Available online at www.sciencedirect.com
ScienceDirect
Journal of Current Ophthalmology xx (2017) 1–9
http://www.journals.elsevier.com/journal-of-current-ophthalmology

Review

Part-time versus full-time occlusion therapy for treatment of amblyopia: A meta-analysis

Negareh Yazdani [a,b], Ramin Sadeghi [c], Hamed Momeni-Moghaddam [a,b], Leili Zarifmahmoudi [c], Asieh Ehsaei [a,b,*], Brendan T. Barrett [d]

[a] *Refractive Errors Research Center, School of Paramedical Sciences, Mashhad University of Medical Sciences, Iran*
[b] *Department of Optometry, Mashhad University of Medical Sciences, Mashhad, Iran*
[c] *Nuclear Medicine Research Center, Mashhad University of Medical Sciences, Mashhad, Iran*
[d] *School of Optometry and Vision Science, University of Bradford, Bradford, United Kingdom*

Received 10 November 2016; revised 9 January 2017; accepted 29 January 2017
Available online ■ ■ ■

Abstract

Purpose: To compare full-time occlusion (FTO) and part-time occlusion (PTO) therapy in the treatment of amblyopia, with the secondary aim of evaluating the minimum number of hours of part-time patching required for maximal effect from occlusion.
Methods: A literature search was performed in PubMed, Scopus, Science Direct, Ovid, Web of Science and Cochrane library. Methodological quality of the literature was evaluated according to the Oxford Center for Evidence Based Medicine and modified Newcastle-Ottawa scale. Statistical analyses were performed using *Comprehensive Meta-Analysis* (version 2, Biostat Inc., USA).
Results: The present meta-analysis included six studies (three randomized controlled trials [RCTs] and three non-RCTs). Pooled standardized difference in the mean changes in the visual acuity was 0.337 [lower and upper limits: −0.009, 0.683] higher in the FTO as compared to the PTO group; however, this difference was not statistically significant ($P = 0.056$, Cochrane Q value = 20.4 ($P = 0.001$), $I^2 = 75.49\%$). Egger's regression intercept was 5.46 ($P = 0.04$). The pooled standardized difference in means of visual acuity changes was 1.097 [lower and upper limits: 0.68, 1.513] higher in the FTO arm ($P < 0.001$), and 0.7 [lower and upper limits: 0.315, 1.085] higher in the PTO arm ($P < 0.001$) compared to PTO less than two hours.
Conclusions: This meta-analysis shows no statistically significant difference between PTO and FTO in treatment of amblyopia. However, our results suggest that the minimum effective PTO duration, to observe maximal improvement in visual acuity is six hours per day.

Keywords: Occlusion; Amblyopia; Part-time; Full-time

Introduction

Amblyopia is a relatively common disorder, affecting 1–4% of the general population.[1–4] This condition features a unilateral or, less commonly, a bilateral loss of vision caused by abnormal development of the visual system during the critical period of visual development (the first 8–10 years of life). It represents visual loss at a cortical level where information first interacts between the two eyes. If not treated during the critical period, amblyopia can cause lifetime significant visual impairment.[5] Although improvements are possible in adults with proper treatment, early detection and treatment still offer the best outcome.[6,7]

The basic pathophysiologic mechanisms of amblyopia are abnormal binocular interaction and pattern vision deprivation. Amblyopia can be classified based on the underlying cause; strabismus, refractive error (anisometropia or bilateral high

Disclosure: The authors report no conflicts of interest and have no proprietary interest in any of the materials mentioned in this article.

* Corresponding author. Department of Optometry, Mashhad University of Medical Sciences, Parastar 2, Ahmadabad Avenue, Iran.
E-mail address: ehsaeia@mums.ac.ir (A. Ehsaei).

Peer review under responsibility of the Iranian Society of Ophthalmology.

http://dx.doi.org/10.1016/j.joco.2017.01.006

Please cite this article in press as: Yazdani N, et al., Part-time versus full-time occlusion therapy for treatment of amblyopia: A meta-analysis, Journal of Current Ophthalmology (2017), http://dx.doi.org/10.1016/j.joco.2017.01.006

refractive error) and form deprivation.[8] Strabismic and anisometropic amblyopia commonly co-exist.[9]

In amblyopia therapy, the first step is correction of the refractive error and constant use of spectacles and/or contact lenses until no further improvement in visual acuity is obtained.[10] The next step is often occlusion therapy in order to force reliance upon the weaker eye by patching the dominant eye. Occlusion therapy and appropriate refractive correction remain the mainstay of treatment since the 18th century, and while newer approaches to treatment are emerging, occlusion retains its central place in amblyopia treatment in most clinical settings.[11] Occlusion variables are classified according to the area of visual field occluded (total or full and partial or sectorial e.g. bi-nasal patch for promotion of alternate fixation), effect on light transmission (opaque or non-transmitting for light and form and attenuating or partial light transmission) and wearing time.[12]

Amongst clinicians, there are different opinions about the appropriate duration of occlusion therapy for maximum treatment effect, ranging from short periods of occlusion (part-time occlusion (PTO)) to full-time occlusion (FTO) for the treatment of amblyopia. Some clinicians are proponents of FTO, and believe that appropriately-monitored patients treated with FTO can have excellent outcomes.[13,14] However, supporters of PTO, by contrast, feel that less patching time is not inferior to FTO.[15] Occlusion amblyopia, or the development of amblyopia in the originally better-seeing, patched eye, is a risk commonly cited by opponents of FTO. Although the incidence of occlusion amblyopia in children treated with FTO is admittedly significant (19.3%,[16] 25.8%,[14]), it is almost always reversible.[12] Furthermore, after cessation of treatment, the final interocular difference in visual acuity was actually less in children with a history of occlusion amblyopia, suggesting that occlusion amblyopia can herald a better visual potential in the initially amblyopic eye.[14,16]

Some studies suggest that FTO results in better improvement in visual acuity of amblyopic eyes than does PTO.[15,17,18] One retrospective review in a small sample size (n = 45), demonstrated a trend toward better visual outcome and a more rapid improvement in patients treated with FTO compared to those treated with PTO (<6 h).[13] However, there is continuing controversy regarding the number of hours of patching per day that should be prescribed for amblyopia, ranging from less than 2 h a day,[15,18] or between 2 and 6 h a day (part-time occlusion)[15,17] to more than 10 h a day, 7 days a week (i.e. FTO).[17]

The primary objective of this systematic review and meta-analysis was to investigate the efficacy of full-time versus PTO therapy in the process of rehabilitation of amblyopic patients.

Methods

Search strategy and inclusion criteria

For considering studies for this systematic review, we included randomized controlled trials (RCTs) and observational, peer-reviewed publications that compared the effects of two patching regimens: FTO (more than 10 h a day or all waking hours) and PTO (6 h or less). Participants in these trials were children diagnosed with amblyopia (strabismic, anisometropic, strabismic & anisometropic), had visual acuity in the weaker eye between 0.3 and 1.3 logMAR, visual acuity in the sound eye of 0.3 logMAR or better, no previous amblyopia therapy, no ocular pathology, no prior surgery. Additionally, where anisometropia was diagnosed, it was more than 0.5 diopter difference in the spherical equivalent refraction, and when strabismus was diagnosed, it was constant not intermittent. There was no restriction for time of follow-up as different studies had different time point for follow-up. Studies with combination therapies, those considering FTO or PTO as a treatment option alone, using atropine as a penalization method, limited to only one type of amblyopia, or those with any associated active treatment options were excluded from this meta-analysis.

For identification of studies, we searched PubMed, Scopus, Science Direct, Ovid, Web of Science and Cochrane library from their inception to March 2016. Search terms were “part-time”, “full-time”, “patching”, “occlusion”, “amblyopia” or “therapy”. In addition, reference lists of relevant articles were searched for additional trials and we used the Science Citation Index to search for articles that cited the included studies. No language limit was exerted on the search strategy. Unpublished papers were not included.

We used Der-Simonian and Laird method or random effects model in order to pool the studies. In this method, between study variability is taken into account for weighting and is more suitable for heterogeneous studies.[19]

Two authors (NY & AE) checked the titles and abstracts obtained by the searches to determine whether they met the inclusion criteria (mentioned above) for this review.

Statistical analysis

For each study, the mean difference in visual acuity recorded in logMAR notation was determined for the PTO and FTO groups. To pool the effect sizes across studies, a random effects model was used. Heterogeneity was evaluated by the Cochrane Q test (the significance level was considered to be 0.05.) and I^2 index.[20] Publication bias was evaluated graphically by funnel plots and statistically by Egger's regression intercept method.[21]

The quality of the RCTs was evaluated by the Oxford Center for Evidence Based Medicine checklist for RCTs.[22] Observational studies were checked by the modified Newcastle-Ottawa scale for observational studies.[23] Sub-group analyses according to the study design (RCT vs. non-RCT) and duration of part-time patching were also performed. All statistical analyses were performed using Comprehensive Meta-Analysis (version 2, Biostat Inc., USA).

Results

Fig. 1 shows the PRISMA flowchart for this review. Overall, six studies were included in this systematic review.

Please cite this article in press as: Yazdani N, et al., Part-time versus full-time occlusion therapy for treatment of amblyopia: A meta-analysis, Journal of Current Ophthalmology (2017), http://dx.doi.org/10.1016/j.joco.2017.01.006