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MYOPIA CONTROL WITH ATROPINE 0.01%

Myopia is the most common human eye disorder in the world. A WHO survey in 2003 found up to 33% of 12-year-old children in Malaysia are myopic. The prevalence of myopia appears to be increasing in East Asia's rapidly developing economies and will affect 2.5 billion by 2020 (Kempen et al, Arch 2004).

High myopia is associated with macular choroidal degeneration, retinal detachment, glaucoma and premature cataract, making it one of the most important causes of visual impairment worldwide (Buch et al Ophthalmology 2009).

Current studies show an association of environmental influences (particularly decreased outdoor time) with myopia onset and progression. Increasing time outdoors has been shown to reduce the incidence of myopia and its progression (Ramamurthy et al Clin Exp Optom 2015). Near work was found to be associated with myopia in some studies (Mutti et al IOVS 2002, Ip et al IOVS 2008) but more recent studies have been less conclusive in their findings with some showing no association (Saw et al IOVS 2006). Sustained near work with little rest appears to be a more important factor than total near work time (Jones-Jordan et al IOVS 2012).

Although many interventions aimed at myopia control have been proposed, only a few have been subjected to rigorous randomised controlled trials. Non-pharmaceutical interventions that have been shown to be minimally effective includes myopia control lenses (bifocals or varifocals) (Cheng et al JAMA 2014) and rigid gas permeable lenses (Walline Arch Ophthal 2004). Although widely practised in Malaysia, under-correction of myopia (Chung et al Vis research 2002) or intermittent glasses wear (Ong et al Optom Vis Sci 1999) has not been shown to be effective in retarding myopia progression. Orthokeratology has been shown to retard myopia progression to up to 40% (Swarbrick et al Ophthalmology 2015, Cho et al IOVS 2012, Chen et al IOVS 2013). However, this method is associated with infective keratitis and thus has to be used with great care.

MALAYSIAN SOCIETY OF OPHTHALMOLOGY

The most effective method to date for myopia control is atropine eye drops. Atropine was used for myopia treatment since the nineteenth century by Wells. Subsequent studies have shown atropine to be effective in retardation of myopia progression (Bedrossian Ophthalmology 1979, Gimbel Canadian J Ophthalmol 1973, Gruber Ophthalmology 1985, Yen et al Ann Ophthalmol 1985, Shih et al Acta Ophthalmol Scand 2001). The exact mechanism of atropine is not known but it is thought to act on the retinal or scleral in inhibiting eye growth. Although atropine 1% has been used for myopia control, it did not gain popularity due to a high incidence of photophobia and loss of accommodation.

More recently, the Atropine for Myopia Treatment studies (ATOM 1 and ATOM 2), a series of randomised, double masked, placebo controlled trials were performed. ATOM 1 showed atropine 1% reduces myopia progression in children by 77%. The treatment is well tolerated with some side effects of photophobia and loss of accommodation. As such, patients using atropine 1% require photochromatic progressive addition lenses. ATOM 2 compares the efficacy and adverse effects of lower concentration of atropine. It found that atropine 0.01% was almost as effective in reducing myopia progression as higher concentrations but with less rebound effect comparing with higher concentrations of atropine. Atropine 0.01% is associated with less photopic pupil dilation and no clinically significant loss of accommodation and near visual acuity. Children using atropine 0.01% do not need progressive additional glasses. Atropine 0.01% (Myopine) preparation is currently available on a named patient basis in Malaysia.

In conclusion, there are several interventions which are effective in control of myopia progression. Of these, atropine 0.01% appears to have a good risk-benefit ratio with no clinically significant visual side effects and a clinically significant 50 % reduction in myopia progression.

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