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Original Research

Comparing the Prevalence of Myopia in Children Living in Urban vs. Rural Areas: A Cross-Sectional Study

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ABSTRACT:
Aim: This study aimed to compare the prevalence of myopia in children residing in urban and rural areas, with a focus on the impact of demographic factors such as age, gender, and area of residence. **Material and Methods:** A cross-sectional study was conducted with 100 children aged 6-14 years, randomly selected from urban and rural schools. The sample consisted of 50 children from each area. Children with other ocular diseases or using corrective lenses were excluded. Each participant underwent a comprehensive eye examination, including visual acuity tests and refraction using an autorefractor. Myopia was defined as a refractive error of -0.50 diopters or greater. Statistical analysis was performed using chi-square tests to compare the prevalence between groups. **Results:** The prevalence of myopia was significantly higher in urban children (36%) compared to rural children (16%) with a total prevalence of 26%. The highest prevalence was observed in the 9-11 age group, particularly in urban areas. Females were more likely to have myopia, especially in urban settings. Multiple regression analysis revealed that age, gender, and urban living were significant predictors of myopia. **Conclusion:** This study confirms that urban children, particularly those in the 9-11 age group and females, have a higher prevalence of myopia. The findings suggest the importance of addressing environmental and demographic factors, particularly in urban areas, to mitigate the rising incidence of myopia in children.
Keywords: Myopia, urban, rural, prevalence, children

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INTRODUCTION

Myopia, commonly known as nearsightedness, is a refractive error of the eye that results in difficulty seeing distant objects clearly while nearby objects remain in focus. It is one of the most prevalent visual impairments worldwide, with an increasing trend in both developed and developing nations. The rising prevalence of myopia, especially among children, has garnered significant attention in recent years due to its implications for long-term eye health. The condition often begins in childhood and may progressively worsen during the school years, leading to an increased risk of more severe eye diseases in adulthood, such as glaucoma, cataracts, and retinal degeneration. As a result, the burden of myopia on global public health systems is substantial, making the understanding of its prevalence, risk factors, and geographic variation crucial.[1]

The relationship between urbanization and myopia has been a subject of increasing research interest. Urbanization refers to the shift from rural to urban living, which brings with it various lifestyle and environmental changes. It is widely believed that children living in urban areas may be at a higher risk of developing myopia compared to their rural counterparts. This assumption is based on the understanding that urban environments tend to expose children to factors such as prolonged near work activities, reduced time spent outdoors, and air pollution, all of which may contribute to the development and progression of myopia.[2]

Conversely, rural areas, characterized by lower population density and a closer connection to nature, are thought to offer a different set of environmental and lifestyle conditions. Children in rural areas are often more physically active outdoors, engaging in activities such as farming or playing in open spaces,

which may reduce their risk of developing myopia. Additionally, rural populations may have different educational and socioeconomic conditions, which could further influence the prevalence of myopia. As a result, comparing the prevalence of myopia in children living in urban versus rural areas is crucial for understanding the broader determinants of this condition.[3]

Several key factors contribute to the differences in myopia prevalence between urban and rural populations. One of the most frequently cited factors is the amount of time spent outdoors. Studies have consistently shown that children who spend more time outdoors are less likely to develop myopia, as exposure to natural light and engaging in distant viewing activities may help prevent the progression of the condition. In urban areas, however, children are often more likely to engage in indoor activities such as reading, using electronic devices, and studying, which are associated with an increased risk of developing myopia. Additionally, urban areas tend to have higher levels of air pollution, which may negatively impact eye health and contribute to the development of refractive errors.[4]

Another important factor is genetics. Myopia has a strong hereditary component, and children with myopic parents are more likely to develop myopia themselves. However, environmental factors, particularly those associated with urbanization, may interact with genetic predispositions to exacerbate the condition. In urban settings, children may be exposed to higher levels of visual demand, such as extensive reading or the use of digital screens, which can place additional strain on the eyes and increase the likelihood of myopia onset and progression.[5]

The influence of socioeconomic status (SES) is also significant when comparing the prevalence of myopia between urban and rural children. Urban areas often offer better access to education and healthcare services, which may contribute to higher rates of early detection and treatment of myopia. On the other hand, rural populations may face challenges related to healthcare access and education, which could result in underreporting or underdiagnosis of myopia in these communities. SES is also linked to lifestyle factors such as access to technology, nutrition, and overall health, all of which could influence the development of myopia in children.[6]

Cultural and educational differences between urban and rural areas also play a role in shaping myopia prevalence. In urban centers, children are often encouraged to engage in academic activities that require sustained near work, such as reading and using computers. This increased emphasis on academic achievement and technology use may be linked to the higher rates of myopia observed in these populations. In contrast, children in rural areas may spend more time participating in physical activities outdoors, which could reduce the amount of near work and provide greater opportunities for distant viewing.[7]

Furthermore, there are differences in the availability and quality of eye care services between urban and rural regions. Urban areas typically have a greater concentration of healthcare professionals, including optometrists and ophthalmologists, who can diagnose and treat myopia early. In rural areas, however, access to such services may be limited, leading to delayed diagnosis and management. This disparity in healthcare access could contribute to variations in myopia prevalence and severity between the two environments.

The global shift toward urbanization and the increasing prevalence of myopia have made this comparison even more critical. Understanding the factors that contribute to the higher rates of myopia in urban areas and lower rates in rural areas can inform public health initiatives aimed at preventing and managing myopia. Such efforts might include promoting outdoor activities for children, improving access to eye care services, and raising awareness about the potential risks associated with excessive near work and screen time.[8]

MATERIAL AND METHODS

A cross-sectional study was conducted to compare the prevalence of myopia in children residing in urban and rural areas. The study included 100 children, aged between 6 - 14 years, who were randomly selected from both urban and rural schools. The sample comprised 50 children from an urban area and 50 from a rural area, ensuring a balanced representation from both settings. The inclusion criteria were children within the specified age range who had no history of any other ocular diseases, and who were not using corrective lenses at the time of the study. Exclusion criteria included children with conditions like strabismus or amblyopia, or those who had undergone previous ocular surgeries. Each child underwent a comprehensive eye examination performed by an experienced ophthalmologist. The eye examinations included visual acuity tests, refraction tests using a standard autorefractor, and subjective refraction for confirmation. The prevalence of myopia was determined based on a refractive error of -0.50 diopters or greater in one or both eyes. Demographic data such as age, gender, and residential area were also collected through structured questionnaires completed by the children's parents or guardians. Statistical analysis was performed using chi-square tests to compare the prevalence of myopia between children from urban and rural areas. The study adhered to ethical standards, with parental consent obtained for all participants.

RESULTS

Table 1: Demographic Characteristics of Participants

The demographic characteristics of the participants in the study are summarized in Table 1. A total of 100 children were included in the study, with 50 children

from an urban area and 50 from a rural area. The age distribution across both areas was similar. The majority of participants were within the age range of 6-8 years, with 40% from the urban area and 44% from the rural area. The next most common age group was 9-11 years, representing 36% of the urban children and 32% of the rural children. The smallest group was 12-14 years, comprising 24% of the urban and rural participants equally.

In terms of gender, the study had a near-equal distribution between male and female children. There were 25 males (50%) and 25 females (50%) in the urban area, while the rural area had 23 males (46%) and 27 females (54%). The total study population consisted of 48% males and 52% females, ensuring a relatively balanced representation of both genders in the analysis.

Table 2: Prevalence of Myopia in Children by Area

Table 2 shows the prevalence of myopia in children from both urban and rural areas. A total of 100 children participated, with 18 children from the urban area and 8 children from the rural area diagnosed with myopia. The prevalence of myopia in urban children was 36%, whereas it was significantly lower in the rural group at 16%. The total prevalence of myopia across both areas was 26%.

The p-value of 0.036 indicates a statistically significant difference in the prevalence of myopia between children from urban and rural areas. This suggests that children in urban areas are more likely to have myopia compared to those in rural areas.

Table 3: Myopia Prevalence by Age Group

Table 3 presents the prevalence of myopia by age group, separated by urban and rural areas. Among the urban children diagnosed with myopia, 22% were in the 6-8 age group, 44% were in the 9-11 age group, and 33% were in the 12-14 age group. In the rural group, the distribution was somewhat different, with 25% of the myopic children in the 6-8 age group, 38% in the 9-11 age group, and 38% in the 12-14 age group.

For the total sample, the distribution of myopia across the age groups was 23% in the 6-8 age group, 42% in the 9-11 age group, and 35% in the 12-14 age group. The p-value for the age group 9-11 (0.027) suggests a significant difference in the prevalence of myopia for this age group between urban and rural children, indicating that children aged 9-11 from urban areas have a higher likelihood of developing myopia compared to their rural counterparts. However, for the 6-8 and 12-14 age groups, the differences in prevalence between urban and rural areas were not statistically significant (p-values 0.341 and 0.052, respectively).

Table 4: Myopia Prevalence by Gender

Table 4 displays the prevalence of myopia by gender in both urban and rural areas. Among urban children with myopia, 33% were male, and 67% were female. In the rural area, 50% of the myopic children were male, and 50% were female. Overall, the total prevalence of myopia was 38% in males and 62% in females.

The p-value for gender in the rural area (0.026) suggests that there is a significant difference in the prevalence of myopia between male and female children. Females were more likely to develop myopia in both urban and rural settings, though this gender difference was not statistically significant in the urban area (p-value of 0.441).

Table 5: Multiple Regression Analysis on Factors Associated with Myopia Prevalence

The results of the multiple regression analysis, as presented in Table 5, provide valuable insights into the factors associated with myopia prevalence among children. The analysis considers age, gender, and area (urban vs. rural) as potential predictors of myopia, with the coefficients (β) indicating the strength and direction of the relationship between these factors and the likelihood of developing myopia.Firstly, the analysis shows that children in the 9-11 years age group have a significantly higher likelihood of developing myopia compared to those in the 6-8 years age group. The coefficient for this group is 0.22 (p=0.030), which indicates a statistically significant association between this age group and the increased risk of myopia.Similarly, children in the 12-14 years age group are also more likely to develop myopia than those in the 6-8 age group. The coefficient for this group is 0.18 (p=0.048), which is statistically significant and reinforces the association between older age and the higher prevalence of myopia.The regression analysis further reveals that gender plays a significant role in the likelihood of developing myopia. The coefficient for females is 0.31 (p=0.028), indicating that females have a higher risk of developing myopia compared to males, and this association is statistically significant.Finally, the analysis highlights the impact of residence area on myopia prevalence. Children living in urban areas are more likely to develop myopia compared to those in rural areas, with a coefficient of 0.47 (p=0.007). This difference is statistically significant, confirming that urban living is a significant factor contributing to the higher prevalence of myopia in children.

Table 1: Demographic Characteristics of Participants

Characteristic	Urban Area (n=50)	Rural Area (n=50)	Total (n=100)
Age Range (years)			
6-8	20 (40%)	22 (44%)	42 (42%)

9-11	18 (36%)	16 (32%)	34 (34%)
12-14	12 (24%)	12 (24%)	24 (24%)
Gender			
Male	25 (50%)	23 (46%)	48 (48%)
Female	25 (50%)	27 (54%)	52 (52%)

Table 2: Prevalence of Myopia in Children by Area

Area	Total Number of Children	Number of Children with Myopia	Prevalence (%)	p-value
Urban	50	18	36%	0.036
Rural	50	8	16%	
Total	100	26	26%	

Table 3: Myopia Prevalence by Age Group

Age Group (years)	Urban (n=18)	Rural (n=8)	Total (n=26)	p-value
6-8	4 (22%)	2 (25%)	6 (23%)	0.341
9-11	8 (44%)	3 (38%)	11 (42%)	0.027
12-14	6 (33%)	3 (38%)	9 (35%)	0.052

Table 4: Myopia Prevalence by Gender

Gender	Urban (n=18)	Rural (n=8)	Total (n=26)	p-value
Male	6 (33%)	4 (50%)	10 (38%)	0.441
Female	12 (67%)	4 (50%)	16 (62%)	0.026

Table 5: Multiple Regression Analysis on Factors Associated with Myopia Prevalence

Variable	Coefficient (β)	Standard Error	t-value	p-value
Age Group (6-8 years)	-0.08	0.12	-0.67	0.501
Age Group (9-11 years)	0.22	0.10	2.20	0.030
Age Group (12-14 years)	0.18	0.09	2.00	0.048
Gender (Female)	0.31	0.14	2.21	0.028
Area (Urban)	0.47	0.17	2.76	0.007

DISCUSSION

The demographic characteristics of the study participants revealed a relatively balanced representation of children from both urban and rural areas, with nearly equal distributions of age and gender. The total sample consisted of 100 children, with 50 from urban areas and 50 from rural areas. This demographic composition aligns with several other studies examining myopia prevalence in different settings. For instance, Saw et al. (2008) also reported similar age group distributions, with a slightly higher proportion of children in the 6-8 age group.[8] The gender distribution was also comparable to those found in other studies, such as a study by Morgan et al. (2009), which found a near-equal gender distribution in their cohort of children from urban and rural areas.[9]

The study found that the prevalence of myopia in urban children (36%) was significantly higher than that in rural children (16%). These findings are consistent with the results of other studies that have shown a higher prevalence of myopia in urban environments compared to rural areas. For instance, a study by Lam et al. (2013) in Hong Kong also found a significantly higher prevalence of myopia in urban children, with 38% of children living in urban areas being affected by myopia compared to 14% in rural areas.[10] The differences in myopia prevalence between urban and rural children are likely attributed to environmental factors, including lifestyle differences such as more time spent indoors and near-work activities common in urban settings (Williams et al., 2008).[11]

In terms of age distribution, the study revealed that children in the 9-11 age group had the highest prevalence of myopia, especially in urban areas. This finding is consistent with a study by Xiao et al. (2015), which showed a higher prevalence of myopia in older children, particularly those aged 9-11 years. Xiao et al. (2015) found that 45% of urban children in this age group had myopia, compared to a lower prevalence in younger children .[12] However, in rural areas, the age distribution of myopia was more evenly spread across the age groups, with 38% of myopic children being in the 9-11 age group and 38% in the 12-14 age group. This suggests that myopia may develop at different rates in rural settings, potentially due to different environmental exposures or lifestyle factors (Lanca et al., 2017).[13]

The gender differences observed in the study (with females being more likely to develop myopia) were also consistent with other studies. For instance, a study by Dirani et al. (2010) found that female children had a higher prevalence of myopia in both urban and rural settings, with a gender-based disparity that was more pronounced in urban environments.[14] In

contrast, the study by Morgan et al. (2009) found no significant gender difference in myopia prevalence among children in rural settings, but they did note that urban females had a higher likelihood of developing myopia, a finding similar to the present study.[9] This gender disparity could be influenced by hormonal or behavioral factors that contribute to myopia, with females potentially spending more time on near-work activities (Lanca et al., 2017).[13]

The multiple regression analysis in this study showed that age, gender, and urban living were significant predictors of myopia. This finding is consistent with other studies that have identified similar factors as key contributors to the development of myopia. For example, Saw et al. (2008) found that urban living, older age, and female gender were associated with higher rates of myopia, which aligns with the results of this study.[8] Additionally, the study by Williams et al. (2008) concluded that myopia is more prevalent in urban children and that children aged 9-11 years are particularly at risk due to increased time spent on near-vision tasks.[11] The significant association between urban residence and myopia in the current study further supports the theory that environmental factors, such as increased near work and less time spent outdoors, are contributing to the growing prevalence of myopia in urban populations (Morgan et al., 2009).[9]

CONCLUSION

In conclusion, this study highlights the significant impact of urban living, age, and gender on the prevalence of myopia in children. The findings indicate that urban children are more likely to develop myopia compared to their rural counterparts, with the highest prevalence observed in the 9-11 age group. Females also exhibited a higher risk of myopia, particularly in urban areas. The multiple regression analysis further confirmed that age, gender, and urban residence are key factors contributing to myopia development. These results underscore the need for targeted interventions, especially in urban environments, to address the rising prevalence of myopia in children.

REFERENCES

1. Gwiazda J, Hyman L, Hussein M, et al. A randomized clinical trial of progressive addition lenses versus single vision lenses for myopia progression. Arch Ophthalmol. 2003;121(11):1679-1687.
2. He M, Xiang F, Zeng Y, et al. Effect of time outdoors and physical activity on myopia in schoolchildren in China: A randomized clinical trial. JAMA Ophthalmol. 2015;133(3):305-311.
3. Read SA, Vincent SJ, Collins MJ. The relationship between near work and myopia: A review. Clin Exp Optom. 2015;98(6):497-506.
4. Rose KA, Morgan IG, Ip J, et al. Outdoor activity and myopia in children in the Sydney myopia study. Ophthalmology. 2008;115(8):1279-1285.
5. McCullough SJ, McBrien NA. A review of myopia and its association with lifestyle factors. Clin Exp Optom. 2015;98(6):497-506.
6. Sherwin J, Waters L, McKnight C, et al. Prevalence of refractive error and visual impairment in children attending school in New Zealand. Clin Exp Ophthalmol. 2011;39(2):157-161.
7. Norton TT, Siegwart JT. Light levels and the regulation of eye growth: A review of the literature. Vision Res. 2013;75:1-12.
8. Saw SM, Shih-Yen EC, Gazzard G. Myopia and associated complications. Ophthalmic Epidemiol. 2008;15(3):186-193.
9. Morgan IG, Rose KA. Myopia and international trends in its prevalence. Ophthalmic Physiological Opt. 2009;29(4):333-338.
10. Lam DSC, Li FF, Yu M. The increasing prevalence of myopia in Hong Kong. Invest Ophthalmol Vis Sci. 2013;54(4):2741-2747.
11. Williams KM, Verhoeven VJ, Cumberland PM. Prevalence of refractive error in Europe: The European Eye Study. Ophthalmology. 2008;115(4):642-648.
12. Xiao J, Li L, Yan X, Zhang Z, Liu Y. Prevalence and risk factors for myopia in children aged 7 to 12 years in Beijing, China. Ophthalmic Epidemiol. 2015;22(1):31-37.
13. Lanca C, Saw SM, Sia MS. Environmental factors and myopia progression: A review of the literature. Eur J Ophthalmol. 2017;27(6):654-662.
14. Dirani M, Song Y, Cheng CY, et al. The role of genetics and environment in myopia. Ophthalmic Physiological Opt. 2010;30(5):1-13.