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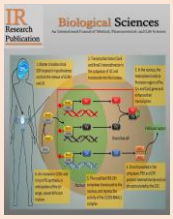

Knowledge of refractive errors and barriers to spectacle lens utilisation among patients attending selected eye clinics in tertiary hospitals in Bauchi State, Nigeria

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ABSTRACT

Spectacle lens remains the most cost-effective, non-invasive and widely acceptable means of correcting refractive errors. This study is aimed at assessing the level of knowledge of refractive errors and barriers to spectacle utilisation among patients undergoing refraction in tertiary hospitals in Bauchi State. Descriptive survey research design was employed in the study. The respondents consisted of three hundred and eighty-four (384) male and female patients, aged 18 to 80 years, undergoing refraction at the Eye Units of Abubakar Tafawa Balewa University Teaching Hospital, Bauchi and Specialist Hospital, Bauchi, who were conveniently and purposefully sampled. Their mean age was 46.0 ± 15.4 years and 52.1% were males. Respondents' demographics, knowledge of refractive errors and barriers to spectacle utilisation were collected using questionnaires developed through the literature review. Pearson chi-square test was used to investigate associations between outcome variables and $p< 0.05$ was considered statistically significant at 95% confidence level. 60.8% of the respondents had adequate knowledge of refractive errors; 78.2% cited spectacle as a corrective method. There were also associations between age; educational level and knowledge of refractive errors in the areas of presbyopia ($p=0.0003$), and myopia ($p=0.0016$). High cost ($p=0.0359$) and stigmatisation ($p=0.0091$) were significant barriers to spectacle utilisation. Knowledge of refractive error and its corrective modality was significantly associated with respondents' age and educational levels. The study recommended effective counselling on the misconception of drugs as corrective measures of refractive errors.

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Introduction

Good vision is essential for full participation in educational and economic activities, as well as personal wellbeing, self-sufficiency and productivity. People cannot realise their potentials without clear and functional vision. These tasks are the sole responsibility of the eye. Its importance is

highlighted by the sheer range of measures taken in many societies to enable those with permanent sight loss to navigate their surroundings and tackle everyday tasks independently [1]. Any disorder affecting its integrity, that is, its anatomy, health, and or physiology results in ocular anomalies. These anomalies may manifest as refractive errors, cataract, glaucoma, diabetic retinopathy, strabismus, and many others. Hence the significance of good eye heath cannot be over emphasised. Despite this notable importance of the eye, many people still don't take appropriate care of their eye health; and this is why avoidable causes of blindness are not attended to by majority of people until complications set in [2]. This may be attributable to individuals' knowledge variance to eye defects and utilisation of its corrective measures. Knowledge of common eye disorders plays vital roles in encouraging people to seek for remedy to them, as well as the utilisation of the prescribed solutions particularly spectacle lens for refractive errors' correction [3]. These refractive errors include hyperopia, myopia, astigmatism, and presbyopia (old-age-sight). These ocular defects cause reduction in individual's visual performance and have several global social and economic implications especially in low- and middle-income countries if uncorrected [4, 5]. They adversely affect the quality of life, educational status and career opportunities as well as social interaction of the victims. The associated symptoms include blurred vision, intermittent double vision, tearing, photophobia (extreme sensitivity to light), eyestrain, itching, and headache [6].

Refractive errors occur when the eyes' optical systems fail to focus light from infinity effectively on the retina for clear vision, with accommodation relaxed, thereby resulting in blurred vision. Uncorrected refractive errors constitute a public health problem due to its prevalence nature. The World Health Organization (WHO) reported that uncorrected refractive errors are one of the leading causes of global vision impairments of which estimated 80% were avoidable [7, 8, 9]. Avoidable visual impairment or blindness is seen as impairment or blindness that could be treated or managed by known, cost-effective means. Global estimate by WHO, indicated that more than 2.3 billion people suffer from poor vision due to refractive errors; of which 670 million are considered visually impaired because they do not have access to corrective treatment (spectacles lenses), and that more than 90.0% of them live in rural and developing nations [10, 11, 12]. However, only an approximate 1.8 people billion world-wide have access to eye test and effective treatment [13]. Furthermore, the study group of the National Blindness and Visual Impairment Survey in Nigeria (2005-2007) found that refractive errors were responsible for 1.4% of avoidable blindness in persons 40 years and above in Nigeria, at the time of the survey [14, 15]. Without significant investment in preventative actions, those numbers with avoidable visual impairments are likely to increase, particularly in low and middle-income countries. Greater number of women are exposed than men and the impacted number rises exponentially with senility [1]. The reason behind this may likely be that women have prolonged life span than men in the developed nations, and majority of the ocular conditions are associated with advances in age, for instance, age-related macular degeneration, cataract, glaucoma, and presbyopia. On the other hand, in low-income counties, in which refractive errors, presbyopia, cataract, glaucoma are the major causes of most of the avoidable visual impairment, this gender disparity comes into play due to the significant differences in accessing services between the two genders. Men access services more frequently than women as a result of several cultural, belief system and socio-economic factors [1].

The exact causes of refractive errors are unknown. Common risk factors include heredity, nutrition, environment, anterior-posterior length of the eyeball, and shape of the eyes' cornea [16, 17]. As a physiological phenomenon, refractive errors can also be affected by age, and diseases. It cannot be prevented; and overuse of the eyes does not cause or exacerbate refractive errors [13, 16]. It has no gender barrier, and affects people of all ages, professionals, socio-economic levels, and ethnic groups [16]. It can easily be diagnosed, measured and "corrected" with spectacle lenses or other means of refractive errors corrections such as contact lenses, low vision devices and photorefractive surgery [16, 18]. The choice of correction varies depending upon factors such as cost, profession, socio-economic status and hobbies of an individual [8]. Long-standing uncorrected refractive errors can lead to amblyopia (lazy eye), strabismus (half past 4 o'clock eye), and diplopia [19]. These complications negatively affect the educational, psychological and social well-being of an individual [20, 21]. Despite the integration of refractive errors into the national plans for the prevention of avoidable blindness; "VISION 2020 ¬– The Right to Sight", an initiative of WHO and the International Agency for the Prevention of Blindness (IAPB) in 1999, with the mandate of improving the accessibility to cheap spectacles lenses for alleviating refractive errors, the prevalence of uncorrected refractive errors remains high due to ignorance, low demand for spectacles when needed, beliefs system and misconception that using spectacles will worsen vision or reduce the power of the eyes [7, 22, 23]. It could also be related to dearth of qualified eye care professionals to provide effective information and treatment; high cost and financial constraints to afford the corrective

devices they required [14, 24]. This study tends to elicit the level of knowledge of refractive errors, influence of age and educational level on knowledge of refractive errors and its corrective methods, as well as barriers to spectacle lens use by patients assessing refractive eye care services at the selected eye clinics in tertiary hospitals in Bauchi State.

Spectacle lens is an optical instrument consisting of a pair of lenses incorporated into a frame, resting on the nose and held in place by sides extending towards and over the ears and positioned approximately 12 millimetres from the eyes [4]. Its use for correction of refractive errors dates back to the Middle Ages (5th–15th century) and has remained the most cost-effective, non-invasive and widely acceptable means of correcting refractive errors due to its high success rate in terms of visual acuity, and improved quality of life [24]. But the society is structured in such a way that individuals determine what should be accepted as treatment modalities for their eye's defects; this is why majority of people including the educated ones still don't accept spectacles as a treatment option for refractive errors [2]. Research has shown that without spectacle lenses, individuals with poor vision (refractive errors) are at major disadvantage both in school and social life because 80.0% of all learning occurs through vision [26, 27]. And, failure to address poor eye health mainly through spectacle lens utilisation can lead to economic burdens for all, as the Lancet Commission found, based on conservative assessments, that the prevalence figures for 2020 suggest an annual global productivity loss due to vision impairment of approximately US$ 411 billion in purchasing power parity. The cost to tackle unaddressed refractive errors and cataracts alone is estimated at US$ 24.8 billion [1]. Spectacles can also be used as protective device, means to conceal eyes defects, fashion, and mark of dignity [4, 25]. However, People who need spectacles are often stigmatised, causing them to shy away from wearing them, even when given free of charge, because they would be thought of as being blind or visually handicapped. Contrary to the above perceptions, people wear spectacles because it improves their vision, appearance, augments their confidence, makes them look innocent and humble, and cause an impression of intelligent among peers [12, 23]. Besides, there seem to be a significant association between age, educational levels of respondents and knowledge of refractive errors and its corrective methods which might enhance utilisation of spectacles. Furthermore, understanding the psychological dispositions and knowledge of patients regarding refractive errors and barriers to spectacle lens use can help eye care professionals determine the best approach to addressing their challenges. It will also guide them and decision-makers to better understand the needs of the society, which will help improve productivity as well as reduce the global and national economic cost in lost productivity due to uncorrected refractive errors. The exhibitions of poor knowledge of refractive errors and its corrective methods as well as the redundancy in accepting spectacle lenses for vision enhancement by patients accessing refractive eye care services in the eye clinics of the selected tertiary hospitals in the state prompted the uptake of this study, so as to find out the true position. The evaluation of the study outcome will help Government, Non-Governmental Organisations (NGOs), Educators, and Researchers, to obtain baseline evidence to forecast future coverage of health promotion activities that could facilitate knowledge of refractive errors, and elimination of barriers to spectacle lens usage.

Materials and methods

Research design

Descriptive survey research design was employed, in order to achieve the purpose of the study.

Research setting

The study was carried out in the Eye Clinics of Abubakar Tafawa Balewa University Teaching Hospital, (ATBUTH), Bauchi and Specialist Hospital Bauchi (SHB), between June 1 and August 31, 2023, to assess the level of patients' knowledge of refractive errors, corrective methods, and barriers to spectacle lens use for refractive errors correction. The two hospitals were among the tertiary hospitals in the State. Their eye clinics were chosen because they have well established and functional eye units, up-to-date clinical equipment, greater manpower and patients turn-out. They are located in the state capital and serve as referral centres for other primary and secondary health centres within the state.

Study Population, Sample Size and Sampling Techniques

The study population consisted of 10,100 of the 27,260 adult patients, male and female aged 18 to 80 years old, accessing refractive eye care services at the eye units of the two tertiary hospitals, seen in 2022: according to the Records and Health Information Units of the Eye clinics of the two hospitals28. The sample size for the respondents was 384, calculated using William G. Cochran's formula (1977) for estimating sample size population proportion of a known population as follows: N= $Z^2 P \frac{(1-P)}{D^2}$

Where-

P = estimated proportion of the outcome of the response assumed to be (50.0%) or 0.50 of the respondents' knowledge of refractive errors, corrective methods and barriers to spectacle lens use for refractive errors correction. (Since the proportion of the population with the characteristics was not known)

D = maximum acceptable sampling error (degree of precision) = (5.0%) or 0.05 in decimal notation:

Z = Normal deviation at the desired confidence interval. The value of the z-statistic at the 95% confidence interval level = 1.96.

N = minimum number of sample size (where target or total population > 10,000).

The (10.0%) non-respondents' rate =10/100 x 384 = 34 was not taken into consideration because the possibility of dropouts and unforeseen circumstance were rare, as the respondents were accessed as they visit the clinics to access eye care until the require sample size was reached. They were sampled through a multistage sampling procedure involving convenient and purposive sampling techniques, because not all patients accessing eye care services had need for refractive test. One hundred and ninety-two (192) were sampled from each of the two tertiary hospitals (making a total of 384).

The criteria for inclusion in the study were male and female patients aged 18 years and above, accessing refractive eye care service (test for glasses), as well as consent to participate in the study. A pretested, structured, self-administered questionnaire developed based on the literature review was employed in order to collect quantitative data from the respondents. It was sectionally divided into (A, B, and C), that gathered information on respondents' demographics, knowledge of refractive errors and corrective methods, and barriers to spectacle lens use respectively.

Validity and Reliability of the Instrument

The validity of the instrument was established by three research experts; whose observations and corrections were used for the final draft of the instrument. The reliability of the instrument was determined using test re-test method. The instrument was administered twice on fifty hospital workers from Federal Medical Centre, Azare, Bauchi State, who had the similar characteristics with the study population. This was done within the interval of two weeks. The workers were not part of sample for the study. The scores obtained from the sampled workers on two separate administrations were subjected to Pearson's Product Moment Correlation coefficient, which yielded coefficient of 0.78 (r = 0.78). However, Cronbach's alpha statistics was further used to ascertain the internal consistency of the instrument which yielded a coefficient value of 0.832. Both coefficient values were high enough and were considered reliable for used in the study.

Data Collection

Research and Ethical Clearance was obtained from the Research and Ethics Committees, of the Bauchi State Ministry of Health, and ATBUTH, Bauchi, respectively, which was then submitted to the Heads of Ophthalmology Departments, SHB and ATBUTH, Bauchi, respectively before the study commenced. Three hundred and eighty-four (384) copies of the questionnaire were administered by the researcher and three assistants who were workers in the selected hospitals. The research assistants were briefed on the modalities on how to administer the instrument. The questionnaires were taken back the same day they were given as soon as the respondents were done answering them. The process continued until the required sample size was reached.

Data Analysis

Data analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 23. The results were calculated in frequencies and percentages. Tables were used to present the results for easy appraisal. Descriptive statistics was used to compute the proportion of knowledge of refractive errors and its corrective methods as well as barriers to spectacle lens use for refractive errors correction. Pearson chi-square (X^2) test was used to assess the significant associations between the outcome variables and $P< 0.05$ was considered statistically significant at 95% confidence level.

Ethical Consideration

In order to gain access to the respondents, permission was obtained from the Ethics and Research Committee of the Bauchi State Ministry of Health, and ATBUTH, Bauchi, respectively. Informed consent was obtained from all respondents before the study and the aims of the study were explained to them. Confidentiality and anonymity was ensured with records and the information collected from the respondents and they were used solely for the purpose of the study. The study was also performed in accordance with the tenets of the Declaration of Helsinki, 2013.

Results

Socio-demographic Characteristics

Three hundred and eighty-four (384) patients responded to the study. There were 200(52.1%) males and 184(47.9%) females, with age ranging from 18-80years (mean age: 46.0 ± 15.4). The respondents age, gender and educational level distributions were as presented in (Table 1). The males and females mean ages were 44.9± 15.0 and 47.2 ± 16.0 respectively. There was almost an equal distribution of the respondents' gender. However, the slightly difference in male to female ratio (1.1:1.0) as noted in the study might be accidental as a result of the convenient sampling of the respondents. The age range of 39-59years (44.0%) had the highest number of respondents followed by 18-38years (35.2%), while 60-80years (20.8%) had the least. However, majority of the respondents (79.2%) from both sexes were within the 18-38years (35.2%) and 39-59years (44.0%) age brackets, thereby substantiating the average age established.

Furthermore, sixty (15.6%) of the respondents had primary educational qualification while 150(39.1%), 140(36.5%) and 34(8.9%) had secondary, tertiary and non-formal educational qualifications respectively. In addition, greater proportions of the respondents (75.6%) from both sexes were secondary (39.1%) and tertiary (36.5%) educational qualification holders respectively. This indicated that the respondents were enlightened and the selected tertiary hospitals likely to be situated within the radius of an educational environment.

There were adequate and moderate levels of knowledge of refractive eye problems among the respondents especially myopia (80.8%), hyperopia (65.1%) and astigmatism (50.5%) respectively. However, (60.8%) of the respondents had moderate knowledge of at least one refractive eye problems. Moderate numbers of the respondents (50.7%) had had a refractive eye problem before and (67.8%) had undergone an eye examination before. Besides, the respondents had adequate knowledge of spectacle lenses (78.2%) as means of correcting refractive errors while greater number (88.1%) agreed to the use of drugs as corrective method. There was almost an equal distribution of the respondents' knowledge of refractive errors by gender. However, the slightly difference in male to female ratio (1.1:1.0) of knowledge of refractive errors as indicated by the study might be as a result of chance associated with the convenient sampling of the respondents (Table 2).

The study indicated that education levels of the respondents had great influence on the knowledge of refractive errors and their corrective methods. The primary level had moderate knowledge of myopia (66.7%), while the secondary, tertiary levels and non-formal levels had adequate knowledge of it (80.0%); (89.3%) and (73.3%) respectively. Furthermore, the secondary level had moderate knowledge of hyperopia (65.3%) and astigmatism (56.0%) and inadequate knowledge of presbyopia (46.0%) respectively while the tertiary level had adequate knowledge of hyperopia (77.1%) and moderate knowledge of astigmatism (55.7%) and presbyopia (55.7%) respectively. The primary and the non-formal levels had inadequate knowledge of hyperopia, astigmatism and presbyopia.

On the other hand, all the educational levels identified spectacle lens as a corrective measure of refractive errors, with primary level (58.3%) and non-formal levels (58.8%) showing moderate knowledge of it, while the secondary (83.3%) and tertiary (85.7%) levels had adequate knowledge of it as corrective measure of refractive errors. These outcomes indicated the role education play in the knowledge of refractive errors and their management modalities. However, the erroneous outcome is the fact that all the educational levels strongly believe that drugs can take care of refractive errors. In addition, the primary level (53.3%) and non-formal level (82.4%) indicated that exercises could take care of refractive errors. They also believed that fasting and prayer (58.3%) and (58.8%) respectively could be used to overcome refractive errors. (Table 3). This also points out the significant role education would play in the eradication of such misconceptions.

The study indicated that the respondents highly agreed to the following as barriers to spectacle lens utilisation for remedy to eye problems: 'it is very expensive' (86.6%); 'it prevents normalisation of vision' (84.4%); 'it is stigmatising' (75.6%); and moderately in these areas: 'teased for wearing spectacles by others' (67.8%); 'it doesn't make any difference in their vision' (65.2%); and 'it makes one look old' (66.2%) (Table 4).

Hypothesis 1. Ho1: There is no significant association between age of patients and knowledge of refractive errors

Table 5 showed the grand calculated Pearson chi-square value of 46.90 with the corresponding table value of 5.991 and a p-value of 0.0000. The hypothesis was rejected because the X^2_{cal} =46.90 > $X^2_{0.05(2)}$ =5.991, p = 0.0000. This implies that there was significant association between age of the respondents and knowledge of refractive errors in the selected tertiary hospitals in Bauchi State. The table further showed the calculated Pearson chi-square values for the following components of age

of the respondents and knowledge of refractive errors with their corresponding p-values that were significant: 'presbyopia' (X^2 =16.06, p-value=0.0003; 'spectacles' (X^2 =9.82, p-value=0.0074); and 'drugs' (X^2 =7.23, p-value=0.0269).

Hypothesis 2. Ho2: There is no significant association between educational levels of patients and knowledge and corrective methods of refractive errors

Table 3 showed the grand calculated Pearson chi-square value of 233.28 with the corresponding table value of 7.815 and a p-value of 0.0000. The hypothesis was rejected because the X^2_{cal} = 233.28 > $X^2_{0.05(3)}$ =7.815, p = 0.0000. This indicated that there was significant association between educational level of the respondents and knowledge and corrective methods of refractive errors in the selected tertiary hospitals in Bauchi State. The table further showed the calculated Pearson chi-square values for the following components of educational levels of the respondents and knowledge and corrective methods of refractive errors with their corresponding p-values that were significant: 'myopia' (X^2 = 15.25, p-value = 0.0016); 'hyperopia' (X^2 = 22.81, p-value = 0.0000); 'astigmatism' (X^2 = 13.43, p-value = 0.0037); 'presbyopia' (X^2 = 9.81, p-value = 0.0202); 'spectacles' (X^2 = 28.38, p-value = 0.0000); 'contact lenses' (X^2 = 9.74, p-value = 0.0209), and 'surgery' (X^2 = 10.31, p-value = 0.0161).

Discussion

Knowledge of common eye diseases (refractive errors) plays a significant role in motivating patients to seek treatment for their eye problems. The respondents had adequate knowledge of myopia, moderate knowledge of hyperopia, and astigmatism, and low knowledge of presbyopia. (Table 2). These finding were supported by the study carried out in Sudan and among undergraduate students of University of Buraimi, Oman respectively [7, 27]. This sound knowledge of refractive errors could be attributed to the literacy level and enlightenment of the respondents. This indicted that there is correlation between education and knowledge of refractive errors as most of the studies carried out within educational environments produced similar significant outcomes such as the studies conducted in Ghana [19, 23]. This underscores the great role education plays in all segments of humanity and the society at large. With education and knowledge of refractive errors, access to eye care services, counselling, acceptability and use of spectacle lenses by the respondents when prescribed could easily be achieved. Besides, individuals could readily understand the causes, symptoms and treatment modalities of refractive errors and seek appropriate treatment to prevent vision loss. This might involve regular eye check-ups, and preventive solutions such as wearing of protective eye shield and taking breaks from digital devices. Furthermore, adequate knowledge of refractive errors would help policymakers in this field to better understand the needs of the society and areas to channel the limited resources to improve productivity, and reduce the global and national economic cost in lost productivity due to uncorrected refractive errors1.

Knowledge of refractive errors, and its management measures could play a vital role in prevention of avoidable visual impairment secondary to refractive errors. It could also help individuals make informed decisions among the treatment options available. This may include eye care practices such as wearing protective eyewear during sports or outdoor activities, taking breaks from digital devices, and maintaining healthy diet to support eye health. The study result showed that adequate number 78.2% of the respondents indicated spectacle lens use as a means of managing refractive errors. This might be associated with sound educational level of the respondents. However, despite this adequate knowledge of spectacle lens as corrective measure, greater number 88.1% agreed to the use of drugs as a major means of refractive errors correction. This might likely be associated with the belief system or aged-long perception of the people to drugs as a management option in all ailments. Other measures responded to included: contact lenses 34.9%, surgery 20.8%, fasting and prayer 47.9%, and exercises 39.0% which were low. (Table 2). This study results were also in tandem with the study conducted in Ghana, and Ebonyi State, Nigeria, where the respondents had good knowledge of spectacle lens as means of correcting refractive errors [4, 29]. The high response level of the respondents to spectacle as measure of refractive error correction could be as a result of the sound knowledge of refractive errors. However, there were low responses to contact lenses, and surgery as refractive errors' management modalities in this study. This may be associated with ignorance and lack of enlightenment on the part of the eye care specialists on these subjects. In addition, the low response to refractive surgery as a corrective method might be attributed to the dearth of twenty-first-century technology to execute such procedure here in Nigeria; considering the fact that Nigeria is still a developing nation [19]. This should be a matter of urgent concern to the eye care professionals so as to enlighten the patients during consultation on other ways of refractive errors correction despite its absence in the country, because knowledge is power.

Furthermore, the high level of consideration of drugs in this study as against the low outcome in a study in Ghana might be associated with cultural belief of the locality where the study was carried out19. In this study, it was observed that the respondents hold this tenet that drugs ("Magani") could cure every ailment, and when they were attended to in the hospital and were not given drugs, they felt dissatisfied. This causes them to keep moving from one health facility to another in search of drug-related cure instead of a suitable optical remedy. This calls for urgent action on the part of eye care professionals and physicians as well, to address this deep-rooted fallacious belief through effective counselling and education of patients.

Pearson Chi-square analysis showed statistically significant association between age and knowledge of refractive errors and its corrective methods among the respondents in selected tertiary hospitals in Bauchi State. To ascertain the influence of age of the respondents on knowledge of refractive errors and its corrective methods, psychosocial questions were asked among the 384 respondents; and detailed results were as shown in Table 5. These three questions were significantly associated; with age 60-80 years showing greater preponderance: Which of the following refractive errors do you have knowledge of: 'Presbyopia?' ($X^2_{(2)}$=16.06, p =0.0003); which of the following corrective knowledge of refractive errors do you have: 'Spectacle (eye glasses)?' ($X^2_{(2)}$ = 9.82, p=0.0074); and which of the following corrective knowledge of refractive errors do you have: 'Drugs?' ($X^2_{(2)}$=7.23, p=0.0269). However, the significance of 'drugs' as a corrective measure could be attributed to respondents' ignorance and belief system that drug can take care of all ailments. The preceding two answers could be attributed to adequate knowledge of refractive errors and its corrective measures as a function of age. This study result was in tandem with the study conducted in Southern Indian states of Andhra Pradesh and Telangana [3]. Age plays a significant role in the development and prevalence of refractive errors. This is primarily due to physiological changes in the lens of the eye with age. As people age, the lens becomes sclerosed, becoming less flexible and less able to change shape to focus on objects at different distances. This could result in different types of refractive errors such as presbyopia, hyperopia, myopia and astigmatism [16]. Besides, older people are most likely to have other eye conditions associated with age that could contribute to refractive errors, such as cataracts, age-related macular degeneration, or diabetic retinopathy. Hence, the prevalence of refractive errors increases with age. Therefore, in refractive errors' diagnosis and management, age should be an essential factor of consideration.

Pearson Chi-square analysis showed statistical significant association between educational levels of the respondents and knowledge of refractive errors and its corrective methods in selected tertiary hospitals in Bauchi State. To ascertain the effect of educational levels of the respondents on knowledge of refractive errors and its corrective methods, psychosocial statements were put across the 384 respondents; and detailed results were presented in Table 3. These seven statements were significantly associated, with the tertiary, followed by the secondary educational levels showing more preponderance: Which of the following refractive errors do you have knowledge of: 'myopia' ($X^2_{(3)}$=15.25, p-value=0.0016); 'hyperopia' ($X^2_{(3)}$=22.81, p-value=0.0000); 'astigmatism' ($X^2_{(3)}$=13.43, p-value=0.0037); 'presbyopia' ($X^2_{(3)}$=9.81, p-value=0.0202); 'spectacles' ($X^2_{(3)}$=28.38, p-value=0.0000); 'contact lenses' ($X^2_{(3)}$=9.74, p-value=0.0209), and 'surgery' ($X^2_{(3)}$=10.31,p-value=0.0161).

This study result is in line with the study conducted in Ebonyi State, Nigeria [24]. Education plays a significant role in creating and improving the awareness about refractive errors and its management options. Higher educational levels as seen in the study were associated with a greater understanding of refractive errors and its corrective methods. With this, individuals could understand the different types of refractive errors, causes, symptoms and corrective measures; and adequately equipped to seek vision correction when the need arose to prevent vision loss. Besides, education could help one understand the relevance of periodic eye check-up and effective preventive eye care practices like putting on eye shields and limiting the amount of time spent on digital devices so as to reduce digital devices-vision-syndrome and maintaining a healthy diet to support eye health. The inadequate knowledge of contact lens and refractive surgery in the study might likely be associated with low enlightenment and education of the patients in these regards by eye care specialists. This calls for more commitment on part of eye care specialists as well as government, non-governmental organisations and other stake holders in eye care sector so as to improve the awareness. Education could also play significant role in the understanding of the benefits and limitations of each refractive errors' management options and paves way for informed decision on the best, based on individual's needs and preferences [16]. Above all, education could greatly enhance the quality of life of individuals with vision challenges through adequate knowledge of refractive errors and its corrective methods.

Barriers are factors that pose as limitations to the utilisation of a particular object, in this context,

spectacle lenses for correction of refractive errors. In this study, the respondents believed the following as barriers to spectacle use: 'it is very expensive 88.6%'; it prevents normalisation of vision 84.4%'; and 'it is stigmatising 75.6%'; 'it makes one look old 66.2%'. Others include: 'teasing by others for wearing spectacles 67.8%'; 'it doesn't make any difference in their vision 65.2%'; and 'it makes one depend on it 57.3%' (Table 4).

The expensive nature of spectacles revealed in this study was in tandem with the studies conducted in Zaria, Nigeria; Mozambique, and Igabi, North-western Nigeria respectively [10, 13, 14]. In these areas, the respondents stated that high cost was responsible for non-purchase and use of spectacle lenses. The high cost of spectacles noticed in this study could be attributed to the effect of public-private-partnership (PPP) engaged upon by the hospitals for the provision of glasses, where every participant in the business network wants to make gain, thereby raising the cost of services. It could also be attributed to the rising inflation in the country attributable to the currency devaluation against the dollar that affects the prices of hospital consumables and other services. Therefore, frantic effort should be made by the Federal Ministry of Health and other Health Care Agencies and Parastatals to incorporate the provision of spectacle lenses into the National and Social health insurance scheme for easy accessibility and affordability by the masses. On the other hand, the general populace should be encouraged to enrol into the scheme for easy access to health care services. The concept of spectacle stigmatisation, teasing, makes no difference in vision, prevents normalisation of vision, and it makes one depend on it, was supported by the studies carried out in Ghana, and India respectively [11, 23, 29]. These misconceptions towards spectacle use might be related to ignorance, lack of socialisation, and insufficient knowledge of information concerning the benefits spectacle offers in the management of refractive errors. It could also be associated with past experience of the use of incorrect prescription, ill-fitting or uncomfortable spectacle lenses leading to discouragement in using them regularly. It could also result from dearth of eye care specialists to provide the need enlightenment concerning spectacle lens and its benefits. In addition, cultural beliefs could as well be a factor. In some cultures, wearing spectacle lens could be perceived as a sign of weakness, aging or visually handicapped, which could discourage individuals from using them even if they need then for clearer vision. In this regard, adequate eye care practitioners should be engaged by the government and private sector both at urban and rural areas to provide eye care services to the masses and at the same time enlighten them on the benefits associated with spectacle lens use in the management of refractive errors. By this means, misconceptions, disinformation or distorted facts, negative perceptions, along with long-standing stigmas associated with spectacles lenses use among the public could be averted.

Conclusion

Generally, the results of this study revealed that the respondents had moderate knowledge of refractive errors and its corrective methods, with age and educational level as contributing factors. It also showed that spectacle lenses still remained the most popular method of correcting refractive errors; as they are cost effective, simple, non-invasive and most widely acceptable due to its high success rate in terms of visual acuity, and improved quality of life. However, the most significant barriers to spectacle utilisation were high cost, stigmatisation, and misconception of drugs as a corrective measure of refractive errors. Hence, adequate counselling and enlightenment in that regard should be intensified to nip such an erroneous belief in the bud. The following limitations should be taken into consideration in analysing the results of this study. The descriptive survey design nature of the study makes it impractical to generalise the outcomes to all patients or the general masses in Bauchi State. Besides, difficulties may arise in accessing some of the sources due to sites upgrades or maintenance. Furthermore, since the study only included patients accessing refraction test, and age range of 18years and above, opinions of those below 18years were not included; therefore, may be different. Further limitation to the study is that it was not designed longitudinally, which would have given room for longer observation of respondents and the understanding of various refractive errors' management methods and implementation of the most efficient option. One of the strengths of this study was that it was comprised of males and females' respondents from all walks of life (That's is young and elderly, of different educational, economic, professional and social background), and their ever willingness in partaking in the study. Recommendations:

- The government and stakeholders in the eye care sector should intensify counselling and enlightenment programmes about refractive errors, benefits of its management methods and regular eye check-ups through various channels such as mass and social media, public health experts and schools. This will help in early detection of avoidable visual impairments and also correct misconceptions and fallacies about refractive errors and spectacle lens utilisation, even among the educated mases.

- The misconception by the respondents that drugs, exercises, fasting and prayer could take care of refractive errors, should be a wake-up call to eye care professionals, to intensify enlightenment in that regard in order to dispel such erroneous belief; and educate them on other ways of refractive errors correction such as photorefractive surgery, and contact lens.

Contribution of authors

James, Iliya Kyamru (Ph.D): He served as a supervisor to the project. He also played a significant role in the data analysis and interpretation as well as organising and proofreading the article to the final submission. Collins Onyeahiri (OD) and Agho Felicia Omere (OD) play critical roles data collection, presentation as well as drafting of the article and discussion of findings.

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Conflict of Interest

We hereby declare having no conflict of interest.

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