

## Effect of an Occupational Health Program in Improving knowledge and Practice of workers Regarding Health Hazards at Atbara Cement Factory 2014 – 2018

Abdalahmanabdallatifmohmed saeed1 ,El-saidaAbdElmageed Elrufie1 ,

El-saidaAbdElmageed Elrufie1, RN, CHN, PhD. Assistant Professor

Nursing College, Ribat University Department of Community Health Nursing Khartoum, Sudan.

Author:Abdalahmanabdallatifmohmedsaeed Nursing College, Alribat University Khartoum , Sudan

ElsayedaAbdElmageedElrufaie , Assisstant professor PhD, CHN, RN

Nursing ColledgeRibat Uiversity Khartoum, Sudan

### Abstract

**Objective:** Most of the world's population spend about one-third of their adult life at work, and with work-place injuries and fatalities remaining at unacceptably high levels. Aim : The study aimed to evaluate The effect of an occupational training health program in improving knowledge of workers regarding health hazards at Atbara Cement Factory

**Methods:** Quasi-experimental: pre and posttest design for the same groupwas conducted usingtotalcoverage,the study sample consisted of 147 workers . The study was conducted in AtbaraCementFactory in River Nile state.

The Data were collected by a structured interview questionnaire consisting of demographic data,a knowledge data. The intervention program included occupational educational training program. Compliance with these measures was monitored and recorded.

**Results:** Knowledge of the participants regarding occupational safety before and after implementation of the education program ,significantly increased from pretest to posttest. Regarding the risks in cement factories, as one of the occupational risks 54(36.7%) of the participants at pretest increased to 132(89.9%) at post. the mean value of the occupational risk (wound), the mean score of risk was  $0.37\pm 0.44$  at pretest, and at posttest was  $0.90\pm 0.30$ ; T value was (-11.3) indicates significant differences between pre and posttest the occupational risk (P value =  $0.012 < 0.05$ )

**Conclusion:** workers in most cases lake the basics of knowledge regarding occupational riskswhich pose a risk to their physical, mental and social well-being. For the minimizing and elimination of this problem, more efforts are necessary from stakeholder at the company and administration level .A program to promote safety education and the use of personal protective equipment among cement factory workers is recommended

**Key Words:** Occupational Health, Occupational Hazards, Personal Protective Equipment

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### I. Introduction

Occupational health is the study of promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations. The main focus in occupational health is to maintain worker's health and working capacity, to improve the working environment to become conducive to safety and health, and to develop the working organizations and cultures in a direction which supports health and safety . Factories represent one of the most important strategic manufactures and a basic element in the economic development of any country .Workers in the sector factories constitute an important productive aggregate in the community (1).

Within the WHO Member States the discipline of occupational health is undergoing rapid development. This is largely due to the new demands and expectations from employers, employees and their representative bodies as they recognize the economic, social and health benefits achieved by providing these services at the workplace. The rapid development of occupational health services has also, in part, been driven by the expanding program of Europe legislation in the areas of health, safety and environmental protection and the need by employers to respond to this legislation (2). Occupational health means provision of comprehensive health care (personal and impersonal) to workers through a mix of promotive, preventive, curative and rehabilitative interventions so as to raise their quality of life. It is also defined as the effect of working environment and work on the health of the workers and in turn the effect of workers health status on the productivity.

In addition occupational health services, provided at the workplace to address the health care needs of working populations have been identified as an important component of the public health strategy(3).

Workers of cement factories were exposed to cement dust at various stages of the manufacturing. These stages include quarrying, handling and grinding of the raw materials into clinker, blending and addition of additives and finally packaging and shipping of the finished products. They further stated that long term exposure of workers to cement dust could affect lung function(4).

There is a potential association between exposure in the cement industry and an increased risk of stomach and rectal cancers. Works which have been done in the United Arab Emirates by Ahmed & Abdullah (5), related high prevalence of respiratory symptoms and health problems such as cough and phlegm among cement workers, to dust exposure and cumulative dust exposures (5).

The role of the specialist occupational health nurse is primarily orientated towards:

Improving environmental health management, by reducing risk to the working population and the wider community, which contributes to the wider public health agenda.(6).

Other studies have shown that cement dust may enter into the systemic circulation and thereby reach the essentially all the organs of body and affects the different tissues including heart, liver, spleen, bone, muscles and hairs and ultimately affecting their micro-structure and physiological performance. Most of the studies have been previously attempted to evaluate the effects of cement dust exposure on the basis of spirometry or radiology, or both. However, collective effort describing the general effects of cement dust on different organ and systems in humans or animals, or both has not been published. Therefore, the aim of this review is to gather the potential toxic effects of cement dust and to minimize the health risks in cement mill workers by providing them with information regarding the hazards of cement dust(7) .

Though most workers in cement producing companies are mostly exposed to significant occupational hazards and are consequently at high risk of work- related diseases, the majority of workers tend to have low levels of knowledge, education and training on occupational hazards (8) .

There is a limited amount of information on the knowledge of cement factory workers on occupational hazards in Sudan. It is therefore important that a study of this nature be carried out to determine the occupational hazards knowledge by workers in the cement industry with a view to making necessary recommendations to achieve worker safety.

The chemical hazards arise from excessive air born concentrations, chemicals could occur through either inhalation, dermal or ingestion and through contaminated hands. These toxic chemicals may have acute or chronic effects on the workers. Acute effects such as dizziness, headache, nausea, vomiting, sleepiness, fatigue, slurred speech, disequilibrium, loss of consciousness, respiratory tract irritation, acute pneumonitis, a plastic anemia, leukemia, kidney, bladder, lung cancer, lymph sarcoma, and pulmonary (9)

Workplace safety is very important for each and every employee in the industry because all the workers desire to work in a safe and protected atmosphere. Health and safety is the key factor for all the industries in order to promote the wellness of both employees and employers. It is a duty and moral responsibility of the company to look after the employee's protection (10) .

The employing organizations also have to incur economic losses in the form of compensatory benefits that they have to pay to the employee. Secondly, they lose their goodwill among other employees as well as their customers. Also, it is a moral responsibility of an employer to ensure the safety of his/her employees. When an organization utilizes human beings as an important resource, it is the organization's duty to look after their safety (11) .

## **II. Materials and Methods:**

**Research design:**A quasi –experimental research design was used in carrying out the study.

**Research setting:**This study was carried out in the cement at Atbara factory. Established in Sudan in 1947. Established a new production line (5600) tons / day and one of the largest lines in Sudan and Africa. Location of the (ancient) plant The Atbara cement plant is located about 2.5 kilometers south of the Atbara River and the east of the Nile River.

**Samples:**The total sample consisted of 147 of workers of factory cement workers were used.

A pretest questionnaire was distributed to the participants. An initial set of questions collects data on cement workers age, job title (if found) and previous training background. Another set of questions covers their knowledge about occupational health hazards and safety measures to prevent such hazards. Their attitude and practice of different lines

of prevention were also assessed in the questionnaire. Then a health education session

–about two hours long in the form of interactive lecture was carried out by the researcher. A handout of the training session was distributed all over the workers, the attending and supervisors. The questionnaire was then distributed as a post-test to those who participated in the study.

It comprises 20 questions to assess the worker's knowledge regarding occupational health and managing occupational injuries. This tool was divided into two parts; one demographic data that included (educational level, experience years). The second part included the knowledge of workers about managing occupational injuries. This questionnaire was filled by the researcher (interview questionnaire).

**Tools of the study:** Two tools were used for data collection:

Tool one: A structured interview questionnaire was designed and utilized by the researcher to collect the necessary data. It is divided into three parts and entailed the following items:

-**The first** part includes questions related to sociodemographic characteristics of the workers such as age, level of education, occupation etc.

-**The second** part include questions related to occupational risk factors such as; types of exposure to occupational hazards during the working day, physical, accident, and chemical.

-**The third** part includes questions related to workers knowledge about safe working environment, personal protective equipment, how to protect themselves from occupational hazards and importance of using it, types of occupational hazards and their effects on their own health, source of information and most common diseases.

The health promoting program was developed based on reviewing of related literature and the result of the assessment tools (pretest).

Content validity of the tool was checked by a panel of four experts from the Community Health Nursing specialty and modifications were done based on their opinions.

A pilot study was done on 10% of the study sample to test the feasibility of study tools and Modifications were done based on the results of the pilot study. Those who shared in the pilot study were excluded from the main study sample.

**Health promotion program construction:** It consisted of three phases:

First, preparatory and assessment phases: A review of recent, current, national and international related literature in various aspects, to design the study tools.

Second, planning and implementing phases

General objective: The objective of health promotion program were to improve the health workers through improving their knowledge, attitude, and practices towards safety measures in factory environment.

Content of the program: Has been derived from The American Association of Occupational Health Nurses, Inc. (AAOHN), Canadian Association for Occupational Health Nurses The association of occupational Health Nurse Practitioners (UK). **Content of the program content** PPE, types, availability, safe work environment, and first aid in case of occupational hazards. (Overview of Occupational Health, Types of Injuries, workers risks, Prevention strategies).

The program was implemented over a period of 6 months; it was carried out in 6 sessions (time allowed 12 hours distributed on 6 sessions: 3 hours for theory and 3 hours for practice. The duration of each session ranged from 60 - 90 minutes.

At the beginning of each session, the researcher started by divided the sample size into groups (not less than 20). a summary about what was given through the previous sessions and objectives of the new one, taking into consideration using simple and clear language to suit the participants level of understanding.

Different teaching methods were used including lectures, group discussion, demonstration and redemonstration, and role-play to implement the program.

The educational media were brochures, colored posters, laptop screen show and real objects.

At the end of each session, the workers were informed about the content of the next session and its time

**Third, the evaluation phase:**

Evaluation was based on scores of acquired knowledge, attitude and practices in pre-test and immediate post-test.

**Ethical considerations:**

-The Researcher has obtained an approval letter from the National Al Ribat University Graduate College and scientific research.

The researcher also got permission from Atbra cement factory administrator.

- Furthermore, the workers were informed about the nature of the study, and the right to withdraw at any time, or refuse to answer specific question without giving any reason. Workers verbal agreement to participate was obtained. Confidentiality was regarded..

The researcher followed a high confidential approach during gathering, analyzing, and interpretation of the participant's data. To keep the rights of others all sources of the literatures were mentioned and listed at the end of the study involving all details regarding authors, and publishers.

### III. Data Analysis:

The collected data as pretest and posttest organized, categorized, tabulated using numbers and percentage. The statistical package for social sciences (SPSS version 20). Descriptive statistics including frequency, percentage, mean, Standard deviation, Confidence Intervals 95%, P value 0,05 Chi square test) were used for statistical analysis.

**Data processing and analysis:** Statistical Package for Social Science (SPSS version 20) program for data analysis, where mean and standard deviation for continuous data analysis and frequency table for data analysis. Paired sample t-test along with association the level of knowledge and practice were used for analysis (p-values < 0.05) significant.

#### Data presentation and interpretation

Data were presented in the form of tables and graphs. Statistics were presented with frequency tables. Association illustrated with cross tables and test statistics were added in the footnotes of the tables. Tables and charts were used to illustrate descriptive statistics.

#### Data quality management

The completed questionnaires were collected, checked for completeness, clarity of the information, and finally coded.

### IV. Results :

Table 4.1 shows the demographic characteristics and other variables of the 147 subjects. Most of the subjects (57.1%) were aged between 20-35 years old. Most of the subjects (39.5%) had primary educational level. The majority of subjects were workers (74.1%). Majority (74.8%) had laborer duties. Most of the subjects (44.9%) had work experience between 8-10 years. The subjects resident 5 km from the factory were (40.8%).

**Table 4.1: Distribution of the participants according to demographic characteristics (N = 147)**

| Variable             | No (%)   |
|----------------------|----------|
| <b>Age in years:</b> |          |
| < 20                 | 13(8.9)  |
| 20-35                | 84(57.1) |
| 36-50                | 31(21.1) |
| > 50 years           | 19(12.9) |

**Table 4.2 Distribution of the participants according to training on occupational safety training program (N = 147)**

| Variable                                      | No (%)     |
|---|------------|
| <b>Training on occupational safety:</b>       |            |
| No  | 64(43.5)   |
| Yes   | 83(56.5)   |
| <b>Total</b>                                  | 147 (100%) |
| <b>Type of training: ( Occupation Safty )</b> |            |
| Lectures                                      | 60(40.8)   |
| Practical                                     | 23(15.6)   |
| <b>Duration of training:</b>                  |            |
| 1 week  | 64(43.5)   |
| 2 weeks                                       | 17(11.6)   |
| 1 month                                       | 2(1.4)     |

The participants who had training on occupational safety were (56.7%). Most of them 43.5% trained for one week and 40.8% trained through lectures (Table 4.2).

#### Safety measures in the factory

For the majority of the participants 37.1% the medical checkup was done once per year, 55.1% of them said the factory provides safety tools and 81% said there is a safety unit in the factory.

**Table 4.3: Distribution of the participants according to Occupational Health facilities and safety in the factory**

| Variable  | No (%)   |
|---|----------|
| <b>Frequency of medical checkup in the factory:</b> |          |
| No medical check up                                 | 13(8.8)  |
| Once before assigned in the job                     | 41(27.9) |
| Once/ 6 monthly                                     | 40(27.2) |
| Once yearly   | 53(37.1) |

|   |                                 |
|---|---------------------------------|
| <b>Factory provides safety tools:</b><br>Not Provide<br>Not sure<br>Provide | 13(8.8)<br>53(36.1)<br>81(55.1) |
| <b>Health unit in the factory:</b><br>No<br>Available                       | 28(19.0)<br>119(81.0)           |

**Table (4.4) Differences in knowledge between pretest and posttest regarding occupational risks in cement industry**

| Items                | Pre (n=147)  |           | Post (n=147) |           | SE   | CI 95% |       | T     | Df  | P            |
|----------------------|--------------|-----------|--------------|-----------|------|--------|-------|-------|-----|--------------|
|                      | Correct N(%) | Mean ±SD  | Correct N(%) | Mean ±SD  |      | Lower  | Upper |       |     |              |
| Wounds               | 54(36.7)     | 0.37±0.48 | 132(89.8)    | 0.90±0.30 | 0.05 | -0.62  | -0.44 | -11.3 | 292 | <b>0.012</b> |
| Skin diseases        | 64(43.5)     | 0.44±0.50 | 137(93.2)    | 0.93±0.25 | 0.05 | -0.59  | -0.41 | -10.8 | 292 | <b>0.014</b> |
| Respiratory diseases | 72(51.0)     | 0.51±0.50 | 140(95.2)    | 0.95±0.21 | 0.04 | -0.53  | -0.35 | -9.8  | 292 | <b>0.021</b> |

**Table (4.5) Differences in knowledge between pretest and posttest regarding basic work environment safety components**

| Items            | Pre (n=147)  |           | Post (n=147) |           | SE   | CI 95% |       | T    | Df  | P     |
|------------------|--------------|-----------|--------------|-----------|------|--------|-------|------|-----|-------|
|                  | Correct N(%) | Mean ±SD  | Correct N(%) | Mean ±SD  |      | Lower  | Upper |      |     |       |
| Good ventilation | 95(64.6)     | 0.65±0.48 | 136(92.5)    | 0.93±0.26 | 0.05 | -0.37  | -0.19 | -6.2 | 292 | 0.002 |
| Safety tools     | 109(74.1)    | 0.74±0.44 | 138(93.9)    | 0.94±0.24 | 0.04 | -0.28  | -0.12 | -4.8 | 292 | 0.019 |
| Safety unit      | 107(72.8)    | 0.73±0.45 | 142(96.6)    | 0.97±0.18 | 0.04 | -0.32  | -0.16 | -6.0 | 292 | 0.16  |

**Table (4.6) Differences in knowledge between pretest and posttest regarding required equipment during daily work**

| Items    | Pre (n=147)  |           | Post (n=147) |           | SE   | CI 95% |       | T    | Df  | P     |
|----------|--------------|-----------|--------------|-----------|------|--------|-------|------|-----|-------|
|          | Correct N(%) | Mean ±SD  | Correct N(%) | Mean ±SD  |      | Lower  | Upper |      |     |       |
| Head set | 70(47.6)     | 0.45±0.50 | 133(90.5)    | 0.90±0.29 | 0.05 | -0.52  | -0.33 | -8.9 | 292 | 0.001 |
| Mask     | 86(58.5)     | 0.59±0.49 | 131(89.1)    | 0.89±0.31 | 0.05 | -0.40  | -0.21 | -6.3 | 292 | 0.011 |
| Gloves   | 90(61.2)     | 0.61±0.49 | 132(89.8)    | 0.90±0.30 | 0.05 | -0.38  | -0.19 | -6.0 | 292 | 0.014 |

**Table (4.7) Differences in knowledge between pretest and posttest regarding the safety and protection wearing**

| Items        | Pre (n=147)  |           | Post (n=147) |           | SE   | CI 95% |       | T     | Df  | P     |
|--------------|--------------|-----------|--------------|-----------|------|--------|-------|-------|-----|-------|
|              | Applied N(%) | Mean ±SD  | Applied N(%) | Mean ±SD  |      | Lower  | Upper |       |     |       |
| Wear headset | 65(44.2)     | 0.44±0.50 | 135(91.8)    | 0.92±0.27 | 0.05 | -0.57  | -0.38 | -10.1 | 292 | 0.013 |
| Wear mask    | 61(41.5)     | 0.41±0.49 | 128(87.1)    | 0.87±0.34 | 0.05 | -0.55  | -0.36 | -9.2  | 292 | 0.011 |
| Wear gloves  | 55(37.4)     | 0.37±0.49 | 138(93.9)    | 0.94±0.24 | 0.04 | -0.65  | -0.48 | -12.6 | 292 | 0.001 |

**Table (4.8) Differences in knowledge between pretest and posttest regarding the action taken in case of exposure to occupational trauma**

| Items                                      | Pre (n=147)  |           | Post (n=147) |           | SE   | CI 95% |       | T    | Df  | P     |
|--|--------------|-----------|--------------|-----------|------|--------|-------|------|-----|-------|
|  | Correct N(%) | Mean ±SD  | Correct N(%) | Mean ±SD  |      | Lower  | Upper |      |     |       |
| Inform safety unit                         | 75(51.0)     | 0.51±0.50 | 136(92.5)    | 0.93±0.26 | 0.05 | -0.51  | -0.32 | -8.9 | 292 | 0.003 |
| Temporary treatment                        | 81(55.1)     | 0.55±0.49 | 134(91.2)    | 0.91±0.28 | 0.05 | -0.45  | -0.27 | -7.6 | 292 | 0.002 |
| Continue to work and treat the wound later | 82(55.8)     | 0.66±0.47 | 140(95.2)    | 0.95±0.21 | 0.04 | -0.48  | -0.31 | -8.8 | 292 | 0.004 |

## **V. Discussion**

Even in the 21st century, millions of people are working daily in a dusty environment. They are exposed to different types of health hazards such as fume, gases and dust, which are risk factors in developing occupational disease (12). Cement industry is involved in the development of structure of this advanced and modern world but generates dust during its production. Cement dust causes lung function impairment, chronic obstructive lung disease, restrictive lung disease, pneumoconiosis and carcinoma of the lungs, stomach and colon (13). According to socio-demographic characteristics of the study sample indicates that the age of the workers ranged from 20 to 35 years. This finding is not consistent with the results of Shabani, et al., (2004), who performed a survey about skin problems among cement factories, and reported that 55% of the workers their age ranged from 20 to less than 60 years this may be due to their age.

regarding the workers, education level more than half of the workers had of secondary school (39.4%). Educational level school, 49% primary or preparatory education. More than three quarters of workers were married. experience years ranged from 3 to  $\geq 10$  years. This is consistent with the results of Minamoto, et al., (2004), who performed a survey about bronchial asthma among cement factories workers. They reported that 88% of the workers had a technical diploma and 66% were working as technical operators.

When compared this result with study of Omotosh Musa<sup>1</sup> published a study entitled occupational hazard awareness and safety practices among cement factory workers at obajana, Kogi state, Nigeria (Most of the respondents 261 (96.3%) were aware of protective measures while 10 (3.7%) of them were not aware of these measures. One hundred and sixty (60.1%) understood prevention of occupational hazards to mean reducing hazards to the minimum).

The finding of the current study showed that different in knowledge in NAIGERIAN workers specially in the awareness of protective measures (96%) of workers under study, and also how to prevent occupational hazards (60%) there was more knowledge among Nigerian workers cause of there is more awareness and knowledge in Cement factory that done by administration in the cement factory in Naigerian. Also due to increase in awareness in community due to increase in level of education among workers.

The present pretest result revealed that a minority of the studied workers wear Wear headset which disagreed with the results of Moore, (2007), who carried out a survey of 998 noisy factories in New Zealand and showed that 43% of the workers actually wore the hearing protectors provided. Concerning workers' knowledge, relatively high percentages of the studied workers had correct answers as moderate knowledge about types of PPE, types of occupational diseases and had moderate knowledge about the correct practices in case of exposure to Wounds accidents, Respiratory diseases, contact between chemical materials and skin. However, workers knowledge improved after implementation the program. These results were incongruent with Ryan and Lawer, (2004), who clarified that the knowledge about first aid and medical emergencies can literally mean the difference between life and death and can help in prevention of disability or injury, and first aid skills will increase workers confidence in dealing with both minor and major emergency and will be reassuring the injured person. Regarding to workers attitude, the majority of the studied workers had positive attitude about different aspects of occupational safety and work related hazards. This is inconsistent with Durocher, (2007), who found that the majority of workers had poor knowledge and negative attitude about the preventive measures. The present study result showed that the factory did not give periodic training to workers about the occupational safety which is contradicting with Levy and Wegman, (2000), who stressed that the education and advice concerning specific work hazards are essential. Concerning the availability of PPE in the current study, results revealed that, in spite of its presence it is not enough, and that there was lack of in service training performed on its use as well as no periodic checking about it which may be explained by the lack of administrative follow up for specialized employees responsible from this role. On the contrary, Levy & Wegman, (2000), reported that the occupational safety and health administration (OSHA) and other authorities have emphasized the importance of developing a complete program for PPE.

The present study showed that ventilation, light, and periodic medical examination inside the factories were not available which may be explained by lack of safe working environment and no application of the Occupational Health and Safety Assessment Series (OHSAS). In this respect, Levy & Wegman, (2000), (reported that the good lighting enhances the ability of workers to perceive and react to these hazards. As well, Rosenstock, et al., (2005), mentioned that the ventilation is a central component of hazard.

## **VI. Conclusion:**

According to the findings and research hypothesis health promotion program will improve the workers knowledge, attitude and practices regarding safety measures. This was obvious in table 5,6,7 that showed statistical significant improvement before and after implementation of the health promotion program regarding knowledge, attitude and practice.

According to the study findings the researcher concluded that:

Encourage workers to use safety tools ( gowns, masks, gloves, helmets ...)  
Regular Medical check-up pre employment and every 6 months.  
Regular training programs for workers in order to fulfill their profession requirements.  
This study should stimulate further researches in occupational health in other cement factories.

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