Content available at: https://www.ipinnovative.com/open-access-journals

IP Journal of Nutrition, Metabolism and Health Science

Journal homepage: https://www.jnmhs.com/

Original Research Article

A qualitative analysis on prevalence of refractive errors in children

Mayur Savaliya[1]*, Hirava Sevak[1], Patel Keyuri R[1], Patel Prakruti H[1]

[1]*Dept. of Clinical Research and Healthcare Management, Indus University, Ahmedabad, Gujarat, India*

ARTICLE INFO

Article history:
Received 04-06-2024
Accepted 19-06-2024
Available online 12-07-2024

Keywords:
Refractive errors
Population
Demographics
Health Survey
Children
Eye power
Nutrition
Fast food Impact

ABSTRACT

Introduction: General Health survey was conducted in order to gain a better understanding about the lifestyle of children and their weekly consumption of nutrition. The study was mainly based on information provided by children and their family members. The survey has 400 different cases from all over Ahmedabad, Gujarat showcasing the eye power and cause of power. There are cases with eye power as well as non-eye power once.
Aim: To evaluate the general public's understanding of and attitude towards refractive errors in the North-central part of Gujarat, Ahmedabad.
Settings and Design: Door-to-door population survey in the region of North-central Gujarat, Ahmedabad.
Materials and Methods: A 15-point questionnaire was created and the information was gathered and analyzed to determine statistically the knowledge, attitude, and practice of the general population and population as well as to identify important demographic relationships.
Result: It was seen that among all the refractive errors myopia was the most common one seen in children. After myopia the most common Refractive error was amblyopia accompanied with astigmatism and then hyperopia was seen rarely in children. From 400 children's 54 children were diagnosed with Refractive errors that is 13.5%.
Conclusion: Refractive errors were common in both the genders. Age population between 3 to 9 shows fluctuations while population of 10 to 12 years had higher number of individuals suffering from Refractive disorders.

1. Introduction

Refractive errors are vision problems caused by the eye's shape, which prevents light from focusing accurately on the retina.[1] Some types of refractive errors are discussed below:-

1. Hyperopia: It is also known as farsightedness i e , makes nearby objects look blurry
2. Myopia: It is also known as near sightedness i e , makes far-away objects look blurry
3. Astigmatism: It can make far-away and nearby objects look blurry or distorted
4. 4. Amblyopia: It is also known as lazy eye i.e., brain recognize sight from one eye i.e., stronger eye and can't recognize from another eye.[2,3]

This article delves into the results of a comprehensive study aimed at shedding light on the general eye health and weekly nutrition intake of children in Ahmedabad.[4,5]

2. Materials and Methods

Door-to-door step surveys are a valuable method for gathering data on the presence of refractive errors in

* *Corresponding author*.
E-mail address: mayursavaliya.cr@indusuni.ac.in (M. Savaliya).

https://doi.org/10.18231/j.ijnmhs.2024.012

a community.[6,7] By conducting face-to-face research, researchers were able to reach patients in schools, houses, and hospitals. This approach allowed for a comprehensive collection of data from a diverse range of individuals in real-time.[5,8]

The use of a CRF (Case Report Form) provided to surveyors ensured that all necessary information about the respondents was accurately recorded.[4] This method of data collection is particularly important when studying refractive errors, as it allows for the collection of detailed and accurate information that may not be easily obtained through other means.[9]

With the data of the children's eye we also gathered data of nutrition which they consume and try to find the cause of the refractive error in school going children.[10,11]

In focusing on children, the surveyors took an extra step to ensure the well-being of the minors by obtaining the signatures of their guardians. This not only helps to protect the rights of the children but also ensures that the data collected is reliable and ethically obtained.

Overall, door-to-door step surveys are a valuable tool for studying refractive errors in a community, providing researchers with real-time, accurate data from a diverse range of respondents.[12]

Figure 1: Photographs of the survey

In this survey, a detailed questionnaire form CRF (case history form) was filled after healthy conversation with children and their parents. This CRF form is as mentioned below.

In this form, after general physical and eye examination, nutrition chart has been included that is strongly connected for the food of the current children in this particulate area.[12,13]

3. Result

It was seen that among all the refractive errors myopia was the most common one seen in children. After myopia the most common Refractive error was amblyopia accompanied with astigmatism and then hyperopia was seen rarely in children.

From 400 children's 54 children were diagnosed with Refractive errors that is 13.5%. As shown in figure 2.

From 13.5% (54) sample size 66.7% (36) had myopia, 7.4% (4) had amblyopia, 9.2% (5) had astigmatism and 1.8% (1) with hyperopia. 11.1% (6) population had myopia combined with amblyopia and 3.7% (2) populations with astigmatism combined with amblyopia and 1.8% (1) population had hyperopia combined with amblyopia.

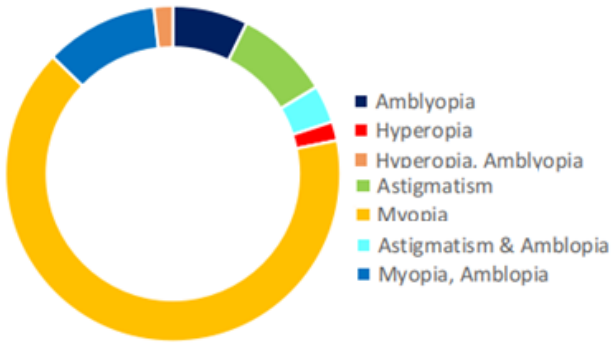


Figure 3: Type of power

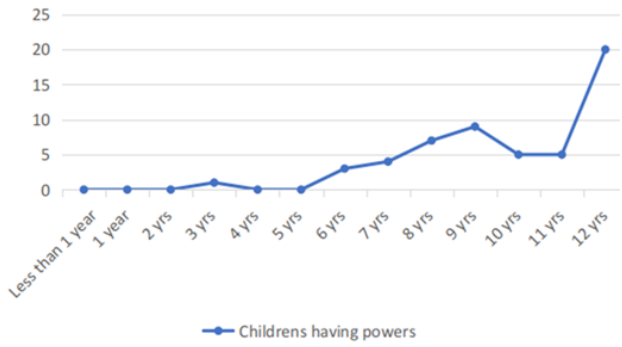
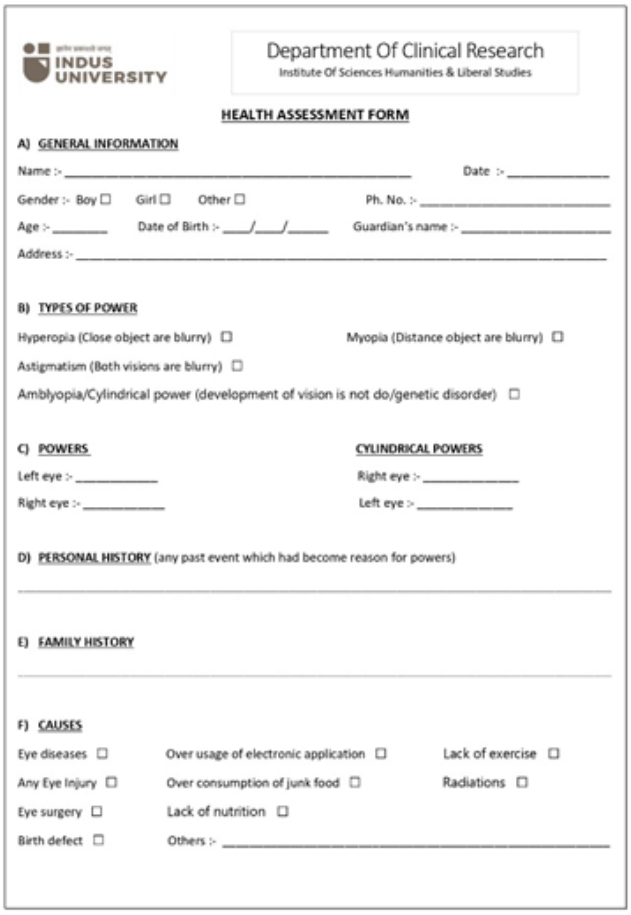


Figure 4: Line graph showing refractive error in different age group



INDUS UNIVERSITY

Department Of Clinical Research
Institute Of Sciences Humanities & Liberal Studies

HEALTH ASSESSMENT FORM

A) GENERAL INFORMATION

Name :- _____ Date :- _____

Gender :- Boy ☐ Girl ☐ Other ☐ Ph. No. :- _____

Age :- _____ Date of Birth :- ___/___/_____ Guardian's name :- _____

Address :- _____

B) TYPES OF POWER

Hyperopia (Close object are blurry) ☐ Myopia (Distance object are blurry) ☐

Astigmatism (Both visions are blurry) ☐

Amblyopia/Cylindrical power (development of vision is not do/genetic disorder) ☐

C) POWERS **CYLINDRICAL POWERS**

Left eye :- _____ Right eye :- _____

Right eye :- _____ Left eye :- _____

D) PERSONAL HISTORY (any past event which had become reason for powers)

_____

E) FAMILY HISTORY

_____

F) CAUSES

Eye diseases ☐ Over usage of electronic application ☐ Lack of exercise ☐

Any Eye Injury ☐ Over consumption of junk food ☐ Radiations ☐

Eye surgery ☐ Lack of nutrition ☐

Birth defect ☐ Others :- _____

G) NUTRITIONAL CHART

Junk Food	Healthy Food	Non-Veg Food
Fries	Salad	Eggs
Burger	Roti/Sabji	Chicken
Pizza	Pulses	Meat
Vadapau/Dabeli	Rice	Sea Foods
Beverages	Fruits	Others :

Consumption per week :- _____

I, _____, hereby acknowledge that all the information mention above is according to best of my knowledge and I have given by my consent and I permit to use this information for project purpose without any objection.

Signature of guardian: Signature of Surveyor: Signature of Department Head:

_____ _____ _____

Figure 2: The CRFform to collect Data

The thorough results of these refractive errors are discussed below:

1. Birth Defect - From 13.5% (54) sample size; 27.8% (15) population had refractive errors through birth defects in which majority of birth Defect were seen in myopia.
2. Over use of electronic applications - The over use of electronic application is also one of the most common cause of developing refractive errors. Out of 13.5% (54) sample size, 81.4% (44) population had the habit of using electronic applications in which majority of them had myopia and thus, it might be one of the causes for developing refractive errors.
3. Over consumption of junk food - Nowadays junk food consumption is nothing new but it does cause many disorders and it might be one of the causes to develop refractive errors as well. Out of 13.5% (54) sample size, 44.5% (24) population consume junk food whose frequency is discussed below:- Among 13.5% (54) sample size, 46.3% (25) population consume junk food once a month, while 31.5% (17) population, while 13% (7) population consumed junk food twice a day and only 1.8% (1) population rarely ate junk food. Thus, from above discussion we conclude kids who consume junk food once and twice a week are concluded to have over consumption of junk food.
4. Lack of exercise - As we all know exercise plays a very important role in keeping our body fit and fine and thus Out of 13.5% (54) sample size, 53.7% (29) population did not go through any physical exercises which might be a cause for refractive errors.

4. Discussion

This study was started by creating a questionnaire CRF form that included four types of disease/conditions under eye disorders namely astigmatism, myopia, amblyopia and hyperopia.[6,12]

Using the door-to-door survey method, we attempted to gather data on children's suffering from eye disorders and its prevalence among them.[5,7]

It gave us the chance to engage with the children's and helped us and understand different eye disorders and their causes better.[14]

Table 1: Suspected causes co related with refractive error

S.No.	Causes	Have	Don't have
1	Birth defect	15 (3.8%)	385 (96.2%)
2	Over use of electronic application	45 (11.25%)	355 (88.75%)
3	Over consumption of junk food	36 (9%)	364 (91%)
4	Lack of nutrition	33 (8.25%)	367 (91.75%)
5	Lack of exercise	29 (7.25%)	371 (92.75%)
6	Radiation	20 (5%)	380 (95%)

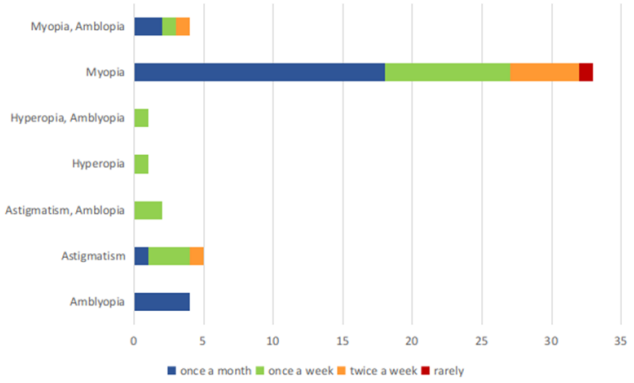


Figure 5: Consumption on Junk food by the children's who are having refractive error

We chose Ahmedabad, or to be more precise, the areas of Science City, Sola, Maninagar, Nikol, Ghatlodia, Thaltej, Gota, Gulab Tower, Naranpura and Odhav, in north-central Gujarat, for our study.

Out of 400 children's we found 13.5% (54) population had Refractive errors and also, we studied their demographic information, Medical history, food habits, family history, and their quality of life.

With the help of collected cases and statistical analysis, we were able to bifurcate the cases which shows the count of male and female as well as occurrence of different refractive errors in different age groups.

It was prominent that majority of children followed healthy diet and lifestyle.

4.1. Hyperopia

1. Hyperopia, also known as farsightedness, is a common refractive error of the eye that affects a person's ability to focus on near objects clearly. This condition occurs when the eyeball is too short or the cornea (the clear front part of the eye) is too flat, causing light rays to converge behind the retina instead of directly on it.[1,5,15]

   (a) People with hyperopia often experience eyestrain, headaches, and difficulty reading or seeing objects up close. They may squint or frown frequently in an attempt to improve their near vision. Hyperopia can be present at birth or develop later in life, and its severity can vary from mild to severe.

   (b) In summary, hyperopia is a common refractive error that impairs near vision, but it is treatable with glasses, contact lenses, or refractive surgery. By seeking proper eye care and using the recommended corrective measures, individuals with hyperopia can enjoy clear and comfortable vision at all distances.[2,5,7]

4.2. Myopia

1. Myopia, commonly known as nearsightedness, is a refractive error of the eye that affects a person's ability to see distant objects clearly. This condition occurs when the eyeball is too long or the cornea (the clear front part of the eye) is too curved, causing light rays to converge in front of the retina instead of directly on it.[8–10]

   (a) People with myopia often experience blurred vision when looking at objects far away, such as road signs, whiteboards, or television screens. They may need to squint or move closer to see clearly. Myopia can develop in childhood or adolescence, and its severity can range from mild to severe.

   (b) The exact cause of myopia is not fully understood, but it is believed to be influenced by a combination of genetic and environmental factors. Excessive near work, such as reading or using digital devices for extended periods, has been linked to an increased risk of developing myopia, particularly in children.

   (c) In summary, myopia is a common refractive error that impairs distance vision, but it is treatable with glasses, contact lenses, or refractive surgery. By seeking proper eye care and using the recommended corrective measures, individuals with myopia can enjoy clear and comfortable vision at all distances, reducing the risk of potential complications associated with uncorrected nearsightedness.[8,9,13]

4.3. Astigmatism

1. Astigmatism is a common refractive error of the eye that affects the way light rays focus on the retina. Unlike myopia (nearsightedness) or hyperopia (farsightedness), which result from the overall curvature of the cornea or the length of the eyeball, astigmatism is caused by an irregular or asymmetrical curvature of the cornea or lens.[5,7,9]

   (a) Astigmatism can be present at birth (congenital) or develop later in life due to various factors, such as eye injuries, certain eye diseases, or the natural aging process. It can occur in combination with myopia or hyperopia, further complicating the refractive error.

   (b) The most common symptoms of astigmatism include blurred or distorted vision, eye strain, headaches, and squinting or closing one eye to see better. The severity of astigmatism can vary from mild to severe, and it may affect one eye more than the other.

   (c) While astigmatism can cause visual discomfort and impairment, it is generally a treatable condition. With proper diagnosis and appropriate corrective measures, individuals with astigmatism can enjoy clear and comfortable vision at all distances, reducing the risk of potential complications associated with uncorrected refractive errors.[9]

4.4. Amblyopia

1. Amblyopia, commonly known as "lazy eye," is a visual impairment that occurs during childhood and results in reduced vision in one or both eyes. It is caused by abnormal development of the neural pathways between the brain and the eye(s), leading to poor visual processing and reduced acuity.[6,7,11]

   (a) Amblyopia typically develops during the critical period of visual development, which occurs from birth to around 6-8 years of age. During this time, the neural connections between the eyes and the brain are most susceptible to disruptions or abnormal input.
   If left untreated, amblyopia can lead to permanent vision loss or impairment in the affected eye(s). Early detection and treatment are crucial to prevent long-term visual deficits.[2,15,16]

   (b) Regular eye examinations during childhood are essential for early detection and management of amblyopia, as well as other vision disorders. By addressing amblyopia promptly, children can develop proper visual function and avoid the long-term consequences of this condition.

5. Source of Funding

None.

6. Conflict of Interest

None.

7. Acknowledgement

Foremost, I, Dr Mayur Savaliya and Ms Hirava Sevak would like to express our sincere gratitude to the students Keyuri R. Patel and Prakruti H. Patel for the continuous hard work to this Project study and research, for their patience, enthusiasm, and immense knowledge. As with any piece of research that results in the production of a thesis there is not only one person who can accomplish this goal it needs a team of people who work behind the scenes and helped us accomplish our goal, and we would like to acknowledge all the people who helped us to successfully complete the research. Without their assistance, encouragement, guidance and support we would not have succeeded. We are very grateful to all those people who have given us so much time, love and energy in producing this thesis.

We also wish to express our gratitude to our supervisor at Indus University, for continuous support and advice throughout the thesis process that kept our work on track. Secondly, we must thank the participants who contributed data because without their participation this thesis could never have been completed and finally with the love and support of my fellow surveyor, my teammate, my friend and family members I could not have accomplished my thesis.

8. Source of Funding

None.

9. Conflict of Interest

None.

References

1. Tongue AC. Refractive Errors in Children. *Pediatr Clin North Am*. 1987;34(6):1425–37.
2. Karakus S. Refractive Errors, The Johns Hopkins University. Available from: https://www.hopkinsmedicine.org/health/conditions-and-diseases/refractive-errors.
3. Bates A. Common eye problems among children. *Consultant Ophthalmologist, Eye, Ear and Mouth Unit*;.
4. Bates A. Common eye problems in children. *London J Prim Care (Abingdon)*. 2010;3(1):27–30.
5. Ovenseri-Ogbomo GO, Assien R. Refractive error in school children in Agona Swedru, Ghana. *South Afr Optometrist*. 2010;69(2). doi:10.4102/aveh.v69i2.129.
6. Bremond-Gignac D. Myopia in children. *Med Sci (Paris)*. 2020;36(8-9):763–8.
7. Shrestha GS, Sujakhu D, Joshi P. Refractive error among school children in Jhapa, Nepal. *J Optom*. 2011;4(2):49–55.

8. Padhye AS, Khandekar R, Dharmadhikari S, Dole K, Gogate P, Deshpande M, et al. Prevalence of Uncorrected Refractive Error and Other Eye Problems Among Urban and Rural School Children, Department of Community Ophthalmology. *Middle East Afr J Ophthalmol*. 2009;16(2):69–74.
9. O'Donoghue L, Mcclelland JF, Logan NS, Rudnicka AR, Owen CG, Saunders KJ, et al. Refractive error and visual impairment in school children in Northern Ireland. *Br J Ophthalmol*. 2010;94(9):1155–9.
10. Coles R. Vision and eye health in children. Available from: https://pharmaceutical-journal.com/article/ld/vision-and-eye-health-in-children.
11. Prakash WD, Marmamula S, Keeffe J, Khanna RC. Effective refractive error coverage and spectacle coverage among school children in Telangana, South India. *Eye (Lond)*. 2024;doi:10.1038/s41433-024-02986-6.
12. Bikbov MM, Kazakbaeva G, Fakhretdinova AA, Tuliakova AM, Iakupova EM, Jonas SP, et al. Prevalence and associated factors of myopia in children and adolescents in Russia: the Ural Children Eye Study. *Br J Ophthalmol*. 2024;108(4):593–8.
13. Mukharram M, Bikbov GM, Kazakbaeva AA, Fakhretdinova, Azaliia M, Tuliakova, et al. Prevalence and associated factors of myopia in children and adolescents in Russia: the Ural Children Eye Study. Heidelberg, Germany;.
14. Oguego N, Okoye OI, Okoye O, Uche N, Aghaji A, et al. Eye health myths, misconceptions and facts: results of a cross-sectional survey among Nigerian school children. 2018;20(2):144–8.
15. Murthy GVS, Gupta SK, Ellwein LB, Muñoz SR, Pokharel GP, Sanga L, et al. Refractive error in children in an urban population in New Delhi. *Invest Ophthalmol Vis Sci*. 2002;43(6):623–31.
16. Banayot RG. A retrospective analysis of eye conditions among children attending St. John Eye Hospital, Hebron, Palestine. *BMC Res Notes*. 2016;9:202. doi:0.1186/s13104-016-2011-.

Author biography

Mayur Savaliya, Assistant Professor

Hirava Sevak, Lecturer

Patel Keyuri R, Student

Patel Prakruti H, Student

Cite this article: Savaliya M, Sevak H, Patel Keyuri R, Patel Prakruti H. A qualitative analysis on prevalence of refractive errors in children. *IP J Nutr Metab Health Sci* 2024;7(2):68-73.