بسم الله الرحمن الرحيم

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Assessment of Inspiration Capacity of Lung Among Cement Factory Workers in Berber Cement Factory (2019-2020)

A thesis submitted for partial fulfillment of the requirement for degree of Nursing Bachelor

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الآيـــــة

قال تعالى:

(وَاتَّقُوا يَوْمًا لَا تَجْزِي نَفْسٌ عَنْ نَفْسٍ شَيْئًا وَلَا يُقْبَلُ مِنْهَا شَفَاعَةٌ وَلَا يُؤْخَذُ مِنْهَا عَدْلٌ وَلَا هُمْ يُنْصَرُونَ)

صدق الله العظيم

سورة البقرة الآية (48)

Dedication

All our thank firstly and lastly to our great (Allah) from blessing

And kindness flow through all our life.

The essence of like meaning of humanity

Our mothers

To: all whom we love and respect the one who thought how to be available member in the community

Our fathers

Dear: brothers and sisters who gave us the sense of everlasting worth

To our teachers

Acknowledgement

All thanks to our god Allah from the start to the end.

We grateful to all those who contribute their time and effort to help us to make this research as accurate and useful as possible, all workers in Berber Cement Factory and their director.

We would like to acknowledge the contribution of our supervisor

Dr. Nora Osman

Who guide us throughout our way.

Our thanks also extended to our colleague, teachers, friends, sisters and brothers.

Abstract

Background: Few studies have been carried out on acute effect of cement dust exposure. This study is conducted to investigate and assess the relationship between inspiration capacity of lung and exposure to cement dust among cement factory workers.

Aim: To assessment the effect of direct exposure to cement among cement factory workers.

Material and methods: Cross-sectional study was conducted during the period from November 2019 to March 2020 on workers of barber cement factory. 110 individuals participants were included in this study, all of them never subjected to questionnaire and measuring lung capacity.

Data analysis: The study was analyzed by using statistical package of social sciences (SPSS).

Results: Total number of participant in research were 110 workers, (82.7%) of them exposed directly to cement dust, while (17.3%) were exposed indirectly, and the result is very high significant to decrease lung capacity related to exposure to cement dust.

Conclusion: The study show that there is effect of exposure to cement dust and lung volume capacity.

Recommendations:

Cement factory must be far away from people houses.

All workers of cement factory must wear all safety tools such as mask and protective emission.

Environment and engineers control of cement dust, protective, techniques, producers, measures and equipment and periodic medical examination.

الملخص

الخلفيـة: قـد أجريـت دراسـات قليلـة علـى التـأثيرات الحـادة الناجمـة عـن التعـرض لغبـار الأسمنت، وأجريت الدراسة للتحقق وتقييم العلاقة بين استنشاق غبار الأسمنت وسعة الرئة لدى عمال مصنع الأسمنت.

الهدف: التحقق من تأثير التعرض المباشر لغبار الأسمنت على سعة الرئة لدى عمال مصنع الأسمنت.

التحليل: تم تحليل البيانات باستخدام برنامج الحزم الإحصائية للعلوم الاجتماعية.

النتـائج: (82.7%) مـن العمـال يتعرضـون مباشـرة لغبـار الأسـمنت بينمـا (17.8%) لا يتعرضون مباشرة للغبار، كانت نتيجة تأثير غبار الأسمنت يقلل من سعة الرئة بدرجة عالية.

الخاتمة: وضحت الدراسة أن هنالك تأثير للتعرض لغبار الأسمنت على سعة الرئة .

التوصيات:

- يجب تكون أن مصانع الاسمنت بعيدة عن اماكن السكن.

- يجب على جميع العمال داخل المصنع ارتداء أدوات السلامة.

- المراقبة البيئية الهندسية لإنبعاث المادة العالقة وفرض إجراءات وتقنيات وقائية والفحص الطبي الدوري.

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List of Abbreviations

Abbreviation	Meaning
BM	Particular Matter
CO_2	Carbon Dioxide
NO_2	Nitrogen Dioxide
O_3	Ozone
SO_2	Sulfur Dioxide
COPD	Chronic Obstructive Pulmonary Capacity
VC	Vital Capacity
TIC	Total Lung Capacity
FEV1	Fred Expiratory Flow
FVC	Forced Vital Capacity
PEF	Peak Expiratory Flow
FEF	Forced Expiratory Flow

1. Introduction

1.1 Introduction:

Environmental and occupational pollution has always been major cause of morbidity and mortality. The dust are linked with an increased risk of chronic obstructive pulmonary disease [1].

Cement dust is waste generated in concrete plant ,and is at any particle spread in the air and effect respiratory health.

Inspiration is an increase in lung volume accomplished by applying an expansion force to the respiratory system .normally inspiratory muscle provide the necessary force (negative-pressure breathing).

Volume and Capacity: pulmonary function is frequently measured in terms of volume of air moved by the lung clearly define condition. the capacities is fundamental part of pulmonary physiology.

Respiratory health effect: there are many problem effecting the respiratory system in the human body and there are many factor that cause various disease and serious respiratory infection such as: crisis ,lung fibrosis ,acute and chronic function –asthma, may be a cement dust effecting on the pulmonary function by causing some of disease.

1.2 Problem statements:

Based on the above information, about how and when the spread of concrete plants in barber cement governorates, and the impact of their use on human health, environmental, and this is what we will be studied by the researcher in his research, while the researcher will be studied the health effects on the capacity of lung that have occupied as result of direct exposure of workers to dust and for long hours of work.

Therefore, there are many problems and lack of awareness as a result of wrongful conduct to work in the plants of concrete, where the impact of the non-use of protective supplies negatively on the respiratory health of workers in the plants and on the quality of the air in the around area.

This research investigated the health effects on the respiratory system, which occurred as a result to the exposure of workers to dust, cement and guidance for long hours of work and controversial. Due to the lack of available data and to submit a report on the health effects in the respiratory tract that can cause concrete to factory workers and the limited availability of data associated with cement dust.

1.3 Justification:

1. Reduce the occurrence of respiratory protect the concrete plants workers health, especially respiratory system, in order to life with a good health.

2. Diseases for workers, through the promo Increase awareness of workers and owners of the concrete plants and people to the seriousness of the presence of these plants in populated areas.

3. Increase awareness of workers and owners of the concrete plants and people to the seriousness of the presence of these plants in populated areas.

1.4 Objectives:

General objective:

To understand the of effect of exposure to cement dust on pulmonary function of cement plants workers in the barber cement factory.

Specific objective:

-To measurement the effect of inspiration cement dust on lung capacity.

2. Literature Review

2.1 Inspiration:

Inspiratory force is generated by contraction of the inspiratory muscles, which is pands the gas volume within the respiratory system. At the beginning of the inspiration, the lungs contain gas that has a pressure equal to the atmospheric pressure, causing the gas pressure in the lungs to decrease, if the air ways are open gas will flow from an area of higher pressure to an area of low pressure, renewing the O_2 concentration and diluting the CO_2 level in the alveoli. [3]

Inspiration is an active process and result from the descent of the diaphragm and movement of the ribs upward and outwards under the influence of the intercostal muscles, respiratory muscles are similar to other skeletal muscles but are less prone to fatigue. [4]

2.2 Air pollution:

Air pollution is defined as the presence of undesirable levels of physical or chemical impurities. Many organizations such as the World Health Organization. [8] Recognized particulate matter (PM), carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), lead (Pb) and sulfur dioxide (SO_2), as classical pollutants presenting a hazard to sensitive populations [9].

Air pollution with particulate matter (PM) has been found to be amajor threat to human health. Health impact is caused by concentrations of PM in ambient air to PM standards, the size of the particles and spatial planning [10].

2.3 Cement dust:

Cement dust is a particularly alkaline and irritant dust, and might therefore be considered to pose a greater risk of respiratory tract damage than many other poorly soluble dusts (generically often referred to as “low toxicity dusts” [11]. review described evidence for an increased risk of chronic bronchitis and impairment of pulmonary function (consistent with Chronic obstructive pulmonary disease (COPD), in cement dust exposed workers, but there was a lack of data on dose-response relationships [12].

Cement is one of the most important building materials in the world. A cement plant can be a significant source of air pollutants, and cement dust can affect respiratory symptoms and lung function. Previous studies indicate reduced lung function [17].

Results of several studies showed that these emissions are adversely affecting human health in a variety of ways, like itchy eyes, respiratory diseases like tuberculosis, chest discomfort, chronic bronchitis, asthma attacks, cardio-vascular diseases and even premature death . [13]

2.4 Cement dust impacts worldwide:

It is impossible to envisage a modern life without cement. Cement is an extremely important construction material used for housing and infrastructure development and a key to economic growth. Cement demand is directly associated to economic growth and many growing economies are striving for rapid infrastructure development which underlines the tremendous growth in cement production .[15]

2.5 Cement dust exposure and health outcome:

The health risks posed by inhaled dust particles are influenced by the deposition pattern of the particles in the various regions of the respiratory

tract and by the biological responses exerted by the deposited dust particles. [14]

Cement dust irritates the skin, the mucous membrane of the eyes and the respiratory system. Its deposition in the respiratory tract causes a basic reaction leading to increased pH values that irritates the exposed mucous membranes. [16]

The resulting exposure to cement dust has led to impairment of respiration and a prevalence of respiratory symptoms. The severity of impairment of respiratory function has been shown depend on years of exposed. [2]

The reports suggest that cement dust exposed may neither increase the morbidity of respiratory disease nor be associated with the prevalence of respiratory symptom among worker. [2]

Lung function impairment is the most common occupational respiratory problem in subjects exposed to dust in industrial sectors . Inhaling high level of cement dust may occur when workers empty bags of cement, sanding, grinding or cutting concrete can also release large amounts of dust containing high levels of crystalline silica. Prolonged or repeated exposure can lead to disabling and often fatal lung diseases.[17]

2.6 Lung volumes:

Tidal volume and vita capacity (VC-the maximum amount of air that can be expelled from the lung after the deepest possible breath) can be measured by spirometry, total lung capacity (TLC-the total amount of air in the lung after taking the deepest breath possible).can be measure by asking the patient to rebreathe an inert non-absorbed gas (usually helium)and recording how much the test gas is diluted by lung gas, this measures the volume of intrathoraci gas that mixes with tida breaths, alternatively, lung volume may be measured by body plethysmography,

which determines the pressure\volume relationship of the thorax this method measures total intrathoracic gas volume, including poorly ventilated areas such as bllae. [7]

2.7 Respiratory function test:

in clinical practice, airflow limitation can be assessed by relatively simple tests that have good intra subject repeatability, results must be compared with predicted values for healthy subject as normal ranges vary with sex and age, the standard deviation for the peak inspiratory flow rate is approximately 50l/min, and fore the FEV1 it approximately 0.4L. repeated measurements of lung function are useful for assessing the progression of disease in individual patients. [5]

2.8 Spirometer:

It consist of an inverted ,airtight bell that is counterbalance over a pulley so that it move freely, the patient is connected to the spirometer by a mouthpiece and two tubes that contain one-way valves to minimize the dead space of the equipment, expired gas collected under the bell and inspired gas is withdrawn from the spirometer, usually, the expired gas is freed of co2 by mean of a chemical absorbent .records of the respiratory volume changes are made on a rotating drum or kymograph.[3]

Spirometry is recommended as the “gold standard” for the diagnosis of obstructive lung disease. [19] All construction sites generate high level of dust typically from concrete, silica, asbestos, cement, wood, stone, sand and the workers are exposed to this airborne dust [20].

The patient takes a maximum inspiration followed by a forced expiration (for as long as possible) into the spirometer.

It measures the 1-second fred expiratory volume (FEV1) and the total volume of exhaled gas (forced vital capacity, FVC) both FEV1 and FVC are related to age, sex. [6]

2.9 Mechanisms of pollutants on pulmonary function:

Air pollutants can come from many sources and include both gaseous and particulate matter as cement dust. Particulate matter (PM) is the principal component of indoor and outdoor air pollution. PM is a complex, multi-pollutant mixture of solid and liquid particles suspended in gas [21]. The primary exposure mechanism to PM and other particle sources is by inhalation. [21]

Because the lung interfaces with the external environment and is frequently exposed to air pollutants, such as PM, it is prone to oxidant-mediated cellular damage, the adverse health effects of particulate pollutants may be explained by several mechanisms, including innate immunity, adaptive immunity, and the production of reactive oxygen species. [22]

2.10 Clinical effects on pulmonary function:

PM is a mixture of organic and inorganic solid and liquid particles of different origins, size, and composition. It is a major component of urban air pollution and greatly effects health. Penetration of the tracheobronchial tract is related to particle size and the efficiency of airway defense mechanisms. [23]

Pulmonary functional measurements reveal significantly increased lung resistance, transpulmonary pressures, and functional residual capacity with decreased dynamic lung compliance and arterial oxygen tension and accompanying chronic respiratory acidosis [24]. Changes include increases in lung elastance, resistance, and transpulmonary pressures, and decreased

dynamic lung compliance, 37,38 with accompanying decline in arterial O_2 tension and increased arterial CO_2 tension. [24]

Respiratory tract disorders, the most important group of occupational diseases in the cement industry are the result of inhalation of airborne dust. Chronic bronchitis often associated with emphysema has been reported as the most frequent respiratory disease [25]. Additionally silicosis followed by mixed dust pneumoconiosis have been claimed greatest risk for cement factory workers. [26]

It has also been revealed that people of cement dust zone are badly affected by respiratory problems. Several studies have also demonstrated linkages between cement dust exposure, chronic impairment of lung function and respiratory symptoms in human population. Cement dust irritates the skin.[27]

Growing epidemiologic evidence indicate that inhalation of airborne increase respiratory and cardiac mortality and morbidity and produce arrange of adverse respiratory health outcome such as as asthma ,lung function decline and lung cancer.[1]

2.11 Common respiratory disease symptom:

Cough, wheezing, shortness of breathing and chest pain.[8]

The most common respiratory symptom in workers was dyspnea, pain with inspiration, cough, wheezing, stuffy nose and excessive mucus production.[17]

2.12 Size matter effect:

Particle size is the most important factor in determining where particles are deposited in the lung. Compared with large particles, fine particles can remain suspended in the atmosphere for longer periods and be transported over longer distances. Some studies suggest that fine particles have

stronger respiratory effects in children than large particles. This diagram shows that particles greater than 10 micrometers rarely make it past the upper airways, whereas fine particles smaller than 2 micrometers can make it as far as the alveoli. [8]

2.13 Health endpoint associated with cement dust exposure:

During studding the overall health end point of both short term and long term study cement dust has an effect on pulmonary function mortality and morbidity .its important to categorize the specific endpoint of cement dust exposure to show the wide ranging spectrum .

The general health endpoint include:

1. Mortality.

2. Hospital admission.

3. Emergency room visit.

4. Asthma symptoms days.

5. Restricted activity days.

6. Acute respiratory symptoms. [8]

2.14 Previous studies:

1. The study was done to assess cement dust exposure and it is relationship to respiratory health effect both acute and chronic respiratory system and ventilator function imbirement among Portland cement factory worker in Khash located in the south part of Iran in (2001). [17]

Measuring pulmonary functions of workers exposed to dust and unexposed group showed a significant decrease in vital capacity forced vital capacity FEF25-75 and forced expiratory volume in the first second ($p<0.05$).[17]

2. The study was conducted to investigate the association between current total dust exposure and acute respiratory symptoms and respiratory function among cement factory worker (2010).

The highest prevalence of respiratory symptoms for the high exposed worker was stuffy nose (85%) followed by shortness of breathing (47%) and sneezing (45%) PEF decreased significantly across the shift in the high exposed group .the number of years of work in high exposure sections and current smoking were also associated with cross-shift decrease in PEF. [2]

3. The study was designed to investigate the effect of cement dust exposure on lung function in Nigerians because of paucity of such data.

The exposed group was significantly heavier than unexposed ($p<0.001$). did not differ significantly between the exposed and unexposed group when the subjects were unmatched .following the matching of subjects the vital capacity ($p<0.001$) and FEV1% (0.005) fell significantly in the exposed group compared to the unexposed while the forced vital capacity and the peak expiratory flow rate (PEFR) did not differ significantly. [29]

4. This study aimed to determine the particular matter concentration (pm10) in work place air and personal dust, and there effect on the respiratory health of exposed workers, the lung function of 449 exposed worker was examined, the concentration of pm 10 in work place air and personal dust exposure was measured, spirometry was used evaluate the lung function capacity include forced vital capacity (FVC), forced expiratory volume in 1 second (FEV1), forced expiratory volume retro (FEV%), and peak expiratory flow rate (PEF).

The result of this study showed a decrease in the mean value and percent predicted value of FVC,FEV1,FEV1%,PEF and FEF(25-75%).the lung capacity of participants refiled 24.50%, 4.45% and 7.13% had mildly

moderatory restrictive and small airway disease, the respiratory symptoms were dyspnoea (22.49), wheezing (10.69%), chest pain (10.69%) and chronic cough (2.90%). Factor influencing lung capacity include mask usage (Adj.or:0.44 cl:0.25-0.79 p value :0.006) and chest pain (Adj:OR:2.68cl :1.14-6.30 p value:0.024) (2017). [28]

3. Material and Methods

3.1 Study Design:

Analytical cross sectional study.

3.2 Study Area and Setting:

The study was carried out in barber cement factory. This is located in Sudan-river Nile state.

Barber cement factory, which is located in the center of the river Nile state on eastern branch of river Nile ,north to Atbara city about 36Km

3.3 Study Period:

From November- 2019 to march- 2020.

3.4 Study Population:

Workers in barber cement factory.

3.5 Sample Size:

110 sample available from workers of factory during data collection.

3.6 Inclusions Criteria:

Inclusion criteria are characteristic that people who work in cement factory and included in the study.

3.7 Exclusion Criteria:

Excluded people who work in cement factory but don’t expose to direct dust.

3.8 Data Collection Tools:

Data was collected using questionnaire.

3.9 Data Collection Technique:

Structured questionnaire in face –to- face interview and measuring lung capacity by spirometer from each individual. Both verbal and written consent was obtained from each individual included in the study.

3.10 Data Analysis:

The data was coded and analyzed by soft word computer SPSS version.

3.11 Ethical Considerations:

Permission approval took from each worker before starting the study and they signed consent , and the original director of cement factory informed and agree to collect data .informed verbal consent explain the purpose of study and privacy information for each worker.

4. Results

4.1 Frequency Table

Table [1] Age

	Frequency	Percent	Valid Percent	Cumulative Percent
20-30 years	48	43.6	43.6	43.6
30-40 years	39	35.5	35.5	79.1
40-above	23	20.9	20.9	100.0
Total	110	100.0	100.0	

Table [2] Qualification

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Primary	25	22.7	22.7	22.7
	secondary	50	45.5	45.5	68.2
	university	24	21.8	21.8	90.0
	Above all	2	1.8	1.8	91.8
	Other	9	8.2	8.2	100.0
	Total	110	100.0	100.0	

Table [3] Martial status

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Marriage	72	65.5	65.5	65.5
	Single	38	34.5	34.5	100.0
	Total	110	100.0	100.0	

Table [4] The length of time spent in the current profession

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-10	101	91.8	91.8	91.8
	10-20	9	8.2	8.2	100.0
	Total	110	100.0	100.0	

Table [5] Are you exposed directly to cement dust

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	91	82.7	82.7	82.7
	No	19	17.3	17.3	100.0
	Total	110	100.0	100.0	

Table [6] How many hours to exposed the cement dust

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	6-8 hours	1	.9	.9	.9
	8-10 hours	9	8.2	8.2	9.1
	10-12 hours	100	90.9	90.9	100.0
	Total	110	100.0	100.0	

Table [7] Are you smoking

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	37	33.6	33.6	33.6
	No	73	66.4	66.4	100.0
	Total	110	100.0	100.0	

Table [8] Duration of smoking

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-5 years	22	20.0	56.4	56.4
	5-10 years	8	7.3	20.5	76.9
	10-15 years	2	1.8	5.1	82.1
	Above 15	7	6.4	17.9	100.0
	Total	39	35.5	100.0	
Missing	System	71	64.5		
Total		110	100.0		

Table [9] Have coughing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	27	24.5	24.5	24.5
	No	83	75.5	75.5	100.0
	Total	110	100.0	100.0	

Table [10] Is a cough are exaggerated when you exposed to cement dust

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	33	30.0	30.0	30.0
	No	77	70.0	70.0	100.0
	Total	110	100.0	100.0	

Table [11] A cough is associated with sputum

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	16	14.5	14.5	14.5
	No	94	85.5	85.5	100.0
	Total	110	100.0	100.0	

Table [12] You have a history with dyspnea

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	18	16.4	16.4	16.4
	No	92	83.6	83.6	100.0
	Total	110	100.0	100.0	

Table[13] You have dyspnea occurred as continues

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	6	5.5	5.5	5.5
	No	104	94.5	94.5	100.0
	Total	110	100.0	100.0	

Table[14] Are you have any chronic disease

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	8	7.3	7.3	7.3
	No	102	92.7	92.7	100.0
	Total	110	100.0	100.0	

Table[15] If present

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	diabetes	5	4.5	71.4	71.4
	tuberculosis	2	1.8	28.6	100.0
	Total	7	6.4	100.0	
Missing	System	103	93.6		
Total		110	100.0		

Table[16] Safety equipment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Mask	5	4.5	4.5	4.5
	All	105	95.5	95.5	100.0
	Total	110	100.0	100.0	

Tale [17] Lung capacity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1000-2000	17	15.5	15.5	15.5
	2000-3000	3	2.7	2.7	18.2
	3000-4000	73	66.4	66.4	84.5
	4000-5000	17	15.5	15.5	100.0
	Total	110	100.0	100.0	

Table [18] One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Are you exposure to direct cement dust	110	1.17	.380	.036
	110	3.82	.880	.084

Table [19] Test Value

One-Sample Test

	Test Value = .05					
	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Exposure to cement dust	31.009	109	.000	1.123	1.05	1.19
Lung capacity	44.922	109	.000	3.768	3.60	3.93

Results

Total number of participant in this research were (110) workers.

Table (1) shows study group ages were (43.6%) of them between (20-30) years old. While (35.5%) of them were between (30-40) years old, and (20.9%) of them were (40 and above) years old.

Table (2) show study group qualification was (22.7%) of them primary, while (45.5%) were secondary and (21.8%) university, while (1.8%) above all and (8.2%) other.

Table (3) show marital status of study group were (65.5%) married and (34.5%) were single.

Table (4) show length of time spent in the current profession was (91.8%) of them between (0-10) years, (8.2%) of them between (10-20) years.

Table (5) show exposed to cement dust were(82.7%) of them direct expose and (17.3%) were indirect exposed.

Table (6) show (9%) were spent (6-8) hours daily, (8.2%) spent (8-10) hours and (90.9%) are (10-12).

Table (7) show (33.6%) of them were smokers and (66.4%) were no smoker.

Table (8) show duration of smoking were (56.4%) of them smoking (1-5) years, (20.5%) smoking (5-10) years, (5.1%) smoking (10-15) and (17.9%) were above (15) years.

Table (9) show (24.5%) of them have coughing and (75.5) have not coughing

Table (10) show (30%) of them are exaggerated cough when exposed to cement dust while (70%) are not exaggerated cough when exposed to cement dust.

Table (11) show (14.5%) of them have sputum with cough and (85.5%) have not sputum with cough.

Table (12) show (16.4%) have dyspnea and (83.6%) have not history of dyspnea.

Table (13) show (5.5%) of them dyspnea occurred as continuous a expose to cement dust and (94.5%) doesn't occur continuously.

Table (14) show (7.3%) of them have chronic disease and (92.77%) have not any chronic diseases.

Table (15) show (71.4%) of them have history of DM, (28.6%) have TB.

Table (16) show (95.5%) use all safety equipment ,while (4.5%) are use mask only.

Table (17) show lung capacity (15.5%) have score between (1000-2000)ml, (2.7%) between (2000-3000) and (66.4%) between (3000-4000) and (15.5%) between (4000-5000).

Table (18) and (19) show positive significant relationship between the exposure to cement dust and lung capacity. ($p<0,000$)

5. Discussion, Conclusion & Recommendations

5.1 Discussion:

This cross sectional study was conducted during the period from November (2019) to March (2020), in Berber cement factory.

General objective of this study is to evaluate the effect of inspiration cement dust in lung capacity among worker.

Specific objective of this study to identify the relationship between exposure to cement dust in lung capacity.

In this study we found the relationship between exposure to cement dust

When we compare our study with other studies we found:

In world:

In Iran measuring pulmonary function of worker exposed to cement dust and unexposed group showed a significant decrease in vital capacity forced vital($P<0.05$).while in our study we found very high significant than Iran study(0.000).may be due to using the spirometer.

In Africa:

In Nigerians study investigate the effect of cement dust exposure in lung function , vital capacity ($P < 0.001$) it is high significant ,while in our study we found very high significant result (P 0.000) .

In world in north Thailand:

Study to determine the PM concentration in work place and dust and their effect on the respiratory health using spirometer to measuring lung capacity the result of this study was show decrease value of FVC, FEV, PEF and FEF. Factor effect lung capacity include usage mask (P value 0.006). While in our study we found very significant result (P value 0.000).

In this study found positive significant between the exposure to cement dust and inspiration of lung capacity.

In this study found the decrease the inspiration of lung capacity related to exposure to cement dust.

5.2 Conclusion:

Despite studies included in this review showing some degree of association between exposure to cement dust and lung capacity ,the existing evidence in insufficient to draw firm conclusion .most studies use cross sectional studies which has inherent weakness providing evidence of causation or association .we other weakness include suboptimal measurement of exposure and outcome.to improve the quality of evidence of association between exposure to cement dust and lung capacity its recommended that future study should employ method that increase accuracy in measuring the exposure and outcome, this should include personal monitoring of the exposure by spirometer.

5.3 Recommendations:

1. Workers should be informed about the different hazard effect of cement dust on health and enforced them to the proper use of protective equipment.

2. Use of continuous emission monitoring and environmental management system.

3. Advise about stop the smoking.

4. Development of lows to protect the industry and protect them from effect of cement dust.

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