

Unmet Presbyopia: Unearthing The Iceberg - Reasons And Remedies. A Pilot Study In Rural Dakshina Kannada

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Abstract:

Purpose: To estimate the burden of uncorrected presbyopia in Rural Dakshina Kannada population, accessibility and barriers to spectacle correction and willingness to pay for it. **Methods:** A cross-sectional, pilot survey for assessing the perceived barriers of correction of near visual acuity among 100 presbyopes attending rural eye camps was conducted by a tertiary care centre in Dakshina Kannada. Unaided and pinhole distant visual acuity, near vision was assessed. For the purpose of this study, functional presbyopes were defined as those above 40 years of age who had impairment of near visual acuity of <N8 and who improved by at least one line of visual acuity by placing a plus lens in front of either eye with an uncorrected distance vision of at least 6/12 in both eyes. Met needs, unmet needs and spectacle coverage rate was determined. **Results:** The mean age of participants was 49.79 ±6.25 years. 63% had mild near vision impairment. The unmet need was high (82.6%) and the spectacle coverage was low (34.6%). 82% of the subjects were involved in routine activities/occupation needing good near vision, beedi rolling being the important one. Majority (56%) had to travel more than 10km for procuring spectacles. **Conclusion:** The unmet needs of presbyopic correction was high (82.6%) in the rural Dakshina Kannada population with low spectacle coverage (34.6%). Illiteracy, long distance needed to travel to procure spectacles, low income were the reasons for the high unmet needs. This affected a large number of people (56%) who depended on good near vision for their livelihood.

Keywords: Dakshina Kannada, Presbyopia, Perceived barrier, Spectacle coverage, Unmet needs

I. Introduction

Presbyopia is the loss of accommodation or recession of near point with age.^[1] It is the most common form of visual morbidity in the population above 40 years.^[2] A variety of factors influence the onset of presbyopia such as individual variation in accommodative ability, distant refraction, climate, geographic location, demands and expectations, gender and ethnicity.^[3] Refractive error has been included as a priority in World Health Organization :Global initiative for the elimination of avoidable blindness: VISION 2020. However there is a lack in emphasis on presbyopic correction.^[4]

We aimed to estimate the burden of uncorrected and undercorrected presbyopia in the rural population of Dakshina Kannada and find out the reasons for the same. An interview based semi structured questionnaire prepared by the authors was used to assess the spectacle coverage in the community by assessing the met and unmet needs of presbyopic correction along with the perceived barrier.

II. Materials and methods

The study was conducted in the Dakshina Kannada district which lies in the southern part of the state of Karnataka. The study population was predominantly rural and depended largely on beedi rolling and farming for their occupation and income. A cross-sectional, pilot survey of the perceived barriers of correction near visual acuity was administered by interview method, to patients attending rural eye camps conducted by a tertiary care centre in Dakshina Kannada. The local authorities were responsible for announcing the availability of the health outreach programme, which offered a variety of medical services for all ages. One of the services was a mass-screening program aimed at identifying individuals with uncorrected presbyopia and prescribing them with reading glasses to correct near vision.

The study was conducted over a period of two months. All patients having functional presbyopia attending medical/ophthalmology camps organized by tertiary care centre were included in the study. Institutional Ethics Board approval was obtained before conducting the study. Study population included rural population attending medical/ophthalmology camps organized by tertiary care centre. All patients having ocular problems were examined and treated. For the purpose of this study, functional presbyopes were defined as those above 40 years of age who had impairment of near visual acuity of <N8 and who improved by at least one line of visual acuity by placing a plus lens in front of either eye with an uncorrected distance vision of at least 6/12 in both eyes. After eliciting the history, the patients were subjected to testing of distant visual acuity with the

help of the Snellens chart at a distance of 6m under appropriate illumination. Subjects with vision of 6/12 or better were subjected to near correction. Near vision was assessed at a standard distance of 33 cm in outdoor illumination with the help of Roman type near vision chart, depending on patient preference and/or literacy level near correction was given. Retinoscopy was not performed. In subjects who were already having spectacles near vision with spectacles was assessed. Those with uncorrected vision worse than 6/12 were referred to the hospital for dilated retinoscopy and correction. The anterior segment was assessed using torch light. Posterior segment was examined in a dimly lit room, using a direct ophthalmoscope through an undilated pupil. Those above the age of 40 years having near vision problem were invited to take part in the study after obtaining the written informed consent. Those without any known ocular morbidity as determined by both history and a screening examination were included in the study. The examination was performed by a single ophthalmic medical officer. The validated semi- structured questionnaire was administered by interview method by the primary investigator in the local language. Data about basic demographics, the activities affected by poor near vision, and subject's perceived barriers hindering the seeking of appropriate treatment were obtained. The total unmet need of presbyopia was assessed as the sum of population above 40yrs not using spectacles for near vision and number of people not comfortable with current pair. Spectacle coverage (Presbyopic spectacle coverage PCC) was calculated in the following manner: $PCC (\%) = 100 \times (\text{met needs of presbyopia}) / ((\text{met needs}) + [\text{unmet needs}])$. The "met need" was defined as including those persons with functional presbyopia and had spectacles that allowed near vision to improve to N8 or better. Unmet need was defined as including those with near vision <N8 due to functional presbyopia who did not have near-vision corrective spectacles or who did not improve with the current near vision spectacles.

Patients were then classified according to the classification of near vision impairment provided by the International Agency for Prevention of Blindness (IAPB) Refractive Error Program Committee which has also been used by WHO ⁽⁵⁾

1. Mild NVI: presenting binocular near vision <20/40 to 20/63
2. Moderate NVI: presenting binocular near vision <20/63 to 20/200
3. Severe NVI: presenting binocular near vision <20/200 to 20/400
4. Near vision blindness: presenting binocular near vision <20/400

III. Results

100 presbyopes were included in the study. The age distribution of participants is as indicated in fig 1.

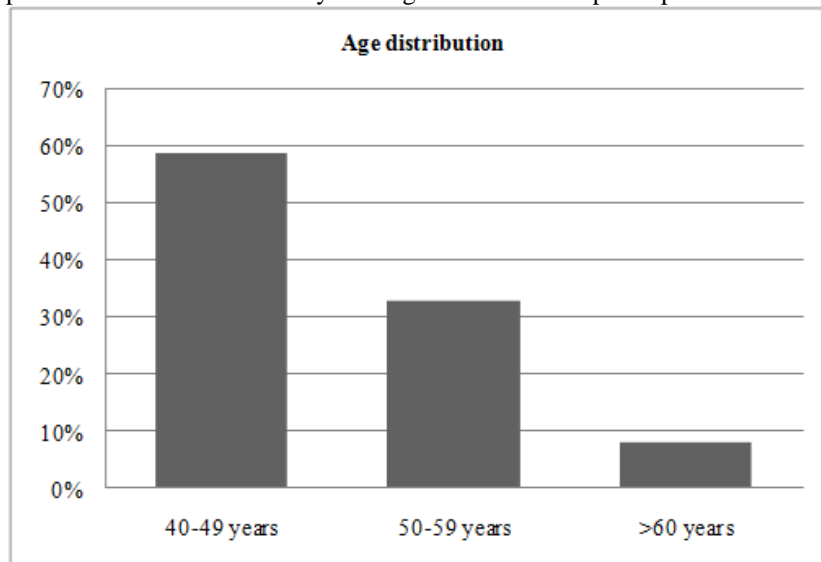


Figure 1

Mean 49.79 ±6.25 years. There was no significant gender difference. Most were illiterate (fig 2) and 56% had near work dependent occupation (fig 3).

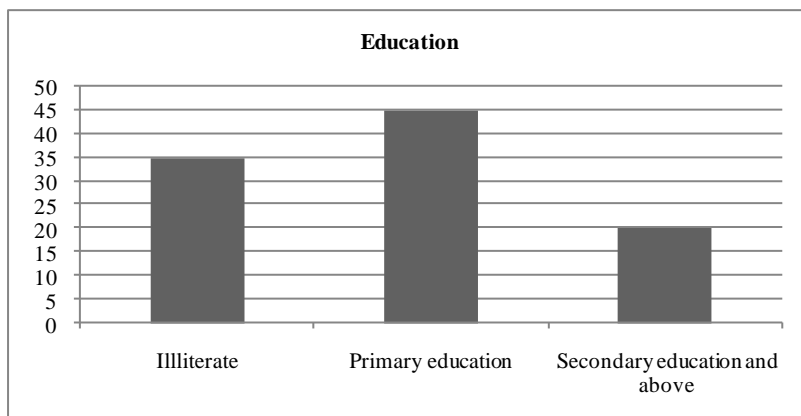


Figure 2

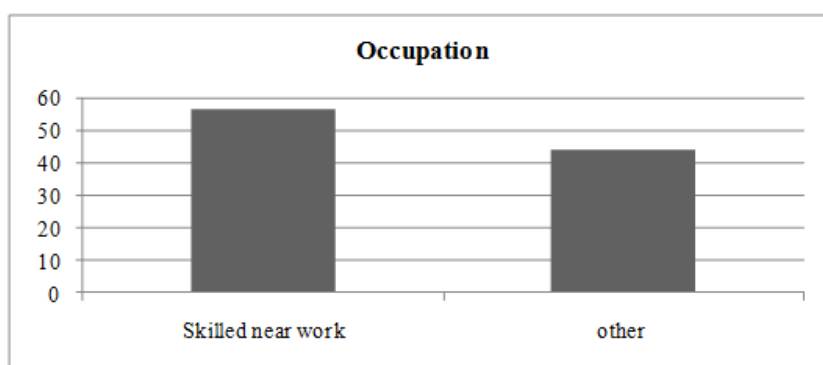


Figure 3

Most of the presbyopes had mild near vision impairment (fig 4) according to IAPB classification. 54 % did not use near vision spectacles for reduced near vision.

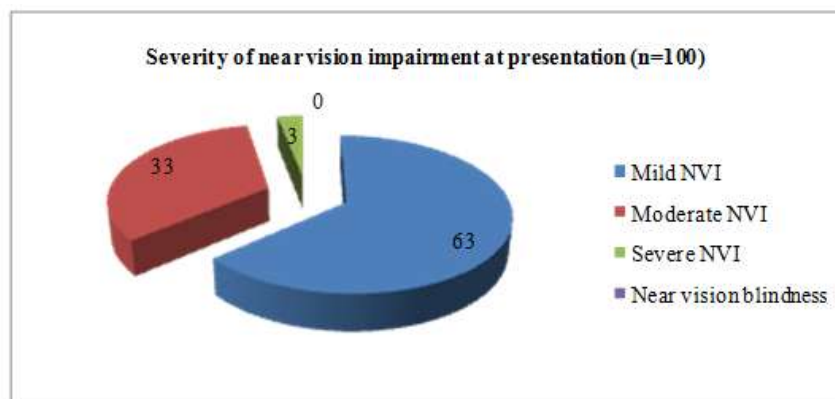


Figure 4

Out of the 46 % who were using spectacles for near 29% were not comfortable with the current pair. 20% of them hadn't got any eye testing done nor changed their glasses for past 4 years. Hence 17% indicated the met needs and 83 % unmet needs of presbyopia. The spectacle coverage rate was 36.95(Table1).

Table 1

	Met needs	Unmet needs	Spectacle coverage
MALES	11	34	23.9%
FEMALES	6	49	10.9%
Total	17	83	

As shown in the monthly income graph (fig 5) most earned between Rs 1000-5000 per month.

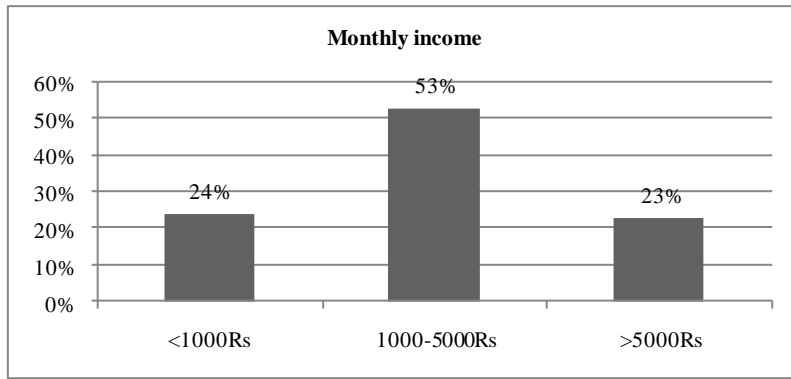


Figure 5

82 % of the subjects were involved in routine activities/occupation needing good near vision. Most common day to day activities that demanded near vision is represented in the graph (fig 6).

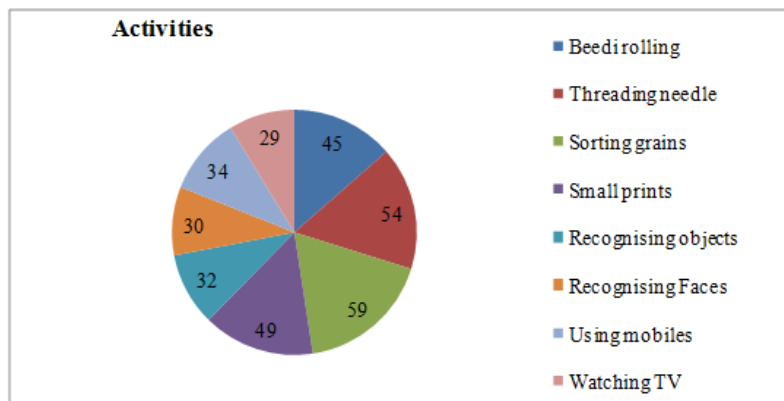


Figure 6

Assessment of the questionnaire revealed that most of the female presbyopes depended on near vision for income/occupation beedi rolling being main one in the rural part of the district. Assessment of perceived barrier revealed that 58% of presbyopes cited both lack of finances and distant location of eye care centres as commonest reasons for not procuring appropriate spectacles. 30% felt that mainly cost and 12% felt that mainly distance was the main barrier for procurement of spectacles (fig 7).

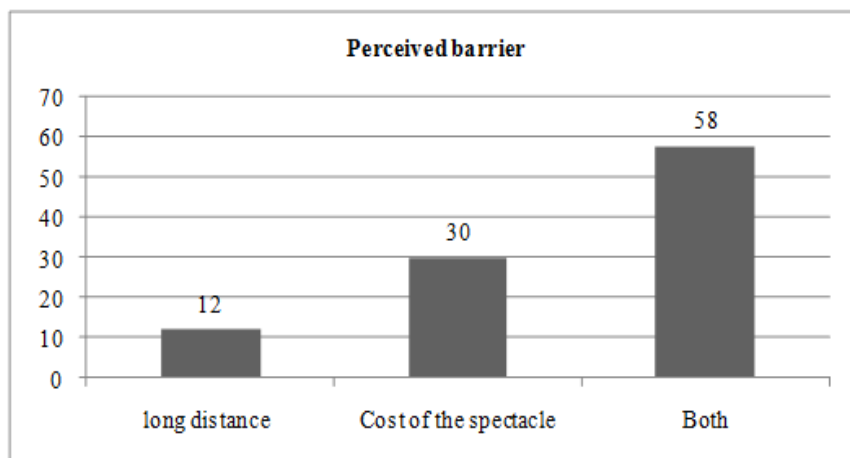


Figure 7

Majority had to travel for more than 10km for procuring spectacles (fig 8).

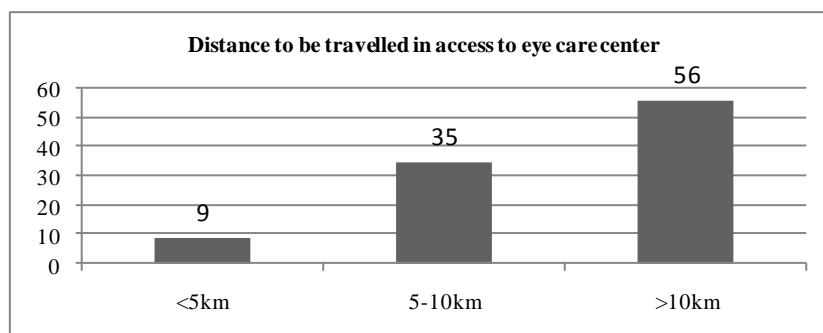


Figure 8

IV. DISCUSSION

Global estimates of the number of people with uncorrected presbyopia are very limited. It was estimated that 1.04 billion people were presbyopic, 517 million of whom were without adequate correction in 2005.^[6] With increasing population, age, literacy and life expectancy the need for presbyopic spectacles correction is bound to increase. The onset and degree of presbyopia may vary depending on climate, geographic location, sex, and ethnicity. However, studies have not always adequately adjusted for confounding factors.^[6,7,8,9] Functional presbyopia is associated near vision impairment. Population based studies have reported a prevalence of presbyopia in developing country ranging from 43.8% in Timor-Leste^[2], 58.9% in Tanzania^[10] to 67.3% in China^[5]. Prevalence of presbyopia was not calculated in this study as it is not a population based study. The impact of presbyopia may vary in rural and urban area and hence perceptions too. In rural areas, they usually do not carry out near vision activities at night because of poor access to electricity resulting in poor lighting conditions. Hence they might report fewer complaints relating to undercorrected presbyopia. Also villagers are less likely to be involved in high-concentration near vision tasks. Males had a slightly better spectacle coverage (52%) than females (46%). Spectacle use was similar in both the genders in two of the earlier studies conducted in South India.^[10,11] Most uncorrected/undercorrected presbyopes in this study were either illiterate or only had primary school education. In population based studies in India^[12,13] and Nigeria^[14], no association was observed between presbyopia and education. On the contrary, Tanzania^[10] had a higher prevalence of presbyopia among more highly educated subjects. Possibly because of a higher demand for concentrated near work would uncover more of presbyopia. In the Zanzibar study^[15], univariate analysis, urban location, higher education, and certain occupations were significantly associated with met need. Multivariate analysis showed that being educated to the secondary level remained independently associated with owning presbyopic correction.

1.1 Occupation and Presbyopia:

Among the presbyopic rural DK population included in our study 83% did not have adequate presbyopic correction. Spectacle coverage rate among these individuals was 36.95%. Studies have shown a high prevalence of presbyopia in the developing areas with low spectacle coverage^[14]. Studies have also shown that presbyopia is associated with difficulty in near vision-related tasks, some of which may influence one's ability to earn a living a finding similar to our study^[16]. Most of the presbyopes with unmet needs (59%) in this study were in the 40-49 years, the prime productive age group. In a population dependent on good near vision for their occupation, this could translate into poor productivity at work and reduced income. The prevalence of unmet presbyopic needs in a few other developing countries was relatively lesser as suggested by other studies northern China^[5] (27.6%), Tanzania^[10] (50.4%) and Timor-Leste^[2] (43.5%). According to the Kenyan study^[17] even a farmer requires good near vision for harvesting grains, weeding and planting seeds. Older farmers may be less productive than younger counterparts because of uncorrected near-vision problems, and this may have wider implications for the community at large depending on the distribution of farming tasks among family members. Ramke *et al.* found an increased probability of having uncorrected presbyopia if residing in a rural domicile, being a subsistence farmer and being illiterate.^[2] Residing in a rural setting may result in poorer access to spectacles and health-care services. Persons who are unable to read or write may be less able to communicate their symptoms, which may delay the diagnosis and consequent management of presbyopia.

1.2 Spectacle coverage and factors related to poor coverage:

Spectacle coverage was low in this population. However, not everyone with presbyopia would necessarily benefit from near vision correction, as evidenced by the numbers who required add but were in the no difficulty group in a Filipino study.^[16] About 70% reported some degree of difficulty and presumably would benefit from near vision correction. Spectacle coverage in our study was 36.95%. It was higher than in the study

in Zanzibar where among the 381 individuals examined, 340 needed spectacles for presbyopia, but only 60 had them (coverage-17.6%). It exceeded that reported in studies in other developing countries like China, Timor-Leste, Kenya, and Tanzania which were in the the range 17.6% to 26.2%.^[2,18,10] In this study the high rate of illiteracy, low income, correlates with low spectacle coverage. In the Timor-Leste study the “Presbyopia Correction Coverage” (PCC) was 26.2%^[2]. Lower correction coverage was associated with rural domicile and illiteracy. In the Bangladesh study^[16], spectacle coverage was 25.2% for a 6/12 cut off. Spectacle coverage among those living in rural areas was 15.9% for the 6/12 cut off. While in urban residents, these values were significantly higher at 58.8%. In the Kenyan study^[17] functional presbyopia was found in 111 participants (85.4%). Among participants with functional presbyopia, 5.4% wore reading glasses. The unmet presbyopic need was 80%, met presbyopic need was 5.4% and presbyopic correction coverage was 6.3%.

1.3 Barriers to spectacle correction:

In this study the distance needed to travel to procure glasses as well as the cost of procuring glasses together was the main barrier to access adequate presbyopic spectacle correction. More than 50% had to travel more than 10km distance to procure spectacles. Only 13% had an income of Rs 5000 and above (fig 6 & 9). It also explains the reason why most of them (20 out of 46) who used spectacles changed them after a four year or more interval. In a study conducted in Timor-Leste^[2] and Andhra Pradesh^[12] in India, the cost of spectacles and lack of felt need or perceived need were the commonly reported barriers for uptake of spectacles^[14]. In Northern rural China the principle barrier to accessing presbyopic correction was poor spectacle quality^[5] while in another study in rural China^[5] reported lack of knowledge about their condition and/or its correctibility was the barrier. In the east African study,^[15] out of 280 participants interviewed, the commonest reasons cited were that spectacles were not regarded as a high priority (33%), lack of money (30.6%), and lack of awareness that their near vision could be improved (14.6%). There were no sex or age group differences. The main reasons for no longer having spectacles were that they were broken (41.7%) or lost (41.7%). Spectacles were not replaced on account of cost (54.6%) and distance (27.3%). Cost was also the main reason why participants given a prescription had not collected their spectacles (29.6%).^[15] In the Kenyan study^[17] cost was cited as the main barrier to spectacle use in 62% of participants with presbyopia. Most of them procured near vision spectacles from camps (40% i.e.20 out of 46] or spectacle shops (33% i.e. 17 out of 46). Very few sought opinion from ophthalmologists (medical colleges or private practioners).

The results of this study have practical implications for programme planners of visual morbidity prevention programs. In an Indian population of 1.28 billion, 83.3% of them live in rural areas. 13.5% fall into the age between 45-64% with average life expectancy being 68.46 years^[4]. Based on this demographic data, approximately 16 million adults in rural India are likely to be affected by functional presbyopia. More population-based studies are required to extrapolate the data to the general population, so that a sustainable programme may be developed to relieve the burden of presbyopia. Integration of primary eye care into primary health care would improve the situation in rural areas. At the end of the study we suggest distribution of free/subsidized ready-made single-vision glasses through the inclusion of presbyopic correction in the National Programme for the Control of Blindness and through District Blindness Control Society programme as a simple and cost-effective intervention to improve near vision. Presbyopic spectacles may be distributed at Primary health centres, Community health centres, as well as district hospitals. Trading of unused spectacles can be encouraged as it ensure maximum utilization of limited resources. The MBBS Phase III part I students as well as interns must be taught to prescribe simple presbyopic corrections as a part of their curriculum.

V. Conclusion

This study concluded that the unmet needs of presbyopic correction was high (82.6%) in the rural Dakshina Kannada region with low spectacle coverage (34.6%). This resulted in a significant visual impairment and affected the livelihood of a large number of people dependent on good near vision for occupation. The main barriers for procuring presbyopic spectacles were long distance needed to travel as well as the high cost of spectacles when their income was low . We suggest efforts to be made to remediate this problem by focusing on improving, strengthening and utilizing already available resources.

References

- [1]. Pointer S. The presbyopic add. I.Magnitude and distribution in a historical context. *Ophthalmic physiol opt* 15(4), 1995, 235-40.
- [2]. J Ramke, Toit R, Palagyi G, Brain T, Naduvilath, Correction of refractive error and presbyopia in Timor-Leste. *Br J Ophthalmol* 91(7), 2007, 860-66.
- [3]. Holden BA, Fricke TR, Ho MS, Wong R, Schlenker G, Cronje S, Burnett A, Papas E, Naidoo KS, Frick KD, Global Vision Impairment due to Uncorrected Presbyopia, *Arch Ophthalmol* 126(12), 2008,1731-39.
- [4]. World Health Organization: Action plan for the prevention of avoidable blindness and visual impairment, 2009–2013. Geneva: WHO Press; 2010

- [5]. Lu Q, He W, Murthy VSG, He X, Congdon N, Zhang L, Li L, Yang J, Presbyopia and Near-Vision Impairment in Rural Northern China, *Invest Ophthalmol. Vis. Sc.*, 52(5), 2011, 2300-05.
- [6]. Holden B Fricke T May Ho S, Global vision impairment due to uncorrected presbyopia, *Arch Ophthalmol* 126(12) 2008,731–739.
- [7]. Miranda M N, The geographic factor in the onset of presbyopia, *Trans Am Ophthalmol Soc.* 77 1979, 603–21.
- [8]. Nirmalan P, Krishnaiah S, Shamanna B . A population-based assessment of presbyopia in the state of Andhra Pradesh, South India: The Andhra Pradesh eye disease study, *Invest Ophthalmol Vis Sci*, 47(6), 2006, 2324-28.
- [9]. Burke A, Patel I, Munoz B, Population-based study of Presbyopia in Rural Tanzania, *Am J Ophthalmol*, 113(5), 2006, 723–27.
- [10]. Dandona R, Dandona L, Kovai V, Giridhar P, Prasad MN, Srinivas M, Population-based study of spectacles use in southern India, *Indian J Ophthalmol*, 50(2), 2002,145–55.
- [11]. Pema R, George R, Sathyamangalam Ve R et al, Comparison of refractive errors and factors associated with spectacle use in a rural and urban South Indian population, *Indian J Ophthalmol*, 56(2) 2008,139–44.
- [12]. Nirmalan PK, Krishnaiah S, Shamanna BR, Rao GN, Thomas R, A population based assessment of presbyopia in the state of Andhra Pradesh, south India: the Andhra Pradesh Eye Disease Study, *Invest Ophthalmol Vis Sci*, 47(6), 2006, 2324–2328.
- [13]. Maramamula S, Keefe J, Rao GN, Uncorrected refractive errors, presbyopia and spectacle coverage: results from a rapid assessment of refractive errors survey, *Ophthalmic Epidemiol*, 16(5.) 2009, 269–274.
- [14]. Chiroma R, Prevalence of presbyopia and the impact of uncorrected presbyopia on the quality of life in rural Gwagwalada, Abuja Nigeria. Msc, 2010.
- [15]. Heidi R, Laviers HR, Omar F, Jecha H, Kassim Gilbert C. Presbyopic Spectacle Coverage, Willingness to Pay for Near Correction, and the Impact of Correcting Uncorrected Presbyopia in Adults in Zanzibar, East Africa. *Investigative Ophthalmology & Visual Science*, 51(2), 2010, 1234-1241.
- [16]. Rupert R. A. Bourne; Brendan P. Dineen; Deen M. Noorul Huq; Syed M. Ali; Gordon J. Johnson, Correction of Refractive Error in the Adult Population of Bangladesh: Meeting the Unmet Need, *Investigative Ophthalmology & Visual Science*, 45(2,) 2004,410-417.
- [17]. Sherwin JC, Keeffe JE, Kuper H, Islam A, Muller A, Mathenge W Functional presbyopia in a rural Kenyan population: the unmet presbyopic need *Clinical & Experimental Ophthalmology*, 36(3), 2008,245-51.
- [18]. Wubben JT, Guerrero MC, Salum M, Wolfe GS, Giovannelli GP, Ramsey JD, Presbyopia: a pilot investigation of the barriers and benefits of near visual acuity correction among a rural Filipino population, *BMC Ophthalmology*, 2014 14:9.