



# Screening for Amblyopia in First and Second Grade Children in Kanpur

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## ABSTRACT

**Objective** - To publicize findings from a nationwide amblyopia screening program for Kanpur school children.

**Methods** - This is a prospective national amblyopia screening study. Children in the first and second grades (6–7) in the northern region of Kanpur are enrolled in the program. The cover-uncover test, cycloplegic retinoscopy, and best-corrected visual acuity were all part of the eye examination. An ETDRS visual acuity chart was used to measure monocular visual acuity without correction. Additionally, when the test conditions were satisfied, children were assessed with complete cycloplegic refraction. A variation of two lines or more in best-corrected visual acuity was considered to be suggestive of unilateral amblyopia. As compared with this, bilateral amblyopia was described as having a best-corrected visual acuity in the best eye of 20/40 or lower.

**Results** - Of the entire sample examined (n = 17 203), 2.78% (n = 479) had amblyopia. Hypermetropia (64.45%) was the most common cause of amblyopia, followed by previous ocular surgeries (15.1%), myopia (10.43%), strabismus (9.39%), congenital cataract (0.63%).

**Conclusion** - Among Kanpur children with amblyopia, this is the first and only study to identify modifiable risk factors. Many children in Kanpur suffer from amblyopia during their early schooling, undiagnosed. Increased government funding is required for screening initiatives aimed at improving visual health Kanpur population.

**Keywords** - Screening, amblyopia, community, population-based, study, and screening program

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## INTRODUCTION

In the pediatric population, Amblyopia is the most prevalent cause of reversible blindness<sup>[1]</sup>. Early detection is important for psychological and physical reasons. It has been discovered that amblyopia slows reading speed and has an impact on athletic and academic performance<sup>[2]</sup>. The government must conduct nationwide screening programs to identify and treat amblyopia in early stages due to its prevalence at a significant age at which the condition can be fixed<sup>[3-5]</sup>. In the area, relevant national studies were carried out [6-7]. However, no thorough study was conducted in Kanpur. Here are the results of the

largest amblyopia screening program ever conducted in Kanpur. The initiative was designed for first- and second-graders Kanpur's northern region.

## MATERIAL & METHODS

**Subjects** - In Kanpur, a total of 6532 school children, aged six to seven year, completed amblyopia screening. 1126 schools in the northern Kanpur, were included in the screening. First and second graders made up the entire sample of kids for this study. Four classes were visited each school on average. The classes were selected at random. From September 2022 to February 2023, the film was screened.



**Instruments** - The National Women's Health Care Center (NWHCC) offered an ophthalmology mobile outpatient clinic. To test intraocular pressure (IOP) in particular situations, the clinic had a slit lamp, a kid auto refractometer, an automated Snellen chart and a Tonopen. The retina might be seen using an indirect ophthalmoscope and handheld lenses. An ordinary ophthalmoscope and a retinoscope were present.

**Employees** - Each child included in the study has undergone examination by a registered nurse. Additionally, an expert volunteer, writer helped the nurse with the triage. The nurse and the writer were in charge of filling out forms. A pediatric ophthalmologist and optometrist at the mobile clinic were consulted for a comprehensive eye examination and refraction in cases where children were suspected of having eye issues.

**Screening** - There were two rooms in the screening area: one was used by the nurse to assess visual acuity, and the other was used by the writer to complete the consent and questionnaire. The screening commenced early in the morning and lasted until 2:00 pm in order to ensure that all youngsters were completely focused on the process. The consent and questioning forms were filled out by parents in front of a writer. Surveys asked about contact information, age, gender, relationship, hospitalization to the intense neonatal care unit, chronic illnesses, diabetes in the family, and retinitis pigmentosa history. Congenital cataracts, congenital glaucoma, squint history, wearing spectacles, patching, intraocular tumors, inflammation of the eyes, and hazy daytime or night time vision were among the ophthalmic issues. Using a Snellen chart, a competent and experienced nurse from the ophthalmology department was involved in the visual acuity assessment process. For children with 20/20 vision, a normal pediatric autorefraction test, and no history of ocular disease, no further action was needed. The remaining kids were directed to the portable clinic for in-depth eye exams.

**Comprehensive Eye Exam** - Students were scheduled to see an ophthalmologist at the portable eye clinic if they had a history of prior eye surgeries, eyeglass wear, glaucoma, prominent squint, or inability to achieve 20/20 vision by Snellen chart. With the goal to rule out alternative causes of vision impairment,

cycloplegic refraction, a full ocular examination, and best-corrected visual acuity (BCVA) were obtained. Slit-lamp biomicroscopy and indirect posterior pole ophthalmoscopy were performed as part of the evaluation. The cost of military service was used to provide eyeglasses to patients who could not afford them. During the national survey, 1327 pairs of eyeglasses were donated in total.

#### **Descriptions**

**Strabismus** - Strabismus was defined as children with ocular misalignment with BCVA for both near and distance.

**Amblyopia** - a decrease in the quality of central, corrected vision resulting from an impairment in retinal image formation during the first ten years of life.

**Unilateral amblyopia** - a difference in BCVA of two or more lines using the ETDRS chart, or less than 20/30 in the worse eye with amblyogenic factors. **Bilateral amblyopia** - a BCVA of 20/40 or worse in both eyes in the presence of amblyogenic factors.

Screening the anterior and posterior segments ruled out any organic diseases other than congenital glaucoma and cataracts that could cause vision loss. A minimum of 45 minutes were spent in cycloplegic refraction after two drops of 1% cyclopentolate hydrochloride were applied.

**Analytical Statistics** - SPSS Statistics for Windows, was used to do the statistics. The mean, median, mood, and standard deviation of every metric were included in the summary of descriptive data. The t-test for students was utilized.

#### **RESULT**

A total of 6532 students in the first and second grades underwent amblyopia screening. The current study covered the 1126 children. 479 cases (2.78%) of amblyopia were found. Of those cases, 188 patients (39.2%) had amblyopia in their right eye, and 291 patients (60.8%) had amblyopia in their left eye. Amblyopia was more common in men (54.2%) than in women (45.8%). The majority of the study's participants, 14 439 (83.9%), were first-graders. The others were second graders. 74.6% of the sample as a whole had health insurance.

821 (4.8%) of the children had congenital conditions. 355 people (2.1%) had congenital conditions affecting the eyes, including retinitis



pigmentosa, congenital glaucoma, and cataracts. There was a report of a newborn intensive care unit admission in 965 cases (5.6%). In contrast, 32 (6.7%) of the students with amblyopia had systemic congenital abnormalities, and the proportion of hereditary eye problems was much higher (Table 1). One well-known risk factor for amblyopia is squint. In this study, 45 students (9.39%) who had amblyopia also had a squint, while the overall population had 465 (2.7%) who had a squint or were having treatment for one. There were higher indications of reading difficulties at school in the amblyopia group.

It was determined that (85.4%) eyes did not have any refractive errors. Multiple refractive errors were

observed in 2513 students (14.6%) overall. myopia and hypermetropia in 1203 (58.1%) and 1310 (52.1%) of the students respectively. In comparison with anisometropic myopia (5.2%), amblyopia was more common in cases of anisometropic hypermetropia (35.2%).

The percentage of cases of amblyopia with cause is shown in Table 2. According to the current study, the primary cause of amblyopia is a difference in refractive error between the two eyes. In conditions of amblyopia, hypermetropia is most common (64.45%). Myopia (10.43%), strabismus (9.39%), and congenital cataract (0.63%) were the other causes of amblyopia.

**(Table-1), Detailed congenital eye problem**

Congenital eye diseases	Amblyopia	Total
Cataract	0.63	0.43
Glaucoma	0.84	0.95
Retinitis pigmentosa	1.67	0.37
Intra ocular tumours	0.42	0.31
Reading difficulties	7.31	2.9
Night vision problems	1.67	0.30
Squint	9.39	2.7
Headache	3.13	2.49
Ocular surgeries	45.09	2.15

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**(Table-2), Percentage of amblyopia cases according to the cause**

Causes of amblyopia	Percentages
Hypermetropia	64.45
Myopia	10.43
Strabismus	9.39
Congenital cataract	0.63
Previous ocular surgeries	15.10



## DISCUSSION

To prevent and treat amblyopia-related vision loss in school-age children, vision screening is extremely important[14]. In the current study, 2.78 percent of students have amblyopia. Our percentages are lower than those of some of our neighboring nations, such as Saudi Arabia, where a recent survey found a frequency of 3.9% [16]. Furthermore, Yemen is thought to have a greater percentage of amblyopia—6.7%, according to some studies[17].

Anisometropia was the most responsible for 74.88% of the cases of amblyopia, according to one study. 10.43% of instances of amblyopia had myopia, and 64.45% of cases with hypermetropic amblyopia. Among the causes, strabismic amblyopia ranks second (9.39%). Remarkably, a chart analysis by Al-Haddad et al. [10] reveals that strabismus is the most prevalent cause of amblyopia in children under three years old (37%), while anisometropia is the most common cause in children between the ages of three and fifteen years (36%).

According to a second recent study on schoolchildren (6–16 years old) conducted in Coastal Karnataka, India, anisometropia is once again the most common cause of amblyopia[21]. To sum up, our findings align with those of previous local research projects [18].

The fact that only children who met our criteria for amblyopia underwent a thorough eye examination was one of the study's limitations. Youngsters who were thought to have strong eyesight but did not have a thorough checkup may have further ocular problems that were missed during screening. Moreover, the statistical analysis did not include children whose parents did not sign the consent form. Therefore, it is anticipated that the overall rate of amblyopia will be lower than the actual rate.

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