

## Correction of Refractive Error: Adolescents' Choice

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### Abstract

**Objectives:** To identify methods of refractive error correction preferred by adolescents in the rural region of India.

**Materials and Methods:** A quantitative cross-sectional, questionnaire-based study was conducted to investigate the choices of refractive correction among teenagers in the junior college, rural district of India. A purposive sampling was done to complete the required sample size. Inclusion criteria for the study was considered as, students who enrolled in the four majors of programme i.e., BiPC (biology, physics and chemistry), MPC (maths, physics and chemistry), HEC (history, economics and civics), CEC (commerce, economics and civics) and Vocational; including CS&E (computer science and Engineering) and A&T (accountancy and taxation). Age ranged from 16-18 yrs. Exclusion criteria; students who were over 18 yrs. were excluded from the study. A self-designed questionnaire was used to obtain the data. Content validation and test-retest were conducted prior to administration of the questionnaire.

**Results:** Total N= 631 participants from four majors were included in the research. The results reveal a 57% of the samples preferred spectacle lens to correct refractive error closely followed by 41.5% of adolescents choosing contact lenses. Contraindication (46.1%) was suggested as a hindrance to the use of contact lens while only 15.5% chose affordability and (38.4%) listed as an occupation is the key factor to not to use contact lenses for correcting refractive error. Most salient features in the research are that more than half of the population considered eye hospital as the healthcare facility to seek in case of inadequate vision.

**Conclusion:** The study concludes that there is a lack of awareness related to primary eye care among the said population, emphasizing the role of eye care professionals in the public health sector.

**Keyword:** Preferences, Refractive Error, Adolescents, Refractive Correction, and Methods.

### Introduction

Globally, an uncorrected refractive error is considered as the central concern of visual impairment including both developing and developed world. In addition, this uncorrected refractive error is predominantly seen in developing countries like India **Resnikoff, S., Pascolini, D., Mariotti, S. P., & Pokharel, G. P. (2008)**. Refractive error can be corrected by various methods like spectacle, contact lenses or refractive surgery. If the refractive error is not optimally corrected it can lead to functional vision deficits in the real-world scenario. In addition, improper refractive correction can lead to visual impairment and loss of productivity of an individual. Moreover, a worldwide figure suggests 153 million populace suffers from uncorrected refractive error, and 161 million are having visual impairment **Resnikoff S, Pascolini D, Mariotti SP, et al. (2004)**. The recent data of Andhra Pradesh eye disease study indicates that 16% of blindness and 46% of visual impairment is attributed by uncorrected refractive error **Dandona R, Dandona L, Srinivas M, et al; (2002)**. However, hardly any studies have been reported on the preferred method of refractive correction among teenagers as per the recent search of Medline.

Furthermore, when it comes to the adolescent's refractive correction status and preferred method of corrective options have hardly been investigated, especially among the rural population. Hence, I would like to investigate the same. To find which is the most preferred refractive option among teenagers when it comes to refractive correction choices. Moreover, the author assures that this research may enlighten the need of future generation's preferences of visual aids.

## **Method**

It is a cross-sectional prospective questionnaire-based study conducted to investigate the preferred method of refractive correction among adolescents. A self-designed and validated questionnaire was applied to acquire the data. The questionnaire was made from the evidence of previous studies. However, hardly any supporting review available with regard to the preferred method of refractive correction among the adolescent age group. The questionnaire comprises of mainly two parts; demographic details – focus primarily on programme enrolled, family history of glasses, gender and age of the participants, the second part includes – the preferred method of refractive correction. The items having both open-ended and closed-ended questions were included. There was a total of ten item was applied. In addition, each test item having single choices of options for the study subjects while answering the research. Total 630 samples were included in the study. Inclusion criteria for the study; the age of the subject between 16 to 18 years were considered. To add further, students who enrolled in the various programme like; MPC (Math's, Physics and Chemistry), BIPC Biology, Physics and Chemistry, HEC History and Economics, CEC Commerce, Economics and Civics, and Vocational (CS&E and A&T) Computer Science and Engineering and Accountancy and Taxation. Furthermore, subjects who are not willing to be part of the study were also excluded from the research. Before administration of the survey into the mainstream content validation and test-retest was conducted to ensure the validity of the questionnaire. The subject experts confirmed the content validation of the questionnaire. Prior to the start of the study, necessary approval was obtained from the concerned college where the students are enrolled. After obtaining the formal approval from the College Board members, the purpose of the study was explained to the participants. In addition, informed consent was obtained from each study subjects. The study protocol was aligned with the Declaration of Helsinki for the research comprises the human being. Likewise, prior to distributing the questionnaire, the voluntary nature of the study was explained to the subjects.

Furthermore, privacy also assured to the participants by ensuring, the data which collected for the purpose of the study only use for scholastic and research purpose. In addition, given the option to the study contestants that, they can withdraw from the study at any point in time. Moreover, later the questionnaire was distributed to the subjects and the required data was collected in a sealed envelope.

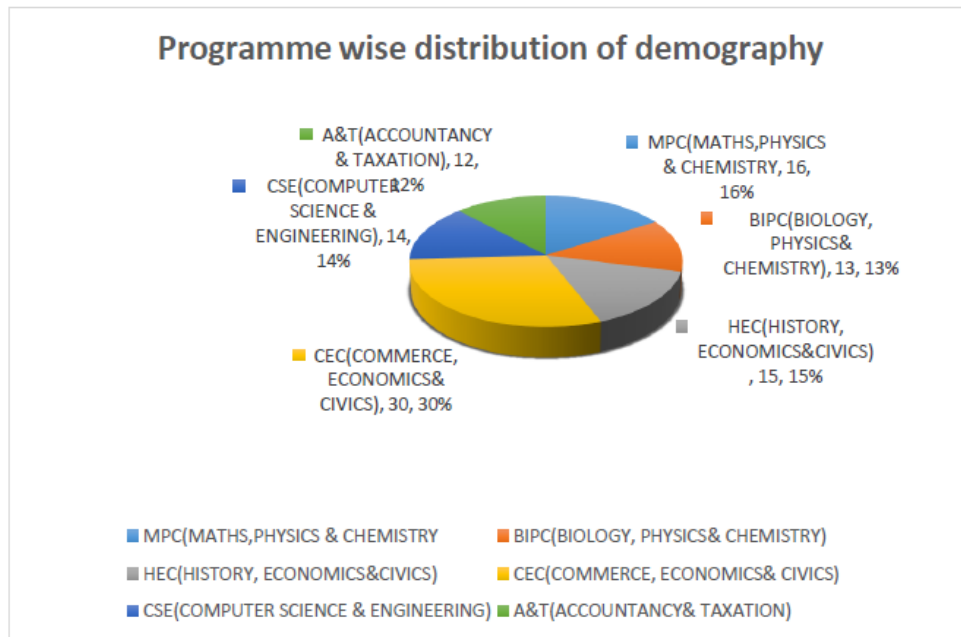
## **Sampling**

A total of N=631 sample were considered for the study. Purposive sampling was applied. All students fulfilling the inclusion criteria were added to the study until the required number achieved.

## **Data management and analysis**

Data were entered by using a Microsoft XL spreadsheet, after the completion of a questionnaire. Later the data was analyzed using a Statistical Package for Social Science (SPSS 10.0.5) (SPSS Inc. Chicago, USA). The descriptive statistics were applied to understand the preferred method of refractive correction.

## Results



**Figure 1.** Shows the demographic distribution, programme wise

The demographic profile of the programme wise enrollment among adolescents in the study, showed a total of five majors were considered for the purpose of the study as follows, MPC (Math's, Physics and Chemistry) 101 (15.87%) Biology, Physics and Chemistry (BiPC) 85 (13.47%), History and Economics (HEC) 93 (14.76%). Commerce, Economics, and Civics (CEC) 187 (29.6%) and the vocational programme consists of another two-sub programme i.e.; Computer Science and Engineering (CS&E) 90 (14.28%) and Accountancy and Taxation (A&T) 75 (11.9%).

**Table 1.** exhibits the programme vs. choices of refractive correction

Programme-wise distribution of preferred method of refractive correction among adolescents																														
Programme	Methods of refractive correction in case of poor vision (%)				Level of comfort using spectacle (%)					Disadvantages of using spectacle (%)			Level of comfort using contact lens (%)				Surgical aspects of refractive correction & its Importance (%)					Disadvantages of Surgical aspects of refractive correction (%)					The frequency of eye examination (%)			Total sample per programme (N)
	Spectacle	Contact lenses	Surgery	Medicine	Neutral	All of the above	Not known	No	Yes	Cosmetic reason	Affordability	Type of occupation	Yes	NO	Neutral	All of the above	Yes	NO	Not aware of	Neutral	All of the above	Cost of the procedure	Fear of complication	Others	Not aware of	All of the above	Once a year	Every six months	Every three month	Grand Total
MP C	36 .5	0. 5	0. 5	0. 5	5 8	0. 8	15 .3	1 7	3. 8	34 1	1. 1	15 3	3 1	9. 2	5. 4	16 2	4. 2	1 3	7. 3	0. 8	19 8	8 1	1 1	28 9	9 0	101				
BiP C	31 .5	1 7	6. 5	2 3	2 5	0. 6	0. 9	1 41	2 24	53 9	1. 9	40. 7	6 6	1 7	14 .8	12 35	7. 4	2 4	0. 8	1 4	16 7	26 .9	1 3	7. 41	42.5 9	34. 3	2 2	85		
HE C	43 9	9 9	0. 8	0. 8	9. 1	0. 6	0. 6	19 4	2 15	35 3	3 3	22. 73	3 3	1 9	8. 5	3 27	6 6	5 5	1 1	1 1	7. 3	19 .8	8. 5	6. 2	36.9 15	15 1	93			
CEC	44 .9	9. 6	5. 4	4 0	2 1	3. 2	1. 1	30 4	4 .5	72 .2	4. 28	32. 6	1 0	1. 6	37 .4	19 18	4 1	7. 5	3 3	1 7	1 9	38 .5	2 0	15 .5	66.8 1	32. 1	1 1	187		
VO C-1	46 .7	1 1	2. 2	4 0	1 9	2. 2	1 38	0 0	4 .9	28 .6	65 56	5. 4	24. 6	3 6	34 .4	11 14	33 45	1 7	3 3	3 1	7. 2	28 0.	15 .5	1 7	0. 8	75 24	24 1	90		
VO C-2	89 5	0. 5	0. 5	0. 4	3 1	0. 6	0. 5	52 5	16 .8	83 90	90 45	45 1	1 1	44 14	14 45	7 7	3 3	1 1	2 1	7. 2	0. 65	1 62	1 4	6. 02	88 1	1 1	75			

\*BiPC- Biology, Physics, and Chemistry, \*MPC- Maths, Physics, and Chemistry, \*HEC-History, Economics and Civics, \*CEC-Commerce, Economics and Civics, \*VOC-1- Vocational-1(Computer Science and Engineering) and \* VOC-2 (Accountancy and Taxation) Quora.com (2018).

Table-1 exhibits the programme wise distribution of preferred method of refractive correction among adolescent. Out of six programmes, comprising 6 major test items higher responses were given by VOC-2 participants and the least response were given by MPC programme students, However, 1 test item showed the lower rate was given by BiPC students. The students who enrolled in VOC-2 express that, most preferred refractive correction in case of poor vision, the choice is spectacle lens (89%) and the least was found in the BiPC. (31.5%). While (52%) of VOC-2 discipline expressed as “NO” to the comfort of spectacle lens usage. Whereas, (15.3%) participants from MPC discipline reported as a minimum. Likewise, the majority of the VOC-2 contestants (83 %) rated as “affordability” is the greatest challenge while going for spectacle lenses and the least was MPC (34%). Similarly, the comfort level of using contact lens opted by VOC-2 “YES” by (45%) and the least by MPC (15%). Furthermore, surgical aspects of refractive correction opted by VOC-2 as “NO” (45%) and the minimum by MPC (16%). However, disadvantages of surgical aspects of refractive correction rated as “fear of complication” maximum by VOC-1(28.8%) and the lowest found in the VOC-2 (0.65%). Most interestingly, (88%) VOC-2 discipline respondents reveal that frequency of eye check will be once in a year. Moreover, (28%) of MPC programme participants answered “fear of complication” as disadvantages of refractive surgery.

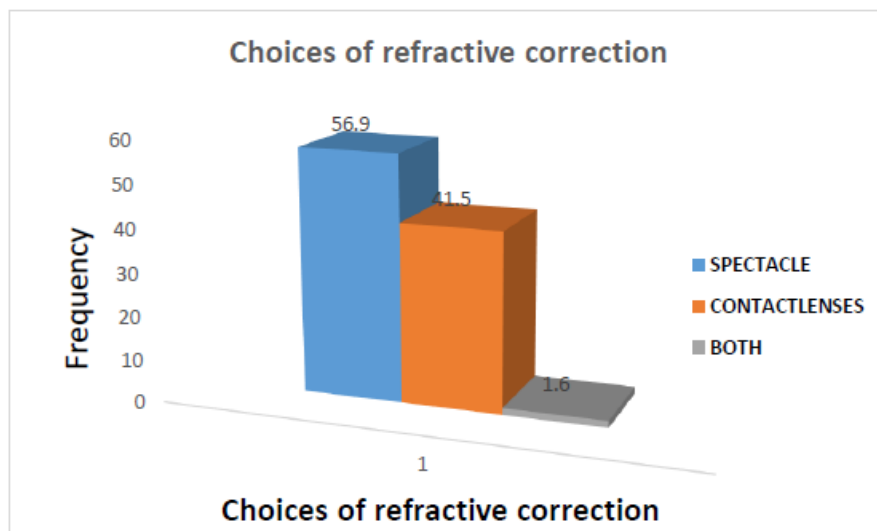


Figure 2. demonstrates the choices of refractive correction

Figure-2 demonstrates the choices of refractive correction in case of poor vision revealed as 359 (57%) of the participants opted spectacle as the preferred choices. While 262 (41.5%) subjects preferred contact lens as the corrective option. Moreover, preferences towards both visual aids towards correcting refractive error found least in number 10 (1.6%).

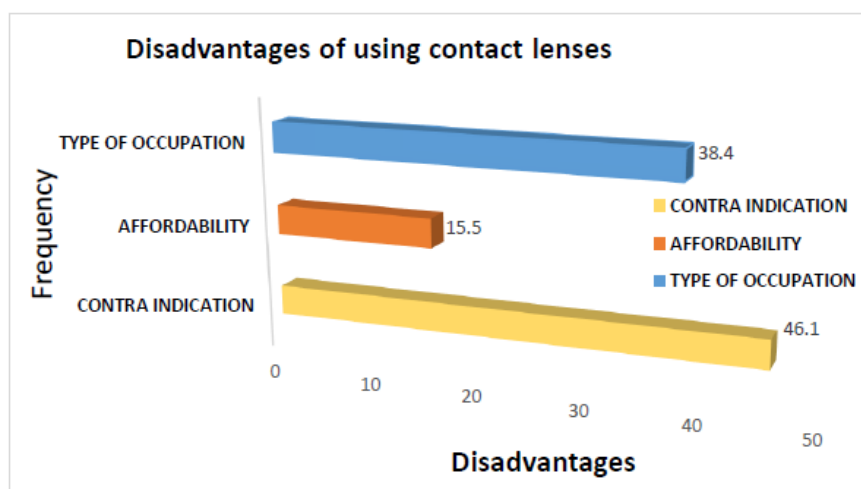


Figure 3. Exhibits the disadvantage of using a contact lens as optical aids

Figure-3: (46.1%) 291) sited contraindication as a hindrance to the use of contact lens while only (15.5%) 98 chose affordability. (38.4%) 242 indicated that the type of occupation of an individual could be a limitation to the use of contact lens.

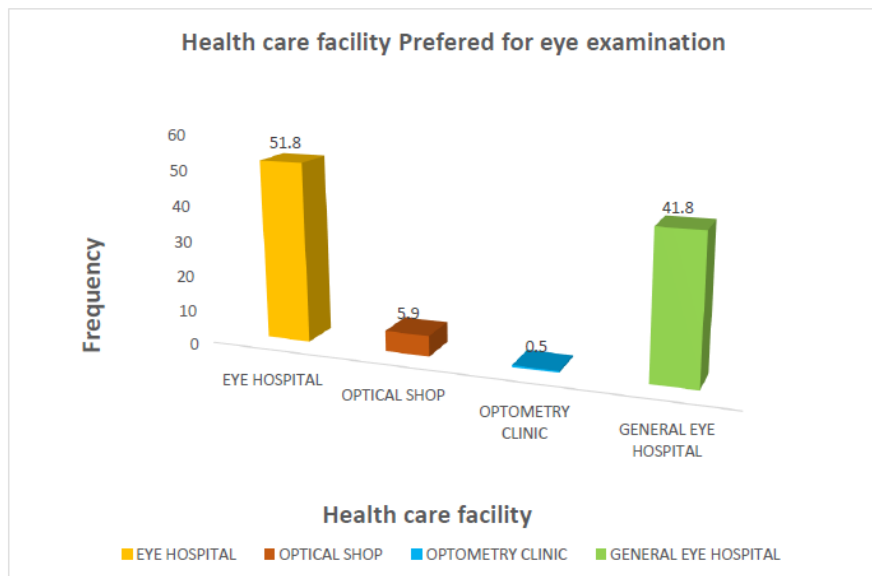


Figure 4. healthcare facility opted for an eye examination

Figure-4 healthcare facility chosen by the enrolled students in the study, highest have opted as eye hospital 327(51.8%) followed by 264 (41.8%) as general hospital, optical shop, 37(5.9%) and only a few members have chosen optometry clinic 3 (0.5%) in the case of poor vision.

## Discussion

As per our knowledge and the recent Medline search, this is the first kind of study to investigate the preferred method of refractive correction among teenagers in the higher secondary school level. Furthermore, it is a population-based study conducted in a rural area mainly focusing on the future generations. Moreover, the investigator firmly believes that the results acquired from this research may have a significant impact on the public health perspective. It is also reported that uncorrected refractive error significantly affects visual impairment and blindness globally. **Bourne, R. R., Stevens, G. A., White, R. A., Smith, J. L., Flaxman, S. R., Price, H., ... & Pesudovs, K. (2010).** Hence, this finding may be vital for correcting a refractive error when it comes to rural children. The present study showed the most preferred options for teenagers with regard to refractive correction is spectacle lenses (N=631) **56.9%**. While contact lens as the choices considered only **41.5%** of the teenagers. Likewise, surgery as a corrective option for refractive error only accepted by 2.5% among all the programmes. In addition, this finding was supported by a study done by **Agarwal, R., & Dhoble; P. (2013)** reported that knowledge with regard to the spectacle as the choices of refractive correction responded by **92 %** when it comes to vision impairment. Whereas in the same study **14%** of the subjects responded towards surgery as the option and similarly contact lens were up to **54%**. Moreover, the present study reveals that glasses are the prime choices of refractive correction, in the case of the rural adolescent is preferences.

Conversely, **46.1%** responded that contraindication to wearing contact lens as a hindrance factor whereas **15.5%** sited affordability. On the other hand, **38.4%** indicated that the type of occupation of an individual could prevent him/her from choosing a contact lens as a corrective measure. When it comes to the choice of healthcare facility for vision care, **51.8%** preferred to use eye care hospital, followed by **41.8%** choosing general hospital. Interestingly, **5.9%** would rather go to an optical shop to get their eye examined in case of reduced vision. However, less than **1%** chose an optometrist. This finding in our study indicated that a huge gap exists with regard to awareness about primary eye care professionals and their role in vision care. Furthermore, with regard to frequency of eye examination was opted by majority of the participant as once in year (**53.5%**), this finding was contradicted in a study conducted by **Taylor, H. R. (2003)**, are reported that, instead of specifying the duration, the routine eye examination was referred depend on the affordability

and impact of vision loss. To add, awareness related to eye examination also focus to educate the community and the future generations, mainly people who belong to the positive family history of a vision-related problem

## Conclusion

To conclude there is a gap existing between the primary eye care delivery system in the rural region and preference of the youth. This can have a negative impact in the community level when it comes to the refractive correction facility by the primary eye care professionals.

## Limitations of the study

Due to the paucity of the time, larger sample size with multiple colleges could have been considered.

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