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INVESTIGATION OF VISUAL PERFORMANCE AND VISUAL COMPLAINTS DURING READING USING VIDEO OCULOGRAPHY (VOG)

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ABSTRACT

The visual performance and visual complaints during reading were investigated. The visual performance was measured in term of eye movement and reading speed in a range of refractive power and was examined by using Video Oculography. The association between visual complaints (asthenopia and blurriness) and induced prism adaptation was studied too. Fifty young adults aged between 19 and 34 years old (mean: 22.63, SD: 1.97 years) with refractive errors between +0.50D and -6.00D (mean: -1.77D SD: 1.97D) were recruited in this study. Subjects were required to read the 200 words text at 40 cm while the eye movement and the reading speed were recorded using video oculography (VOG). Subjects were then required to wear induced base-in (1PD and 3PD) and base-out (1PD and 3PD) prisms. They were required to adapt for 30 minutes with each pair of induced prism. After the adaptation, they were required to read the short text. The occurrence of the visual complaints (asthenopia and blurriness) during reading was recorded. Spearman correlation coefficient revealed insignificant correlation between refractive error and reading speed (r_s=0.18, p>0.05), saccades (r_s=-0.20, p>0.05), fixations (r_s=-0.30, p>0.05) respectively. A moderate negative correlation was found between regressions and refractive error (r_s=-0.50, p<0.05). Wilcoxon Signed rank test revealed a significant complaint of asthenopia between 1PD and 3PD base-out (z=-2.00, p<0.05) as well as between 3PD base-in and 3PD base-out induced prism adaptation during reading (z=-2.00, p<0.05). Blurriness during reading was significantly reported between 3PD base-in and 3PD base-out (z=-2.00, p<0.05), and between 1PD and 3PD base-out induced prism adaptation (z=-2.11, p<0.05). Visual performance (reading speed and eye movement) was insignificantly correlated with visual complaints (asthenopia and blurriness) during reading with induced prism adaptation. Although regression is inversely correlated with the refractive range between +0.50D and -6.00D, reading speed, saccades and fixations remained stable during reading. Asthenopia and blurriness were more common in base-out induced prism during reading. A model on inter-correlation between visual performance and visual complaints during reading was proposed.

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Noor Suhailly Saiman

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CHAPTER ONE

INTRODUCTION

Reading is an important skill to enhance quality of life. Development of the skill takes active engagement from an early age. Reading is perceptual vision skills which are learned and developed. This visual ability consists of neuro-muscular activities which developed in infancy and refined through the early years (Scarborough et al., 2009; Chapman et al., 2000; Gregory, 1994; Gaddes, 1985). Through the toddler years the individual refines this perceptual system gradually in order to achieve visual readiness for school (Schwanenflugel et al., 2006; Parilla et al., 2004; Chapman et al., 2000; Olofsson & Niedersøe, 1999). Visual skills like recognition, binocular vision and visual processing are crucial for early reading skills and organizing written work (Schuett et al., 2008; Groffman, 2006; Taylor, 2006; Kim & Davis, 2004;). Normal development of visual skills allows children to achieve comfortably clear vision during learning years. Effective visual performance during reading depends on visual acuity, eye focusing, tracking skills, eye teaming, eye-hand coordination and visual perception (Richmond, 2010; Clutten, 2009; Kim, 2004; Garzia et al., 2000).

Reading is a receptive skill, whether in the silent or oral mode. Based on clinical assessment, reading skill gradually developes throughout early education years to meet the demand for near task (Scheiman, 1993; Garner, 1990). In general, reading involves word recognition, comprehension, fluency, and motivation (Katzir et al., 2006; Georgiu et al., 2006; Savage & Frederickson, 2005). The reading skills demand constant practice, development, and improvement. Skillful readers gradually develop fast skills of word recognition and immediate knowledge of relevant vocabulary. Eventually, reading fluency derives from the ability of readers to automatically decode individual words in larger language units (Samuels, 2002; Eskey, 1988). To accomplish simultaneous synchronization across tasks during reading, immediate execution is required in order to accelerate effortless performance in an autonomous condition without much consciousness and awareness (Logan, 1997). Reading difficult structures/words of a text sometimes decreased the reader's