The effect of a Homoeopathic complex eye drop solution on the symptoms of Computer-induced Asthenopia

1. Introduction and epidemiology

Visual display units (VDU's) such as laptops, tablets, smartphones, computers, game consoles and televisions have become an essential part of our modern life both in school and at work places (Izquierdo & Townsend, 2008). Up to 90% of computer users may experience visual symptoms at one time or another with the use of VDU's (Barthakur, 2013). Asthenopia (eyestrain) is typically associated with near-work and symptoms include dry eyes, eye fatigue and difficulty focusing. The major cause of computer-induced asthenopia is fatigue of the ciliary and extra-ocular muscles due to prolonged accommodation and vergence required by near-vision work (Tiwari *et al.*, 2011). The severity of the symptoms is proportional to the time spent using a VDU device and symptoms are substantially reduced after discontinuing usage; even so, the symptoms can affect work productivity and quality of life (Barthakur, 2013).

Conventional treatment for asthenopia includes correction of refractive errors, use of occupational glasses, eye drops and punctal occlusion (Garin, 2014); ergonomic measures can also be helpful (Barthakur, 2013). Homoeopathy is a holistic treatment modality based on the "Law of Similars" (Dekkers, 2009). Homoeopathic remedies enhance the body's own curative abilities, enabling the body to heal itself (Ahmad, 2005). Homoeopathic remedies may provide a safe complementary treatment option for asthenopia. The homoeopathic complex eye drop solution used in this study consists of *Conium maculatum* 6X, *Natrum muriaticum* 6X, *Ruta graveolens* 6X and *Senega officinalis* 6X. It is a widely available eye drop solution indicated for the relief of computer-induced asthenopia. To date, no specific research could be found on the effect of this eye drop complex on the symptoms of computer-induced asthenopia.

2. Aim of the study

The aim of the study was to determine the effect of a homoeopathic complex eye drop solution on the symptoms of computer-induced asthenopia using a Symptom Index Questionnaire.

3. computer-induced asthenopia

The number of computer users is increasing rapidly worldwide, with an estimated 1 billion people using computers in 2008 (Bhanderi *et al.*, 2008), and 5.3 million computer users in 2006 in South Africa (Goldstuck & Laschinger, 2006). Between 64% - 90% of computer users will experience symptoms of asthenopia and it is likely that this number will increase over the years due to increased use (Rosenfield *et al.*, 2010) of electronic devices. In addition to computer users, it is estimated that there are over 3 billion internet users in the world (Internetlivestats.com, n.d) and 14 million internet users in South Africa (Nevill, 2013). In South Africa it is estimated that people spend an average of 431 minutes (7.2 hours) every day looking at cell phones, tablets and other VDU's. That breaks down to 115 minutes spent watching TV, 126 minutes in front of a computer or laptop, 127 minutes on a smartphone and 63 minutes with a tablet (Berthelette, 2014).

The following factors are associated with an increased incidence of asthenopia:

- Duration of computer use: most individuals who work on a computer for more than 4 hours daily experience eye-related discomfort or visual problems;
- Uncorrected refractive errors: Uncorrected refractive errors compound the problem of asthenopia, which may cause added fatigue with computer usage, as the eye fails to bring parallel light to the retina;
- Age >50 years: loss of near focus ability decreases with the increase in age, which further leads to symptoms of computer-induced asthenopia;
- Binocularity dysfunction, accommodation insufficiency or convergence insufficiency disorders: the major cause of computer-induced asthenopia is believed to be eye muscle fatigue due to prolonged accommodation and vergence demands;
- Ergonomic factors: improper positioning of the computer may lead to symptoms associated with computer-induced asthenopia. Numerous studies have shown that placing a computer monitor below the horizontal plane of the eye increases visual comfort;
- Psychological factors: some complaints of visual health described by VDU workers are associated indirectly to psychological distress associated with working conditions; and

- Gender: computer-induced asthenopia is more prevalent in females than males (Vilela *et al.*, 2015).

4. Symptoms of computer-induced asthenopia

Common symptoms of computer-induced asthenopia may include dry eyes (inadequate lubrication of the eyes), burning eye pain, itchy or irritated eyes, eye fatigue (failure of the eye to accommodate), difficulty focusing (inability to keep a focal point), intermittent double vision with near fixation, blurred vision (lack of sharpness of vision resulting in the inability to see fine details) and frontal headaches (aching pains localized around or between the eyes) (Amalia *et al.*, 2010). Individuals with computer-induced asthenopia also complain of photophobia (sensitivity to light) and lacrimation (increased secretion of tears) (Akinbinu & Mashalla, 2013). These symptoms are temporary and are relieved when resting the eyes (Barthakur, 2013). The symptoms described may also be attributed to asthenopia while reading or with normal near work.

5. METHODOLOGY

5.1 Research sample

The research sample consisted of 30 participants, male and female, between the ages of 18-35 years, recruited by means of purposive sampling. Advertisements were placed at the UJ Health Clinic, on the Doornfontein campus (Appendix A) with relevant permission granted.

Participants were included in the study if they:

- Were male or female, between the ages of 18-35;
- Experienced at least two or more eye-related symptoms of asthenopia (blurred vision, frontal headache, dry eyes, photophobia, lacrimation, slow focusing, burning eye pain, itchy or irritated eyes, eye fatigue and diplopia) when using a VDU;
- Used a VDU for a minimum of 3 hours per day; and
- Experienced eyestrain symptoms for at least one month prior to the study.

Participants were excluded from the study if they:

- Used contact lenses; (Contact lenses may compromise tear layer and have an effect on symptoms)
- Was suffering from frequent ocular infections or allergies, glaucoma, cataracts, styes, and optic nerve atrophy;
- Had eye-related problems such as amblyopia, strabismus or uncorrected refractive error;
- Used medications such as eye drops, anti-histamines, beta-blockers, diuretics, antidepressants, hormone replacement therapy, isotretinoin, anticholinergics or immunosuppressive drugs; or
- Had underlying chronic conditions that may result in dry eyes: These may include- rheumatoid arthritis, systemic lupus erythematosus, hypothyroidism, omega 3 fatty acid deficiency, vitamin A deficiency, Sjogren's syndrome, scleroderma, connective tissue diseases, hepatitis C, undergoing radiation therapy or have had refractive surgery, epilepsy or other neurological disorders.
- Farsightedness more than +1.00D, astigmatism more than -1.00D and myopia of more than 1.00D uncorrected as determined by autorefraction (as this could cause asthenopia symptoms)

5.2 Research design and procedure

This was a randomised, double-blind, placebo-controlled, one-day study. The sample groups were shared with another researcher who assessed tear-break up time (TBUT) and used a visual analogue scale (VAS) to determine eye discomfort levels. The participants attended an initial consultation at the UJ Optometry Clinic. All participants were requested to read the Information Form (Appendix B), sign the Participant Consent Form (Appendix C) once they had agreed to participate, and complete the Participant Selection Questionnaire to be assessed if they met the inclusion and exclusion criteria (Appendix D). All participants who met the criteria were tested for any refractive errors present by a qualified optometrist using an autorefractor; they were also screened for accommodation and vergence errors. If a participant had any significant uncorrected refractive errors, they were referred to a qualified optometrist at the Optometry Clinic and excluded from the study. Participants proceeded to the UJ computer lab to play a computer game for a two hour period. Participants wearing glasses for reading wore their glasses while using the

computer but contact lenses wear was excluded due to reasons mentioned already. After the 2-hour period, all participants were requested to complete the Symptom Index Questionnaire (SIQ) (Appendix E). Participants returned to the computer lab where they were randomly divided into two groups. One group received the homoeopathic complex eye drop solution (treatment group) and the other group received distilled water (placebo group). They were instructed to place two drops into each eye. Participants continued playing the game for a period of 30 minutes, after which they completed the SIQ again.

The homoeopathic complex eye drop solution and distilled water drops were prepared by the manufacturer and randomized by an independent person. Both the treatment and placebo eye drops were labelled and packaged in an identical manner in 10ml bottles. Each person selected a number and received the corresponding numbered bottle of the medication (or preparation).

5.3 Reliability and validity

The medication was manufactured using good manufacturing procedures by the manufacturer to ensure quality control. Both the placebo and treatment groups received eye drops in identical containers; the eye drops were randomized by an independent person. Sheedy *et al.* (2003) suggested that symptom questionnaires should be used in order to measure subjective ocular discomfort associated with asthenopia. Currently there is no standardized, validated asthenopic symptom questionnaire; most research studies conducted on asthenopia however, make use of a numerical grading system. Various studies relating to asthenopia have made use of symptom questionnaires, relating specifically to the parameters measured in the study (Rahman & Sanip, 2011; Shrestha *et al.*, 2011). The Symptom Index Questionnaire was developed by the researcher for the purposes of this study and evaluated the following 11 asthenopic symptoms: eye fatigue, sore or aching eyes, itchy or irritated eyes, lacrimation, dry eyes, hot or burning eye pain, intermittent diplopia at near fixation, blurred vision, photophobia, frontal headache and difficulty focusing. Symptom severity was rated by the participant using a 4-point Likert scale where: 0 = none, 1 = slightly, 2 = moderately, and 3 = severely. Likert scales are a reliable means of evaluating subjective symptom severity (McLeod, 2008).

5.4. Data collection and analysis

All data from the questionnaires were statically analysed by means of frequencies and descriptives, and non-parametric tests. Inter-group comparisons were done using the Mann-Whitney U-test. Comparison within the groups (intra-group) was done using the Wilcoxon Signed Ranks Test (Kuhudzai, 2015).

6. Summary: Intra-group analysis

The Wilcoxon Signed-Ranks test results for the asthenopia symptoms for both the placebo and treatment groups. A *p*-value > 0.05 is considered as non-statistically significant and < 0.05 is considered statistically significant. All the symptoms evaluated in the placebo group showed a statistical difference as their *p* values were less than 0.05. In the treatment group only the symptoms dry eyes (p=0.096), burning eyes (p=0.180) and frontal headache (p=0.84) showed no statistically significant change with a *p* value of more than 0.05.

7. Summary: Inter-group analysis

The Mann-Whitney U test comparing the results before treatment was administrated for both groups (time 1) and after the administration of treatment (time 2). All the *p* values at time 1 are greater than 0.05 indicating that the two groups symptoms were very similar before treatment, there was no statistical difference between the symptoms before treatment for both groups. At time 2 there were statistically significant differences for tearing eyes (p=0.035), frontal headache (p=0.020) and difficulty focusing (p=0.036). This indicates that the placebo outperformed the treatment groups for these three symptoms, there were no significant differences between the groups for any of the other symptoms. Overall the treatment group did not outperform the placebo.

8. Conclusion

Intra-group analysis revealed that the placebo group showed a significant improvement over time of all symptoms evaluated, while the treatment group only improved in 8 of the 11 symptoms. Inter-group analysis indicated that there was a statistically significant difference in three symptoms (tearing eyes, frontal headache and difficulty focusing) of computer-induced asthenopia between the two groups in favour of the placebo group. Therefore it can be concluded that the homoeopathic complex eye drop solution was not more effective than the placebo in

decreasing the symptoms of computer-induced asthenopia, over a short time period. Future studies could make use of a larger sample size and longer duration, and individualised homoeopathic treatment could also be investigated.

9. References

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