

# Prevalence of refractive error in mentally retarded students of Kathmandu Valley

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## ABSTRACT

Mental retardation also known as 'mentally handicap' means a delay or insufficient development of mental capacities. The prevalence of mental retardation in Nepal is 4.1%. Vision being the best sense for their education and daily activities, a cross-sectional and descriptive study was conducted to find out the refractive error among the students in the schools for mentally retarded people. A total of 134 clinically diagnosed cases of mentally retarded students from three different schools of Kathmandu Valley were examined. Distance visual acuity was taken with the help of Cat Ford Vision Drum, SG chart and Kay Picture Test method but first preference was given to SG chart. Cyclo-retinoscopy and fundus examination under mydriasis were done in all the cases. Examination revealed that more than half of the examined had one or more ocular disorders with refractive error being the most common type of ocular morbidity followed by ocular motility disorders. Refractive errors were found in 34.4% in which the most common type of refractive error was simple hypermetropia. In conclusion refractive error was seen commonly among mentally retarded people of Kathmandu Valley.

**Keywords:** Prevalence, refractive error, mentally retarded, ocular morbidity.

## INTRODUCTION

Mental retardation (MR), also known as mentally handicap, mental impairment, or "SUSTA MANASTHITI" in Nepali, means a delay or insufficient development of mental capacities and associated behavioral abnormalities in comparison to normal ones of the same age. Its prevalence in the world is 2.5% to 3.0%.<sup>1</sup> Nearly three fourth of such cases are mildly handicapped and about 4 per 1000 (0.4%) of general population are more severely handicapped with an IQ below 50.<sup>2</sup> In Nepal "Maryknoll Fathers Project" which had done a survey in 1989 for the prevalence of mentally retarded population found about 4.1% suffering from MR. Among them 40.0% were less than 14 years of age.<sup>3</sup>

In the physiologically normal eye, when the accommodation is in the relaxed state the parallel rays of light converge to focus on the retina to form clear image. This ideal optical condition is known as emmetropia.<sup>4</sup> Its attainment depends on coordinated growth of the ocular tissues that include axial length, corneal curvature, lens curvature and thickness. Any mismatch between power of refractive component and axial separation gives rise to refractive error. Only a single millimeter change in curvature of cornea changes refractive power by 6.0D and 1.0mm change in axial length changes the refractive power by 3.0D.<sup>5</sup> As the mental retardation is a developmental disorder, there may be mal-development of the ocular tissues responsible for the occurrence of refractive error.

A study conducted in three government schools of Kathmandu valley, showed 11.0% of total 1100 children having mal-development.<sup>6</sup> Since there is correlation between MR and mal-development and the development of refractive error, this study was thus carried out to find out the prevalence of refractive error in MR students; since such a type of study has never been done in Nepal.

Prevalence of refractive error not only varies with age but also associated with genetic background, nature of the work and environment; place of residency and mental status. A study done in mentally retarded adults in USA by B. Levy revealed a higher frequency of ocular anomalies of all types than typical of a group of non-retarded subject of the same age.<sup>7</sup> A similar kind of study done by J.A. Polcar showed a higher incidence of refractive error and eye diseases in the mentally retarded population.<sup>8</sup> Around 4.1% of the Nepalese population is mentally retarded. Even though the mentally retarded people comprise a fair amount of the total population; till date there has been no study conducted on this group in our country. Therefore this study was carried out in an attempt to determine the visual problems in the above said group.

In mentally retarded people, vision is more crucial because the visual sense is more memorable than the hearing sense. In 1995, Heller *et al* checked the capacity of memory of mentally retarded children in different senses by using three different cues; first object and speech cues, second movement and speech

cues and third speech cues only. They found that object and speech cues, and movement and speech cues, which need vision, were more memorable than the speech alone.<sup>9</sup> This study proves that vision is especially important for mentally retarded population.

Childhood mental retardation should not be over looked because 40.0% of the total mental retardation is below 14 years and the country would lose more of the productive years in terms of work and economy.<sup>10</sup> If these mentally retarded children have poor vision due to uncorrected refractive error in addition to mental retardation, they will not be educated enough to develop skills for their better living, since vision is the better sense compared to hearing and speech. Therefore, correction of poor vision of these children in time will definitely open up new horizon in their learning period which will help them in their future. This study was undertaken to determine the visual problems in particular refractive status in mentally retarded people. Though done on a small scale this research would serve as a baseline for future research work.

## **MATERIALS AND METHODS**

Three schools from Kathmandu valley were selected as a study site. A team of an ophthalmologist, an optometrist and an ophthalmic technician visited the school. A total of 138 case of clinically diagnosed case of mental retarded children were enrolled for this study. Those students not willing to participate in the study and students with history of ocular trauma and previous ocular surgeries were excluded from the study.

History was taken with the help of parents and teachers. Distance visual acuity was taken with the help of Cat Ford Vision Drum, SG chart and Kay Picture Test method but first preference was given to SG chart. Extra-ocular motility test, convergence test, Hirschberg test and cover test was done precisely. External and internal ocular examination was done with the help of hand held slit lamp and ophthalmoscope. Fundus was evaluated after dilating the pupil in each student. Standard streak retinoscopy was performed in all subjects in a dark room at working distance of 50cm. Cycloplegic refraction was done in all cases.

## **RESULTS**

A total of 134 subjects included from three different schools of Kathmandu Valley comprised the sample size. Among them 78 (58.2%) were males and 56 (41.8%) were females with the age group varying from 5 to 40 years. Maximum number of students was in the age group 11-15 years.

This study showed that out of a total of 134 students; 91 were found to have refractive error accounting for 67.9%. The most common refractive error among these patients was simple hypermetropia comprising of 50.3%, followed by myopia and astigmatism respectively (Fig.1).

In addition to refractive error, other ocular findings observed were ocular motility disorders accounting for 10.1%, followed by lid abnormalities, anterior segment abnormalities and fundus abnormalities (Fig.2).

Most of the MR students had visual acuity of 6/6 to 6/9 that accounted for 57.8%. The remaining students (42.2%) had some amount of visual impairment ranging from mild to severe (Fig.3).

## **DISCUSSION**

This study was carried out in three different mentally retarded schools of Kathmandu valley where they were mainly trained for their daily living activities, and were also provided vocational training. One hundred thirty four students of 5 to 40 years of age were included out of which 58.2% were males and 41.8% were females. The large range of the age (5-40yrs) and uneven age distribution in MR students shows larger discrepancies in mean, median and mode values with high standard deviation.

Prevalence of refractive error was found to be 67.9% of the total cases. This figure is not compatible with the value obtained by the study done by Jacobson L who found 23.7% prevalence of considerable refractive error.<sup>11</sup> In this study, higher prevalence of refractive error might be due to the inclusion of low magnitude refractive error i.e.  $\geq \pm 0.5$ DS. As in most of the literature  $\pm 1.5$ DS is considered as a baseline refractive power that brings significant change in vision in MR, taking as a reference point the prevalence of refractive error was found to be 34.4%. Out of this, 18.8% were hyperopic and 11.2% and 4.3% were myopic and astigmatic respectively. This result matches with the result obtained from a research conducted by Warburg M., who found that hypermetropia of  $>+1.5$ D was 21.0%.<sup>12</sup> A study done in Korea by Kim *et al* showed higher prevalence of astigmatism (31.0%), followed by hyperopia, (28.0%) and myopia (25.0%).<sup>13</sup>

Generally in normal population (with normal IQ) prevalence of myopia was found to be higher than that of hyperopia but in mentally retarded population it was just the reverse. A study by Manley and Schulat on the refractive status of two group having IQs of 103 and 41 showed that the normal IQ group had 14.0% hypermetropia and 86.0% myopias whereas the retarded group 76.0% hypermetropia and 24.0% myopias.<sup>14</sup> The result of the above mentioned study shows similarity with the result of this study, in which hypermetropia (50.3%) was predominant over myopia (24.9%). Kirschen M had also found more hyperopia in a retarded group than in the normal population of the same group.<sup>15</sup>

In this study, 72.4% students had suffered from some kind of eye problem, which is similar to the result obtained by Mwanza *et al*. They found 60.2% of subjects to have ophthalmic abnormalities.<sup>11</sup> Ocular

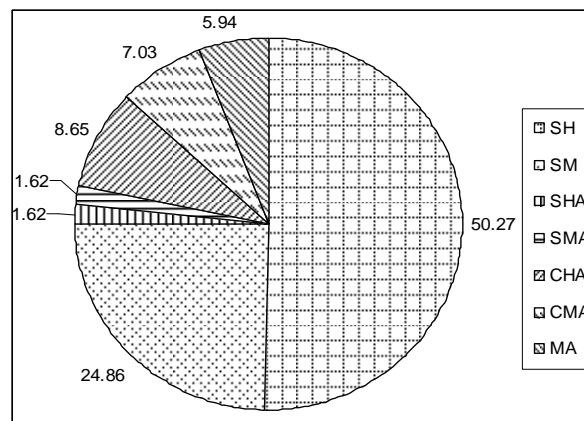
motility disorders like nystagmus and squint were the second most common associated ocular abnormalities accounting 10.1%. This is similar to the result obtained by Mwanza *et al* who found ocular motility disorder in 13.6% cases.<sup>16</sup> Third common ocular problem was eye lid abnormalities accounting for 9.4%. This may be due to poor hygiene.

Visual acuity ranged from 6/6 to 6/9 in 57.8% of MR students; while the remaining students (42.2%) had some amount of visual impairment. A study done by Warburg found 12.0% visual impairment and 3.8% blindness. This big difference may be due to the reliability of the chart used in assessing visual acuity. In this research vision was taken by Cat ford Vision drum, which has poor reliability compared to picture wall chart.<sup>12</sup>

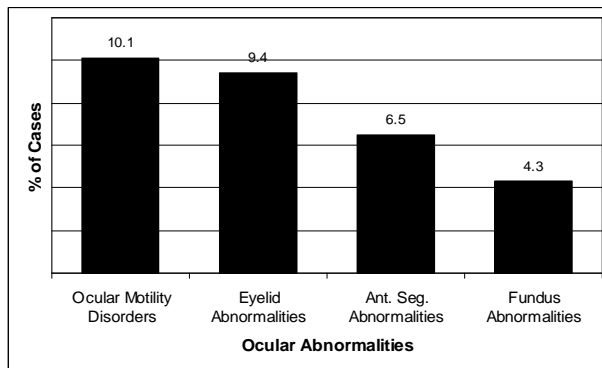
In conclusion, this study showed the prevalence of significant refractive error among the mentally retarded to be 34.4%, were simple hypermetropia was the most common type of refractive error. This study was therefore done to assess the visual problems in MR people and to solve their problems.

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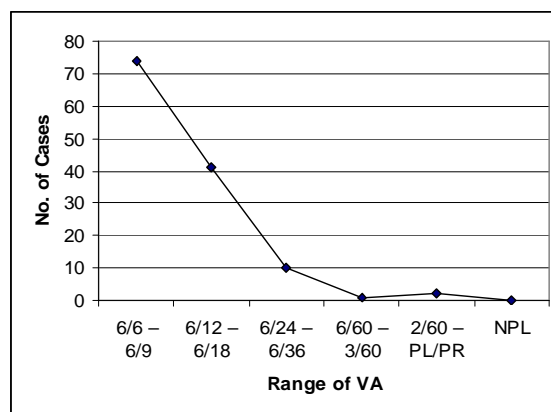
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**Fig. 1.** Showing pattern of refractive error



**Fig. 2.** Associated eye diseases



**Fig. 3.** Distribution of VA of best eye