

Early detection of Amblyopia in children and its impact on treatment effectiveness

Alia nazal aleneze

Optometrist

Email: alia-n-5@hotmail.com

Abstract

Amblyopia is a sensory vision deficit that can be best detected, diagnosed, and treated during the early stages of visual development. Only a small percentage of children receive visual scans during this critical period of development although this care is often free and easily accessible. Amblyopia can be improved or more easily eliminated when treated early in life. Because amblyopia in older children is generally less responsive to treatment, there is an addition to early identification of strabismus, its risk factors, and its subsequent treatment. The clinical preference is to initiate treatment in children before the age of seven when the optimal visual result is usually easier to obtain.

Alternatively, screening of at-risk infants may be more efficient and cost-effective in early detection of strabismus. Educating and training health care professionals, such as pediatricians, to recognize some of the risk factors for squint and encourage early

referral of a child at risk to an eye care professional may prevent the development of amblyopia. It is not clear if early vision screening will be cost-effective and associated with better outcomes. Improving treatment through individual patching regimens or early initiation of occlusion, and new microscopic treatment methods may enhance adherence to therapy, provide better results and shorten treatment duration. It was found through previous studies that screening of vision early is associated with a lower prevalence of amblyopia.

Keywords: Amblyopia, Early detection, Children, Prevention, Treatment, Effectiveness.

نبذة مختصرة

الغمش هو عجز في الرؤية الحسية يمكن اكتشافه وتشخيصه وعلاجه بشكل أفضل خلال المراحل المبكرة من التطور البصري. تتلقى نسبة صغيرة فقط من الأطفال عمليات مسح بصري خلال هذه الفترة الحرجة من التطور على الرغم من أن هذه الرعاية غالبًا ما تكون مجانية ويمكن الوصول إليها بسهولة. يمكن تحسين الغمش أو التخلص منه بسهولة أكبر عند علاجه في وقت مبكر من الحياة. نظرًا لأن الغمش عند الأطفال الأكبر سنًا يكون أقل استجابة بشكل عام للعلاج ، فهناك إضافة إلى التحديد المبكر للحول وعوامل الخطر الخاصة به وعلاجه اللاحق. التفضيل السريري هو بدء العلاج للأطفال قبل سن السابعة عندما يكون الحصول على النتيجة البصرية المثلى أسهل في العادة.

بدلاً من ذلك ، قد يكون فحص الرضع المعرضين للخطر أكثر كفاءة وفعالية من حيث التكلفة في الكشف المبكر عن الحول. قد يؤدي تثقيف وتدريب المتخصصين في الرعاية الصحية ، مثل أطباء الأطفال ، للتعرف على بعض عوامل الخطر المتعلقة بالحول وتشجيع الإحالة المبكرة للطفل المعرض للخطر إلى أخصائي العناية بالعيون ، إلى منع تطور الغمش. ليس من الواضح ما إذا كان الفحص المبكر للرؤية سيكون فعالاً من حيث التكلفة ومرتبطة بنتائج أفضل. قد يؤدي تحسين العلاج من خلال أنظمة الترقيع الفردية أو البدء المبكر في الانسداد ، وطرق العلاج المجهرية الجديدة إلى تعزيز الالتزام بالعلاج ، وتقديم نتائج أفضل وتقصير مدة العلاج. وجد من خلال الدراسات السابقة أن فحص الرؤية في وقت مبكر يرتبط بانخفاض معدل انتشار الغمش.

الكلمات المفتاحية: الغمش ، الكشف المبكر ، الأطفال ، الوقاية ، العلاج ، الفعالية

1. Introduction

The eyes are one of the graces of God upon us and our only means of vision, but they are exposed to many diseases if we do not take good care of them, and the amblyopia- especially in children is one of the major problems that are widespread in our society. An amblyopia eye in children is not only an aesthetic problem for the child, but also affects the strength of vision, and it is one of the common conditions that affect children and its treatment is done simply and easily only if it is noticed early (Alan Greene, 2019).

The visual defects that a person may suffer from are numerous, and vary in their causes and symptoms, and among the most common cases - especially among children - is the amblyopia that leaves all kinds of negative health and psychological effects on the lives of those with it, which over time constitutes a social obstacle that prevents them from interacting and integrating with their peers In society, this obstacle cannot be overcome and overcome, except through early detection that defines treatment methods, which differ according to cases, some require medicines, others require wearing medical glasses, and others require intervention (Chang, 2007).

Amblyopia is a unilateral or rare decrease in visual acuity. Depending on when treatment is started, amblyopia may be fully or partially reversible. The main causes that prevent the normal development of visual acuity during early childhood, which lead to strabismus, are: amblyopia, anisometropia, and visual deprivation. Experiments confirmed that for the normal development of vision it is necessary to have an external stimulus with light and to have a clear and sharp image at the flick of both eyes.

Light stimuli in early childhood affect macular development. Refractive errors interfere with the normal progression of vision. If not caught early enough and if not treated properly, it can lead to amblyopia, monocular, or even endoscopy in more severe cases (ČANADANOVIĆ et al., 2011). If the refractive errors are equal in both eyes, then the decrease in visual acuity is generally the same. The difference in refractive errors between the two eyes results in greater amblyopia in the eye with a larger refractive error. According to von Norden and Borien, any decrease or difference in visual acuity of more than two lines of Snellen is considered amblyopia. Amblyopia is existent in 2-4% of school children and preschool and is the key reason of childhood age disability (American Academy of Ophthalmology. , 2006).

This research aims to provide an integrated topic on amblyopia and the importance of early detection of laziness and ways to prevent it in children, including an overview of new forms of treatment and early detection over the next few years, by providing an update on current management and recent research to prevent amblyopia.

1. Methods (Sources of data)

Bibliographic databases were searched for randomized controlled trials, non-randomized controlled trials, and cohort studies with no restrictions on a particular year of publication and language. Searches were supplemented by a manual search in the included study bibliographies and reviews to locate articles that were not picked up by our main search strategy. The search strategy was based on combinations of Medical Subject Headings (MeSH) and keywords and was not limited to specific

languages or years of publication. The search strategies of other databases have been modified to meet the requirements of each database. However, the search algorithm was similar. Although not the focus of this review, the literature search also included terminology associated with lazy eye, treatment of amblyopia, and diagnostic measurements. Searches were supplemented by a manual search in the bibliographies of the included studies and reviews.

2. Diagnosing Amblyopia cases and symptoms

Lazy eye is a problem that affects the eye, and it results in the arrival of a blurred image from the affected eye, the opposite of the phenomenon from the healthy eye. Among the causes of the lazy eye is the defects of vision, such as farsightedness or shortness, and this problem crystallizes in the event that there is a difference in degrees of vision between the eye and the other, that is, one eye is affected by myopia, for example, more than the other, especially if there is one eye weaker than the other, the brain neglects the weak, and it depends on the strong eye image. Another reason for the laziness of the eye is the infection with cataract, so the affected eye hinders the delivery of an accurate image of the brain, and because of this, the brain depends on the healthy eye (WHO, 2020). In addition to the fall of the eyelid on the eye, which hinders it from accurate vision, and most often this occurs as a result of a congenital problem. The most prominent cause of laziness in the eye is amblyopia, as it prevents the eyes from focusing together on the same image, and double vision occurs, and for the brain to get rid of this duplication, it ignores that image sent by the amblyopia eye (Alan Greene, 2019).

One of the most important symptoms of lazy eye is in early childhood, so he cannot complain, or express his illness, so the symptoms are noticed by the mother, by approaching the child to the thing he wants to see, such as being very close to television screens, computers, or phones Smart, as can be seen by narrowing his gaze when wanting to look at something.

3. The importance and effectiveness of early detection of lazy eye (Amblyopia)

Timely identification of an eye problem is critical because children are more responsive to treatment when eye problems are diagnosed early. Visual competencies such as near vision, eye movement and coordination between the two eyes are associated with good eyesight in children. Children undergo a comprehensive eye exam when they are six months old. Additional eye exams are done in the eye clinic when they are two years old, at four years old and before the age of six. Studies show that 25% of school-age children and 5-10% of pre-school children suffer from vision problems (Rashad, et al., 2018). The earlier treatment for amblyopia is started, the shorter the length and the better the end result. The basic principle in treating amblyopia is to stimulate the amblyopia during the vision process by excluding the better eye (ČANADANOVIĆ et al., 2011).

Early diagnoses of any eye diseases, or amblyopia cases in children, begin in early childhood and before the child enter school. The importance of this matter increases if one of the child's relatives suffers from the presence of amblyopia or laziness in the eye, and the first thing that must be determined by the specialist doctor is to differentiate

between the real and the false amblyopia, and if the amblyopia is the only pathological phenomenon in the child or it is a symptom associated with another disease that affects the cornea, lens, or retina (Alan Greene, 2019). Among the signs of false amblyopia is the appearance of the eyes of infants crossed (similar to a amblyopia), and the noses of young children are wide and flat with a fold of skin at the inner part of the eyelid, which gives the eyes the shape of a amblyopia, and the false amblyopia may be a result of the large or small opening of the eye, or the distance between the centers of the pupils in the eyes is smaller or larger than normal (Rashad, et al., 2018).

It is worth noting that cases of false amblyopia do not need any treatment, and they may disappear automatically when children reach the age of seven or eight, and may remain for life, and in all cases they do not need any specific treatment. In cases of true amblyopia, the child does not improve if he is over four months old, so the child must be examined in case of doubt that he has a problem. If the doctor makes sure that the existing amblyopia is a real and not a false one, then he conducts the necessary medical examinations to determine the type of amblyopia, and measure its degree to reach the appropriate diagnosis and treatment (Rashad, et al., 2018).

Early detection of amblyopia is important for effective treatment; however, it can still be treated at an older age (Daw, 1998). Recent evidence of successful treatment of squints in children up to 12 years of age and most screening programs for older children have encouraged (Lee et al., 2010). This helps detect undiagnosed cases of amblyopia that have been missed in previous screening programs or those who live in

countries with poor medical services and lack of screening programs (Simons, 2005). Although the global prevalence of amblyopia is 1.6-3.6% (WHO, 2020), available data on the prevalence of amblyopia and RE (refractive error) in different geographic areas are still insufficient (Rashad, et al., 2018).

4. Treatment of lazy eye (Amblyopia)

The purpose of amblyopia treatment is to preserve the visual ability of the eye and protect it from laziness, as well as achieving the integrity of the eyes, in addition to working to restore vision in both eyes at the same time. The treatment of amblyopia varies from case to case depending on the cause, as children must be examined by a specialist doctor during childhood stages in order to detect any possibility of eye diseases, and this matter is important if one of the relatives suffers from the presence of squint or laziness in the eye (Pediatric Eye Disease Investigator Group. P, 2009).

The treatment of amblyopia varies from case to case depending on the cause of the injury, as the treatment may include the use of eyeglasses or a surgery to modify the position of the eye muscles, as well as the eradication of cataracts (opaque lens) if present, in addition to correcting any other defects that are the cause of Eye deviation from its normal position, and lazy eye can be treated by covering the healthy eye with the aim of improving the visual ability in the affected eye if necessary. In light of a comprehensive eye examination of the inner and outer parts of the eye, the ophthalmologist decides the appropriate treatment for the case, whether it is a visual, medical or surgical treatment, and it may

require treatment that combines two or more of these treatments together and the latest sterilization methods must be followed to prevent infection during the operation (ČANADANOVIĆ et al., 2011).

The most acceptable form of treatment is occlusion, that is, better coverage of the eye during the vision process (Repka, 2009). It is the only treatment option for children with amblyopia whose heart rate is less than 0.5 (Pediatric Eye Disease Investigator Group., 2007). Occlusion is a simple way to force a blurred eye during the vision process and is the fastest way to achieve results. Amblyopia is treated until the best possible visual acuity is achieved, or until visual acuity is equal in both eyes. Patients should be monitored on a regular basis even after the best visual acuity of strabismus is achieved due to its possible occurrence (ČANADANOVIĆ et al., 2011). If visual acuity does not improve within a period of 6 to 8 months despite adequate treatment, and there are no organic causes for ghouls, the condition is considered definitive (Holmes, 2001)

5. The Ways to prevent laziness eye (Amblyopia)

Amblyopia, in particular, is a priority in prevention programs through 2020 to prevent vision impairment (Ojaghi et al., 2016). The first years of life are very important in developing visual acuity and anthropomorphic aptitude. Refractive errors or strabismus can distort visual acuity, which may place a significant burden on the affected child (Jamali et al., 2009). Amblyopia develops during childhood due to an abnormal visual experience; hence, it is an acquired defect (Moradabadi, 2014). Amblyopia is a dark vision that occurs in a lazy eye that generally

develops as a result of strabismus, media opacity, equilibrium, and major refractive errors, such as high astigmatism, farsightedness, or nearsightedness (Chang, 2007). Amblyopia can be prevented by early detection and treatment of strabismus, astigmatism, cataracts and other vision problems (Alan Greene, 2019).

Screening of at-risk infants may be more efficient and cost-effective in early detection of amblyopia. Educating and training healthcare professionals, such as pediatricians, to recognize some of the risk factors for squint and encourage early referral of a child at risk to an eye care professional may prevent the development of amblyopia. The child at risk was defined to guide pediatricians and other primary health care professionals regarding when to refer these children, appropriate frequency for follow-up evaluation, compliance management and treatment (Backman, 2004).

Amblyopia is one of the most common causes of visual impairment in childhood, and because it is treatable, at least in children, great efforts have been made to detect it as early in life as possible. Amblyopia screening programs among preschool and school children have been widely organized around the world (Sjöstrand & Abrahamsson, 1997).

Early treatment is critical to improving amblyopia in children. The first aspect of the treatment is to provide a clear image using optical correction in addition to contact lenses. The optical patch should be worn at all times during all waking hours. If the patch is removed, vision in the opaque eye becomes blurred and interferes with visual development. In some cases, providing a clear, static image alone improves vision. Some children will

also need a 'better eye' patch, as well as with C.L. Good eye patch stimulates the visual development of the weaker, opaque eye. Another way to enhance amblyopia stimulation is to blur the vision of a healthy eye (ČANADANOVIĆ et al., 2011). This can be done by placing overcorr / hypocorrection C.L over the healthy eye or by administering drops to blur the healthy eye. In most cases, a patch is not required on a healthy eye. It is very important to the quality of life and sporting activities and has great importance for normal social activities. Visual correction is often required in the long term, and in the vast majority of children, vision can be improved if the parents and child are in compliance with the prescribed treatment and in good compliance with the ophthalmologist. Objective correction of refractive error is an essential component of treatment in any anisotropic condition. This, as a first step includes examination of muscular paralysis and as a second step correct objective correction and then wisdom, appropriate procedure for contact lenses (Salopek-Rabati, Pavan, & Katelan, 2013).

6. Conclusion

The purpose of this research was to investigate the early detection of amblyopia in children, its effect on the effectiveness of treatment, and how to prevent or treat amblyopia in childhood. Amblyopia is a visual deficit that affects binocular vision and is best treated within the first three years of visual development. On review, significant evidence was found for the successful management of strabismus, with treatment of obstruction and atropine. However, managing amblyopia remains difficult, mainly due to compliance issues and suboptimal treatment outcomes during occlusion and atropine punishment. Recent studies have

found evidence of new methods of treating amblyopia, especially with regard to ophthalmic therapy, although these are still under investigation. More robust clinical trials of these new treatment methods are still warranted in order to determine their role in treating amblyopia. Contact lenses are the preferred optical method for correcting anisometropia.

Based on studies on the topic, we **recommend** that vision screening programs and professional eye exams be performed on all newborns but these programs are expensive and difficult to implement. An alternative might be to consider referrals of "at risk" children to eye care professionals. Healthcare professionals and the general public should be educated about the risk factors for strabismus. They should be aware of the importance of strabismus identification and referral of at-risk children, and the value of treatment for the child and society. Normal vision in each eye greatly reduces the risk of eye injuries and vision loss, as well as allowing the child to pursue jobs that are visually demanding.

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