that can result in serious respiratory diseases and hearing loss. Workers are also affected by respiratory diseases such as pneumoconiosis or black lung disease. Mining continues to be a dangerous, in order to prevent future injuries and fatalities, it is important for new safety measures and mining alternatives to be fully explored and implemented [3].

Every year more than 2 million people die from occupational accidents or work-related diseases in the world. By conservative estimate, there are 270 million occupational accidents and 160 million cases of occupational diseases. Hazardous substances cause the deaths of an estimated 440000 workers. Of these, asbestos alone kills some 100000 workers worldwide each year [4].

There are potential hazards and risks to employees’ safety while working in iron mining and manufacturing worksites. It is then essential for...
employees to wear the correct safety protective equipment and follow the necessary safety measures to protect themselves. If an accident occurs, an employee wearing the right personal protective clothing and devices can reduce the risk of injuries such as broken bones, minor burns, rashes or cuts [5].

Occupational health nursing is a subspecialty of community health nursing which focuses on the prevention of adverse health effects caused by occupational and environmental hazards. The role of the occupational health nurse is broad and includes health care provider, manager/coordinator, educator/advisor, case manager and consultant. Regardless the type of role, the occupational health nurse must participate in continuing nursing education activities [6].

Significance of the study: Pneumoconiosis (Silicosis) is the most common occupational lung disease in Egypt where its prevalence rate ranges from 18.5% to 45.8% among workers exposed to free crystalline silica dust. Despite its high prevalence, there is a lack of enforcement of exposure limits, availability and use of personal protective equipment, and occupational health education programs [7]. Continuous inhalation of silica dust may result in diseases such as pneumoconiosis, lung cancer, pulmonary tuberculosis, eye problems, or skin problems [8].

Thorough literature review revealed that there were no researches in Egypt focusing on knowledge and self-reported practices of iron mine workers about pneumoconiosis.

Therefore, the aim of this study was to assess knowledge and self-reported practices of Iron Mines’ workers about pneumoconiosis.

Subjects and Methods

The study was conducted from July till December 2012.

Research questions:

To fulfill the aim of this study the following two questions were formulated:

1- What is the workers’ knowledge about pneumoconiosis?

2- What are the workers’ self-reported practices about prevention of pneumoconiosis?

Research design:

A descriptive exploratory research design was utilized for this study.

Setting:

The study was conducted at El Gedida Iron Mine area at Bahariya Oasis, Giza Governorate in Egypt.

Sample:

A sample of 240 workers (50% of total workers population) was included in this study through simple random sampling technique.

Tools of the study:

The study tool was developed by the investigator. The Structured interviewing questionnaire composed of four-part to collect data for this study. Part I: Demographic characteristic of the workers such as: age, education, occupation, etc., Part II: Medical history such as: Medical problems, chronic illness, etc., Part III: Workers’ knowledge regarding pneumoconiosis such as: Definition, causes, signs and symptoms, etc. and Part IV: Workers’ self-reported practices about prevention of pneumoconiosis such as: Personal protective measures, environmental measures, and hygienic measures. Five experts from Community Health Nursing Department at the Faculty of Nursing, Cairo University were asked to revise the tool for its content validity. For knowledge and self-reported practices, complete correct answer was given two points, incomplete answer was given one point, and incorrect answer was given zero. Then total scores for participants were calculated and presented on three levels: Unsatisfactory, partially satisfactory and satisfactory.

Ethical and legal considerations:

An official permission to conduct the proposed study was obtained from the officials of both Faculty of Nursing Cairo University and the Head Sector of iron mines’. The protocol of this study was approved by the Ethical Committee for Faculty Research. Written informed consents were secured from all participants prior to data collection. Data were collected during workers’ break time in the lounge. Medical data were collected from workers’ medical records which are kept in the health office at the mine.

Pilot study:

A pilot study was conducted on 10% of the sample (24) workers to assess the feasibility of the study as well as clarity of data collection tool and to determine the needed time for application of the study tool.

Statistical analysis:

Data were coded, scored, tabulated, and analyzed by computer using “Statistical Package for
Social Science” (SPSS windows) version 17. Numerical data were expressed as mean ± SD, and range. Qualitative data were expressed as frequency and percentage. For qualitative data; comparison between two variables was done by using Chi-square test. Relations between different numerical variables were tested using Pearson correlation. Probability (p-value) less than 0.05 was considered significant and less than 0.001 was considered as highly significant.

Results

Results of the current study reveals that more than one third (32.5%) of the workers aged between 40 to less than 50 years old with a mean age of 42.71 ±9.43 years, around half (48.3%) of them had secondary technical education. Regarding place of residence, more than half (68.3%) of the workers resided in rural areas and the majority (84.6%) of them were married. More than two fifths (42.5%) of the study sample were technical workers, more than one third (36.2%) had work experience between 20 to 30 years and more than half (67.9%) of them worked mainly morning shifts.

Concerning the medical history of the workers, almost half (49.6%) of them did not have chronic illnesses, while one fourth (25.4%) were diagnosed as suffering from silicosis. Regarding types of medical services available for workers under study, 35.8% indicated that they were offered routine periodic checkups.

Regarding workers’ knowledge and self reported practices pertinent to pneumoconiosis, Table (1) shows that 17.9% and 22.9% of the workers had unsatisfactory total scores, while 11.3% and 4.6% of workers had satisfactory scores regarding knowledge and self-reported practices respectively, the remaining percentage of workers had fair scores.

Table (1): Distribution of workers’ total scores of knowledge and total scores of self-reported practices about pneumoconiosis (N=240).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Total knowledge</th>
<th>Total self-reported practices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Unsatisfactory</td>
<td>43</td>
<td>17.9</td>
</tr>
<tr>
<td>Partially satisfactory</td>
<td>170</td>
<td>70.8</td>
</tr>
<tr>
<td>Satisfactory</td>
<td>27</td>
<td>11.3</td>
</tr>
<tr>
<td>Total</td>
<td>240</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table (2) illustrates that, there was a statistically significant positive correlation between the workers’ age and total self-reported practices scores (r=0.137, p=0.034), while no statistically significant correlation was found with the total knowledge scores (r=0.028, p=0.661). This table shows a highly statistically significant positive correlation between the workers’ educational level and total knowledge scores (r=0.332, p=0.000) and a statistically significant positive correlation with total self-reported practices scores (r=0.149, p=0.021). Regarding place of residence, there was a highly statistically significant positive correlation with the workers’ total knowledge scores (r=0.246, p=0.000) and no statistically significant correlation was found with the total self-reported practices scores (r=0.035, p=0.586). There was a statistically significant positive correlation between the workers’ job and work experience with total self-reported practices scores (r=0.139, p=0.032 & r=0.111, p=0.05 respectively) while no statistically significant correlation was found with the total knowledge scores (r=0.107, p=0.097 & r=0.093, p=0.152 respectively). This table also shows that there was a highly statistically significant negative correlation between work shift and the workers’ total knowledge scores (r=−0.224, p=0.000), while no statistically significant correlation was found with the total self-reported practices scores (r=0.004, p=0.952). No statistically significant correlation was found between workers’ marital status and problems encountered at work in relation to total knowledge scores (r=0.063, p=0.333 & r=−0.090, p=0.164 respectively) or with total self-reported practices scores (r=0.072, p=0.265 & r=0.021, p=0.749 respectively).

Table (2): Correlation between total knowledge and total self-reported practice scores with Socio-demographic characteristics of the workers (N=240).

<table>
<thead>
<tr>
<th>Socio-demographic characteristics</th>
<th>Total knowledge</th>
<th>Total self-reported practices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Educational level</td>
<td>–0.028</td>
<td>0.661</td>
</tr>
<tr>
<td>Place of residence</td>
<td>0.332</td>
<td>0.000**</td>
</tr>
<tr>
<td>Marital status</td>
<td>–0.063</td>
<td>0.333</td>
</tr>
<tr>
<td>Job</td>
<td>0.107</td>
<td>0.097</td>
</tr>
<tr>
<td>Work experience</td>
<td>–0.093</td>
<td>0.152</td>
</tr>
<tr>
<td>Problems encountered at work</td>
<td>–0.090</td>
<td>0.164</td>
</tr>
</tbody>
</table>

** : Correlation is highly significant at the level of ≤0.01.
* : Correlation is significant at the level of ≤0.05.

Table (3) reveals that, there was a statistically significant negative correlation between types of chronic illnesses and total self-reported practice scores (r=−0.136, p=0.035), while no statistically significant correlation was found with the total knowledge scores (r=−0.076, p=0.240). This table
also shows that, there was a highly statistically significant negative correlation between types of medical services and the workers’ total knowledge scores \((r=0.179, p=0.005)\), while there was a statistically significant positive correlation with total self-reported practices scores \((r=0.114, p=0.05)\).

Table (3): Correlation between total knowledge and total self-reported practices scores with Medical History of the workers \((N=240)\).

<table>
<thead>
<tr>
<th>Medical History</th>
<th>Total knowledge</th>
<th>Total self-reported practices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(r)</td>
<td>(p)</td>
</tr>
<tr>
<td>Types of chronic illness</td>
<td>−0.076</td>
<td>0.240</td>
</tr>
<tr>
<td>Disability percentage</td>
<td>0.010</td>
<td>0.881</td>
</tr>
<tr>
<td>Types of medical services</td>
<td>−0.179</td>
<td>0.005**</td>
</tr>
<tr>
<td>Importance of regular follow-up</td>
<td>−0.052</td>
<td>0.418</td>
</tr>
<tr>
<td>Work accidents</td>
<td>−0.019</td>
<td>0.77</td>
</tr>
</tbody>
</table>

** : Correlation is highly significant at the level of ≤0.01.  
* : Correlation is significant at the level of ≤0.05.

The current study indicated that all iron mine’s workers were men and more than one third of them aged between 40 to less than 50 years old with a mean age of 42.71 ±9.43 years. The same results were supported by Zungu [11], who carried out a study about prevalence of post-traumatic stress disorder in the South African mining industry and found that more than half of the workers were 40 years and older with a mean age of 39.5 ±9.1 years. Results also show that, almost half of the workers had secondary technical education. These results were supported with many studies as Dat [12], who carried out a cross sectional study on 420 workers in Vietnam and reported that, most of workers had secondary school education.

Concerning the place of residence, more than half of the workers in the current study resided in rural areas. This result contradicted with Mahmoud et al., [13] who conducted a study on occupational health hazards among Assuit Spinning Factory workers. They reported that workers were equally distributed among urban and rural areas. Regarding marital status of the workers, the majority of workers were married. This result is in agreement with other studies as Kifle et al., [14], who carried out a cross-sectional on 453 production workers about “Work related injuries and associated risk factors among iron and steel industries workers” in Ethiopia indicated that, more than half of the workers were married.

Table (4): Correlation between total knowledge and total self-reported practices of the workers \((N=240)\).

<table>
<thead>
<tr>
<th>Study variable</th>
<th>Total knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total self-reported practices</td>
<td>0.3</td>
</tr>
</tbody>
</table>

* : Correlation is significant at the level of ≤0.05.

**Discussion**

The incidence of pneumoconiosis has been a decreasing trend, but it is still one of the most serious occupational diseases worldwide. Pneumoconiosis prevention remains a top priority in developing countries where mines workers constitute an important productive sector of the community and consequently are the wealth and welfare of the nation [9]. Those workers are exposed in their working environment continuously to either potential or actual hazards which have an impact on their health whether by acute or adverse serious effects [10]. Hence, the aim of this study was to assess knowledge and self-reported practices of Iron Mines’ workers about pneumoconiosis and too fulfills this aim the following two questions were formulated:

- What is the workers’ knowledge about pneumoconiosis?
- What are the workers’ self-reported practices about prevention of pneumoconiosis?

Results of the current study indicated that all iron mine’s workers were men and more than one third of them aged between 40 to less than 50 years old with a mean age of 42.71 ±9.43 years. The same results were supported by Zungu [11], who carried out a study about prevalence of post-traumatic stress disorder in the South African mining industry and found that more than half of the workers were 40 years and older with a mean age of 39.5 ±9.1 years. Results also show that, almost half of the workers had secondary technical education. These results were supported with many studies as Dat [12], who carried out a cross sectional study on 420 workers in Vietnam and reported that, most of workers had secondary school education.
Regarding the medical history of the workers, results of the current study indicated that, almost half of the workers did not have chronic illnesses, while one fourth were diagnosed with pneumoconiosis (silicosis). This result was supported by the results of Aghilinejad et al., [16] who carried out a cross-sectional study on 180 stone-cutter workers in stone-cutting factories in Malayer-Azandarian (Hamadan province). They found that, 8.9% of the workers had silicosis. Results of the current study shows a higher silicosis rate (one fourth) and this difference might be due to improper use of personal protective equipment or improper applications of environmental safety measures among workers of the current study sample.

Regarding workers disabilities, about three quarters of the workers in this study did not have occupational disability. This result is supported by Ahmed and Salah [17], who carried out a study in Tourah Cement Factory and stated that more than three quarters of reported incidents in medical records did not show occupational disability, while one fourth of the workers had temporary disability. Regarding types of medical services provided for mine’s workers, more than one third of the workers were offered periodical routine checkups. This result contradicts results of a study conducted by Tam & Fung [18], who conducted a study on Hong Kong construction workers on using personal respiratory protective equipment. They reported that, more than three quarters of the workers did not perform the regular physical routine checkups.

Regarding total knowledge and self-reported practices scores of the workers, it was found that more than two thirds of workers had fairly satisfactory scores regarding their knowledge and almost three quarters had fairly satisfactory self-reported practices regarding pneumoconiosis. In this regard, a study was conducted by Yadav et al., [19], on awareness and practices about Silicosis among the Sandstone Quarry workers in Desert Ecology of Jodhpur, Rajasthan, India. They found that, more than two thirds of workers knew the real risk factors and symptoms of the disease and the majority of workers had poor practices regarding prevention of the disease.

There was a statistically significant positive correlation between the workers age and total knowledge scores, while no statistically significant positive correlation was found with the total self-reported practices scores. There was a highly statistically significant positive correlation between the workers’ educational level and total knowledge scores and a statistically significant positive correlation with total self-reported practices scores. This result was supported by Sanaei et al., [20] who conducted a study on evaluation of knowledge, attitude and behavior of Iranian workers towards occupational health and safety. They reported that, there was a significant relation between total knowledge scores and level of education. Dat [12], also reported that, there was a highly statistically significant positive correlation between the workers educational level and total knowledge scores. The higher the educational level of the workers the more knowledgeable they are about pneumoconiosis and the better their self-reported health practices.

There was a statistically significant positive correlation between the workers’ type of job with total self-reported health practices scores while no statistically significant correlation was found with the total knowledge scores. This result was supported by Madinane [21], who conducted a study on knowledge, attitude and practices regarding personal protective equipment amongst Stevens lumber mills employees in the Capricorn district of Limpopo province, south Africa. He reported that, there was a statistically significant correlation between types of work of the workers and total self-reported practices scores.

There was a statistically significant positive correlation between workers’ work experience and total self-reported practices scores while there was no statistically significant correlation with the total knowledge scores. This result was supported by Ahmed and Salah [17], who studied health workers in Tourah Cement Factory. They reported that, there was highly statistically significant correlation between workers’ years of experience and total self-reported practices scores. Also Hafiz and Mark [18], indicated that, the variable years of service had a statistically significant effect on the knowledge of the workers, which mean that, the longer period of work experience for workers, the better self-reported practices. No statistically significant correlation was found between workers’ marital status and problems encountered at work in relation to total knowledge scores and also with total self-reported practices scores.
There was a statistically significant negative correlation between types of chronic illness and total self-reported practice scores, while no statistically significant correlation found with the total knowledge scores. This result was supported by Sabouhi et al., [22], who studied knowledge, awareness, attitudes and practice about hypertension in hypertensive patients referring to public health care centers in Iran. They reported that, there was no significant relationship between types of chronic illness and total knowledge scores. There was a statistically significant positive correlation between total knowledge scores and total self-reported practices scores of workers about pneumoconiosis, where the more knowledge they have the better self-reported practices they performed. This result was supported by Devina and Kiran [23], who conducted a study on knowledge and practice regarding prevention of occupational hazards and attitude towards utilization of safety measures among fishermen. There was significant relationship between total knowledge and total self-reported practices scores, when workers are provided with basic knowledge about preventive measures, environmental measures and hygienic measures this will support them in practicing healthy behaviors regarding prevention of pneumoconiosis.

In Conclusion:

Iron mine workers’ knowledge and self-reported practices are not appropriate to deal with an occupational hazard for which the only treatment is prevention.

Recommendations:

- Health education programs should be developed for Iron mine workers about the occupational safety measures and prevention of pneumoconiosis.
- More emphasis on providing and maintaining sufficient safety/protective measures for workers in Iron mines.

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