A Community based Cross - Sectional Survey to Assess the Conditions of Refractive Error & Cataract by Eye-Screening Program in Remote Areas of Northern India

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Abstract: Introduction: It is a state in which optical system of the eye fails to adjust to bring parallel rays of light to focus on proper place (fovea) and the size of the eyeball either increases or decreases because age factor which effects the eye focus. The global estimate of the total number of people of all ages with visual impairment is 253 million of which 36 million are blind. It is also estimated that 82% of people living with blindness are aged 50 and above. Studies from urban India suggest that 49.3 million of those aged ≥15 years may have refractive errors. Cataract is the leading cause of blindness in Africa, affecting an estimated half of the seven million blind people in that continent. Many studies confirmed that the high burden of blindness due to cataract in the Indian population especially in the older age group. So the objective of our study is to measure the significance and analyse the percentage of refractive error and cataract at varying age group (0-19), (20-39), (40-59), (60+) and to make awareness about these conditions in remote areas of Saifai town. Material & Method: A community based cross sectional survey was done in the remote areas covering an area of 5 km. A rural program for control of blindness was conducted from December 2015 to March 2016. Out of 1700 patients a total of 1032 patients were included in the study of varying age groups i.e. (0-19, 20-39, 40-59, 60+). The research design used for this study is systemic random sampling without repetitions (SRSWOR). Result and Discussion: The average mean of the age group 0-19 years was found to be 33.33% and for 20-39 was found to be 13.66% for 40-59 year the mean value calculated was 27.80% and for the age group above 60 the calculated average mean was found to be 25.56%. The female responders were found more 48.83% without refractive error and Cataract as compared to the male responders 40.40% in the age group 0-19 years. 22.96% responders were diagnosed with refractive error with the prevalence more in female 50.63% as compared to male 49.36% among all age groups, out of 507(29.74%) , the cataract rate was found to be more in male 53.74% than in females 46.25% (%). Conclusion: The study reveals that the older adults above 60 years have high prevalence of cataract an early diagnosis can prevent it from secondary complications like glaucoma etc. The prevalence of refractive errors was found more in the age group of 40-59 years thereby there is a need of eye care including early diagnosis and timely interventions for promotion of eye health at community level. There must be regular 6 month eye screening program for all the age group and mainly focusing on 40-59 years.

Keywords: Refractive error, Eye screening program, Myopia, Hypermetropia, Astigmatism, Cataract

1. Introduction

The refractive error is a condition in which the size of the eyeball either increases or decreases because age factor affect the eye focus. In this the light rays do not fall on the retina. It falls either in front or behind the retina. Children forms one of the main age groups requiring attention to refractive errors because of the high prevalence of myopia, Hypermetropia and astigmatism [1]. It is the most common cause of visual impairment and the second most common cause of blindness in the world. The global estimate of the total number of people of all ages with visual impairment is 253 million of which 36 million are blind [2]. The important causes of visual impairment are uncorrected refractive errors (43%) followed by cataract (33%). About 217 million people have low vision in the world,[3] .There are mainly three types of refractive error known a) Myopia (Short sightedness).b) Hypermetropia (Long sightedness) c) Astigmatism. The Vision 2020: the Right for Sight has one of its aims to eliminate visual impairment visual acuity less than 6/18 and blindness due to refractive errors or other causes of low vision.

Myopia is a common cause of visual impairment which is usually acquired and nearly always progressive. It rarely occurs before the age of 5 years and new cases appear throughout childhood and adolescence particularly between the ages of 6 to 15 years [1].

Hypermetropia is a condition in which the light rays fall behind the retina when the eyeball is at resting position. it is a leading sight problem with near vision. Astigmatism is a condition affecting in which the curvature of the cornea (one meridian > than the other Curve). When the cornea has an irregular shape it is called as corneal astigmatism and when the shape of the lens is distorted it results in lenticular astigmatism which results blurred or distorted vision [5].

Cataract is the leading cause of blindness in Africa, affecting an estimated half of the seven million blind people in that continent [4]. This number is likely to increase substantially, as approximately 600 000 Africans become blind from cataract each year. Many studies confirmed that the high burden of blindness due to cataract in the Indian population especially in the older age group [6] with estimates of a 5% or more prevalence of cataract blindness in those 50 years of age and older [7] [15]. The area which we have taken in our study is purely a rural area in which people are not aware about the complications which might be possible because of various eye conditions like refractive errors, cataract etc so
the objective of our study is to measure the significance and analyse the percentage of refractive error and cataract at varying age group (0-19), (20-39), (40-59), (60+) and to make awareness about these conditions in remote areas of Saifai town.

2. Materials and Methods

The study was conducted around the areas of up University of medical sciences, Saifai Etawah in the community outreach. The verbal consent for conducting this study was obtained from the concerned villages and schools and from the respondents. Patients who were diagnosed with refractive error and cataract and fulfilling the following inclusion and exclusion criteria will be selected for the study after obtaining informed written consent. The patient included in the study were a) between the age group 0-19, 20-39, 40-59 & 60 above patients [10] [19]. b) Refractive Error like Myopia, hypermetropia & Astigmatism. C) Cataract. d) Both males and females. e) Ratio of Normal visual acuity f) Hypermetropia with +1DS and that of astigmatism (> +0.75D) [11] The respondents with organic defects in eye such as corneal opacity, choroid and retinal disorders, Pterigium, Glaucoma, hypertensive and diabetic, myopia of (-25DS) , (-0.50DS) [11] and mentally retarded patients were excluded from the study. The Subjective assessment and evaluation was done in the campaign area for detecting various eye conditions like refractive error and cataract. The screening was done from a six meters distance on a Snellen’s chart. Those with visual acuity less than 6/9 were subjected for refraction test. The cataract condition was examined with the help of ophthalmoscope and torch light. For objective refraction the respondents were asked to visit the tertiary eye care hospital for diagnosing the cataract conditions and for retinoscopy test followed by cyclopegic refraction when the best corrected visual acuity could not be achieved. Post diagnosis with refractive errors and cataract the patients were asked to complete the pre-designed, pre-tested questionnaire focusing on socio-demographic variables. After considering about the inclusion and exclusion criteria, 1032 subjects were randomly selected without repetitions (SRSWOR). The sample size is calculated using an average mean showing the prevalence of refractive error and cataract among varying age groups of 0-19, 20-39, 40-59, 60+ years of both genders in order to examine the frequency of Normal , Refractive errors and Cataract among general population in the areas of Saifai.

3. Result and Discussion

The study population comprised of 1032 patients of varying age groups visiting to the eye screening programme around 5 km range of Saifai Medical University UPUMS Saifai, Etawah (UP). Out of total 1032 respondents examined, Male ratio was higher 51.64% as compared to female ratio 48.35%. (Graph 2.1)
Table 1.2 shows that post assessment, female responders were found more 48.83% without refractive error and Cataract as compared to the male responders 40.40% in the age group 0-19 years.

There are many population-based studies on the proportion of refractive errors[15], [16], [17] and these studies mainly focus on the pattern of refractive errors and various aspects of visual impairment in different parts of the world. As refractive error is an established public health problem and therefore it is essential for all the primary care physicians to know the magnitude and type of refractive errors in the community [12] [18]. Table 1.3 shows that out of total population; 22.96% responders were diagnosed with refractive error with the prevalence more in female 50.63% as compared to male 49.36% among all age Groups. The refractive error was found more in the age group 40-59 years [20.35% male > 21.75% female]. The overall incidence rate in India has been reported to vary between 21% and 25% in patients attending eye outpatient departments [8]. Acc to mattha et al the overall prevalence of refractive errors was found to be 12.5% [9]. Refractive error, especially myopia, is a common problem in the young people, more so in the student community [19].

[Table 1.4] [Graph 2.4] shows the prevalence of Myopia, hypermetropia and astigmatism. The prevalence of myopia in our study is found to be 50.63% and is seen more in male 66.67% than female 33.33%. The age group commonly affected is 20-39 years with 37.5% and in person with age group 40-59 years 29.16%. Midelfart and colleagues (2002) reported a prevalence of myopia 35.0% in persons aged 20-25 years and a prevalence of 30.3% in persons aged 40–45 years [13]. The prevalence of hypermetropia in our study is 21% seen in males (57.69%) more females (42.30%) and is highest in the age group Above 60+. It increased till 59 years and then decreased with increasing age. Similar trend has been found in some population-based studies [14] [19]. The proportion of astigmatism in our study is 27% seen more in females (38.46%) than males (61.53%). The age group commonly affected is 20-39 years. In many population-based studies astigmatism was found to be the most common type. [20] [21].

Table 1.2: Table showing average mean of refractive error and cataract in different age groups

<table>
<thead>
<tr>
<th>S.No</th>
<th>Gender</th>
<th>Age Group</th>
<th>Normal Cases</th>
<th>Refractive Error</th>
<th>Cataract</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Male</td>
<td>0-19</td>
<td>40.40%</td>
<td>2.90%</td>
<td>0.87%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20-39</td>
<td>39.71%</td>
<td>11.34%</td>
<td>1.41%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40-59</td>
<td>18.94%</td>
<td>20.35%</td>
<td>11.22%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60+</td>
<td>1.90%</td>
<td>12.59%</td>
<td>47.70%</td>
</tr>
<tr>
<td>2</td>
<td>Female</td>
<td>0-19</td>
<td>48.83%</td>
<td>6.10%</td>
<td>0.87%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20-39</td>
<td>27.65%</td>
<td>17.73%</td>
<td>2.12%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40-59</td>
<td>9.47%</td>
<td>21.75%</td>
<td>18.24%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60+</td>
<td>0</td>
<td>4.58%</td>
<td>32.44%</td>
</tr>
</tbody>
</table>

Table 1.3: Table showing average mean of types of refractive errors and cataract among male and female population

<table>
<thead>
<tr>
<th>Cases</th>
<th>No of Cases (N=237)</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refractive Error</td>
<td>Myopia</td>
<td>120(50.63%)</td>
<td>80(34.67%)</td>
</tr>
<tr>
<td></td>
<td>Hypermetropia</td>
<td>52(21%)</td>
<td>30(57.69%)</td>
</tr>
<tr>
<td></td>
<td>Astigmatism</td>
<td>65(27%)</td>
<td>25(38.46%)</td>
</tr>
<tr>
<td>Cataract</td>
<td>307(29.74%)</td>
<td>165(53.74%)</td>
<td>142(46.25%)</td>
</tr>
</tbody>
</table>

Table 1.4: Prevalence of types of refractive errors among varying age groups

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Myopia (120)</th>
<th>Hypermetropia</th>
<th>Astigmatism</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-19 years</td>
<td>22(18.33%)</td>
<td>4(7.69%)</td>
<td>1(0.87%)</td>
</tr>
<tr>
<td>20-39 years</td>
<td>45(37.5%)</td>
<td>8(15.38%)</td>
<td>4(3.33%)</td>
</tr>
<tr>
<td>40-59 years</td>
<td>35(29.16%)</td>
<td>19(36.53%)</td>
<td>12(23.08%)</td>
</tr>
<tr>
<td>Above 60</td>
<td>18(15.50%)</td>
<td>21(40.38%)</td>
<td>13(20%)</td>
</tr>
</tbody>
</table>

Graph 2.4: Graph indicating the percentage of Normal cases, refractive error and cataract in varying age groups

In our study out of 307(29.74%) , the cataract rate was found to be more in male 53.74% than in females 46.25% %), in contrast to certain studies that shows female preponderance; 61.2% in males and 68.5% in females, [23] 49.1% in males and 54.8% in females [24] and is seen more in the age group above 60 (55.37%). It is found that the prevalence of cataract in our study is high as compared to refractive error. Soudarsanane MB et al (1985) reported in his study that the rise in cataract above 50 was seen in a rural community of Puducherry that assessed prevalence of cataract in 30 years to be 24.7% and above 50 years at 75.1%. [22], Murthy GV et al (2001) have reported that the prevalence of blindness among the ≥50-year group ranges from 6% to 11.9% and that cataract is the identifiable cause of blindness in 55% to 70% of the blind, with a VA <6/60 used as the cut-off [26].

In these studies the differences were related to the possible differences in the rate of growth between Male and females. In our study the eye condition cataract was highest among respondents above 60 years of age and is found more in male than female as compared to refractive error among varying age groups and this difference is statistically significant (p=0.00) which is similar to Vashist P (2010) study among older population in India. [25].Table 1.5

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Table 1.5: Association of Socio Demographic Variable with Normal, Refractive error and Cataract condition among study population

<table>
<thead>
<tr>
<th>Socio Demographic Variables</th>
<th>N=1032</th>
<th>Normal Cases</th>
<th>Refractive Error</th>
<th>Cataract</th>
<th>Chi df P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-19</td>
<td>307(29.24%)</td>
<td>31(9.91%)</td>
<td>66(1.74%)</td>
<td>510.097</td>
<td>6 0.00</td>
</tr>
<tr>
<td>20-39</td>
<td>95(56.73%)</td>
<td>41(29.07%)</td>
<td>5(3.45%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40-59</td>
<td>81(28.42%)</td>
<td>120(42.10%)</td>
<td>84(29.47%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60+</td>
<td>5(1.90%)</td>
<td>45(17.17%)</td>
<td>212(81.81%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Conclusion

The study reveals that the older adults above 60 years have high prevalence of cataract. Many studies reveal that cataract was found above 40 years of age in both genders [7][25][26]. The main cause can be the senile one and to prevent form further deteriorations a regular 6 month examination with early diagnosis can prevent it from secondary complications like glaucoma etc.

The prevalence of refractive errors was found more in the age group of 40-59 years thereby there is a need of eye care including early diagnosis and timely interventions for prevention of permanent disabilities, and for promotion of eye health at community level. There must be a provision of affordable corrective services which includes regular 6 month eye screening program for all the age group and mainly focusing on 40-59 years.

There must be more researches in these conditions in order to determine the magnitude of the problem and what all resources are needed to solve the problem of refractive errors and cataract conditions. So that we will be very near to achieve the goal of Vision 2020.

5. Acknowledgements

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6. Conflict of Interest

Authors agree that there was no source of conflict of interest.

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Author Profile

Gaurav Dubey, he is currently working as an educator in department of Optometry at Uttar Pradesh University of Medical Sciences, Saifai, Etawah, UP; Presently pursuing PhD in Optometry. He has more than 7 years of experience in academics and completed his post graduation and fellowship from Venu eye Institute; New Delhi. He is also fellow of contact lens from Aligarh and is an active member of IACLE, WCO, OCI & AIOA with license of optometry from MOH Oman.