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# ROLE OF REFRACTIVE CORRECTION IN AMBLYOPIA MANAGEMENT IN ADOLESCENT AGE GROUP

Ophthalmology

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## ABSTRACT

**Aims/purpose :** To evaluate the efficacy of appropriate refractive correction only in amblyopia management in adolescent age group.

**Methods :** Total 42 patients who met inclusion criteria were evaluated for study. 4 patients were lost to follow up. Remaining 38 patients were followed for 20 weeks. None of the children had undergone a previous ocular examination, had ever worn spectacles, received occlusion therapy, or had undergone strabismus surgery.

**Results :** After 20 weeks follow up 2 line improvements in visual acuity from baseline was present in 60.52% of patients. Vision was assessed on snellen's chart by same person under similar physical conditions. Anterior segment examination, Direct and Indirect ophthalmoscopy was done to rule out any organic cause. Patients were subjected under full refractive correction for 20 weeks.

**Conclusion :** Refractive correction alone is a powerful amblyopia treatment modality even in adolescents. Children with anisometropic amblyopia and in some cases of other moderate amblyopia, refractive correction may be the only treatment needed for a successful and final visual outcome.

## KEYWORDS

Amblyopia, Refractive correction, Anisometropia, Pediatric Eye Disease investigator group

## INTRODUCTION :

Amblyopia is the most common cause of monocular visual impairment in both Children and young to middle-aged adults, affecting 2% - 5% of the general population. It develops usually during first 6-8 years of life, better defined as sensitive period of visual development. Thus diagnosis of "Amblyopia" is unlikely if vision reduction occurs after age of 8 years.

Amblyopia is the condition in which best corrected visual acuity is less than 6/12 in the absence of obvious structural or pathological abnormalities of Retina or afferent visual pathway but with one or more amblyopiogenic factors. More precisely, corrected central visual acuity is less than 6/12 in bilateral amblyopia and the difference of two or more lines between the normal and amblyopic eye in unilateral amblyopia. It is caused by an abnormal visual experience during sensitive period of visual development in early childhood most commonly from either a strabismus, an anisometropia, or both. It has been treated by correcting refractive errors followed by occlusion of the sound eye.

Many factors are related to the response to amblyopia therapy. These are initial visual acuity of amblyopic eye, the age of the patient at the time of presentation, the type of amblyopiogenic stimulus (anisometropia, strabismus or deprivation), the duration of amblyopia therapy, the utilized modality of amblyopia therapy and the level of compliance. Among them, the single factor that was most clearly related to a successful outcome was the age at commencement of the therapy. Regarding this age factor, there have been several reports with conflicting results. It has been frequently noticed in clinical practice that in anisometropic amblyopia specially when vision in one eye is near normal with minimal or no refractive error, presentation is much delayed. More or less these children specially of rural background start their schooling at later age and they observe difficulty in vision and related problem at later age. Author also favour the current opinion of several ophthalmologists that every child with amblyopia should be given a chance to improve irrespective to his age of presentation specially if he has never received any treatment modality of amblyopia .

Stewart and colleagues observed encouraging results by treating patients of anisometropic amblyopia with spectacles. They have termed this effect “refractive adaptation”. PEDIG after conducting similar study termed it as “optical treatment of amblyopia”. Authors are also of the opinion to mention this initial and effective treatment modality of amblyopia as “ optical treatment”.

The purpose of this study was to evaluate the efficacy of refractive correction alone in children aged 10-19 years.

## AIM :

This was a prospective observational study. The purpose of our study was to determine the efficacy of 20 weeks of refractive correction alone for improving VA in amblyopic children aged 10 to 19 years.

## MATERIALAND METHODS :

The study was conducted in RIO, Moti Lal Nehru Medical College, Prayagraj. The informed consent was taken from every patient.

## INCLUSION CRITERIA :

1- Anisometropic, ametropic, isometropic amblyopes(10-19 yrs) with central fixation.
2- Accomodative esotropia and small angle squint with central fixation.
3- No previous h/o use of glasses or any other treatment modality of amblyopia.

## EXCLUSION CRITERIA :

1- Amblyopia with eccentric fixation.
2- Anterior/Posterior segment abnormality
3- Pathological myopia
4- Nystagmus
5- Optic atrophy

A total 42 patients met the inclusion criteria. In a detailed history, age of presentation and age at which patient first noticed the complaint was recorded. History of previous treatment was enquired including any previous management such as any spectacle correction, occlusion therapy, use of miotic or orthoptic therapy or previous muscle surgery, along with this family history of similar complaint was taken.

## Examination :

- Vision was assessed using the snellen's chart at 6m distance. The same person made all measurements under similar physical conditions. Near vision was also recorded.
- Pupillary reactions and anterior segment examination was done by slit lamp.
- Hirschberg test, cover test and angle of deviation was measured using prism bar cover test (PBCT) both for distance & near.
- Refraction under full mydriasis and cycloplegia was done. Maximum tolerated refractive correction was given.
- Fundus examination by Direct and Indirect ophthalmoscopy. Fixation pattern was also assessed. Patients with eccentric fixation were excluded.

- Binocular function were assessed by TNO Test, worth four dot test synoptophore.

All patients were given their best corrected spectacles and follow up was done on weeks 2, 4, 8, 12, 16 and 20. Four patients were lost to follow-up. 38 patients were followed for 5 months. At each follow up, visual acuity was checked by same observer in same conditions. Repeat refraction was done as and when required.

**Observation :**

**Table 1 - Table showing age and sex distribution of patients.**

| Age Group | Male | Female | Total | Percentage |
|---|---|---|---|---|
| 10 - 14 years | 10 | 12 | 22 | 57.8% |
| 15 - 19 years | 8 | 8 | 16 | 42.2% |
| Total | 18 | 20 | 38 | |

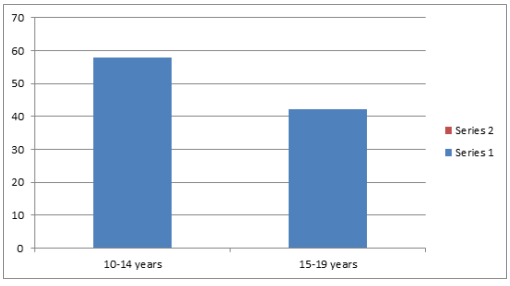



**Table - 2 Table showing Base line visual acuity**

| Vision | No. of Patients | Percentage |
|---|---|---|
| 6/12 to 6/18 | 12 | 31.58% |
| 6/24 to 6/36 | 12 | 31.58% |
| 6/60 to FC | 14 | 36.84% |

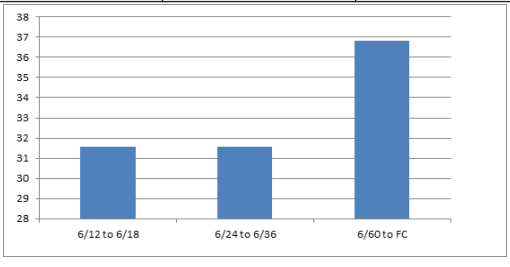



**Table - 3 Table showing Degree of anisometropia**
**Total no of anisometropic patients were 20.**

| Degree of Anisometropia | No.of Patients | Percentage |
|---|---|---|
| Upto +2.0 D Sph | 5 | 25% |
| >+2 to <+4.0 D Sph | 7 | 35% |
| >+4 to<+ 6 D Sph | 4 | 20% |
| >+6.0 D Sph | 2 | 10% |
| ›±1.5 D Cyl | 2 | 10% |

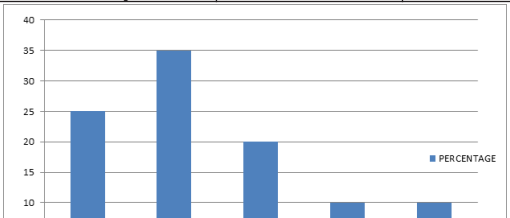
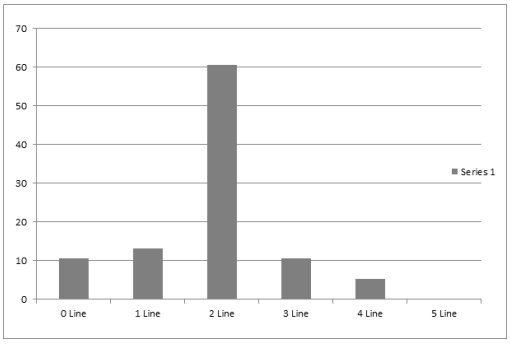



**Table - 3 Table showing improvement in visual acuity from baseline.**

| Improvement in VA from baseline | No. of Participants | Percentage °A |
|---|---|---|
| 0 Line | 4 | 10.52 |
| 1 Line | 5 | 13.15 |
| **2 Line** | **23** | **60.52** |
| 3 Line | 4 | 10.52 |
| 4 Line | 2 | 5.26 |
| 5 Line | 0 | 0 |
| Mean Line | 1.82 | |




**RESULTS :**

1. Out of 38 patients, 18 patients were males and 20 were females. 22 patients were between 10 to 14 years age group (10 males and 12 females). 16 patients were in age group of 15 to 19 years (8 males and 8 females). 20 patients have anisometropia, 10 patients have isometropia, and 8 patients have squint.
2. 63.15% patients in present study were having mild to moderate amblyopia. Quite a significant percentage (36.84%) patients were having severe amblyopia i.e. visual acuity was in the range of 6/60 to F.C.
3. 60% (twelve patients) were having degree of anisometropia below +4D while 40% (8 patients) were having above +4 D of anisometropia Two patients (10%) were having ± 1.5 D cyl. anisometropia.
4. 23 patients (60.52%) exhibited 2 lines of snellen's improvement from baseline visual acuity. Only 4 (10.52%) patient did not show any improvement. Mean lines of improvement was 1.82.

In the present study none of our patient were having myopic spherical anisometropia. One patient was having 1.5 D cyl. anisometropia. We have already excluded patients of pathological myopia.

**DISCUSSION :**

There are general agreement that amblyopia must be treated at an early age and that treatment is more prolonged and less beneficial in older children. However the age beyond which treatment is ineffective is still controversial. In this prospective observational study of 38 untreated amblyopic children 10 to 19 years old, we found that refractive correction with spectacles alone improved amblyopic eye visual acuity with an average of 1.82 lines. Visual acuity improved from baseline by 2 or more lines in 60% of the patients.

Beyond doubt age at presentation is still biggest dilemma in mind of ophthalmologists to expect outcome of ambyopia management. However several workers have recommended, optical treatment as an effective mode of therapy in anisometropic amblyopia. PEDIG also studied role of spectacle correction in anisometropic amblyopia of patients 3 to 7 years of age and found 2 or more lines improvement in 77% of patients. Mean line of improvement was 2.9.

**Chen et al** concluded that amblyopia improved by 2or more logMAR lines in 93% patients and resolved in 45% patients, with a mean improvement in visual acuity of 0.36 logMAR. In this study with spectacle correction alone, 3 to 7 year old children with previously untreated anisometropic amblyopia achieved approximately four line improvement and resolved nearly in half compared to our study may be, because of younger age of patients in this study.

Similarly **Stewart** and Colleagues found a mean improvement of nearly 3 lines in 18 patients with anisometropic amblyopia treated with spectacles.

**Pollard and Manley** reported (without any statistical analysis) no age effect on amblyopia treatment in their 40 amblyopic children aged 2 to 14 years with myopic anisometropia.

With 55 subjects aged 7 to 22 years, **Sen** concluded that, although younger subjects aged 7 to 14 years showed improved visual acuity more often (63.8%) than those aged 15 to 22 years (47.3%), the difference in improvement amount between the two groups was not statistically significant.

D. Kaphle et al also evaluated 0.80±0.70 mean line improvement in

paediatric population instituting spectacles only in anisometropic amblyopia. They concluded that early improvement of visual acuity is related to lesser amount of anisometropia, age and sex.

In our study two lines of improvement in less percentage of patients with less achievement of mean line improvement was probably because we did a study in higher age group (10 - 19 years) and incidentally quite a good percentage (36.83%) of patients in our study were having baseline visual acuity below 6/36 meaning thereby almost touching grade of severe amblyopia. Apart from this 16 patients (42%) were above 15 years of age in present study. Obviously we would have expected more amount of vision improvement if age at presentation is less and base line visual acuity at presentation is less.

However we have evaluated results after 20 months (five weeks) only. PEDIG clearly observed that 62% of their patients showed 1 line or greater improvement after another 5 weeks of spectacles wear and some continued to show further improvement 10 to 15 weeks from randomization. so, we would have also further improvement if occlusion therapy would not have been applied after 5 months of spectacles correction. Thus in our opinion some more time is to be given to follow up these patient as logically also some amount of improvement although slow may be achieved. In our study degree of anisometropia, age at presentation and baseline amblyopic eye visual acuity emerged as definite prognostic parameters.

**CONCLUSION :**

so in amblyopia, even in older children, we should prescribe proper refractive correction for appropriate time, as refractive correction alone can improve vision upto 2-4 lines. It has been universally accepted that greater the compliance of amblyopia therapy better the results. With one of the most accepted treatment modality the occlusion, the high failure rates at times specially in older children might be attributable to poor compliance rather than age factor.

There is no denying that initial spectacle correction exhibit much better compliance than occlusion. Thus the immediate achievement of clarity with spectacles which is naturally preferred over previous blurred vision and better compliance always excites us to rely initially upon full cycloplegic correction. Our study strongly reaffirms that children with anisometropic amblyopia and in some cases of other moderate amblyopia, refractive correction may be the only treatment needed for a successful and final visual outcome.

In conclusion, a therapeutic trial is advisable even in older children, provided the patient is compliant.

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