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Original Article

Effect of Occlusion Therapy in Amblyopia Patients – A Prospective Study

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Abstract

Introduction: Occlusion therapy is given to amblyopic children, which are expected to improve visual acuity. Even the visually evoked responses returned to normal after occlusion therapy. Here, we present the data taken in the South Indian population on occlusion therapy in amblyopia.

Aim: Our study aims to find the effect of occlusion therapy on the visual acuity of amblyopic subjects.

Methods: Data from 67 patients (n = 32) were retrospectively collected and analyzed. Subjects who were diagnosed to have amblyopia during worth four dot test were included in the study. The subjects who did not follow the occlusion therapy were excluded from the study. Subjects who had any other ocular disease other than amblyopia were excluded from the study. Any amblyopia was included in the study (refractive, stimulus deprivation, or strabismic amblyopia). Mean and standard deviations of the visual acuity were before and after the therapy was found. A paired t-test was done to compare the pre- and post-therapy log minimum angle of resolution visual acuities.

Results: Out of 67 subjects, 25 were male and 42 were female with a mean age of 9 ranging from 4 to 15 years. About 34% of the population had congenital amblyopia. About 46% had the other sibling with a similar diagnosis. About 85.8% had good visual improvement after the occlusion therapy.

Conclusion: Although, in conclusion, occlusion treatment (full time, part time, or minimal) is an effective method for the therapy of strabismic, strabismic-anisometropic, and anisometropic amblyopia; the level of initial visual acuity, age at initiation of treatment, and type of occlusion predict the final visual outcome. The initial visual acuity is the most significant factor determining the success of treatment in amblyopia.

Key words: Prism cover test, Prisms, Squint, Strabismus, Synoptophore

INTRODUCTION

The effectiveness of full-time occlusion therapy has been investigated in various studies.[1-4] It has been proved that it effectively improves the visual acuity in cases of amblyopia due to strabismus or anisometropia or both. Older patients have lasting improvement with or without maintenance patching.[5] A review study done by Antonio-Santos *et al.* found no evidence on the effectiveness of any treatment for stimulus deprivation amblyopia. They suggest that future randomized controlled trials are needed to evaluate the safety and effectiveness of occlusion, duration of treatment, level of vision that can be realistically achieved, effects of age at onset and magnitude of visual defect, optimum occlusion regimen, and factors associated with satisfactory and unsatisfactory outcomes with the use of various interventions for stimulus deprivation amblyopia.[1] It is also observed that there is poor understanding from parents and hence there was poor compliance. A study done by Newsham who proved that providing parental knowledge in key areas such as the critical period, the importance of occlusion improved patient compliance. Hence, we understand the importance of occlusion in

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improving visual acuity.[4] The duration of occlusion is also very important. The full-time occlusion may lead to the occlusion amblyopia in the good eye. Studies proved that the occlusion amblyopia occurred at all ages.[3] Hence, the data on the number of hours off occlusion is required to correctly advocate the hours of occlusion. In our study, we would like to present the effect of occlusion on the visual acuity of amblyopic subjects. There is enough evidence that occlusion therapy improves visual acuity. Even the visually evoked responses returned to normal after occlusion therapy. Here, we present the data taken in the South Indian population on the improvement of visual acuity.[6]

Hence, our study aims to find the effect of occlusion therapy on the visual acuity of amblyopic subjects.

MATERIALS AND METHODS

This retrospective study was conducted in the tertiary care hospital. Data from 67 patients ($n = 67$) were retrospectively collected and analyzed. Subjects who were diagnosed to have amblyopia during worth four dot test were included in the study. The subjects who did not follow the occlusion therapy were excluded from the study. Subjects who had any other ocular disease other than amblyopia were excluded from the study. Any type of amblyopia was included in the study (refractive, stimulus deprivation, or strabismic amblyopia).

Amblyopia is defined as the reduction of best-corrected visual acuity of one or both eyes that cannot be attributed exclusively to a structural abnormality of the eye.[7] The amblyopia was confirmed with worth four dot test. If the patient saw two or three lights in worth four dot test and the corresponding eye that failed to see the color of the other lights was considered to be the amblyopic eye.[8]

The data were extracted from the electronic medical records. The number of hours of patching was noted and the number of days of occlusion therapy was noted. The visual acuity values before and after the occlusion therapy were noted. The patients wore the appropriate correction for the amblyopic eye while the good eye was occluded. The visual acuity values were converted into the logarithm of the minimum angle of resolution (MAR). The eye which received the treatment was noted.

Visual acuity was tested using Snellen's visual acuity chart. The visual acuity was tested by hiding the other optotypes to control the crowding phenomenon. The number of subjects using spectacles was noted. The number of subjects who had their siblings with a similar diagnosis was noted. The visual acuity values before and after the occlusion therapy were compared. Statistical significance was tested using a paired sample *t*-test with the visual acuity values before and after treatment was done.

RESULTS

A total of 67 subjects were included in this study. Twenty-five were male and 42 were female with a mean age of 9 ranging from 4 to 15 years.

The distribution of the number of subjects in the different age groups is listed in Table 1.

In this study, out of 67 amblyopic children, 31 children (46%) had the other sibling with a similar diagnosis. The number of hours of patching is listed in Table 2.

Congenital versus acquired amblyopia, out of 67 children, 23 (34% of the population) had congenital amblyopia [Figure 1]. In most cases, vision improved significantly. The vision improved in 115 eyes out of 134 eyes [Figure 2].

Improvement in vision after occlusion therapy was quantified using the log MAR scale. Mean log MAR value at pre-treatment was 0.64 (0.29 SD) and post-treatment was 0.25 (0.23 SD). Paired *t*-test showed $P < 0.001$ indicating a significant improvement in visual acuity with occlusion therapy, as shown in Table 3.

DISCUSSION

In the largest series of strabismic and anisometropic amblyopes, Hiscox *et al.* reported the visual outcome of

Table 1: Age distribution

Age	No. of patients
1–5	6
5–10	36
10–15	25

Table 2: Birth weight

Hours	No. of subjects
2–3	18
3–4	6
4–6	43

Table 3: Vision in log MAR pre- and post-treatment

Occlusion therapy	Log MAR		*P*-value
	Mean	SD	
Pre-treatment	0.64	0.29	<0.001
Post-treatment	0.25	0.23	

MAR: Minimum angle of resolution

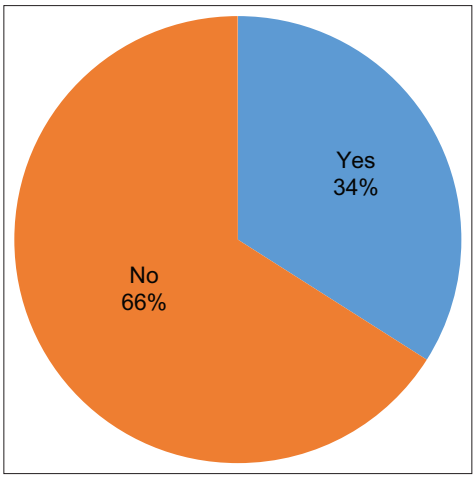

Figure 1: Distribution of Congenital amblyopia

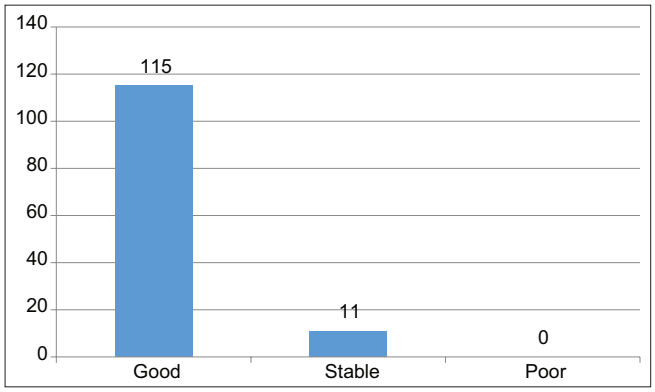

Figure 2: Vision improvement

894 patients in seven centers. In this retrospective study, 48% of the patients achieved a visual acuity of 0.7 or better.[9] Hiscox *et al.* reported the visual outcome of 368 patients and 37% of their patients achieved a visual acuity of 0.7 or better.[9] Beardsell *et al.* reported a better success rate (73%).[10] In a literature review, Flynn *et al.* evaluated the results of 23 studies published between 1965 and 1998.[11] In this study, success was defined as visual acuity of 20/40 or better at the end of the treatment and 85.8% of the patients achieved this. A study by Newsham reported compliance which was found to be an important factor associated with a successful outcome of occlusion therapy.[12] In our retrospective study, we evaluated adherence to therapy using parental daily diaries and we included only the patients who came to the appointments and who did occlusion therapy.

CONCLUSION

Occlusion treatment (full time, part time, or minimal) is an effective method for strabismic, strabismic-anisometropic, and anisometropic therapy amblyopia; the level of initial visual acuity, age at initiation of treatment, and type of occlusion predict the final visual outcome. The initial visual acuity is the most significant factor determining the success of treatment in amblyopia.

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