

Prevalence of Refractive Error among Students of Various Professional Programs at South Bengal, West Bengal, India

Biswajit Mondal¹, Dr. Kavita Bhatnagar², Atanu Maulik³, Himanshu Tripathi⁴, Dr. Manojit Mitra⁵

¹PhD (Scholar), Faculty of Medicine & Allied Sciences, Department of Optometry, Nims University Rajasthan, Jaipur

²Professor & Head, Department of Ophthalmology, National Institute of Medical Sciences & Research, Nims University Rajasthan, Jaipur.

³PhD (Scholar), Faculty of Medicine & Allied Sciences, Department of Optometry, Nims University Rajasthan, Jaipur

⁴PhD (Scholar), Faculty of Medicine & Allied Sciences, Department of Optometry, Nims University Rajasthan, Jaipur

⁵Head, Department of Examinations & University Affairs, NSHM Knowledge Campus, Durgapur

Abstract: *The study was conducted with the primary objective to find out the Prevalence of Refractive Error among students of various professional programs at South Bengal, West Bengal, India and its associated factors. The secondary objective was to assess the association between types of refractive error with gender, age and program they study. This was a cross sectional study conducted in randomly selected young professional college students of different program at South Bengal, West Bengal. A structured Case Record Form was implemented to collect the details of the relevant factors. The respondents were screened for refractive errors through Snellen's chart placed at 6 meters were used to test distant vision. Details of near work and outdoor activities were collected from them. Data were tabulated and analyzed using Statistical package (SPSS) and chi-square test, Cross tabulation and Reliability test to get the results. The prevalence of refractive error showed significant association in univariate analysis with age, gender and various professional program they study. Our Research is consisted with the applications of tools in the domain of Optometry and Ophthalmology.*

Keywords: Refractive error, spectacles, Snellen's chart, visual impairment, Visual Acuity, Cross Sectional, Ametropia

1. Introduction

Refractive errors are the optical state of the eye that can cause eye strain or a decrease in vision. Vision screening plays a vital role for detection of conditions that distort or suppress the normal visual image, which may lead to inadequate performance, even blindness. Ocular examination should be performed at the earlier stage to detect refractive error. Refractive error is the most common condition that needs attention of an Optometrist. Poor vision deteriorates the performance of young people and has a negative impact on future. Ametropias, especially myopia, are common eye conditions worldwide. The development of Ametropia is thought to be the result of interaction between visual environment and heredity. According to the report of World Health Organization (WHO) it is estimated globally that 285 million people are visually imperfect. 39 million are blind and 246 have low vision. 80% of all impaired vision can be prevented or cured. It is prominent that urgent remedial measures on worldwide level are needed to prevent and control the rising levels of unnecessary vision loss. A few studies have been conducted upon the prevalence of refractive error among young population of south Bengal, West Bengal.

The study is being carried out with the following objectives:

- 1) To assess Prevalence of Refractive Error among students of various professional programs at South Bengal, West Bengal, India
- 2) To ascertain if there is any association between type of refractive error with age, gender and program they study.

2. Materials and Methods

Our study was an observational, descriptive and cross-sectional. We employed both simple and random sampling techniques for our study. The students of professional programs of different colleges situated in South Bengal in the state of West Bengal, was determined as the study population. We examined 1500 young students for this study. During the screening we used Snellen's Visual acuity chart both distance and near, trial lens set, occluder, trial frame, Auto refractometer, Ophthalmometer, Heine & Welch Allyn retinoscope. The study period was August, 2016 to July, 2018. Stratified Random Sampling method was applied.

All the students attending colleges in urban area of south Bengal, West Bengal included and the students below 18 years and above 22 years of age, Corneal and lenticular opacities, presence of any ocular infection/inflammation, history of previous ocular surgery, history of ocular injury were excluded from this study. Visual acuity testing was done using the Snellen's chart form six meters' distance. The permission or consent was taken in Informed Consent Form from every participant. A detailed history was obtained from the respondent's, demographic profile like age, gender, program of study, with the general and ocular history. Visual acuity was tested using Snellen's chart for distance as well as near and dry retinoscopy was performed on all the respondents to find out the refractive status. In this study we defined refractive error as, respondents were considered to be myopic when the spherical equivalent was more than or equal to - 0.25D in one or both eyes and

hyperopic when the spherical equivalent is more than or equal to +.25D and astigmatic when the cylinder power is greater than 0.25D. Near visual acuity, near vision chart held at 40cm from the patient and asked them to read, gives the near visual acuity for that patient. Auto-Refractometer was used to measure refractive error, Ophthalmometry was performed and recorded radius of curvature of anterior curvature of cornea. Ethical permission for the study was obtained prior to data collection from Institutional ethical committee of National Institute of Medical Science & Research, Nims University Rajasthan, Jaipur.

3. Results & Discussion

We have studied 1500 young population, studying in various professional programs, out of which 585 were total male respondents and 915 were female respondents. Refractive error diagnosed in 91 Male and 149 female respondents. Refractive error type was Myopia 165, Hyperopia 43, Astigmatism 32 and No refractive error was in 1260 respondents.

In this Research Work, we have combined quantitative as well as qualitative statistical tools. Our Research is consisted with the applications of the following tools in the domain of Optometry/ Ophthalmology, which are explained in brief:

Table 1: Overall Prevalence of Refractive Error

RE Type	Count
1="Myopia"	165
2="Hyperopia"	43
3="Astigmatism"	32
4="No RE"	1260
Total	1500

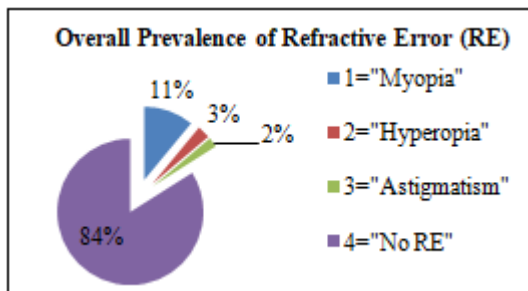


Figure 1: Overall Prevalence of Refractive Error.

Demographic Profile Analysis through Cross tabulation between

Table 2: Age and RE cross tabulation

Age group	RE type count
1="up to 18 years"	88
2="19-20 years"	85
3="Above 21 years"	67

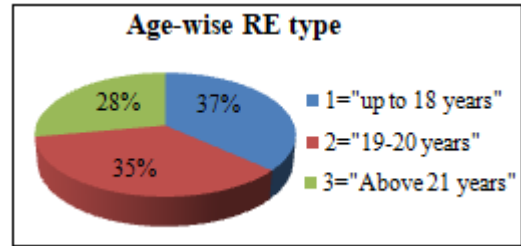


Figure 2: Age-wise RE type excluding No RE

Table 3: Age-wise RE type excluding No RE

		AGE * RE_Type Crosstabulation				Total	
		Myopia	Hyperopia	Astigmatism	No RE		
AGE	up to 18 years	Count	58	19	11	519	607
		% within AGE	9.6%	3.1%	1.8%	85.5%	100.0%
		% within RE_Type	35.2%	44.2%	34.4%	41.2%	40.5%
		% of Total	3.9%	1.3%	.7%	34.6%	40.5%
		Residual	-8.8	1.6	-1.9	9.1	
		Std. Residual	-1.1	.4	-.5	.4	
19-20 years	Count	65	14	6	479	564	
	% within AGE	11.5%	2.5%	1.1%	84.9%	100.0%	
	% within RE_Type	39.4%	32.6%	18.8%	38.0%	37.6%	
	% of Total	4.3%	.9%	.4%	31.9%	37.6%	
	Residual	3.0	-2.2	-6.0	5.2		
	Std. Residual	.4	-.5	-1.7	.2		
Above 21 years	Count	42	10	15	262	329	
	% within AGE	12.8%	3.0%	4.6%	79.6%	100.0%	
	% within RE_Type	25.5%	23.3%	46.9%	20.8%	21.9%	
	% of Total	2.8%	.7%	1.0%	17.5%	21.9%	
	Residual	5.8	.6	8.0	-14.4		
	Std. Residual	1.0	.2	3.0	-.9		
Total	Count	165	43	32	1260	1500	
	% within AGE	11.0%	2.9%	2.1%	84.0%	100.0%	
	% within RE_Type	100.0%	100.0%	100.0%	100.0%	100.0%	
	% of Total	11.0%	2.9%	2.1%	84.0%	100.0%	

Age (Up to 18 years) & RE (Refractive Error)

After cross tabulation among Age and RE it is clearly observed that out of 607 people with the age group of up to 18 years 58 are Myopic, 19 people are Hyperopic, 11 are Astigmatic and 519 do not have any Refractive error.

This is also shown in percentage form. If we observe the % age within Age, then we are observing that 9.6% people are Myopic, 3.1% people are Hyperopic, 1.8% are Astigmatic and 85.5% are having no Refractive error.

If we observe the % age within RE_Type, then we are observing that out of 165 people, 35.2% people are Myopic, 44.2% are Hyperopic, 34.4% are Astigmatic and 41.2% having no Refractive error.

Again If we observe the % age of Total, then we are observing that, 3.9 % people are Myopic, 1.3 % are Hyperopic, 0.7 % are Astigmatic and 34.6 % having no Refractive error.

Age (19-20 years) & RE (Refractive Error)

After cross tabulation among Age and RE it is clearly observed that out of 564 people with the age group of 19-20 years 65 are Myopic, 14 people are Hyperopic, 6 are Astigmatic and 479 do not have any Refractive error.

This is also shown in percentage form. If we observe the % age within Age, then we are observing that 11.5% people are Myopic, 2.5% people are Hyperopic, 1.1% are Astigmatic and 84.9% are having no Refractive error.

If we observe the % age within RE_Type, then we are observing that out of 43 people, 39.4% people are Myopic,

32.6% are Hyperopic, 18.8% are Astigmatic and 38.0% having no Refractive error.

Again If we observe the % age of Total, then we are observing that, 4.3 % people are Myopic, 0.9 % are Hyperopic, 0.4 % are Astigmatic and 31.9 % having no Refractive error.

Age (above 21 Years) &RE (Refractive Error)

After cross tabulation among Age and RE it is clearly observed that out of 329 people with the age group above 21 years 42 are Myopic, 10 people are Hyperopic, 15 are Astigmatic and 262 do not have any Refractive error.

This is also shown in percentage form. If we observe the % age within Age, then we are observing that 12.8% people are Myopic, 3.0% people are Hyperopic, 4.6% are Astigmatic and 79.6% are having no Refractive error.

If we observe the % age within RE_Type, then we are observing that out of 32 people, 25.5 % people are Myopic, 23.3% are Hyperopic, 46.9% are Astigmatic and 20.8% having no Refractive error.

Again If we observe the % age of Total, then we are observing that, 2.8% people are Myopic, 07 % are Hyperopic, 1.0 % are Astigmatic and 17.5 % having no Refractive error.

Table 4: Gender-wise Refractive Error

Gender	RE Type count
1="Male"	91
2="Female"	149

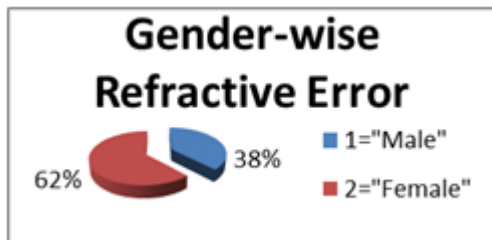


Figure 3: Gender &RE (Refractive Error) type

Table 5: Gender and RE cross tabulation

			RE_Type				Total
			Myopia	Hyperopia	Astigmatism	No RE	
Gender	Male	Count	63	18	10	494	585
		% within Gender	10.8%	3.1%	1.7%	84.4%	100.0%
		% within RE_Type	38.2%	41.9%	31.2%	39.2%	39.0%
		% of Total	4.2%	1.2%	.7%	32.9%	39.0%
		Std. Residual	-.2	.3	-.7	.1	
Female	Female	Count	102	25	22	766	915
		% within Gender	11.1%	2.7%	2.4%	83.7%	100.0%
		% within RE_Type	61.8%	58.1%	68.8%	60.8%	61.0%
		% of Total	6.8%	1.7%	1.5%	51.1%	61.0%
		Std. Residual	.1	-.2	.6	.0	
Total	Total	Count	165	43	32	1260	1500
		% within Gender	11.0%	2.9%	2.1%	84.0%	100.0%
		% within RE_Type	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	11.0%	2.9%	2.1%	84.0%	100.0%

Table 6: Gender-wise RE type excluding No RE

RE Type	Gender	
	1="Male"	2="Female"
1="Myopia"	63	102
2="Hyperopia"	18	25
3="Astigmatism"	10	22

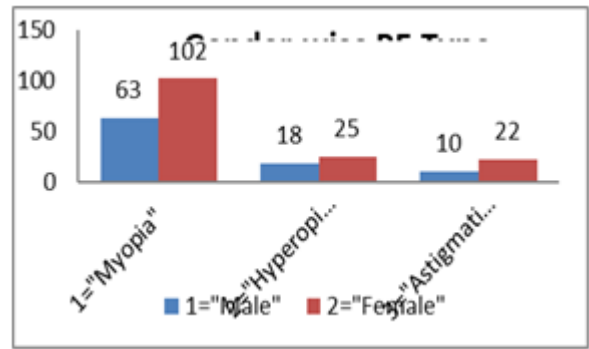


Figure 4: Gender wise RE Type

Gender (Male) &RE (Refractive Error) Type

After cross tabulation among Gender and RE type it is clearly observed that out of 585 Male 63 are Myopic, 18 people are Hyperopic, 10 are Astigmatic and 494 do not have any Refractive error.

This is also shown in percentage form. If we observe the % age within Gender, then we are observing that 10.8 % people are Myopic, 3.1% people are Hyperopic, 1.7% are Astigmatic and 84.4% are having no Refractive error.

If we observe Male % age within RE_Type, then we are observing that out of 165 people, 38.2% people are Myopic, 41.9% are Hyperopic, 31.2% are Astigmatic and 39.2% having no Refractive error.

Again If we observe the % age of Total, then we are observing that, 4.2 % people are Myopic, 1.2 % are Hyperopic, 0.7 % are Astigmatic and 32.9 % having no Refractive error.

Gender (Female) &RE (Refractive Error) Type

After cross tabulation among Gender and RE type it is clearly observed that out of 915 Female 102 are Myopic, 25 people are Hyperopic, 22 are Astigmatic and 766 do not have any Refractive error.

This is also shown in percentage form. If we observe the % age within Gender, then we are observing that 11.1 % people are Myopic, 2.7% people are Hyperopic, 2.4% are Astigmatic and 83.7% are having no Refractive error.

If we observe Female % age within RE_Type, then we are observing that out of 43 people, 61.8% people are Myopic, 58.1% are Hyperopic, 68.8% are Astigmatic and 39.2% having no Refractive error.

Again If we observe the % age of Total, then we are observing that, 6.8 % people are Myopic, 1.7 % are Hyperopic, 1.5 % are Astigmatic and 51.1 % having no Refractive error.

Programs wise RE type

1. B. Optm is denoted as "1"
2. BCA is denoted as "2"
3. BBA is denoted as "3"
4. HM is denoted as "4"
5. B-Tech is denoted as "5"
6. Others is denoted as "6"

Table 7: Programmes & RE (Refractive Error) Type

Programs	B.OPTM	Count	RE_Type				Total
			Myopia	Hyperopia	Astigmatism	No RE	
		59	17	12	395	483	
		% within Programs	12.2%	3.5%	2.5%	81.8%	
		% within RE_Type	35.8%	39.5%	37.5%	32.2%	
		% of Total	3.9%	1.1%	.8%	26.3%	
		Std. Residual	.8	-.6	-.5		
	BCA	Count	49	14	7	410	
		% within Programs	10.2%	2.9%	1.5%	85.4%	
		% within RE_Type	29.7%	32.6%	21.9%	32.5%	
		% of Total	3.3%	.9%	.5%	27.3%	
		Std. Residual	-.5	.1	-1.0	.3	
	BBA	Count	18	6	4	150	
		% within Programs	10.1%	3.4%	2.2%	84.3%	
		% within RE_Type	10.9%	14.0%	12.5%	11.9%	
		% of Total	1.2%	.4%	.3%	10.0%	
		Std. Residual	-.4	.4	.1	-.0	
	HM	Count	13	4	2	112	
		% within Programs	9.9%	3.1%	1.5%	85.5%	
		% within RE_Type	7.9%	9.3%	6.2%	8.9%	
		% of Total	.9%	.3%	.1%	7.5%	
		Std. Residual	-.4	.1	-.5	.2	
	B-Tech	Count	25	2	7	179	
		% within Programs	11.7%	.9%	3.3%	84.0%	
		% within RE_Type	15.2%	4.7%	21.9%	14.2%	
		% of Total	1.7%	.1%	.5%	11.9%	
		Std. Residual	.3	-1.7	1.2	.0	
	Other	Count	1	0	0	15	
		% within Programs	6.7%	.0%	.0%	93.3%	
		% within RE_Type	.8%	.0%	.0%	1.1%	
		% of Total	.1%	.0%	.0%	1.0%	
		Std. Residual	-.6	-.7	-.6	.4	
Total		Count	165	43	32	1260	
		% within Programs	11.0%	2.9%	2.1%	84.0%	
		% within RE_Type	100.0%	100.0%	100.0%	100.0%	

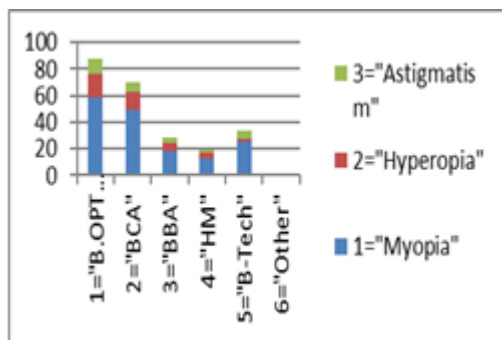


Figure 5: Program wise RE Type

Table 8: Program-wise RE type (excluding no RE)

Program Name	RE Type		
	1="Myopia"	2="Hyperopia"	3="Astigmatism"
1="B.OPTM"	59	17	12
2="BCA"	49	14	7
3="BBA"	18	6	4
4="HM"	13	4	2
5="B-Tech"	25	2	7
6="Other"	1	0	0

Program (B.Optm) &RE (Refractive Error) Type

After cross tabulation among Program (B.Optm) and RE type it is clearly observed that out of 483 B.Optm students 59 are Myopic, 17 people are Hyperopic, 12 are Astigmatic and 395 do not have any Refractive error.

This is also shown in percentage form. If we observe the % age within Programs, then we are observing that 12.2 % people are Myopic, 3.5% people are Hyperopic, 2.5% are Astigmatic and 81.8% are having no Refractive error.

If we observe % age within RE_Type, then we are observing that 35.8% people are Myopic, 39.5% are Hyperopic, 37.5% are Astigmatic and 31.3% having no Refractive error.

Again If we observe the % age of Total, then we are observing that, 3.9 % people are Myopic, 1.1 % are Hyperopic, 0.8 % are Astigmatic and 26.3 % having no Refractive error.

Program (BCA) &RE (Refractive Error) Type

After cross tabulation among Program (BCA) and RE type it is clearly observed that out of 480 BCA students 49 are Myopic, 14 people are Hyperopic, 7 are Astigmatic and 410 do not have any Refractive error.

This is also shown in percentage form. If we observe the % age within Programs, then we are observing that 10.2 % people are Myopic, 2.9% people are Hyperopic, 1.5% are Astigmatic and 85.4% are having no Refractive error.

If we observe % age within RE_Type, then we are observing that 29.7% people are Myopic, 32.6% are Hyperopic, 21.9% are Astigmatic and 32.5% having no Refractive error.

Again If we observe the % age of Total, then we are observing that, 3.3 % people are Myopic, 0.9 % are Hyperopic, 0.5 % are Astigmatic and 27.3 % having no Refractive error.

Program (BBA) &RE (Refractive Error) Type

After cross tabulation among Program (BBA) and RE type it is clearly observed that out of 178 BBA students 18 are Myopic, 6 people are Hyperopic, 4 are Astigmatic and 150 do not have any Refractive error.

This is also shown in percentage form. If we observe the % age within Programs, then we are observing that 10.1 % people are Myopic, 3.4% people are Hyperopic, 2.2% are Astigmatic and 84.3% are having no Refractive error.

If we observe % age within RE_Type, then we are observing that 10.9% people are Myopic, 14.0 % are Hyperopic, 12.5% are Astigmatic and 11.9 % having no Refractive error.

Again If we observe the % age of Total, then we are observing that, 1.2 % people are Myopic, 0.4 % are Hyperopic, 0.3 % are Astigmatic and 10.0 % having no Refractive error.

Program (HM) &RE (Refractive Error) Type

After cross tabulation among Program (HM) and RE type it is clearly observed that out of 131 BBA students 13 are Myopic, 4 people are Hyperopic, 2 are Astigmatic and 112 do not have any Refractive error.

This is also shown in percentage form. If we observe the % age within Programs, then we are observing that 9.9 % people are Myopic, 3.1% people are Hyperopic, 1.5% are Astigmatic and 85.5 % are having no Refractive error.

If we observe % age within RE_Type, then we are observing that 7.9% people are Myopic, 9.3 % are Hyperopic, 6.2% are Astigmatic and 8.9 % having no Refractive error.

Again If we observe the % age of Total, then we are observing that, 0.9 % people are Myopic, 0.3 % are Hyperopic, 0.1 % are Astigmatic and 7.5 % having no Refractive error.

Program (B-Tech) &RE (Refractive Error) Type

After cross tabulation among Program (B-Tech) and RE type it is clearly observed that out of 213 B-Tech students 25 are Myopic, 2 people are Hyperopic, 7 are Astigmatic and 179 do not have any Refractive error.

This is also shown in percentage form. If we observe the % age within Programs, then we are observing that 11.7 %

people are Myopic, 0.9% people are Hyperopic, 3.3% are Astigmatic and 84.0% are having no Refractive error.

If we observe % age within RE_Type, then we are observing that 15.2% people are Myopic, 4.7 % are Hyperopic, 21.9% are Astigmatic and 14.2 % having no Refractive error.

Again If we observe the % age of Total, then we are observing that, 1.7 % people are Myopic, 0.1 % are Hyperopic, 0.5 % are Astigmatic and 11.9 % having no Refractive error.

Program (Others) & RE (Refractive Error) Type

After cross tabulation among Program (Others) and RE type it is clearly observed that out of 15 students 1 are Myopic, no people are Hyperopic or Astigmatic and 14 do not have any Refractive error.

This is also shown in percentage form. If we observe the % age within Programs, then we are observing that 6.7 % people are Myopic, no one found with Hyperopic and Astigmatic and 93.3 % are having no Refractive error.

If we observe % age within RE_Type, then we are observing that 0.6% people are Myopic, no one found with Hyperopic and Astigmatic and 1.1 % having no Refractive error.

Again If we observe the % age of Total, then we are observing that, 0.1 % people are Myopic, no one found with Hyperopic and Astigmatic and 0.9 % having no Refractive error.

4. Conclusion

Based on our study, we can conclude that prevalence of refractive error showed significantly direct relationship with the socio demographic status of the respondents. A statistically significant association was found between prevalence of refractive error with demographic profile of the respondents. By performing the cross tabulation, we found significant relation among Age, Gender and various professional programs of study with refractive error. In our study we have observed that myopia is prevailing among younger students with both age groups (up to 18 years and 19 to 20 years). From this study it was revealed that 11% of total population detected with Myopia which is alarming. The study therefore highlights the prevalence of undetected refractive error in the college students and the importance of early detection and treatment with corrective spectacles which will help to prevent the further progression of refractive error.

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