



ASSESSMENT OF CARDIORESPIRATORY PARAMETERS AMONG THE QUARRY WORKERS IN SABON GARI LOCAL GOVERNMENT AREA OF KADUNA STATE

*¹Aliyu, M., ²Ibrahim, B.G., ²Tanko, Y., ²Muhammed, A and ²Amadu, L

¹Department of Physical and Health Education, Ahmadu Bello University, Zaria

²Department of Human Physiology, ⁵Department of Community Medicine, Ahmadu Bello University, Zaria

*Corresponding author draliyukutigi@yahoo.com: +2348036294142

Abstract

This study was carried out to assess the cardiorespiratory effect of quarrying activities on worker's health in Sabon Gari Local Government Area of Kaduna state, Nigeria. A sample size of 38 was used for the study as test group while 60 persons in the non-occupational sites were selected and used as comparison group making a total of 98 subjects.. Cross sectional study was conducted in the stone crushing site. The mean lung (ventilatory function indices FVC, FEV₁, and peak flow were significantly ($p < 0.05$) lower in the test subjects compared with the comparison group. No significant difference was noted in the value of FEV%. (FVC: 4.01 ± 0.1 (comparison group), 3.54 ± 0.1 (Test); FEV₁: 2.90 ± 0.1 (comparison group), 2.34 ± 0.1 (Test) and Peak flow: 387.13 ± 13 (comparison group), 323.66 ± 14 (Test). The mean value of systolic blood pressure between the test and the comparison group is significant, 126.58 ± 3.0 and 119.50 ± 1.3 respectively. There was also a significant difference in mean of the diastolic blood pressure between the test and comparison group, 82.11 ± 1.7 and 78.3 ± 1.0 respectively ($p < 0.05$). The recommendations proffered include the need for safety consciousness and routine inspection and effective monitoring of quarrying activities by the regulatory agencies and appropriate sanctions meted to defaulters.

Keywords: Quarrying, Cardiorespiratory, Inhalation, Hazard, Parameter

Introduction

In Nigeria, quarrying products are increasingly demanded for industrial, domestic, agricultural and other purposes to satisfy the needs of the rapidly growing population. Individuals working in dusty environments have been found to be at risk of inhaling particulate material (silica) that may lead to adverse health effects. Chronic exposure to dust from crushing of rocks may increase susceptibility to respiratory problems and impaired lung function with tobacco/cigarette smoking and increase length of service as additional predisposing risk factors, Osim *et al.* (1992). The occupationally related lung diseases among quarry workers are most likely due to the deposition of dust in the lung are influenced by the type of dusts, the period of exposure, the concentration and size of the airborne dust in the breathing zone. Again, individuals working in dust, environments have been found to develop adverse respiratory effects such as chronic bronchitis, emphysema, acute and chronic silicosis, lung cancer, etc which are disabling and can even be fatal. According to Urom *et al.* (2004), the major respiratory symptoms among stone quarry workers include non-productive cough, chest pain, catarrh and dyspnea. The prevalence of respiratory morbidity among quarry workers was 32.5%, based on radiological study; the severity of pulmonary function impairment was significantly associated with age, duration of exposure to dust Ghotkar *et al.* (1995).

Before minerals are harnessed, they have to pass through the stages of exploration, mining and processing. Different types of environmental damage and health hazards inevitably accompany the three stages of mineral development (Adekoya, 2003; Aigbedion and Iyayi, 2007). Isiriman (2000) observed that although human influence cannot be removed from any part of the earth, it is important to note that the greatest danger to the human body may as well be caused by workers

who fail to consider the broad health implication of their action. Today, we no doubt trapped in the difficulty of fully utilizing our environmental resources and at the same time ensuring a healthy and sustainable working environment for both the present and the future generations. The general objective of this study is to assess the effect of quarrying activities on quarry workers health in Sabon Gari Local Government Area of Kaduna State, Nigeria. The specific objectives are to determine the cardio respiratory and anthropometric parameters of quarry workers at Sabon Gari local government Area of Kaduna State, Nigeria.

Materials and Methods

Study area: A Cross sectional study was conducted in a stone crushing site located at Sabon Gari Local Government Area of Kaduna State, Nigeria. Only male subject aged 15 – 70 years were used for the study. Purposive sampling was used where all quarry workers gathered and were studied. A total of 98 subjects were used for the study. Two groups of workers were involved (Test and Comparison groups).while 38 subjects were used as test group, 60 were the comparison group.

Data collection: The data collection instruments included questionnaire (self and interview administered), spirometry and peak flow meter. The questionnaire used was semi-structured. The language of the original questionnaire was English. The questionnaire was sent to Hausa language experts for translation and then back translated into English. The administration was done in Hausa language. The study instruments were pre-tested on 20 subjects in Zaria Local Government within the Zaria metropolis. The pre-test of the instruments was done to determine their suitability to ensure clarity, eliminate ambiguity and ascertain the length of time required for administration and answering of questions. The function of the peak flow meter was pre-tested according to the manufacturer's instruction.

Statistical analysis: The data collected were analyzed with SPSS® Windows® Ver. 16.0 (SPSS Inc., Chicago; IL, USA). Independent sample student t test was used for compare the means between the two groups. A $P < 0.05$ was considered statistically significant.

Results and Discussions

The data collected from the field work were analyzed and are presented in tables 1 and 2. The mean age of the study population was 24.23 ± 0.5 (Test group), and 30.97 ± 2.4 (Comparison group). When anthropometric indices in the control subjects and test subjects were compared, significant differences were observed ($p < 0.05$) see table 1. However, the cardio respiratory parameter has a significant difference between the comparison group and the test group except for FEV% which shows no significant difference between the test group and the comparison group (Table 2).

In a similar study Osin *et al* (2004), monitored the lung function and other associated symptoms in people chronically exposed to dust at a granite quarry in Old Netin at Akamkpa Local Government Area of cross river state, Nigeria. Their results showed that the anthropometric parameter and ventilator functions indices of female and male test groups were comparable. Similarly, Ghotkar *et al* (1995), carried out a study of lung and lung function tests in stone quarry workers. The results also are consistent with those obtained in this study where there is a decline in FEV₁ and FCV values. There is a significant difference between systolic and diastolic blood pressure in the test subjects when compared with the control group (table 2). This result is consistent with that in literature (Nwibo *et al*, 2012) where cardiomegaly manifestation of cardiac problem was associated with working in a quarry.

Table 1: Comparison of Anthropometric Parameters of Quarry Workers between Test and Comparison group in Sabon Gari Local Government Area of Kaduna State

Anthropometric Variables	N	Comparison group Mean±SEM	N	Test Mean±SEM
Ages (yrs)	60	24.23±0.5	38	30.97±2.4 ^S
Weights (kg)	60	62.70±1.3	38	57.76±1.0 ^S
Heights (m)	60	1.71±0.1	38	1.68±0.1 ^S
Body Mass Index (BMI) (kg/m ²)	60	21.38±0.4	38	19.39±0.8 ^S

NS = Not Significant; S = Significant (P<0.05).

Table 2: Comparison of Cardiorespiratory Parameters of Quarry Workers between Test and Comparison group in Sabon Gari Local Government Area of Kaduna State

Cardiorespiratory Variables	N	Comparison group Mean±SEM	N	Test Mean±SEM
Systolic Blood Pressure(mmHg)	60	119.50±1.3	38	126.58±3.0 ^S
Diastolic Blood Pressure(mmHg)	60	78.33±1.0	38	82.11±1.7 ^S
FVC (L)	60	4.01±0.1	38	3.54±0.1 ^S
FEV ₁ (L/s)	60	2.90±0.1	38	2.34±0.1 ^S
FEV%	60	71.77±1.8	38	67.18±2.6 ^{NS}
Peak Flow (L/Min)	60	387.13±13	38	323.66±14 ^S

NS = Not Significant; S = Significant (P<0.05).



Fig. 1: Quarry



Fig. 2: Measuring lung function of the subject



Fig. 3: Peak Flow for measuring lung



Fig. 4: Quarry



Fig. 5: Measuring Blood Pressure of the subject

Conclusion and Recommendations

This study concludes that the quarry work environment in Sabon Gari Local Government area of Kaduna state is hazardous, workers shows signs of restrictive lung function impairment and cardiovascular system disorders among test subjects. This has resulted in the high incidence of cardiopulmonary disease symptoms which was observed among the test subjects. It is therefore suggested that companies should be safety compliant so as to be able to devise strategies to enforce safety regulations in companies. Also, a task force should be constituted to regularly conduct environmental impact assessment and sanction defaulters appropriately. In the same vein, workers should be made to undergo periodic medical examination and obtain medical certificate of fitness before, during and after the period of service. It should be mandatory that protective clothing and other gadgets should be provided for workers on duty.

References

- Adekoya, J.A (2003). Negative Environmental Impact of Mineral Exploration in Nigeria. *International Journal of Physical Sciences* pp 613-619.
- Aibedion, I and Iyayi, E.E. (2007). Environmental Effects of Mineral Exploration in Nigeria. *International Journal of Physical Science*, 2(2): 33-38.
- Ghotkar V.B, Mallhure B.R, Zodpey S.P, (1995). Involvement of Lung and Lung Function Tests in Stone Quarry Workers. *Ind. J. Tub.*
- Isirimah, O.N (2000). *Soils and Environmental Pollution Management*. Nichdano Publioshers, Owerri, Nigeria.
- Nwibo, A.N, Ugwuja, E.F, Nwambeke, N.O, Emelumedu, O.F., Ogbonnaya, L.U., (2012). Pulmonary Among Quarry Workers of Stone Crushing Industrial Site at Umuoghara, Ebonyi State, Nigeria. *The International Journal of Occupational and Environmental Medicine* Vol. 3, No. 4.
- Osim, E.E, Esim, R.A., Fossung, F.E and Archibong, E.E (1992). Ventilatory Function in Nigeria Asbestor Factory Workers. *East Africa Medical Journal*, 69: 254-257.
- Osin, E.E., Urom, S.E and Antrl, A.B (2004). *Symptoms of Lung Function Values in Nigerian Men and Women*.
- Urom S.E, Antai, A.B, Osim, E.E, (2004). Symptom and Lung Function Values in Nigerian Men and Women Exposed to Dust Generated from Crushing of Granite Rocks in Calabar, Nigeria. *Nigerian Journal of Physiological Science*. 19:41



<http://www.sosehnigeria.org>