

Major ocular problems found among quarry workers and residents of quarrying communities in Abakaliki, Southeastern Nigeria

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Abstract

Quarrying is a form of mining which involves crushing of stones and obtaining quarry resources on or below the earth surface. This study was carried out in Abakaliki, Southeastern Nigeria, to investigate the major ocular problems found among quarry workers and residents of quarrying communities. One hundred and seventy-seven subjects were assembled at a hall. Ocular examination on each subject included taking the case history, visual acuity, pen light examination and ophthalmoscopy. Results showed that pterygium was found in 39 (22.03%) of the subjects; cataract was found in 21 (11.86%); conjunctival melanosis in 15 (8.47%); cornea opacity in 16 (9.04%); conjunctival hyperemia in 17 (9.60%); and pinguecula in 23 (12.99%). Fifty five (31.35%) of the subjects complained of blurry vision; 49 (27.94%) complained of itching; 17 (9.61%) complained of discharges; 22 (12.46%) complained of headaches; 23 (15.55%) complained of irritation; 38 (21.48%) complained

of pain; 14 (7.93%) complained of photophobia; 16 (8.76%) complained of sandy sensation; and 38 (15.82%) complained of tearing. Quarry workers and residents of quarry communities were advised to go for regular eye and general health check-ups to ensure that any health problem they have is identified early and properly managed by a health professional. Quarry workers were also advised to wear their safety goggles at the work place.

Keywords: Quarry, Safety goggles, Pterygium, Cataract, Itching

Introduction

Quarrying is the process of obtaining quarry resources, usually rocks, found on or below the land surface¹. Some of the stones extracted are sandstone, limestone, perlite, marble, ironstone, slate, granite, rock salt and phosphate rock. The suitability of the stone for quarrying depends on its quality, the possibility of cheap and ready

conveyance to a large market and its inclination and depth below the surface². The two principal branches of the industry are the dimension stone and crushed-stone quarrying. In the former, blocks or sheets of stone, such as marble, are extracted in different shapes and sizes for different purposes. In the crushed stone industry, granite, limestone, sandstone, or basaltic rocks are crushed for use principally as concrete aggregate or road stone². Quarrying generates a lot of particulate matter (dust). Particles with aerodynamic diameters less than 50 μm termed Total Suspended Particulate (TSP) matter can become suspended in the atmosphere, and those with aerodynamic diameters less than 10 μm can be transported over long distances and enter the human respiratory system³. TSP is the concentration of all particles in the atmosphere. Particles with aerodynamic diameters less than 2.5 μm (respirable particles) are most effective at scattering light and have a great effect on visibility or visual intrusion, impairment and the earth's radiation balance⁴. Some of the environmental disturbances created by quarrying are caused directly by engineering activities during aggregate extraction and processing. Air pollution resulting from the activities of mining and mining support companies emanates from high airborne particulate matter, black smoke, noise and vibration resulting from blasting⁵. Large quarry

waste tips or quarry fines stockpiles can be a source of airborne dust which can be exacerbated if they are elevated above the original ground level⁶. Dust may also originate from air filtration units or stacks, haulage trucks, conveyors and transfer points⁷.

Quarry work is carried out using different equipment like explosives, power saws and hand tools. The environment of quarry activities is dry, dusty and heavily polluted. These factors increase the risk of contact of foreign particles into the eyes. There is high risk of ocular injuries and some studies^{8,9} have attributed quarry work to having the highest rate of injury among industrial work. The use of personal protective equipment is valuable in preventing work place injuries. Safety goggles must be worn by quarry workers to prevent ocular injuries. However, compliance is poor either because the workers are not provided with these equipment or because they simply refuse to wear them. A study¹⁰ reported that 81% of quarry workers failed to wear their safety goggles at work site. Most of these workers had poor knowledge of the health and ocular effects of quarry work. According to a study by Koffuor et al.⁸, pterygium is the most common problem encountered among quarry workers and the most common complaints include burning sensation and watery eyes. Dry

eye is also reported as a common problem encountered among quarry workers¹¹.

Quarrying activities release large quantities of air pollutants into the atmosphere. Some of these pollutants include particulate matter, carbon monoxide, sulfur dioxide and nitrogen oxides. These gases disperse into the atmosphere and cause health problems to people within the vicinity of the pollutants. Residents within the neighboring communities of these quarrying activities are in danger of the ocular effects of the pollutants. The objective of this study is to investigate the ocular problems found among the quarry workers and the residents of the quarry communities.

Materials and Methods

This study was a cross sectional observational study carried out at quarry sites in Abakaliki, Southeastern Nigeria. Quarry workers and residents at the vicinity of the quarry activities were assembled at a hall. An Optometrist present at the site examined each subject for eye problems. The examination included taking the case history, visual acuity, pen light examination and ophthalmoscopy. An informed consent was obtained from each subject to be part of the study.

Results

A total of 177 quarry workers and residents of the quarry communities were examined. Table 1 showed that 6 (3.39%) of the subjects examined were between the ages of 11 and 20 years; 25 (14.12%) were between 21 and 30; 54 (30.51%) were between 31 and 40; 50 (28.25%) were between 41 and 50; 42 (23.73%) were above 50 years. Among the subjects examined, 61 (34.48%) were quarry workers; 18 (10.14%) were farmers; 9 (5.07%) were traders; 14 (7.68%) were commercial drivers; 7 (3.92%) were caterpillar operators; 13 (7.35%) were truck loaders; 7 (3.92%) were students; 8 (4.82%) were civil servants and 6 (3.11%) were retired (table 2). Upon ocular examination of the subjects, pterygium was found in 39 (22.03%) of the subjects; cataract was found in 21 (11.86%); conjunctival melanosis in 15 (8.47%); cornea opacity in 16 (9.04%); conjunctival hyperemia in 17 (9.60%); and pinguecula in 23 (12.99%). This is shown in table 3. Fifty five (31.35%) of the subjects complained of blurry vision; 49 (27.94%) complained of itching; 17 (9.61%) complained of discharges; 22 (12.46%) complained of headaches; 23 (15.55%) complained of irritation; 38 (21.48%) complained of pain; 14 (7.93%) complained of photophobia; 16 (8.76%) complained of sandy sensation; and 38 (15.82%) complained of tearing (table 4).

Table 1: Age distribution of subjects

Age group	n	%
11 – 20	6	3.39
21 – 30	25	14.12
31 – 40	54	30.51
41 – 50	50	28.25
Above 50	42	23.73
Total	177	100.00

Table 2: Distribution of occupation of subjects

Occupation	n	%
Farming	18	10.14
Trading	9	5.07
Quarrying	61	34.48
Commercial drivers	14	7.68
Caterpillar Operators	7	3.92
Truck loader	13	7.35
Civil Servant	8	4.82
Student	7	3.92
Retired	6	3.11

Table 3: Distribution of ocular signs among all subjects

Ocular signs	n	%
Cataract	21	11.86
Conjunctival Melanosis	15	8.47

Cornea Opacity	16	9.04
Conjunctival Hyperemia	17	9.60
Pinguecula	23	12.99
Pterygium	39	22.03

Table 4: Distribution of ocular symptoms among subjects

Ocular symptoms	n	%
Blurry vision	55	31.35
Discharges	17	9.61
Headache	22	12.46
Irritation	23	15.55
Itching	49	27.94
Pain	38	21.48
Photophobia	14	7.93
Sandy sensation	16	8.76
Tearing	38	15.82

Discussion

Quarry workers spend hours at the quarry sites and are constantly exposed to wind, dust, debris and varying temperature changes. The continuous accumulation of dust and other atmospheric particles on the eye will cause symptoms of itching, sandy sensation and/or foreign body sensation. These symptoms can be prevented by wearing safety goggles while working. Examination of the subjects showed that pterygium was the most prevalent ocular problem. Other

studies^{12,13} on quarry workers identified pterygium and cataract as the two major ocular problems among quarry workers. Studies¹⁴⁻¹⁶ have shown that long-term exposure to ultraviolet rays of the sun was found to cause cataracts as well as pterygium. Mantyjarvi¹⁷ reported that cataract was a major problem found among industrial workers and it reduced their visual acuity and contrast sensitivity. Although cataract does not cause any symptoms, it can lead to severe reduction in vision and total blindness. This was revealed in the

subjects who complained of blurry vision as shown in table 4.

Flying stones and debris involved with crushing of stone frequently hit the quarry workers and in some cases, these stones and debris hit their eyes resulting in corneal protrusions that eventually lead to corneal opacity. This was found in 9.04% of the subjects. Aliyu and Shehu¹⁸ reported corneal opacity among stone quarry workers who did not wear their safety goggles. Depending on the size and location of the opacity on the cornea, the visual acuity of the subject is greatly compromised. For some of them, there is total blindness in that eye. Itching, pain and tearing were other major symptoms that the subjects complained about. Studies¹⁹⁻²¹ have reported complaints of itching and watery eyes among quarry workers. With the continuous exposure to particulate matter, there would be irritations of the eyes and this could lead to hyperemia and allergic conjunctivitis. Rohatgi²² reported conjunctival hyperemia as a consequence of long-term exposure to particulates among quarry workers.

Majority of these quarry workers are of the lower socioeconomic status and they cannot find any other job to do in order to feed their families but to work at the quarry sites. Most did not finish secondary education and lack the knowledge of

knowing the health consequences of working at the quarry sites without wearing the personal protective equipment (PPE) needed. In some situations, the employers do not provide them with the PPE they need and they do not ask questions. Similar studies²³⁻²⁵ have reported that industrial workers in developing countries lack the knowledge and awareness of the health effects of exposure to hazards at the work site. Sani et al.²⁶ reported that 51.7% of industrial workers were not aware of dangers associated with their work. Another study²⁷ found that only 9.2% of construction workers wore safety goggles at work place.

In conclusion, cataract and pterygium were the most prevalent ocular problems seen among the quarry workers. Most of the subjects complained of blurry vision, pain and itching. Other common ocular problems found in this study include conjunctival hyperemia, tearing and irritations. Quarry workers and residents of quarry communities need to be educated on the hazards that they are living with and the need to protect themselves. They need to go for regular eye and general health check-ups to ensure that any health problem is identified early and properly managed by a health professional. Quarry workers must

always wear their safety goggles and other PPEs at all times when at work.

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