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Profile of anisometropia in Manipur

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Abstract:
Aim: *To study anisometropia and its relationship with amblyopia in the population of Manipur.*
Materials And Methods: *This cohort study was undertaken among 150 anisometropic patients attending Eye OPD in the Department of Ophthalmology, Regional Institute of Medical Sciences, Imphal, Manipur for a duration of 2 years.*
Results: *Myopic anisometropia was the highest constituting 98 patients (65.3%) followed by 41(27.3%) patients with hypermetropicanisometropia. However, the percentage of amblyopia was highest in hypermetropic patients(58.84%) compared to 40.82% among myopic patients.The most prevalent age group is 11 to 20 years constituting 68 patients (45.3%). However, the percentage of amblyopia was highest among the patients less than 10 years of age (71.4%). The chance of developing amblyopia was higher with worsening of the vision. Also, possibility of developing amblyopia increased with increase in dioptres of refractive error. All patients with >8.00 dioptres refractive error developed amblyopia while all patients <2.00 dioptres did not develop amblyopia. Likewise, 100% of patients with vision < 1/60 developed amblyopia while all the patients with vision better than 6/12 did not develop amblyopia. There was a strong correlation (r = 0 .902) between vision on the first visit and at 6 months follow up. Significant improvement occurred after spectacle prescription. Also, there was a strong correlation (r = 0.973) between presence of amblyopia in the first and the second visit. Significant improvement was seen in the outcome of the vision from the first visit to second visit, which could be attributed to spectacle wear. 92% of the newly diagnosed cases of anisometropia were found to be amblyopic compared to 1.29% among previously diagnosed cases.*
Conclusion: *This study found that patientswith anisometropic refractive error were less likely to develop amblyopia if they are detected early and received treatment.*
Keywords: *Amblyopia, Anisometropia*

I. Introduction

Amblyopia (Greek, Amblyos-blunt, ops-vision) is a neurological disorder of vision that is believed to follow abnormal binocular interaction or visual deprivation during early life. It is a condition of diminished visual form sense which is not associated with any structural abnormality or disease of the media, fundi or visual pathway, and which is not overcome by correction of refractive error. Amblyopia is the most common cause of monocular blindness, affecting about 3% to 5% of the population worldwide.Because of its prevalence, amblyopia has a huge financial impact. It has been estimated that untreated amblyopia is associated with a loss of US $7.4 billion in gross domestic product and an additional cost of US $341 million for its prevention and treatment annually in the United States alone. Around one-half to two-thirds of amblyopes have anisometropia. The frequent co-existence of amblyopia and anisometropia at a child's first clinical examination promotes the belief that the anisometropia has caused the amblyopia.The purpose of our study is to find out mainly the relationship of anisometropia with amblyopia, and to know whether early detection of anisometropia and proper treatment help in improving the visual outcome or not.

II. Aims And Objects

The aim of this study was to find out the relation between anisometropia and amblyopia and the relationship between the time of detection, treatment of anisometropiaand development of amblyopia.

III. Materials And Methods

The study was undertaken in the Department of Ophthalmology,Regional Institute of Medical Sciences,Imphal,Manipurfrom October 2011 to September 2013. Patients who had anisometropia with a difference in the refractive power of 1 dioptre or more,in either sphere or cylinder, between the two eyes was diagnosed with amblyopia when visual acuity was less than 6/9 in any eye after full correction of refractive error without any organic cause. A total of 150 diagnosed cases of anisometropia attending RIMS Eye OPD were included in the study. A detailed history was taken emphasizing on time of diagnosis of anisometropia,

spectacle wear and outcome after spectacle wear. Patients included in the study were followed up after 6 months.

Visual acuity was recorded by Snellen's test type for literate patients and Landolt's broken ring test or E-chart for illiterate patients. Hirschbergs test and cover test were done in every patient to find out the presence of squint.

Retinoscopywas done to assess the refractive error. Subjective verification of refraction was done by trial and error method. Subjective refinement of refraction was done by pinhole test. Subjective binocular balancing was done by fogging method. Near vision correction was carried out in patients with presbyopia. In all the patients, pupil was dilated either with 1% cyclopentolate or 0.8 % tropicamide with 5% phenylephrine eye drop by instilling 2 drops at an interval of 5 minutes for 3 times prior to retinoscopy.In children below 6 years, strict instruction was given to their parents to apply atropine eye ointment twice a day for 3 consecutive days prior to the appointed day for retinoscopy.In older children 1 % cyclopentolate or 2 % homatropine eye drops were used before retinoscopy. Patients were advised to come in the next OPD (i.e after 2 days) for post mydriatictest, and after 15 days for atropinized patients and then were prescribed spectacles. Patients were then advised to come for follow up after 6 months.Fundus was examined usingHeinz direct ophthalmoscope and indirect ophthalmoscope to rule out any posterior segment pathology.A general physical and systemic examination was done in every case to rule out any associated problems.

Statistical analysis was done using chi-square test and student t test. P-value <0.05 was taken as significant.

IV. Results

In this study, 11 to 20 years group constituted the maximum number of patients i.e 68 (45.3%) which is followed by < 10 years of age constituting 35 patients (23.3%), minimum number of patients were within 41 to 50 years of age group constituting 4(2.7%) patients.

Out of the 150 cases of anisometropia, 98 patients (65.3%) had myopic anisometropia, 41 patients (27.3%) had hypermetropicanisometropia, 10 patients (6.7%) had astigmatic anisometropia and 1(0.7%) patient had antimetropia.

87 patients (58%) were male and 63 patients (42%) were female,showing that males have higher incidence of anisometropia than females.

In the present study, maximum number of patients (30%) presented with the vision ranging from 5/60 to 3/60. Minimum patients (2.7%) came with a vision better than 6/12.Maximum number of patients (36.7%) were prescribed from 2.25-4.00 dioptres. The percentage of amblyopia is highest among hypermetropic patients (58.84%) as compared to 40.82 % among myopic patients.

We found out that chance of development of amblyopia was more when the vision decreases.100% of patients with vision worse than 1/60developed amblyopia. No patients with vision better than 6/12 developed amblyopia.

There was a strong correlation (r = .902) between vision on the first visit and follow-up (i.e after 6 months).Also, there was a strong correlation (r = .973) in the presence of amblyopia in the first and the second visit. This signifies that there was a significant change in the outcome of vision from the first visit to the second visit. Improvement in the vision could be attributed to spectacle wear which was found to be significant (p-value < 0.05).

72 patients were newly diagnosed with anisometropia and 78 patients were previously diagnosed cases of anisometropia. Among the 78 previously diagnosed cases, only 1 patient(1.29%) was diagnosed with amblyopia. On the other hand, among 72 newly diagnosed case of anisometropia, 66 patients (92%) were diagnosed as a case of amblyopia on presentation. This finding was found to be significant (p-value <0.05).

V. Discussion

The present study analysed the prevalence of anisometropia and amblyopia and the relationship between the two from the patients attending Eye OPD, RIMS. The age of patients in this study ranged from 2 yrs to 50 yrs. The percentage of age distribution was seen maximum in the 11-20 yrs age group, constituting 68 patients (45.3%).

Ingram and Walker [1]found that patients having 1.0 diopter or more of anisometropia had a slight increase in risk for the development of strabismus or amblyopia in a case-control sibling study. Latvala and coworkers[2] also demonstrated anisometropia of 1.0 diopter or more to be a risk factor for the development of amblyopia in a study of 109 amblyopic patients. In our study, anisometropic patients with less than 2.00 dioptersdifference did not develop amblyopia.

Guzowski M, Fraser-Bell S et al[3] in their population study of over 3400 adults aged 49 years and above reported that both the prevalence and the severity of anisometropia increased with increasing levels of ametropia in myopes and hyperopes, but the rise was more dramatic in myopic individuals. Sorsby A, Leary

G.A et al[4] in their studies on anisometropia found anisomyopes to be about two to five times more prevalent than anisohyperopes. Similarly in the present study, we found that myopic anisometropia was highest among the study group constituting 98 patients (65.3%) out of 150 anisometropic patients.27.3% had hypermetropicanisometropia, 10 patients (6.7%) had astigmatic anisometropia and 1patient (0.7%) had antimetropia..

Dadeya S, Shibal F et al [5] have demonstrated that anisometropia can be a powerful amblyopiogenic factor, due to either the decreased resolution caused by optical defocus at the fovea or the production of active suppression. Same results are quoted by Bradley A and Freeman R D [6].In the present study, out of 150 anisometropic patients, 67 patients are found to have amblyopia. The prevalence of amblyopia with various types of anisometropia were as follows:- Out of 98 myopic patients, 40 patients (40.82%) developed amblyopia, 24 patients (58.84%) out of 41 hypermetropic patients developed amblyopia. 3(30%) out of 10 astigmatic anisometropic patients were found to have amblyopia. Even though the total number of anisometropia is highest in myopic patients (65.3%), the percentage of amblyopia is highest among hypermetropic patients constituting 58.84 % of the total amblyopic eyes. On applying Pearson chi square, this finding was found to be significant (p value <0.05).

In the present study, 68.2 % of the patients were found to have amblyopia in the left eye and 31.8% of the patients were found to have amblyopia in the right eye. This is similar with the findings by Repka et al [7] who found that among subjects with anisometropic amblyopia (with or without strabismus), amblyopia was present more often in left (59%) than in right eye (41%).

100% of patients with vision worse than 1/60 were found to develop amblyopia. 84% of patients with vision between 1/60 and 2/60 and 51% of patients with vision between 3/60 and 5/60 developed amblyopia. 23% of patients with6/60 to 6/36 vision and 7.4% of patients with vision between 6/24 and 6/18 also developed amblyopia. No patients with vision better than 6/12 developed amblyopia. After applying Pearson chi-square test, this finding was found to be significant (p-value < 0.05).

There was a strong correlation (r = 0.902) between visual acuity on the first visit and on follow up (i.e after 6 months).Also, there was a strong correlation (r = 0 .973) in the presence of amblyopia in the first and the second visit. This signifies that there was a significant change in the outcome of vision from the first visit to the second visit. Improvement in the vision could be attributed to spectacle wear which was found to be significant (p-value < 0.05).

In the present study, 72 patients were newly diagnosed with anisometropia, while 78 patients were previously diagnosed cases ofanisometropia. Out of the newly diagnosed cases, 66 patients (92%) were found to be amblyopic. Among the 78 previously diagnosed cases of anisometropia, only 1 patient (1.29%) was diagnosed as amblyopia on presentation. Significantly these patients were generally asymptomatic and were not aware of their problem. This could have contributed to their delayed health seeking behaviour.

VI. Figures And Tables

TABLE 1: Frequency of anisometropia in different types of refractive errors.

Types	Frequency	Percentage(%)
Myopia	98	65.3
Hypermetropia	41	27.3
Astigmatism	10	6.7
Antimetropia	1	0.7
Total	150	100

TABLE 2: Age-wise distribution ofanisometropia.

Age in years	Anisometropia	Percentage(%)
0-10	35	23.3
11-20	68	45.3
21-30	31	20.7
31-40	12	8.0
41-50	4	2.7
Total	150	100

TABLE 3: Distribution of vision in relation toanisometropia.

Vision	Frequency	Percentage(%)	p-value
>6/12	4	2.7	0.000
6/18-6/24	27	18	
6/36-6/60	43	28.7	
5/60-3/60	45	30	
2/60-1/60	25	16.6	
<1/60	6	4	
Total	150	100	

TABLE 4: Percentage of amblyopia with worsening of vision

Vision	Frequency	Amblyopia	%	Correlation (r)	p-value
>6/12	4	0	0	-0.524	0.000
6/18-6/24	27	2	7.4		
6/36-6/60	43	13	30.23		
5/60-3/60	45	23	51		
2/60-1/60	25	23	92		
<1/60	6	6	100		
Total	150	67			

TABLE 5: Treatment outcome in amblyopia patients.

	N	r	Mean	Standard deviation	95% confidence interval of the Differences		p-value
					lower	upper	
Vision in the first visit and 2nd visit(after prescribing glasses)	150	0.902	0.247	1.175	0.057	0.436	0.011
Presence of amblyopia in the first visit and 2nd visit	150	0.973	0.000	0.116	0.019	0.019	1.000

TABLE 6: Relationship between time of detection of anisometropia and development of amblyopia.

Time of diagnosis of Anisometropia	Without amblyopia	Amblyopia	Total	Percentage of amblyopia	p-value
Before presentation	77	1	78	1.29%	0.000
On presentation	6	66	72	92%	
Total	83	67	150		

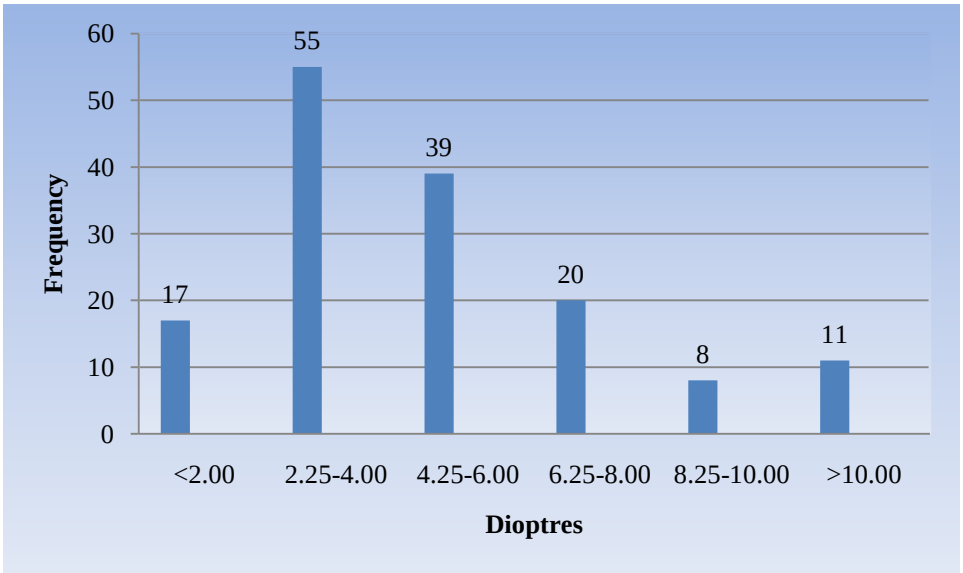


Fig 1: Dioptres distribution in anisometropia

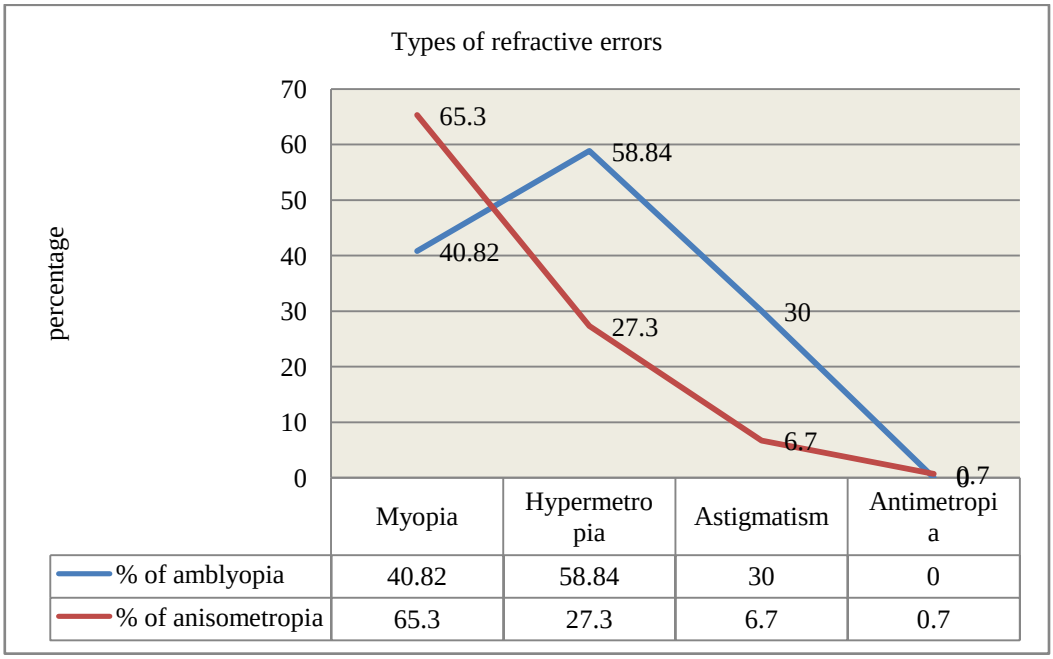
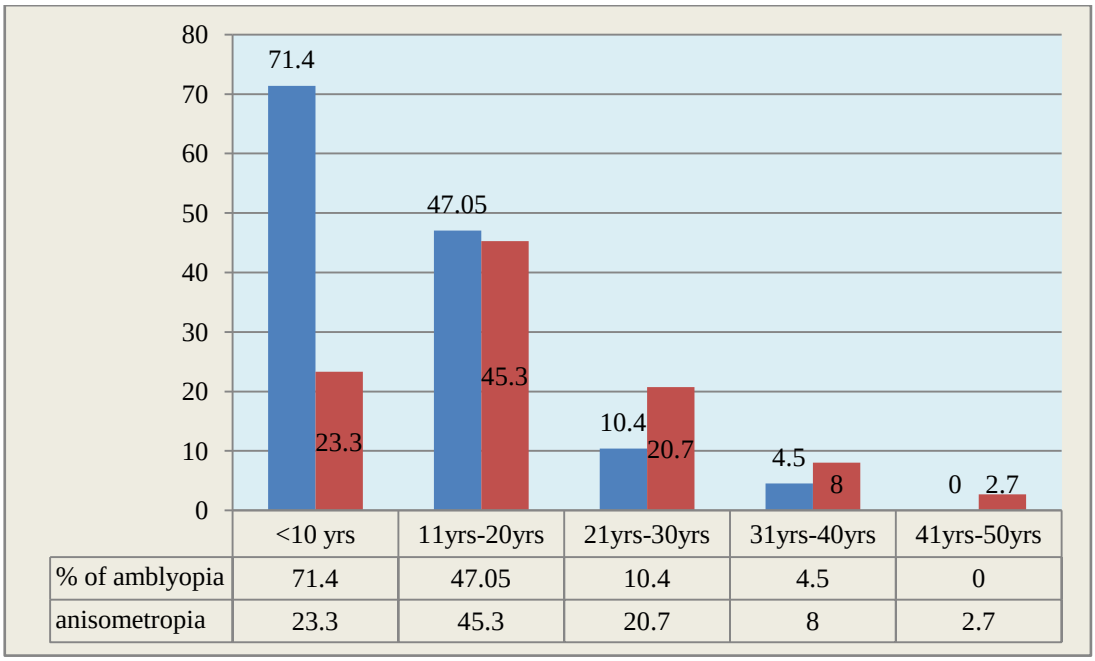


Fig 2: Percentage of anisometropia and amblyopia in different types of refractive errors.



	<10 yrs	11yrs-20yrs	21yrs-30yrs	31yrs-40yrs	41yrs-50yrs
% of amblyopia	71.4	47.05	10.4	4.5	0
anisometropia	23.3	45.3	20.7	8	2.7

Fig 3: Percentage of amblyopia and anisometropia in various age groups.

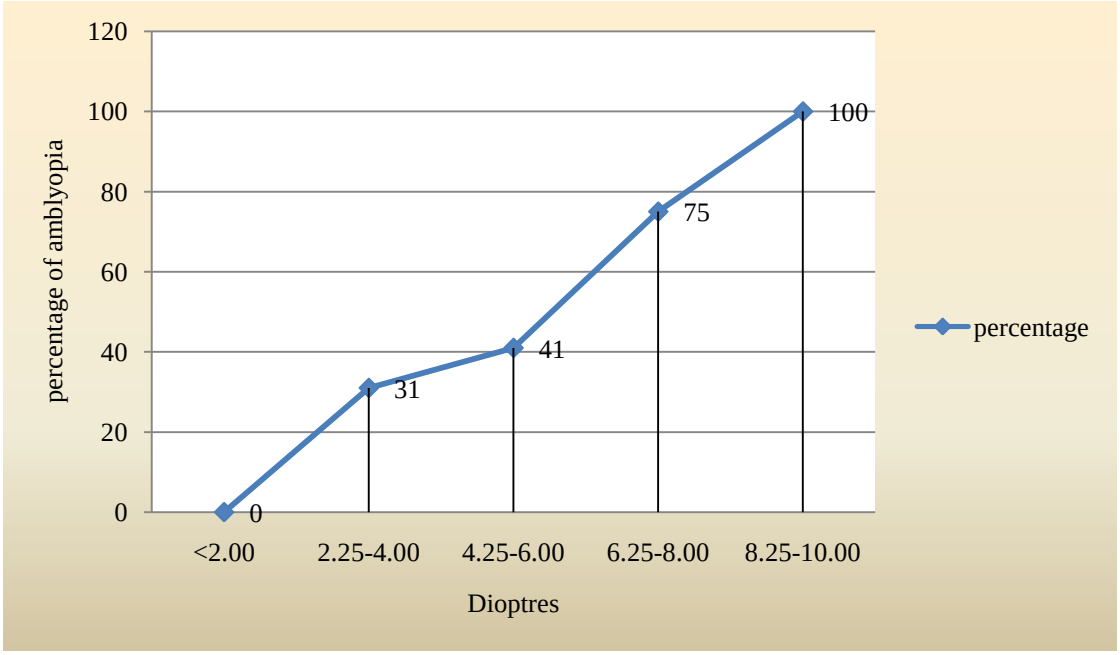


Fig 4: Diopteric categorization with development of amblyopia.

VII. Conclusion

From our study, we found that anisometropia greater than 2 Dioptres is a threshold for amblyopia development. In addition, increasing levels of anisometropia, high levels of anisometropia, and persistent anisometropia in older children are all associated with amblyopia. However, it remains unclear if one can prevent amblyopia by optically correcting anisometropia at an early age. There are several limitations to these data. Many patients with mild and moderate levels of anisometropia were most likely not aware of their problems, therefore were not detected and not included in this study. As a result, this study probably overidentified patients having high-magnitude anisometropiaand, therefore,probably overestimate the prevalence of amblyopia.

Traditional visual screening is essentially limited to children of 4 years and above. Although successful field testing of large numbers of 3-year-old children has been reported (using trained eye doctors with expertise in preschool vision screening techniques), it is unlikely that such success will ever be able to be transferred adequately to field testing in large numbers because of testability issues with less well-trained screeners. Newer

technologies, such as photoscreening, photorefraction, and noncycloplegicautorefraction, provide the opportunity to evaluate younger children in very large numbers. It has been unclear if earlier detection of at-risk children provides significant benefit to warrant continued development of such technology.Previous studies have demonstrated that photoscreening can be highly effective in identifying children who have amblyopiogenic factors, provided the screening setting is highly controlled. This study found that patientswith anisometropic refractive error were less likely to develop amblyopia if they are detected early. Therefore, traditional screening identifies children who are already at a disadvantage with respect to disease progression.

Instituting vision screening at a very early age will detect children with anisometropic refractive error prior to the development of amblyopia. This will allow ophthalmologists the opportunity to intervene with treatment and attempt to prevent amblyopia or retard its further development. The efficacy of such treatment with respect to amblyopia prevention should be the focus of further investigations.

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