

Knowledge and Practice of Workers Regarding Occupational Health Hazards At Sugar Factory

Adel Ali Abdelwahab¹, Soheir Ali Bader EL-Din²,
Awatif Abdelrasik Mohammed³

1. Assistant lecturer of Community Health Nursing, Faculty of Nursing, Minia University, Egypt.

2. Professor of Community Health Nursing, Faculty of Nursing, Cairo University, Egypt.

3. Professor of Community Health Nursing, Faculty of Nursing, Minia University, Egypt

Corresponding Author: Adel Ali Abdelwahab

Abstract

Background: The workers working in the sugar industry are prone to face a number of stresses. Sugar mill employees would develop flulike symptoms several hours after reporting to work at the beginning of a new season or even after a free week end, repeated attacks causes fine scarring of the lungs and impaired breathing.

Aim: study aims to assess knowledge and practice of workers regarding occupational health hazards at sugar factory.

Design: A descriptive research design was used in this study.

Sample: Purposeful samples with number of 130 workers were selected.

Setting: The present study was carried out in Minia sugar factory in Abu Korkas district,

Tools: Data were collected using three tools; the first tool included questions related to demographic characteristics, health history, health habit and occupational health services. The second tool is a questionnaire regarding knowledge of workers about occupational health hazards and the third tool is a self-reported practice questionnaire about using workers personal protective equipment and most commonly first aid in the factory.

Results: the mean age of workers in the study sample was 44.7 ± 8.7 , 37.7% of the workers aged from 40 -49 years and from 20-24 years of work experience. All workers of the study sample had poor knowledge about occupational health hazards and unsatisfactory self-reported practice regarding personal protective equipment and first aids.

Conclusion: the findings of this study illustrated that all workers of the study sample had poor knowledge and unsatisfactory self-reported practice.

Recommendation: Training programs should include awareness about safety measures and orientation regarding work hazards and how to avoid work related injuries as well as first aid measures.

Key words: sugar factory, hazards, training program, workers

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I. Introduction

Work is viewed as important to one's life experience, most adults spend about one third of their time at work. Workers may be exposing to different hazards, which may have tremendous harmful effect on their health. Workers represent 50% of the world's population and contribute significantly to socio-economic development. Their health is largely determined by the occupational health services available to them at their place of work. (Fatima & Shahid, 2017)

The workers are exposed to workplace hazards arising from various activities involved in sugar production. Noise in the factory could lead occupational hearing loss while extreme temperatures from boilers and evaporators are likely serious burns and high levels of dehydration. Other hazards include electric shocks, falls from tall buildings, burns from steam used to drive turbines, burgusse fires in the dry season and gases from the lagoons which can cause skin diseases. (Omusulah, 2013)

Significant of study

The global burden of diseases associated with occupational factors was estimated as 4-10 million cases per year, with approximately 3-9 million in several developing countries per year. The international labor association (ILO), the United Nations agency, has estimated that industrial workers, on a global scale suffer around hundred and sixty million occupational diseases and two million deaths per year, fatalities due to respiratory diseases represent around 140,000 of these. An estimated 12% of chronic obstructive respiratory diseases deaths are from occupational exposure to airborne particulates. (Ahmad, Sattar, & Nawaz, 2016)

Sugar cane workers have a high level of occupational accidents and are exposed to the high toxicity of pesticides. They may also have an increased risk of lung cancer, possibly mesothelioma. This may be related to the practice of burning foliage at the time of cane-cutting. Bagassosis is also a problem specific to the industry as it may follow exposure to bagasse (a by-product of sugar cane). The workers may also be affected by chronic infections which reduce their productivity. The legal framework for their protection is often inadequate. (Bener et al., 2012)

Aim of the Study

- The aim of this study was to assess knowledge and practices of workers regarding the occupational health hazards at sugar factory.

II. Subjects and Methods

Research Design:

- A descriptive research design was used in this study.

Research Setting:

The present study was carried out in Minia sugarcane factory this is located in Abu Korkas district, 20 km south to Minia city and about 250 km south to Cairo, Egypt.

Sample of the study:

A purposeful sample with number of 130 workers were chosen out of the total 360 of the occupational workers at Abu Korkas sugarcane factory, after excluding engineers, technicians, supervisors and papers work and choose the most important hazards in the factory, namely (lime kiln, steam boilers, industrial operations and sulfur furnace)

Study Tool:

- Tool I-** Structured interview questionnaire was constructed by the researcher after reviewing the relevant literature and recent scientific articles; this tool is consisted of four parts:
 - Part 1-** Sociodemographic characteristics such as (name, age, income, residence, education level, marital status and years of work experience).
 - Part 2-** Health history
 - Past health history (diabetes, hypertension, cardiovascular disease, liver disease, hearing loss and others).
 - Current complaint (dyspnea, chronic cough, chest pain, hearing disturbances, tinnitus, headache, blurring vision and others).
 - Occupational history (previous work, absenteeism, exposure to accident, causes and its prevention).
 - Part 3-** Health habit (smoking, shisha and others).
 - Part 4-** Occupational health services
 - Recreation services such as (sports, clubs and resorts).
 - Health services such as (pre-placement examination, periodic medical examination and nursing services).
- Tool II-** Questionnaire to collect knowledge of workers about occupational health hazards such as (noise, dust, heat, light, ventilation and radiation) and how to prevent these hazards. Each correct answer took two scores, incomplete one took one score and the wrong answer or not known response took (zero). It contained 24 questions, so maximum total scores of knowledge were 48. If scores $\leq 50\%$ means poor knowledge (24 score), 51- 70% means fair knowledge (25- 33.6 scores) and more than 70% means good knowledge (≥ 33.7 scores)
- Tool III-** Self-reported practice questionnaire about using workers personal protective equipment and self-reported practice about most commonly first aid in the factory. Practice for personal protective equipment, each wear continuous took two scores, wear sometimes took one score and never wear took (zero). It contained 51 questions, so maximum total scores of self-reported practice were 102. If scores $\leq 50\%$ means unsatisfactory (51 score), If scores $\geq 51\%$ means satisfactory.

Content Validity

The content validity of the data collection tool was examined by three experts who were affiliated to faculty of nursing and faculty of medicine Minia University at community health nursing department and public health / preventive medicine department. The tool was examined for content coverage, clarity, relevance, applicability, wording. Based on experts` comments and recommendations; minor modifications had been made such as rephrasing and rearrangements of some sentences.

Reliability:

The internal consistency of the questionnaires was calculated using Cronbach's alpha coefficients. Test-retest was used. The Cronbach's alpha of the questionnaires were 0.833 and 0.798 indicate good reliability.

Procedure

Verbal informed consents were obtained from all the workers before the study enrollments after that a detailed explanation on study objectives. The questionnaire was administered to every worker individually at their workplace in the factory and data was collected by using the previous mentioned study tool after full explanation of each item. Each worker filled in the questionnaire than back it to the researcher. And researcher filled it for the illiterate participants this lasted for 20 to30 minutes for each one till the needed sample was completed, with duration of 3 months started from (July to the end of August) .

Pilot study

To assess the clarity, reliability and applicability of the study tools which was used in the study for data collection; a pilot study was conducted on 10% of the sample. The results of the pilot study was helped in the necessary modifications of the tools in which omission of unneeded or repeated questions, adding missed questions will be done.

Statistical Analysis

Statistical package for the social science SPSS version 21 was used for statistical analysis of data, as it contains the test of significance given in standard statistical books. Collected data was summarized and tabulated.

Ethical consideration

Informed verbal consent obtained from workers to be included in the study. It was included full explanation of the sheet, rights for privacy, confidentiality and rights to withdraw at any time.

III. Results

Table (1) Frequency distribution of studied sugarcane workers regarding socio-demographic characteristics in Abokorkas sugarcane factory, (n = 130).

Socio-demographic characteristics	No.	%
Age/ year		
• 20-29	11	8.5
• 30-39	29	22.3
• 40-49	49	37.7
• 50- 59	41	31.5
Mean ± SD	44.7 ± 8.7 years	
Income / L.E		
• Less than 1000	5	3.8
• 1000- less than 2000	90	69.2
• 2000- less than 3000	31	23.8
• 3000- 4000	4	3.1
Mean ± SD	1299 ± 523.1 L.E	
Residence		
• Rural	76	58.5
• Urban	54	41.5
Educational level		
• Illiterate	27	20.8
• Read and write	5	3.8
• Primary education	13	10.0
• Secondary education	80	61.5
• Technical education	3	2.3
University education	2	1.5
Years of work experience		
• Less than five years	2	1.5
• 5- 9	36	27.7
• 10- 14	14	10.8
• 15-19	30	23.1
• 20- 24	48	36.9
Mean ± SD	13.4 ± 6.2 years	

• Painful muscles cramp	5	7.4	95.235	.0001**
• Dizziness and headache	3	4.4	21.405	.0001**
• Nausea, vomiting and fainting	8	11.7	X ² .565	.452N.S
• Heavy sweating	10	14.7	20.756	.0001**
• Don't know	17	25	90.502	.0001**
Prevention of the risk of heat				
• Removal of workers with heart and kidney disease from work in places where the temperature is high	1	.8	1.000N.S
• Primary and periodic medical checkup of workers	0	.0	5.098	.02*
• Transfer the causality to a cold place	2	1.5	152.335	.0001**
• Provide large quantities of fluids and tablets containing mineral salts	0	.0	84.898	.0001**
• Rescheduling work time	0	.0	30.129	.0001**
• Good ventilation in the factory	6	4.6	X ² 46.958	.0001**
• Reduce the hours of exposure to heat while giving breaks during work	0	.0	39.115	.0001**
• Using personal protective equipment	7	5.4	X ² 6.154	.01*
• Awareness about the hazards of exposure to heat	0	.0	60.379	.0001**
• Don't know	114	87.7	294.573	.0001**

NS= Not statistically significance * statistically significant at $P - \text{value} \leq .05$ ** statistically significant at $P - \text{value} \leq .01$

Table (4): illustrates that, 52.3% of workers know the risk of exposure to heat. Regarding heat risks, 33.8% of workers stated that feeling tired and fatigue and 19.1% feeling annoyance and nervous. Concerning the prevention of heat risks, 87.7% of workers don't know prevention of heat and only 5.4% using personal protective equipment There is highly significant difference between pre and posttest ($P=.000^{**}$) except the items "feeling tired and fatigue" ($P=.483$), "nausea, vomiting and fainting" ($P=.452$) and "removal of workers with heart and kidney disease from work in places where the temperature is high" ($P=1.000$)

Table (5): knowledge of workers regarding risk of dust exposure and its prevention, (n=130):-

Knowledge	No.	%	Fisher exact test	P – value
Do you know risks of exposure to dust?				
• Yes	112	86.2	19.339	.0001**
• No	18	13.8		
If yes, risks				
• Cough	22	16.9	X ² 154.963	.0001**
• Inflammation of the lungs	15	11.5	9.820	.002
• Difficult breathing	91	70.0	7.035	.008
• Burning sensation in the throat	0	.0	27.777	.0001**
• Bronchial asthma	2	1.5	14.287	.0001**
• Allergy	10	7.7	12.931	.0001**
• Irritation of the eyes	15	11.5	19.838	.0001**
• Don't know	26	20.0	119.678	.0001**
Prevention of dust				
• Continuous maintenance of machinery and equipment	1	.8	.082	.774 N.S
• Provide adequate ventilation in the workplace with fans and means of suction.	2	1.5	29.745	.0001**
• Suppress dust by using water sprays on stockpiles and roads, and when using machinery and cutting equipment.	0	.0	19.043	.0001**
• The use of mechanical work, instead of manual	0	.0	26.460	.0001**
• Conducting preliminary medical examinations for workers	0	.0	10.575	.001**
• Awareness of the worker to the occupational hazards	0	.0	34.529	.0001**
• Wearing personal protective equipment	91	70.0	2.852	.05*
• Don't know	39	30.0	195.647	.0001**

Table (5): Indicates that 86.2% of workers know that the risks of exposure to dust. Regarding dust risks, 70% of workers mentioned that difficult breathing and 16.9% stated that cough. As regard to prevention of dust risks, 70% of workers stated that wearing personal protective equipment. There is highly significant difference (P=.000**) except "continuous maintenance of machinery and equipment" (P=.774)

Table (6): knowledge of workers regarding bagassosis disease and its prevention (n=130):

Knowledge	No.	%	Fisher exact test	P – value
Do you know bagassosis disease				
• Yes	26	20.0	173.333	.0001**
• No	104	80.0		
If yes, the symptoms				
• Shortness of breath	13	10.0	X ² 12.414	.0001**
• Sneezing	0	.0	30.341	.0001**
• Chest pain	0	.0	8.903	.003
• Cough or coughing with blood	2	1.5	22.475	.0001**
• Fatigue	2	1.5	5.465	.02*
• Fever	4	3.1	.440	.507N.S
• Loss of appetite	0	.0	1.269	.260N.S
• Eye inflammation	8	6.2	42.214	.0001**
• Pneumonia	0	.0	3.419	.05*
• Don't know	4	3.1	238.109	.0001**
Prevention of Bagassosis				
• Personal protective masks / respirators	10	7.7	X ² 15.745	.0001**
• Periodic medical checkups of workers who are at risk for exposure	0	.0	5.517	.0001**
• Good ventilation in the workplace	1	.8	61.968	.0001**
• Dust control-prevention /suppression of dust such as wet process	3	2.3	21.793	.0001**
• Don't know	116	89.2	X ² 147.212	.0001**

NS= Not statistically significance * statistically significant at P – value ≤ .05 ** statistically significant at P – value ≤ .01

Table (6) illustrates that 20% of workers know bagassosis disease, concerning symptoms of bagassosis, 10 % and 6.5 % of workers, indicated that shortness of breath and eye inflammation respectively. Regarding prevention of bagassosis, 89.2% don't know prevention and only 7.7% recommended use personal protective masks / respirator . There is highly significant difference between pre and posttest (P=.000**) except the items "fever"(P=.507) and "loss of appetite (P=.260)".

Table 7: knowledge of workers regarding risk of dust exposure and its prevention, (n=130).

Knowledge	No.	%	Fisher exact test	P – value
Do you know risks of exposure to radiation?				
• Yes	68	52.3	81.414	.0001**
• No	62	47.7		
#If yes, risks				
• Nausea and vomiting	4	3.1	23.664	.0001**
• Congenital malformations in babies delivered by pregnant women	2	1.5	4.386	.04*N.S
• Death	2	1.5	1.741	.187N.S
• Skin injuries such as erythema, skin pigmentation, dermatitis, hair loss	1	.8	16.416	.0001**
• Infertility	27	20.8	X ² 75.325	.0001**
• Cancer	38	29.2	X ² 20.755	.0001**
• Don't know	7	5.4	124.263	.0001**
#Prevention of radiation				
• Putting distance and shielding between	3	2.3	3.657	.05*

you and a radiation source and reducing the time you are being exposed				
• Warnings in places where radiation exceeds a certain quantity / proper disposal of nuclear waste	1	.8	.367	.544N.S
• Wear protective clothing	18	13.8	X ² 21.356	.0001**
• Periodic medical examination of workers exposed to these radiation.	4	3.1	1.339	.247N.S
• Health education about radiation hazards	7	5.4	X ² 21.455	.0001**
• Don't know	100	76.9	X ² 163.385	.0001**

NS= Not statistically significance * statistically significant at P – value ≤ .05 ** statistically significant at P – value ≤ .01

Table (7) shows that 52.3% of workers know the risks of exposure to radiation. Regarding radiation risks, 29.2% and 20.8% stated that cancer and infertility. Concerning prevention of radiation, 76.9% of workers don't know prevention of radiation and 13.8% mentioned that wear protective clothing. There is highly significant difference between pre and posttest (P=.000**) except the items "congenital malformations in babies delivered by pregnant women"(P=.04), "death"(P=.187), "warnings in places where radiation exceeds a certain quantity / proper disposal of nuclear waste" (P=.544) and periodic medical examination of workers exposed to these radiation (P=.247).

Table (8): Self-reported practice of workers regarding use of personal protective equipment, (n=130):-

Items	Used continuous	%	Sometimes	%	Never	%
• Overall	104	80	22	16.9	4	3.1
• Head cover	12	9.2	66	50.8	52	40
• Ear plug	11	8.5	84	64.6	35	26.9
• Mask	13	10	76	58.5	41	31.5
• Gloves	14	10.8	77	59.2	39	30
• Rubber boot	49	37.7	55	42.3	26	20
• Muzzle	0	0	1	.8	129	99.2
• Glasses	7	5.4	68	52.3	55	42.3

Table (8):clarifies that 80%, 37.7% of workers used overall and rubber boot continuously, while 64, 6%, 59.2% used ear plug and gloves sometimes and 99.2%, 42.3% and 40% never used muzzle, glasses and head cover respectively.

IV. Discussion

The present study was carried out in sugar factory, which including concern about workers exposure to occupational health hazards. The present study describes knowledge and self-reported practice of workers regarding occupational health hazards Workers are exposed to serious health problems due to lack of knowledge and poor practices of using personal protective equipment.

Regarding age of workers in the study sample, more than one third with age 40 years with the mean age 44.7 ± 8.7. this consistent with (El-Khateb et al., 2011) who study some of the non-auditory effects of noise among exposed workers in abou-qurkas sugar factory, EL-Minia governorate, Egypt and found that all participants with ages ranging from 25 – 59 years (mean age 42.4, S.D. ± 8.0).

Regarding sex the present study show all workers were males. This consistent with (Hajiali, Weisi, & Hashemian, 2014) in Biston sugar production factory that reported all participants were males. However there are female members in factory but all of them in a way be involved with paperwork so not included in their study.

As regard to the education level, two third had secondary education, one fifth were illiterate and 10% had primary education. This result contradicted with (Berivan & Al-Dosky, 2015) who study noise level and annoyance of industrial factories in Duhok city and reported that 5.56% no educational, less than one third primary school, one third intermediate, 5.56% technical and 2.22% university education.

Regarding place of residence, around two third of workers from rural area. This result consistent with (Aida, et al., 2014) who study Health Hazards of Solvents Exposure among Workers in Paint Industry and reported that majority of the workers resided in rural areas.

In relation to years of work experience, more than one third ranged from 20-24 years. this findings contradicted with (Islam, Shakhaoat, & Abu Bakkar, 2017) who study occupational health hazards and safety

practices among the workers of tannery industry in Bangladesh and reported that more than half less than 5 year, one third from 5-10 years and 14.2% was above 10 years.

Concerning with previous work, the current study reveals that one third in architecture / construction. This results contradicted with **(Bodin et al., 2016)** who study intervention to reduce heat stress and improve efficiency among sugarcane workers in El Salvador and found that 44% in construction, 30% in cotton and 25 in mining.

Concerning knowledge of workers about risks of noise, more than two third of workers reported that effect of noise was hearing loss and 18.5% don't know risk of noise. This findings contradicted with **(Shahid, Kousar, & Ajaz, 2014)** who study impact of industrial noise pollution on human health and reported that two fifth annoyance / headache and two third sleep disturbance and B.P.

As regard knowledge of workers about prevention of noise, three quarter of workers stated that using ear-protecting devices and 20.8% don't know prevention of noise. This result contradicted with **(Stephen, De-Veer, & Amfo-Out, 2013)** who study an assessment of level of industrial noise and associated health effects on workers and reported that two third of workers did not know of routine noise monitoring at their workplaces, more than half regularly undergo medical check-up / maintenance works being carried on the machinery used at the factories and less than half of the workers used ear-protecting devices during work period.

As regard to prevention of heat, the current study noticed that majority of workers don't know prevention of heat and only 5.4% using personal protective equipment this result contradicted with **(Xiang et al., 2016)** who study Workers' perceptions of climate change related extreme heat exposure in South Australia and reported that more than two third provision of cool drinking water, two fifth wearing broad brimmed hats and more than one third rescheduling work time , central cooling and air conditioning / electric fans.

As regarding risks of dust, near three quarter of workers mentioned that difficult breathing and 16.9% reported cough. This result contradicted with **(Hafiz & Mark, 2010)** who study knowledge and practices related to occupational hazards among cement workers in United Arab Emirates and reported that three quarter mentioned that exposure to the dust in particular was a serious hazard to their health; majority mentioned respiratory symptoms (cough, sputum), allergy, eyes problem as dust-related health problems and only 5.3% mentioned stomach, liver and heart problems as dust-related problems.

concerning the prevention of bagassosis, the present study showed that majority of workers don't know prevention and only 7.7% recommended use personal protective masks / respirator . This contradicted with **(Tamizharasan1 & Mangalagowri, 2016)** who assess the level of knowledge on prevention and control of bagassosis among workers in sugarcane industry and mentioned that all workers aware of the safety measures and use of face mask by the industrial workers.

Regarding radiation risks, one third and more than one fifth stated that cancer and infertility respectively. This result contradicted with **(Awosan et al., 2016)** who study knowledge of radiation hazards, radiation protection practices and clinical profile of health workers in a teaching hospital in Northern Nigeria and reported that more than two third reported congenital malformation, infertility, skin injuries and cancer.

Regarding types of personal protective equipment, majority of workers used overall continuously, while more than two third used ear plug sometimes and all workers never used muzzle. This disagree with **(Esaiyas, Sanbata, & Mekonnen, 2018)** who study occupational health and safety related knowledge, attitude and practice among wood and metal workers in Hawassa, Ethiopia and reported that majority of workers never used ear plug, helmet ,two fifth used eye glasses continuously and one third used gloves and mask sometimes.

V. Conclusion

- All workers have poor knowledge regarding occupational health hazards and unsatisfactory self-reported practices toward using personal protective equipment.

VI. Recommendations

1. Training and health education programs should be provided to all workers from the starting work and also regularly to improve the worker's knowledge and practice.
2. Workers must be trained not only in the proper use of the protective equipment, but also in the care and maintenance of that equipment, including any pre-fitting, testing, or inspection that may be required.
3. Periodic checkup of health status for workers for early detection of occupational hazards to monitor their health status and early case finding.
4. Further researches should be conducted to explore the health hazards in the field of occupational health in sugarcane factory.
5. Activate the role of occupational health nurse in the factory by facilitating periodic visits to workers to perform workplace assessment to ensure it doesn't affect workers health, develop & implement the most suitable educational program to workers.

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