The association between Myopia and near work activities in young adults in Durgapur, West Bengal

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ABSTRACT

Myopia is one of the most prevalent refractive error that can be defined as a state in which the eye fails to see distant objects properly. Most of the young adults are affected by myopia in the world due to many factors. A few researchers showed in their research articles that near work activities lead to the progression of myopia. The main objective of this paper is to identify all the main factors of myopia in young adults in the southern region of West Bengal, especially in Durgapur. To meet this objective a sample of 2500 young adults were selected using simple random sampling procedure and examined through Snellen's Chart and retinoscope and found 575 young adults have been suffering from various grades of myopia. In the next phase, we have identified the relevant factors of near work activities such as types of light used, time spent on near work per day, uses of a cell phone. We have analyzed the data through SPSS 16.0 software and interestingly we found some significant associations among them.

***Keywords*—** *Myopia, Refractive error, Near work activities, Retinoscope, Snellen's chart*

1. INTRODUCTION

Myopia is one of the major types of refractive error that can be defined where the light is not able to fall on the retina so that the eyes are not able to see distant objects clearly. The young adults are affected by myopia in the world due to a lot of factors. WHO and IAPB global initiative launched in 1999, VISION 2020, the Right to Sight is to eliminate the main causes of avoidable blindness by the year 2020 by giving priorities on cataract, refractive errors, trachoma, onchocerciasis and certain causes of childhood blindness. From the Bulletin of the World Health Organization (WHO) in 2004, it was estimated that more than 161 million people were visually impaired worldwide, of whom 124 million people had low vision and 37 million were blind.

The Near Work Activities are the sum total of daily activities like average time spent on daily work, reading habits, studying, writing, watching television, playing video games, uses of a cell phone, types of light use etc. After gone through the extensive literature review it was found that out of these factors of near work activities like types of light used in near work, daily time spent in near work and uses of cell phone per day have a great impact on Myopic young adults.

A few researchers showed in their research articles that near work activities lead to the progression of myopia. The main objective of this paper is to identify the distribution of the different degree of myopia in young adults at the southern region of West Bengal broadly in Durgapur and to ascertain if there is any association between Myopia with Near Work Activities such as Types of light, Time spent on near work, Uses of a Cell phone. For the fulfilment of this objective, a sample of 2500 young adults was selected by choosing a simple random sampling procedure. A Structured Case Record Form was implemented to collect the details of the relevant factors. The respondents were screened for refractive errors with the subjective refraction procedure method where Snellen's chart was placed at 6 meters distance to test the distant visual acuity. Details of Near Work Activities were collected from brief clinical history taking procedure. Data were tabulated and analyzed using the Statistical package (SPSS). After examined, our observation was, 575 young adults were suffering from various degrees of myopia like Low Degree of Myopia, Moderate Degree of Myopia and High Degree of Myopia. later on, we have identified the progression of myopia is directly related with near work activities which include Types of light used at the time of near work, Time spent on near work, Uses of a Cell phone.

A few studies have been conducted upon the prevalence of refractive error with the near work activities. Among the young population. This research article is being carried out with the following objectives:
- To identify the distribution of different myopia types in young adults at the southern region of West Bengal broadly in Durgapur.
- To ascertain if there is any association between Myopia with Near Work Activities such as Types of light, Time spent on near work, Uses of a Cell phone.

2. MATERIALS AND METHOD
Our study was an observational, descriptive and cross-sectional. We employed both simple and random sampling techniques for our study. The young adults of the southern region of West Bengal particularly in Durgapur were determined as the study population. We examined 2500 young adults 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. After examined of 2500 Young Adults, we found 575 are suffering from Myopia. The study period was August 2016 to July 2018. Corneal and lenticular opacities, the presence of any ocular infection/inflammation, history of previous ocular surgery, and history of ocular injury was excluded from this study.

In this study, we considered the young adults to be myopic when the spherical equivalent was more than or equal to - 0.25D in one or both eyes 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-Refractometry was used to measure refractive error, Ophthalmometry was performed and recorded radius of curvature of anterior curvature of the cornea.

3. STATISTICAL ANALYSIS
In this research work, we have applied statistical tools that may provide us with reasonable accuracy in the quantitative aspect vis-a-vis contributed to satisfying the result with the concept and convention of Health Science, particularly in Vision Science. This research article consists of the application of the following statistical tool.
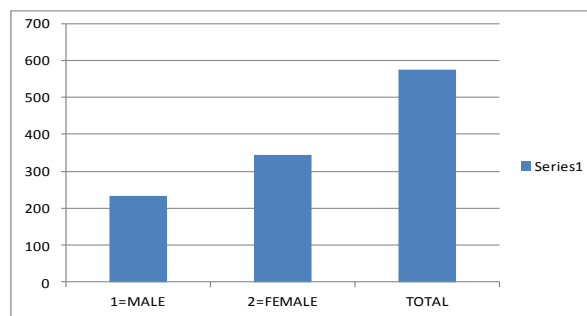
Cross Tabulation: It is a number of tests are available to determine if the relationship between two cross tabulation variables is significant. The purpose of the cross tabulation is to show the relationship between two variables.

4. RESULTS
After examined of 2500 Young Adults, we found that 575 young Adults of Durgapur southern region of West Bengal are suffering from Myopia. Among these 232 were Male and 343 were Females. Which has been shown in figure 1.

Table 1: Overall Prevalence of Myopia among Gender

1=MALE	2=FEMALE	TOTAL
232	343	575

Fig. 1: Overall Prevalence of Myopia among Gender

4.1 Analysis through cross tabulation between myopia with light used in work area
We have analyzed through the Cross tabulation between Myopia with Light used in the Work area and the result shown in table 2.

Table: 2 Types of myopia and light used in work area cross tabulation

Types_Myopia * Light_used Crosstabulation

			Dim light	Moderate light	Bright light	Total
Types_Myopia	Low	Count	83	126	81	290
		% within Types_Myopia	28.6%	43.4%	27.9%	100.0%
		% within Light_used	62.9%	50.4%	42.0%	50.4%
		% of Total	14.4%	21.9%	14.1%	50.4%
		Std. Residual	2.0	.0	-1.7	
	Moderate	Count	44	78	70	192
		% within Types_Myopia	22.9%	40.6%	36.5%	100.0%
		% within Light_used	33.3%	31.2%	36.3%	33.4%
		% of Total	7.7%	13.6%	12.2%	33.4%
		Std. Residual	.0	-.6	.7	
	High	Count	5	46	42	93
		% within Types_Myopia	5.4%	49.5%	45.2%	100.0%
		% within Light_used	3.8%	18.4%	21.8%	16.2%
		% of Total	.9%	8.0%	7.3%	16.2%
		Std. Residual	-3.5	.9	1.9	
Total		Count	132	250	193	575
		% within Types_Myopia	23.0%	43.5%	33.6%	100.0%
		% within Light_used	100.0%	100.0%	100.0%	100.0%
		% of Total	23.0%	43.5%	33.6%	100.0%

4.2 Analysis through cross tabulation between myopia with time spent in daily work

We have analyzed through the Cross tabulation between Myopia with Time spent in daily work and the result shown in table 3.

Table: 3 Cross tabulation between types of myopia with time spent in daily work

Types_Myopia * Time_spent_daily Crosstabulation

			Time_spent_daily			Total
			1-2 Hrs	2-3 Hrs	>3 Hrs	
Types_Myopia	Low	Count	82	47	161	290
		% within Types_Myopia	28.3%	16.2%	55.5%	100.0%
		% within Time_spent_daily	68.3%	46.1%	45.6%	50.4%
		% of Total	14.3%	8.2%	28.0%	50.4%
		Std. Residual	2.8	-.6	-1.3	
	Moderate	Count	32	38	122	192
		% within Types_Myopia	16.7%	19.8%	63.5%	100.0%
		% within Time_spent_daily	26.7%	37.3%	34.6%	33.4%
		% of Total	5.6%	6.6%	21.2%	33.4%
		Std. Residual	-1.3	.7	.4	
	High	Count	6	17	70	93
		% within Types_Myopia	6.5%	18.3%	75.3%	100.0%
		% within Time_spent_daily	5.0%	16.7%	19.8%	16.2%
		% of Total	1.0%	3.0%	12.2%	16.2%
		Std. Residual	-3.0	.1	1.7	
Total		Count	120	102	353	575
		% within Types_Myopia	20.9%	17.7%	61.4%	100.0%
		% within Time_spent_daily	100.0%	100.0%	100.0%	100.0%
		% of Total	20.9%	17.7%	61.4%	100.0%

4.3 Analysis through cross tabulation between myopia with cell phone uses

We have analyzed through the Cross tabulation between Myopia with uses of Cell Phone and the result shown in table 4.

Table: 4 Cross Tabulation between Types of Myopia with Cell Phone Uses

Types_Myopia * Cellphone_used Crosstabulation

			Cellphone_used				Total
			<1 Hr	1-2 Hrs	2-3 Hrs	>3 Hrs	
Types_Myopia	Low	Count	55	28	47	160	290
		% within Types_Myopia	19.0%	9.7%	16.2%	55.2%	100.0%
		% within Cellphone_used	65.5%	66.7%	46.1%	46.1%	50.4%
		% of Total	9.6%	4.9%	8.2%	27.8%	50.4%
		Std. Residual	1.9	1.5	-.6	-1.1	
	Moderate	Count	25	10	36	121	192
		% within Types_Myopia	13.0%	5.2%	18.8%	63.0%	100.0%
		% within Cellphone_used	29.8%	23.8%	35.3%	34.9%	33.4%
		% of Total	4.3%	1.7%	6.3%	21.0%	33.4%
		Std. Residual	-.6	-1.1	.3	.5	
	High	Count	4	4	19	66	93
		% within Types_Myopia	4.3%	4.3%	20.4%	71.0%	100.0%
		% within Cellphone_used	4.8%	9.5%	18.6%	19.0%	16.2%
		% of Total	.7%	.7%	3.3%	11.5%	16.2%
		Std. Residual	-2.6	-1.1	.6	1.3	
Total		Count	84	42	102	347	575
		% within Types_Myopia	14.6%	7.3%	17.7%	60.3%	100.0%
		% within Cellphone_used	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	14.6%	7.3%	17.7%	60.3%	100.0%

5. DISCUSSION

5.1 Low degree of myopia and light used in work area

We have conducted the cross tabulation Low degree of Myopia with the light used (Dim Light, Moderate Light and Bright Light) in the working area and observed that out of 290 low myopic young adults 83 are working under the Dim light, 126 are working under the Moderate light and 81 are working under the Bright light. This is also shown in percentage form. If we observe the % age within Types of Myopia, then we are observing that 28.6% young adults are working under the Dim Light, 43.4% young adults are working under the Moderate Light and 27.9% are working under the Bright Light. If we also observe the % age within the light used in working place then we are observing that out of 132 young adults, 62.9% are working under the Dim Light, 50.4% are working under the Moderate Light, and 42% are working under the Bright Light. If we observe the % age of total then we are observing that 14.4% are using dim light, 21.9% are working under the Moderate Light, and 14.1% are working under the Bright Light.

5.2 Moderate degree of myopia and light used in the work area

We have conducted the cross tabulation Moderate degree of Myopia with the light used (Dim Light, Moderate Light and Bright Light) in the working area and observed that out of 192 moderate myopic young adults 44 are working under the Dim light, 78 are working under the Moderate light and 70 are working under the Bright light. This is also shown in percentage form. If we observe the % age within Types of Myopia, then we are observing that 22.9% young adults are working under the Dim Light, 40.6% young adults are working under the Moderate Light and 36.5% are working under the Bright Light. If we also observe the % age within the light used in working place then we are observing that out of 132 young adults, 33.3% are working under the Dim Light, 31.2% are working under the Moderate Light, and 36.3% are working under the Bright Light. If we observe the % age of total then we are

observing that 7.7% are using dim light, 13.6% are working under the Moderate Light, and 12.2% are working under the Bright Light.

5.3 High degree of myopia and light used in work area
We have conducted the cross tabulation High degree of Myopia with the light used (Dim Light, Moderate Light and Bright Light) in the working area and observed that out of 93 High myopic young adults 5 are working under the Dim light, 46 are working under the Moderate light and 42 are working under the Bright light. This is also shown in percentage form. If we observe the % age within Types of Myopia, then we are observing that 5.4% young adults are working under the Dim Light, 49.5% young adults are working under the Moderate Light and 45.2% are working under the Bright Light. If we also observe the % age within the light used in working place then we are observing that out of 132 young adults, 3.8% are working under the Dim Light, 18.4% are working under the Moderate Light, and 21.8% are working under the Bright Light. If we observe the % age of total then we are observing that 9% are using dim light, 8% are working under the Moderate Light, and 7.3% are working under the Bright Light.

5.4 Low degree of myopia and time spent in daily work, 1-2 hours
We have conducted the cross-tabulation of Low degree of Myopia with the Time Spent in Daily Work and observed that out of 290 low myopic young adults 82 are working 1-2 Hours/day, 47 are working 2-3/day and 161 are working more than 3 hours/day. This is also shown in percentage form. If we observe the % age within Types of Myopia, then we are observing that 28.3% young adults are working 1-2 Hours/day, 16.2% young adults are working 2-3/day and 55.5% are working more than 3 hours/day. If we also observe the % age within the Time spent in Daily work then we are observing that out of 120 young adults ,68.3% of young adults are working 1-2 Hours/day,46.1% of young adults are working 2-3 Hours/day, and 45.6% are working young adults are working more than 3 Hours/day. If we take the % in total then we observe then we are observing that 14.3% young adults are working 1-2 Hours/day, 8.2% young adults are working 2-3 Hours/day, and 28% are working more than 3 Hours/day.

5.5 Moderate degree of myopia and time spent in daily work, 2-3 hours
We have conducted the cross tabulation Moderate Degree of Myopia with the Time Spent in Daily Work and observed that out of 192 moderate myopic young adults 32 are working 1-2 Hours/day, 38 are working 2-3/day and 122 are working more than 3 hours/day. This is also shown in percentage form. If we observe the % age within Types of Myopia, then we are observing that 16.7% young adults are working 1-2 Hours/day, 19.8% young adults are working 2-3/day and 63.5% are working more than 3 hours/day. If we also observe the % age within the Time spent in Daily work then we are observing that out of 120 young adults ,26.7% of young adults are working 1-2 Hours/day,37.3% of young adults are working 2-3 Hours/day, and 34.6% are working young adults are working more than 3 Hours/day. If we take the % in total then we observe then we are observing that 5.6% young adults are working 1-2 Hours/day, 6.6% young adults are working 2-3 Hours/day, and 21.2% are working more than 3 Hours/day.

5.6 High degree of myopia and time spent in daily work >3 hours
We have conducted the cross tabulation High degree of Myopia with the Time Spent in Daily Work and observed that out of 93 high myopic young adults 6 are working 1-2 Hours/day, 17 are working 2-3/day and 70 are working more than 3 hours/day. This is also shown in percentage form. If we observe the % age within Types of Myopia, then we are observing that 6.5% young adults are working 1-2 Hours/day, 18.3% young adults are working 2-3/day and 75.3% are working more than 3 hours/day. If we also observe the % age within the Time spent in Daily work then we are observing that out of 120 young adults ,5% of young adults are working 1-2 Hours/day,16.7% of young adults are working 2-3 Hours/day, and 19.8% are working young adults are working more than 3 Hours/day. If we take the % in total then we observe then we are observing that 1% young adults are working 1-2 Hours/day, 3% young adults are working 2-3 Hours/day, and 12.2% are working more than 3 Hours/day.

5.7 Low degree of myopia and uses of cell phone
We have conducted the cross tabulation Low degree of Myopia with uses of Cell Phone <1 hour/Day and observed that out of 290 low myopic young adults 55 are using cell phone <1 hour/Day, 28 are using cell phone 1-2 hour,47 are using cell phone 2-3 hours/day and 160 are using cell phone >3 hours/day. This is also shown in percentage form. If we observe the % age within Types of Myopia, then we are observing that 19% of young adults are using cell phone <1 hour/Day, 9.7% young adults are using cell phone 1-2 hour/Day, 16.2% are working using cell phone 2-3 hour/Day and 55.2% are using cell phone >3 hours/Day. If we also observe the % age within uses of Cell Phone then we are observing that out of 84 young adults ,65.5% of young adults are using cell phone <1 hour/day,66.7% young adults are using cell phone 1-2- Hours/day, and 46.1% are using cell phone 2-3 Hours/day and 46.1% are using cell phone >3 hours/day. If we take the % in total then we observe then we are observing that 9.6% young adults are using cell phone <1 hour, 4.9% young adults are using cell phone 1-2 Hours/day,8.2% are using cell phone 2-3 Hours/day and 27.8 are using cell phone >3 hours/day.

5.8 Moderate degree of myopia and uses of cell phone
We have conducted the cross tabulation Moderate degree of Myopia with uses of Cell Phone <1 hour/Day and observed that out of 192 moderate myopic young adults 25 are using cell phone <1 hour/Day, 10 are using cell phone 1-2 hour,36 are using cell phone 2-3 hours/day and 121 are using cell phone >3 hours/day. This is also shown in percentage form. If we observe the % age within Types of Myopia, then we are observing that 13% of young adults are using cell phone <1 hour/Day, 5.2% young adults are using cell phone 1-2 hour/Day, 18.8% are working using cell phone 2-3 hour/Day and 63% are using cell phone >3 hours/Day. If we also observe the % age within uses of Cell Phone then we are observing that out of 84 young adults ,29.8% of young adults are using cell phone <1 hour/day,23.8% young adults are using cell phone 1-2- Hours/day, and 35.3% are using cell phone 2-3 Hours/day and 34.9% are using cell phone >3 hours/day. If we take the % in total then we observe then we are observing that 4.3% young adults are using cell phone <1 hour, 1.7% young adults are using cell phone 1-2 Hours/day,6.3% are using cell phone 2-3 Hours/day and 21 are using cell phone >3 hours/day.

5.9 High degree of myopia and uses of cell phone

We have conducted the cross tabulation High degree of Myopia with uses of Cell Phone <1 hour/Day and observed that out of 93 high myopic young adults 4 are using cell phone <1 hour/Day, 4 are using cell phone 1-2 hour,19 are using cell phone 2-3 hours/day and 66 are using cell phone >3 hours/day. This is also shown in percentage form. If we observe the % age within Types of Myopia, then we are observing that 4.3% of young adults are using cell phone <1 hour/Day, 4.3% young adults are using cell phone 1-2 hour/Day, 20.4% are working using cell phone 2-3 hour/Day and 71% are using cell phone >3 hours/Day. If we also observe the % age within uses of Cell Phone then we are observing that out of 84 young adults ,4.8% of young adults are using cell phone <1 hour/day,9.5% young adults are using cell phone 1-2- Hours/day, and 18.6% are using cell phone 2-3 Hours/day and 19% are using cell phone >3 hours/day. If we take the % in total then we observe then we are observing that 7% young adults are using cell phone <1 hour, 7% young adults are using cell phone 1-2 Hours/day,3.3% are using cell phone 2-3 Hours/day and 11.5 are using cell phone >3 hours/day.

6. CONCLUSION

Based on our study, we can conclude that the distribution of different types of myopia in young adults in the southern region of West Bengal broadly in Durgapur has been identified. Also, the near work activities such as Light used in Working area, Time Spent in Daily Work, and uses of Cell Phone have a significant direct relationship with Myopic young adults.

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