

EVALUATION OF DIFFERENT PATTERNS OF REFRACTIVE ERRORS AMONG NEAR WORKERS

*Ijaz Ali

**Fazal Rahman

***Javeria Bukhari

****Syed Amir Gilani

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Corresponding Author: Fazal Rahman; Email: fazalrahman.rm@gmail.com; doi:10.46360/globus.met.320221016

Abstract

Background: Refractive errors are the most frequent form of impaired vision and the second most manageable cause of blindness in the world. Surprisingly, uncorrected refractive errors are accounting for 20% of blindness cases as well as 50% of vision loss cases worldwide. During the year 2000, the international prevalence of myopia and high myopia was calculated to be 22.9 percent and 2.7 percent, correspondingly.

Purpose: The purpose of this study was to evaluate the different patterns of refractive error among near workers.

Methodology: Cross-sectional study was done on 248 participants through a convenient sampling method from the private sector hospitals. Data was collected during 3-4 months from March 2022 to May 2022 by a modified adapted questionnaire to evaluate the pattern of refractive errors among near workers in Lahore.

Results: All the participant's profession was associated with near work. 42.3% of responders reported myopia, 10.9% hyperopia, 14.9% simple myopic astigmatism, 2.4% simple hyperopic astigmatism, 7.3% compound hyperopic astigmatism, and 5.6% with mixed astigmatism.

Conclusion: Near work is strongly associated with the refractive errors most commonly myopia progression and aggravation but unfortunately, there is little research work done in Pakistan on the relationship between near work and refractive errors further studies needed to be done on this topic.

Keywords: Refractive Errors, Near Work, Myopia, Hyperopia, Astigmatism.

Introduction

The balance of the axial length of the eye and the optical power of the cornea and lens defines refractive status. In 2010, uncorrected refractive errors became considered to be the world's leading cause of blindness. Refractive errors are the most frequent form of impaired vision and the second most manageable cause of blindness in the world [1].

In various investigations, the prevalence of refractive errors was already reported at various rates extending around 6% to 45 percent. It is calculated that more than 22% of the earth's population experiences myopia. Nearsightedness prevalence expanded to 70 percent to 80 percent in East Asian countries and 25 percent to 40 percent in Western countries [2].

Myopia, as well as nearsightedness, is the inability to see objects that are far away. Myopia begins whenever the light is refracted in front of the retina instead of just onto the retina. Myopia tends to increase during a person's adolescence and the academic period before stabilizing in their early twenties. Myopia is a significant childhood optical impairment that runs in the family [3].

Farsightedness, commonly known as hypermetropia, is a disorder in which it is easier to see objects that are further away than it is to see those who have been nearby to you. Hyperopia arises when light is refracted behind the retina rather than onto it. If the eyeball is too short or the cornea has even less curvature, this can happen. People around the world might be affected by farsightedness. Certain children build mild hyperopia, which improves by the time they reach maturity [4].

Astigmatism is an eyesight problem that is caused by someone with an imperfectly constructed cornea. Along with astigmatism, the cornea resembles rugby

*Optometry Student, Department of Optometry and vision Sciences, The University of Lahore, Lahore, Pakistan.

**Registered Nurse, Shaikat Khanum Memorial Trust, Lahore, Pakistan.

***Lahore School of Nursing, The University of Lahore, Lahore, Pakistan.

****Dean, Faculty of Allied Health Science, The University of Lahore, Lahore Pakistan.

or an oval rather than a rounded surface. When rays of light approach an astigmatic eye, rays are bent and refracted, producing several concentrate sites on the retina rather than just a singular focus location. Astigmatism hampers people's capacity to perceive objects both close and far away. When the eyeball is not spherical but uniform, it is labeled regular astigmatism; whenever the cornea is not a sphere but not balanced, it is called irregular astigmatism [5].

Because of the increased ocular demands, intensive near-work activity is the extrinsic factor most evaluated for a plausible correlation with refractive errors, primarily myopia; nevertheless, a direct assessment of this relationship has been hard to confirm. Although countless studies have sought to link near-work activity to the emergence of myopia over several years, there is no solid evidence suggesting such a link [6].

Near work has traditionally been thought to be a source of vision disorders. Ramazzini, an epidemiologist, claimed that protracted close work causes "sight problems" such as myopia and changes in the "tonus of the membranes and fibers of the eye..." Many artisans, office workers, and students who have experienced impaired vision, eyestrain, and headaches because of continuous work have validated his observation. There has been a renaissance of interest in these issues since the introduction of video display technology. Despite the belief that close work is stressful and potentially harmful to the eyes, empirical evidence for such effects is equivocal, and the mechanisms underlying visual fatigue symptoms remain unanswered [7].

The consistency of adult and younger near-work affiliations with refraction is more likely to indicate that personal near-work levels are habitual, having been created during childhood and adolescence and that their effect on refraction is long-lasting. The regression coefficients observed should not be generalized to other close work levels in other populations until the current investigation's findings are replicated in other studies [8].

After cataracts, uncorrected refractive error is the second most prevalent cause of global vision impairment. Refractive errors that go uncorrected have a substantial impact on learning and academic success. Medical students had a high prevalence rate of refractive errors, and they were completely oblivious of it. Furthermore, most studies on refractive errors have focused on school-aged children in various parts of India. The proportion of refractive errors among medical students is poorly defined. Myopia was the most frequent refractive defect, accounting for 208 (63.03 percent), followed by Hypermetropia and Astigmatism. The relationship between refractive errors and age and

sex were analyzed, and it was observed that refractive errors were more common in people aged 18 to 23. The exact pathogenic procedures of relatively close myopization of ocular refractive machinery are still unknown. According to a recent theory, myopia is triggered by a fuzzy retinal image that occurs during prolonged close work. ⁽¹⁸⁾. This study presents a unique perspective of Evaluation of Different Patterns of Refractive Errors Among Near Workers in Pakistan.

Problem Statement

Various studies have been conducted previously in the United States, the United Kingdom, Canada, New Zealand, and many other countries on Evaluation of Different Patterns of Refractive Errors Among Near Workers; In Pakistan, there is little work in terms of Evaluation of Different Patterns of Refractive Errors Among Near Workers. Refractive errors are the most common ocular problem affecting all age groups they are considered a public health challenge. Recent studies and WHO reports indicate that refractive errors are the first cause of visual impairment and the second cause of visual loss worldwide as 43% of visual impairments are attributed to refractive errors [9].

Continuous near work like reading, close distances of reading, television viewing and nib-to-fingertip, head tilt when writing, and reading more books are significantly associated with refractive errors, which indicates that visual behaviors and environments may be important factors mediating the effects of near work on refractive errors. Near work related to refractive errors is an important topic. Most people look at it as a simple refractive error that can be corrected by spectacles or refractive surgeries. Refractive errors are ocular diseases considered by an abnormally elongated eyeball, which cannot be rescued by optical lenses or refractive surgeries. Its severity can even result in blindness [10].

The problem of the study focuses on Evaluation of Different Patterns of Refractive Errors Among Near Workers.

Research Objective

The study was guided by the following research objective:

1. To evaluate the pattern of refractive error among near workers.

Significance of the Study

Near work related to refractive errors is an important topic. Most people look at it as a simple refractive error that can be corrected by spectacles or refractive surgeries. In fact, refractive errors are ocular disease characterized by an abnormally elongated eyeball, which cannot be rescued by optical lenses or

refractive surgeries. Its severity can even result in blindness (Fernández-Montero et al., 2015) [12]. Current study will create an insight of relation between near work and myopia. The finding of this study would facilitate students to have an understanding about relation between near work and myopia progression. This study will open the door for other researcher to conduct study on evaluation of the different pattern of refractive error among near workers.

Literature Search

It is important to understand various definitions of health because these are the definitions which direct nursing education and consequently nursing practice. A study finding shows that health definitions not only shape nursing education, but also influence the significance of health promotion [11].

The implications of near-work activity are little established. The measurements of near-work activity in early epidemiologic studies were crude, and educational level or occupational position were frequently utilized as a surrogate measure of near-work activity. As shown in a study conducted by (Seang-Mei Saw, 2002), near-work activity and nocturnal illumination have been identified as possible environmental risk factors for myopia in previous studies [12].

In research made by (Saad & EI Bayoumy, 2007), 1292 respondents filled out a questionnaire on how much near-work they now do in hours per day, such as reading, writing, watching television, and other close work. The current investigation found a substantial link between the prevalence of refractive error and the number of hours spent near work per day. Refractive error was considerably more common among preparatory school students than that among other primary school students. Students exposed to near work for more than 5 hours per day had significantly greater rates of refractive error and poor vision than those exposed for far less than 5 hours per day [13].

A few recent studies have also established that accomplishing near tasks in downward gaze can generate tiny but significant short-term regional changes in corneal optics, which appear to be correlated to eyelid forces exerted on the cornea due to the decreased palpebral aperture. A horizontal band of distortion in the superior cornea, sometimes accompanied by an increment in ATR corneal astigmatism, is a frequent corneal alteration seen after near work in downward gaze. After as little as 15 minutes of reading, clinically significant changes in corneal astigmatism have been detected, which could also take up to 2 hours to completely reverse. Short-term oscillations in corneal and ocular

astigmatism are caused by a variety of reasons, including diurnal variation and physiological changes related to reading or close work, such as eyelid pressures or accommodation in the case of ocular astigmatism [14].

Near work has long been regarded an environmental risk factor for the development of refractive errors because of the link between refractive errors and educational performance and close-work vocations, according to a study. Initially, it was thought that enhanced accommodation due to proximity to work mitigated the effects of education on myopia development. Studies utilizing specific time-based or accommodation-weighted measures of close work, on the other hand, have not found robust relationships between near work and myopia, especially when other factors like parental refractive error are considered [15].

Continuous reading, close reading distances, television viewing and nib-to-fingertip, head tilt when writing, and reading more books are all linked to myopia, suggesting that visual behavior and environments may play a role in mitigating the effects of near work on myopia. Accommodation rises during near-work tasks such as reading and writing, according to a study, and is thought to mediate the relationship between myopia development and near work [16].

Another study was carried out by (Pokharel, Pokharel, Das, & Adhikari, 2010). They determined that a higher prevalence of refractive errors in these counties is suggested to be a result of more near work, after selecting 440 school people from urban and rural schools between the ages of 7 and 15 years for this study using a multi-stage randomization technique. In this investigation, the prevalence of refractive error was reported to be 19.77 percent. The most frequent refractive error was myopia, cases, next by hypermetropia. The least popular type of refractive defect was astigmatism. Various contributory circumstances, such as increased near-work computer use and prolonged study hours due to the competitive culture in the field of education, might well be criticized for refractive defects in youth [17].

Methodology

Study Design: cross sectional study design was used in this study.

Study Site: The study was conducted This study was conducted at the University of Lahore Teaching Hospital, Layton Rahmat Ullah Benevolent Trust LRBT Eye Hospital, and other private and government Hospitals of Lahore.

Duration: This study was carried out in duration of 4 month, from September 2019 to December 2019.

Population: The population of this study was all patients performing near work.

Patient of myopia ranging from -1.00 to -6.00 diopter sphere.

Patient of hyperopia ranging from +1.00 to +6.00 diopter sphere.

Patient of astigmatism ranging from +, -1.00 to +, -3.00 diopter cylinder.

Sampling: A convenient sampling method was used for this study.

Research Instrument: A modified questionnaire adopted from (Shakeel, T., & Mittal, S. K. 2016). Pattern of refractive errors in primary school children in Dehradun city of Uttarakhand State was used to collect data from the study participants.

Data Gathering Procedure: The questionnaire consisted mostly of questions with forced-choice response sets. Section 1 consists of 4 demographic questions and section 2 consist of 7 questions with the previous and current ocular and near work history of participants. Section 3 consist of the unaided and aided distance and near visual acuity of the research participant. Section 4 provides information about the types and pattern of refractive error in study participants.

Ethical Consideration: The rules and regulations set by the ethical committee of university of Lahore will be followed while conducting the research and the rights of the research participants will be respected. Permission for data collection was taken from all the participants on attached consent form. All the data and information taken from participants was kept in confidential. Throughout the study participants were remain anonymous. It is informed that no disadvantages and risk of the study were considered. Participants were informed that any time they will free hand to withdraw from process of study.

Results

This chapter consists of four sections. Section 1 represents the demographic characteristics of the participants whereas section 2 represents previous and current ocular and near work history of participants section3 represents unaided and with glasses distance and near visual acuity of the research participant where section 4 represents types and pattern of refractive error in study participants

Descriptive statistics such as percentages and frequencies were calculated to establish the evaluation of different refractive errors among near workers.

Section 1

This section represents the distribution of participant by demographic characteristics. The data is summarized in terms of frequency and percentage.

Table 1: Description of Demographic Characteristics

Categories	Respondents	
	Frequency	Percent
Gender		
Male	146	58.9%
Female	102	41.1%
Age (years)		
18-35	248	100%
Education of participant		
Formal schooling	56	22.6%
No formal schooling	192	77.4%
Occupation of participant		
Student	12	4.8%
Office Employ	40	16.1%
Textile worker	62	25%
Home industry	50	20.2%
Goldsmith	84	33.9%

The classification of demographic characteristics of participants is shown in Table 01.

Gender of the participants involved in the study were male n = 146 (58.9%) and female n = 102 (41.1%). The frequency of female is higher than male in this study. All participants involved in this study were n = 248 (100%) belong to the age group 18-35 years. participants involved in this study were n = 192 (77.4%) were having no formal schooling, and n = 56 (22.6%) were having formal schooling. n = 12 (4.8%) participants were students, n = 40 (16.1%) were office employs, n = 40 (16.1%) were textile workers, n = 62 (25%), were home industry workers n = 50 (20.2%), and n= 84 (33.9%) were goldsmiths.

Section 2

This section represents the previous and current ocular and near work history of participants (1) family history of refractive errors, (2) any difficulties with vision, (3) any past vision problems, (5) consider any type of ocular treatment, (6) is your profession associated with near work (7) any kind of asthenopic symptoms, (8) near work duration more than 5 hours.

Summary of the Results

Definition of health and factor related to health

The responses strongly agree and agree were grouped and presented as agree and the responses of strongly disagree, disagree, and neutral were grouped and presented as disagree.

Table no 2			
Questions asked about history.	Yes		No
	N	%	%
Do any members of your family have a refractive error	248	60.1%	39.9%
Do you have any problems with your vision?	248	63.3%	36.7%
Do you have any problems with your vision in the past?	248	50%	50%
Have you considered any type of ocular treatment?	248	74.2%	25.8%
Is your profession associated with near work?	248	100%	00%
Do you face any type of asthenopic symptoms while doing work?	248	48.4%	51.6%
Does your near work duration in (hours) = >5 hours on daily basis?	248	92.3%	7.7%

Table no 2 shows that the majority of the participants 60.1% agreed and 39.9% were not agreed to having a family history of refractive errors, only 63.3% of the participants having vision problem while 36.7% of the participant having no visual problems, 50% respond yes to past vision problems while 50% respond no to past visual problems, 74.2% respond that they were considered ocular treatment and 25.8% did not consider any type of ocular treatment, 100% of the participants profession was associated with near work, 48.4% of

the participants were facing asthenopic symptoms while 51.6% were not experiencing any kind of asthenopia, 92.3% of the participants were doing near work more than 5 hours on daily basis while the 7.7 were not doing near work more than 5 hours on daily basis.

Section 3

This section provides information about the types of refractive error find out in study participants.

Table no 3

Table no 20 Types of refractive error	Frequency	Percent	Valid Percent	Cumulative Percent
		%	%	%
Myopia	105	42.3	42.3	42.3
Hyperopia	27	10.9	10.9	53.2
Simple Myopic Astigmatism	37	14.9	14.9	68.1
Simple Hyperopic Astigmatism	6	2.4	2.4	70.6
Compound Myopic Astigmatism	41	16.5	16.5	87.1
Compound Hyperopic Astigmatism	18	7.3	7.3	94.4
Mixed Astigmatism	14	5.6	5.6	100.0
Total	248	100.	100.	

Table no 3 show that 42.3.% of responders reported myopia, 10.9% hyperopia, 14.9% simple myopic astigmatism, 2.4% simple hyperopic astigmatism, 7.3% compound hyperopic astigmatism, and 5.6% with mixed astigmatism.

Discussion

This study was conducted at The University of Lahore teaching hospital and LRBT hospital Lahore, A descriptive cross-sectional study that elaborates the evaluation of refractive error among near workers. Data were collected through a developed modified questionnaire from Shakeel T Tarnum. 248 participants take part in this study. All participants responded differently to every question of the questionnaire. Out of 248 people, 146 respondents are male, and 102 respondents are female. All participants' ages range from 18 to 36 years. In response to this question Respondents respond that 63.3 % of the respondents s having vision problems and 36.7% have no vision problems. Research conducted by Sara A in the UK includes 21.3 percent of people said they had good or bad eyesight. Only four people (5.1%) said they wore glasses or contact lenses. More than 11% said they had trouble recognising a buddy across the street, and 19.5 percent said they had trouble reading. Around 20% of people said they had multiple eye issues. Despite the fact that 38% had never seen an eye doctor [18].

It shows that 60.1 percent of those surveyed have a family history of refractive error. There is no familial history of refractive error in 33.9 percent of the respondents. This finding is like one study in the United States, which found a link between parental myopia and myopia in their offspring, implying a hereditary role in myopia susceptibility. When neither parent was myopic, the prevalence of myopia in children was 7.3 percent, 26.2 percent when one parent was myopic, and 45 percent when

both parents were myopic, showing a major genetic component in myopia [19].

In response to the question, 48.4 % of respondents were experiencing asthenopic symptoms and 51.6% were having no symptoms of asthenopia similarly a study performed by Hassan Hashemi MD in the UK shows that the prevalence of asthenopia was 70.9% and 39.8% found arranged the occurrence of minimum one, two, and three symptoms, of asthenopia respectively [20].

Our data showed the incidence of myopia occurred more than two times that of hypermetropia. types of refractive error based on the results 42.3.% of responders reported myopia, 10.9% hyperopia, 14.9% simple myopic astigmatism, 2.4% simple hyperopic astigmatism, 7.3% compound hyperopic astigmatism, and 5.6% with mixed astigmatism. Myopia was the most prevalent refractive error. In contrast to this study, Cui, J. et al 2021 reported a lower prevalence of myopia (4.8%) compared to the current study while the prevalence of astigmatism was much higher (44.8%) when compared to the current study [21].

We encountered no evidence of the various patterns of refractive errors among near workers during our careful search; hence we matched the results of other studies in similar age groups. In the study by YEKTA A, et al 2019 in carpet weavers in which the prevalence of myopia was 78.95% the greatest shared form of refractive error stood myopia tracked by astigmatism and hyperopia similarly in the current study the most common type of refractive error was myopia followed by astigmatism and then hyperopia respectively. The prevalence of hyperopia was 6.02% the prevalence of astigmatism was 39.47% respectively [22].

Myopia was by far the most prevalent refractive defect in the present study, next by astigmatism. hypermetropia was the least common of all. In contrast to the current study, in their study, Shakeel, Tarannum, and Sanjeev Kumar Mittal (2016) discovered that astigmatism was the most prevalent refractive defect, followed by myopia and hypermetropia [23].

Conclusion and Recommendations

Thus, from the present study, it is obvious that near workers had a higher rate of refractive errors. Individuals who are exposed to more near work had significantly greater rates of refractive error and poor vision than those exposed whose are less exposure to near work. The most prevalent refractive error in this research remained myopia observed by means of astigmatism and hyperopia. The frequency of myopia stayed the highly confronted refractive defect between all genders. Within the present research, this one can be established that myopia is a major refractive error among the near workers, and correction of refractive error especially myopia could benefit the society and nation.

Eye care practitioners should mention that the use of glasses should be compulsory while performing near work if they have any refractive error. If there is or no refractive errors, they should take a gap after one hour near work. There should, in our opinion, enhance public awareness of refractive errors. There should conduct more eye camps. Eye professionals should guide people to check their eyesight at least once in every six months.

Limitations

This study has following limitation.

- The results are based on self-reported data from participants, which limit the validity of the data.
- Our study was a cross-sectional one, and as such the study design limits some of the conclusions.
- The sample size was 248, more than this sample size will improve the accuracy of the study and results.
- As we focus on the multiples type of refractive errors focusing on single refractive error the accuracy of results would be higher.
- The conducted study method not organized follow-ups for the participants further studies must perform follow-ups to improve the accuracy of results.

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Conflict of Interest

There is no conflict of interest between the authors in this manuscript.

References

1. Harb, E.N. (2019). "Wildsoet CF. Origins of refractive errors: environmental and genetic factors". *Annual review of vision science*, 15(5), 47-72.
2. Ahadi, M., Ebrahimi, A., Rahmani, S., & Baghban, A. A. (2021). "Prevalence of refractive errors and color vision deficiency in a population of industry workers in Abhar". *Iran. Medicine*, 100(46).
3. Muhamedagic, L., Muhamedagic, B., Halilovic, E. A., Halimic, J. A., Stankovic, A., & Muracevic, B. (2014). "Relation between near work and myopia progression in student population". *Materia socio-medica*, 26(2), 100.
4. Wiggins, N.P. and Daum, K.M. (1991). "Visual discomfort and astigmatic refractive errors in VDT use."
5. Hendricks, T.J. and De Brabander J., et. al. (2007). "Journal American association "Relationship between habitual refractive error and headache complains in school children". 84(2), 137-43.
6. Westman M. and Liinamaa J. (2012). "Relief of asthenopic symptoms with orthoptic exercises in convergence insufficiency is achieved in both adults and children". *J Optom*, 5, 62-677.
7. Nwosu S.N.N. and Alzie I.U. (2006). "Refractive error in school children in Onitsha, Nigeria". *Nigerian Journal of Health and Biomedical Sciences*, 5(1), 114.
8. Alsaif, B. A., Aljindan, M. Y., Alrammah, H. M., Almulla, M. O., & Alshahrani, S. S. (2019). "Refractive errors among Saudi college students and associated risk factors". *Clinical Ophthalmology (Auckland, NZ)*, 13, 437.
9. Hashemi, H., Fotouhi, A., Yekta, A., Pakzad, R., Ostadimoghaddam, H., & Khabazkhoob, M. (2018). "Global and regional estimates of prevalence of refractive errors: Systematic review and meta-analysis". *Journal of Current Ophthalmology*, 30(1), 3-22.

10. Afghani T., Vine H.A., Bhatti M.A. and Al-Shifa Al-Noor (2003). "(ASAN) Refractive error study of one Million School Children". *Pak J Ophthalmol*, 19, 101-07.
11. Daino V.M.J., Happ A. and Crane P. (1981). "Visual fatigue and occupational stress in VDT operators". *Hum Factors*, 23, 421-38.
12. Fernández-Montero, A., Olmo-Jimenez, J. M., Olmo, N., Bes-Rastrollo, M., Moreno-Galarraga, L., Moreno-Montañés, J., and Martínez-González, M. A. (2015). "The impact of computer use in myopia progression: a cohort study in Spain". *Preventive Medicine*, 71, 67-71.
13. Hyman, L. (2017). "Myopic and hyperopic refractive error in adults: an overview". *Ophthalmic Epidemiology*, 14(4), 192-197.
14. Raasch, T. W. (2018). "Spherocylindrical refractive errors and visual acuity". *Optometry and Vision Science*, 72(4), 272-275.
15. Owens, D. A., & Wolf-Kelly, K. (2019). "Near work, visual fatigue, and variations of oculomotor tonus". *Investigative Ophthalmology & Visual Science*, 28(4), 743-749.
16. Richler, A., & Bear, J. C. (2014). "Refraction, near work and education: a population study in Newfoundland". *Acta Ophthalmologica*, 58(3), 468-478.
17. Jin, P., Zhu, J., Zou, H., Lu, L., Zhao, H., Li, Q., & He, X. (2015). "Screening for significant refractive error using a combination of distance visual acuity and near visual acuity". *PloS one*, 10(2), e0117399.
18. Dey, A. K., Chaudhuri, S. K., Jana, S., Ganguly, P., Ghorai, S., & Sarkar, A. (2014). "Prevalence of refractive errors in medical students". *Int J Health Sci Res*, 4(8), 98-102.
19. Dodie, M., Saunders, K. J., & Little, J.A. (2021). "Correction of Low-Moderate Hyperopia Improves Accommodative Function for Some Hyperopic Children During Sustained Near Work". *Investigative Ophthalmology & Visual Science*, 62(4), 6-6.
20. Kaiti, R., Pradhan, A., Dahal, H., & Shrestha, P. (2018). "Pattern and prevalence of refractive error and secondary visual impairment in patients attending a tertiary hospital in Dhulikhel, Nepal". *Kathmandu Univ Med J (KUMJ)*, 16(62), 114-119.
21. Pokharel, A., Pokharel, P., Das, H., & Adhikari, S. (2010). "The patterns of refractive errors among the school children of rural and urban settings in Nepal". *Nepalese Journal of Ophthalmology*, 2(2), 114-120.
22. Saw, S.M., Zhang, M.Z., Hong, R.Z., Fu, Z.F., Pang, M.H., & Tan, D. T. (2002). "Near-work activity, night-lights, and myopia in the Singapore-China study". *Archives of Ophthalmology*, 120(5), 620-627.
23. Li, S.M., Li, S.Y., Kang, M.T., Zhou, Y., Liu, L.R., Li, H., and Mitchell, P. (2015). "Near work related parameters and myopia in Chinese children: the Anyang Childhood Eye Study". *PloSone*, 10(8), e0134514.