

The Effect of Profession on the Vision of People in Yola, Nigeria.

S. D. Najoji¹ and J. B. Yerima²

¹Department of Basic Science, Federal Polytechnic Damaturu, P. M. B. 1006, Yobe State Nigeria.

²Department of Physics, Modibbo Adama University of Technology Yola, P. M. B 2076, Adamawa State, Nigeria.

Corresponding Author: S. D. Najoji

ABSTRACT: The effect of profession/occupation on the vision of people in Yola the capital of Adamawa state of Nigeria was investigated using the concept that a person of normal vision has near point at 25 cm and far point at infinity. These two points were used as indices to observe the manifestation of symptoms of eye defects (short-sight, SS and long-sight, LS) in 400 young people engaged in eight different professions (teacher, student, computer operator, cameraman, tailor, grain grinder/wood slater, welder and driver) in the study area. Out of 400 people, 109 with SS and LS put together, 29 with other eye defects and 75 discontinued before the end of the experiment. The number of persons per profession in % that manifested symptoms of SS and LS lies in the range 36-20% which is greater than 12-4% and 10% respectively for other eye defects and non-professionals or applicants. This supports the findings of ^(1, 2) that the work stress/strain due to profession enhances significantly the development of symptoms of eye defects. The method is simple and cheap since it does not necessarily require sophisticated equipment and experienced technicians. This vision screening technique has been found to be a useful tool because of its ease of operation even in rural communities and the information it provides to create more awareness of the dangers associated with these occupations and the way out.

Keywords: profession, vision, screening, eye defects, eye lens

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I. INTRODUCTION

Eye defect or refractive error (RE) can develop over time in a person due to daily activities of everyday life or inherited from parents. They may be corrected or become more serious problems causing permanent damage to the eye. The most important thing is the ability to acknowledge the symptoms of eye defects and get them corrected immediately. The eye is one of the most intricate sense organs, an instrument devised by nature, which reacts to light for seeing purposes, which tells us the nature of things around us, their location and provide three-dimensional images of them in colour and motion ³. The eye has the capacity to differentiate light of different spectral qualities ⁴. The cone cells stimulate the colours we see in bright light, we cannot see colour distinctly in dim light. In colour blindness, one or more types of cones are absent or defective ⁵. A common colour-blind condition is a red-green colour-blindness where the person sees a red or a green object as grey. Colour blindness is an inherited condition and can be detected by using chart ³.

There are several suspected environmental causal factors that affect vision which include use of contact lenses, dehydration, mental activities, work condition, climate, room temperature, relative humidity and illumination all influence blink frequency ^(6, 7, 8, 9). The profession or occupation of people that produces constant accommodation and work stress can cause eye defect. Other factors related to eye defect include indoor air pollution, contact lenses and gender difference ¹⁰, and their results showed that indoor air pollution has caused eye defect in many people and people wearing contact lenses experienced dry eyes. They revealed that dry eyes increased with age especially among men and tear film stability is significantly lower among women than men. In addition, women have a higher blink frequency while reading; several factors may contribute to gender differences e.g. the use of make-up ^(7, 11). Another reason could be that the women in previous studies have done more video display (VDU) work than the men including lower grade work ¹².

Blink frequency is the number of blink per minute and it is associated with eye defect ¹³. Blink frequency of an individual depends on the environmental factors mentioned earlier. Break-up time is the time interval in seconds between blinking and rupture. But it is considered to reflect the stability of the tear film and it exceeds the interval between blinks in normal person ⁹. Blink is correlated negatively with break-up time.

Several studies on visual effects have been carried out on some of these professions among which is computer visual effect that is found to be associated with mainly developed countries now on computer users ¹⁴. A study carried out at Egyptian Northern Border University on medical students reveals a high prevalence of REs impairment among them ². Similarly, a study carried out on the prevalence of REs among drivers of public institutions in Ibadan, Nigeria reveals that 16.7% of drivers had under laying REs ¹. Among these studies, none

did consider a wide range of professions as such this study became necessary. This research is designed to investigate the effect of the profession of a person on their visual performance in Yola, Adamawa State.

Theory of vision and visual defects or refractive errors (RE)

The process whereby the shape of the crystalline lens in the eye changes in order for the eye to see objects at different distances from the eye is called accommodation. Refractive error (RE) may be defined as a state in which the optical system of a non-accommodating eye fails to bring parallel rays of light to focus on the retina^(15, 16). There are 3 main types of REs: Myopia (short-sightedness), hypermetropia (hyperopia, long-sightedness, and farsightedness) and astigmatism¹⁷. Myopia is the most common type of RE, a complex trait including both environmental and genetic factors¹⁸. Myopia brings further vision challenges because high myopia increases risk of pathologic ocular changes such as cataract, glaucoma, retinal detachment and myopic macular degeneration, all of which can cause irreversible vision loss¹⁹. Hyperopia is a form of RE in which parallel rays of light coming from infinity are focused behind the light-sensitive layer of the retina when the eye is at rest²⁰. In hyperopia, the images do not focus by the time they reach to the retina because the cornea is flatter or the axial length is short and has been shown to be more prevalent in children than adults²¹.

Astigmatism is a refractive error (ametropia) that occurs when parallel rays of light entering the non-accommodating eye are not focused on retina²². Astigmatism occurs when incident light rays do not converge at a single focal point. Total astigmatism can be divided into corneal (or keratometric), lenticular and retinal astigmatism. Most astigmatism is corneal in origin, lenticular astigmatism is a result of uneven curvature and differing refractive indices within crystalline lens²³. Uncorrected refractive errors (URE) are the most common cause of visual impairment worldwide accounting for 43% of cases and representing an important cause of blindness according to World Health Organisation (WHO) report²⁴. It has been estimated that URE accounts for 153 million individuals of visual impairment globally, and WHO identified URE as one of the priorities for the program of vision 2020²⁵. From the Nigeria national blindness and visual impairment survey, 2005 – 2007 REs were the commonest cause of mild to moderate visual impairment (77.9% and 57.1%) respectively, being responsible for vision defect in 2.4 million adults in Nigeria (i.e. acuity of $< (\frac{6}{12} - \frac{6}{60})$)²⁶.

II. EXPERIMENT

The fact that an object in front of the eyes of a person slowly moving closer to the eyes at a point appears to become blurred is employed in this work to determine whether a person is short-sighted (SS) or long-sighted (LS). The near point and far point of a healthy young man with normal vision approved by a medical doctor were determined at the eye centre, specialist hospital Yola by slowly moving written words closer and away from his eyes. These words were placed fixed at the located near and far points of the normal person and a person under test was asked to read these words under the same conditions. If the test person was able to read only words at the near point clearly then he was labelled as (SS) and if otherwise he was marked (LS). If the person was found neither SS nor LS but showed some symptoms of eye defect then he was tagged as others (OT). This procedure was carried out on four hundred (400) normal persons of age less than 30 years employed in different professions which include teacher, student, computer operator, welder, cameraman, tailor, driver, and grind grinder/wood slater over a period of ten years. The number of persons found with defective vision at the end of ten years for each profession was recorded. The number of persons who discontinued from their professions because of death, resignation, accident, and so on within the period of the experiment was noted as NB. In addition to the authors, forty faithful men were employed to monitor and supervise the four hundred people-ten test persons per supervisor.

III. RESULTS AND DISCUSSION

Table 1 Number of eye defects per profession

Profession	Eye Defect(ED)					
	LS	SS	OT	NB	%LSSS	%OT
Welder	5	13	5	8	36	10
Cameraman	2	9	2	6	22	4
Tailor	3	10	4	9	26	8
Driver	8	2	3	12	20	6
Grain grinder/wood slater	2	12	6	10	28	12
Teacher	7	5	3	8	24	6
Student	5	10	4	13	30	8
Computer operator	7	9	2	9	32	4
Total	109		29	75		
Applicant	2	3	5	7	10	10

Table 1 shows the number of persons per profession that exhibited symptoms of short-sight (SS), long-sight (LS) and other (OT) related eye defects. The number of persons per profession manifesting symptoms of

both SS and LS put together is significantly greater than that of OT. This shows that LS and SS developed to a significant level in persons practising these professions over the period of study. The key to recognize the symptoms of SS and LS so that they can be corrected as soon as possible before they become more serious problems without solutions such as blindness is very important. The percentage number (%LSSS) of persons that manifested symptoms of SS and LS per profession lies in the range 36-20% which is greater than 10% that of people without a permanent job (applicant) and %OT lies within the range 12-4%. Since the percentage number of applicant manifesting eye defects is smaller than the number manifesting SS and LS, then we consider %LSSS (36-20%) significant. Thus, the significance of %LSSS may be attributed to the fact that all the chosen professions directly depend on the working condition of the eye. This is to say, for example, a blind person cannot practice any of these professions in the same way as a person with normal vision. It means then, people engaged in practising these professions subject their eyes to stress and strain when they are doing their jobs. The strain affects the blink frequency of the eyes which in turn may lower the stability of the tear film leading to dry eyes. If the effect of dryness of the eyes leads to SS, this may be due to the eyeball being too long/strong or if LS the eyeball may be too short/weak and in both situations, the crystalline eye lens is unable to focus objects on the retina. Recently over the years through personal communications with people in the study area, eye defects were only attributed to old age and few cases of accidents until when Yola became the state capital in 1976 about the last four decades. Majority of the people from some local government areas in the state whom we interacted with told us that the increase of eye defect or blindness in the area is traced to the history of people who left to the cities and engaged themselves in certain professions to earn a living.

IV. CONCLUSION

Lack of adequate eye specialists and equipped eye centres and increasing cases of eye defects have motivated us to embark on this work. We have employed the near point and far point of a normal person as a measure to identify symptoms of LS and SS among people engaged in various professions. The results showed that the eight professions considered in the study appear to enhance the development of SS and LS. The screening technique is simple and cheap and can be easily carried out even in rural areas. If the situation is properly handled, the chance of eye defects to increase and deteriorate to blindness will be minimized and hence the number of blind persons most of whom are beggars on the streets of Yola will be drastically reduced to a barest minimum level. Finally, we advise the following measures to be taken to avoid or at least minimize the chances of people engaged in these professions getting eye defect.

- (i) For example, a driver cruising a vehicle on road often looks at distant objects in front of him has to strain his eyes to upward gazing thereby increasing the ocular surface area and water evaporation from his eyes. Under this condition, he needs to maintain intact his tear film stability by frequent blinking and short breaks to avoid dry eyes. This is applicable to other professions that involve in focusing on distant objects. In the case of a computer operator, the screen and the keyboard should always be kept at exactly the normal near point 25 cm from the eyes. This arrangement would put a minimum strain on the eye and give more room to downward gazing minimizing evaporation from the ocular surface area by the flow direction of the gaze. This applies to the student, cameraman, tailor, and related professions that require focusing on near objects.
- (ii) Grain grinder/wood slater and welder are exposed to air pollution due to grain/wood and metal particles produced during production. Most of the grinding rooms are usually small and lack proper ventilation and thereby the temperature and relative humidity are high. The presence of particles, high temperature and humidity are environmental causal factors that reduce the rate of blinking which may increase water evaporation. In addition to (i) and (ii) above the environment should be properly ventilated and the people should use clean water/cloth to remove any dirt that enters the eye to avoid contamination of the eye with bacteria since their hands are always dirty.
- (iii) The government should employ psychologists and other professionals to teach the people engaged in these professions how to maintain correct blinking frequency to avoid water evaporation and dry eye. They should also teach them the appropriate posture to take while focusing near and distant objects. The workers should be encouraged to use correct protective wears while they are at work. An intensive campaign to bring to the wider audience the dangers associated with these occupations should be employed.

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