

Efficacy of binocular vision psychology essay



**ASSIGN
BUSTER**

This research will be conducted in order to identify Binocular Vision techniques that commonly used at various regions of the world and then find the most reliable and efficient among all the binocular vision techniques used in clinical practice. The comparison will present the status of reliability, efficiency, strength and weakness of the each techniques in binocular vision measurement assessment. The research also stress on suitability of the test procedure to be done on different group of patient such as gender and age. It will be done by analyze on the previous research data that had been published.

In a cohort of individuals performing demanding near vision tasks, the prevalence of non-strabismic BV dysfunction has been found to be as high as 32. 3% (Porcar & Martinez-Palomera, 1997). Meanwhile the prevalence of strabismus and amblyopia in seven-year-olds has been reported to be 2. 3% and 3. 6% respectively(Williams et al., 2008). Similar results have also been reported by (Lara, Cacho, García, & Megías, 2001) where 22. 3% of symptomatic adults presenting to a general optometric clinic had some degree of binocular or accommodative dysfunction. In the elderly population accommodative dysfunction is the norm but systemic disorders such as cerebral vascular accidents may affect binocular function(F Rowe, 2010)&(Fiona Rowe et al., 2009). Therefore, binocular vision problem can be seen as one of the major problem that facing by the people nowadays.

As an optometrist each every optometric examination should begin with a thorough history taking about the binocular vision status and symptoms facing by patient. This is because a recently acquired incomitant deviation is likely to be symptomatic presenting with diplopia and blurred vision or

symptoms of any associated systemic condition. By contrast, the symptoms associated with a latent deviation may either be absent or non-specific, thus creating a diagnostic dilemma for optometrist. Thus, an efficient examination is crucial in clinical practice to differentiate whether patient has BV related problem or not. Headaches and asthenopia are mostly symptoms that present frequently to the optometrist. It has been reported that the lifetime prevalence of headaches in men and women aged 25-64 years was 93% and 99% respectively (Rasmussen, Jensen, Schroll, & Olesen, 1991). Headache may be related to an eye disorder but it is clear that it is a widespread problem with a wide variety of diverse and possibly multi-factorial etiologies. It is commonly assumed that a reports of blurred vision may relate to binocular vision dysfunction but other causes such as pathology and uncorrected refraction error must be excluded first. Thus, this research will be conducted to know the type of techniques commonly used in different places and best binocular vision technique can be used by optometrist to get the more reliable and efficient diagnosis during clinical practice.

Problem statement

In Lara et al study has suggested that accommodative and nonstrabismic binocular dysfunctions are commonly found in clinical practice. In the study, from the 265 subjects examined, 59 patients (22, 3%) presented some kind of accommodative or binocular dysfunction, with a higher prevalence of binocular disorders. The most common disorders were convergence excess and accommodative excess (Lara et al., 2001). The untreated binocular vision problem can cause frontal headaches, seeing text drifting in and out of focus when reading or writing and easily distracted from reading or near

point activities. Moreover, in pediatrics population, many of visual difficulties go undetected as children seek to learn in other ways or compensate by touching, by holding or getting closer to what they are looking at and by moving around to find a place where they can be comfortable. Therefore, clinician often misinterpreted these children as “ inattentive” or “ hyperactive”. In fact, binocular vision issues are three times more common in those deemed as having attention deficit hyperactivity disorder (ADHD) and 5 out of the 9 clinical criteria used for ADHD diagnosis are identical in binocular vision dysfunction(Granet, Gomi, Ventura, & Miller-Scholte, 2005). Then a good binocular assessment is very crucial to diagnose the symptoms are truly related to BV problem or not to make sure the patient with BV problem get the correct and fast treatment or therapy before it become worst. Thus this research is functions to investigate which of the assessment technique in binocular vision measurement is more efficient. This can be a guide to the optometrist to perform binocular vision assessment effectively and help them to get more accurate diagnosis.

Research objectives

General objective

The aim of this study was to investigate the scientific evidence available on the measurement techniques and procedures in binocular vision assessment in various regions of the world, identifying the types of techniques used and their efficacy.

Specific objective

To identify all techniques commonly used in binocular vision assessment in various regions of the world and its differences.

To determine the most reliable and efficient procedure or test for binocular vision assessment.

Research questions

What is the differences between all techniques commonly used at certain regions in binocular assessment?

Which technique is more reliable and efficient for binocular vision assessment?

Significance of the study

The clinical investigation of binocular vision is concerned with assessing if there is a degree of binocular stress which can give rise to symptoms or suppression. But there are lot of difference types of technique use in binocular assessment at different regions of the world, therefore from this research we can know what is the techniques commonly used at different places, plus the most reliable and efficient technique for the assessment. Therefore the BV problems can be diagnose simply and with more accurate results in a primary eye care practice.

Definition of terms/concepts

Binocular Vision – the simultaneous use of the two eyes.

Accommodation- (eye focusing) the eye's ability to adjust its focus by the action of the ciliary muscle on the crystalline lens.

Accommodative Vergence- a convergence response (to turn the eyes inward) which occurs as a direct result of accommodation (eye focusing).

Vergence - to turn the eyes horizontally (convergence- inward or divergence- outward). Accommodative vergence, fusional vergence, proximal vergence, and tonic vergence are needed to maintain single vision.

Convergence- the ability to use both eyes as a team and to be able to turn the eyes inward to maintain single vision up close.

Divergence - the ability to use both eyes as a team and be able to turn the eyes out toward a far object.

Heterophoria - tendency of the eyes to deviate from their normal position for visual alignment. This condition may be observed when one eye is covered.

Stereopsis- the ability to perceive a three dimensional depth which requires adequate fusion (union) of the images from each eye.

Fixation - the ability to direct and maintain steady visual attention on a target. Fixations are a form of pursuits.

Fusion - the union of images from each eye into a single image.

Tranaglyph- red/green targets used with red/green glasses to develop eye teaming skills.

Vectogram - a three-dimensional picture that is used to strengthen the binocularity system. Available in fixed and variable styles to provide base-in and/or base-out training. 3D glasses are used to view the picture.

CHAPTER 2

LITERATURE REVIEW & CONCEPTUAL FRAMEWORK

Literature Review

Binocular vision (BV) anomalies are one of the problem commonly encountered by optometrist in optometric practice. As a result the optometrist should be able to diagnose binocular dysfunction and investigate it properly. Scheiman et al. (1996) had been studied in clinical pediatric population and found that the most common disorders recorded after refractive error were binocular (14. 3%) and accommodative (5. 4%). In other study shows that convergence excess (7. 1%) was more prevalent than convergence insufficiency (4. 6%), while the number of patients with accommodative insufficiency (2%) was a little higher than those with accommodative excess (1. 8%)(Granet et al., 2005). Furthermore, based on Lara F, Cacho P, GarcÄ±´a A, et al study, from the 265 subjects tested in this study, 59 patients (22, 3%) presented accommodative or binocular dysfunction, with a higher prevalence of binocular disorders. The most common disorders were convergence excess and accommodative excess (Lara et al., 2001). Hopefully this research can help optometrist to choose the best technique with appropriate equipment for BV assessment in a primary eye care practice to get more reliable results.

Techniques used in different regions

Sometimes, different places used different types of techniques for BV measurement and each technique has its own specialty and weakness. Most of country has their own rules and guidelines in vision assessment that

should be followed. For example in United State, in their clinical practice assessment for eye and vision examination need to follow all guidelines set by American Optometric Association. According to the guidelines, all optometrist should fulfill the vision and eye care assessment based on the standard procedures that have been suggested but the optometrist still cannot totally rely on the clinical guideline alone for patient care and management. Moreover the optometrist is recommended to refer to the other references or other sources to obtain a more detailed analysis. Meanwhile for other place such as United Kingdom, the optometrist is get a guide from The Association of Optometrists (AOP) in their clinical practice and in Hong Kong all optometrist is supervised by the Hong Kong Society of Professional Optometrists (HKSPPO) to control the quality of their optometrist's eye care services.

In the contexts of BV technique in clinical assessment, almost of the places used the same procedures in their clinical practice and usually the techniques is chose because of its reliability and efficacy based on the previous study. But there also certain part of measurement that has various techniques that can be choose based on their requirement in different regions for example in measurement of phoria, Howell card is widely used in Australia meanwhile in United Kingdom, their optometrist mainly used Maddox rod. Besides that, in measurement associated phoria or called fixation disparity, the Vectographic Slide and B-VAT are to most commonly used in the United States meanwhile Mallet Unit is used in Britain. Therefore, maybe there are some advantages about the technique that made them choose that technique in their clinical practice.

If we compare Howell Card and Maddox rod, both of them have its own advantages and disadvantages. Howell Card utilizes the Thorington technique of phoria measurement and done at 3m. (Wong, Fricke, & Dinardo, 2002). While Maddox Rod used concepts of prism dissociation and prism neutralization and for distance measurement it is done at 6m. The advantages of Maddox Rod are it is inexpensive, easy to use, quick and accurate but the result using Maddox Rod will tend to be error because patient may localize the streak of the light is at closer distance than the distance of the light source. In the meantime, the Howell Card is designed with a Free-Space viewing that has been reported to have the advantages of providing accommodation accuracy and minimizing the presence of binocular fusion stimuli (Boptom, 1997). Thus, perhaps different regions have their own standard requirement in BV assessment and the technique used should be the most suitable method to fulfill their circumstance requirement.

Techniques in binocular vision measurement

The evaluation of binocular vision involves several distinct parts of testing which is the first part is for measurement of the magnitude and direction of phoria and tropia at distance and near, second part is measurement of positive and negative fusional vergence and third part is for accommodation evaluation. Next part is the measurement of convergence amplitude, then is for evaluation of sensory status and the last part is evaluation of eye movement.

Measurement of the magnitude and direction of phoria and tropia at distance and near

Heterophoria is defined as a deviation from orthoposition that occurs when binocular fusion is distracted, for instance, by covering one eye. There is several conventional procedures can be used such as cover test, prism cover test, von graefe phoria test and the modified thorington test. The cover test may be used to evaluate both heterophoria and heterotropia. In the cover test, one eye will be occluded to eliminate fusion so as to achieve dissociation of the eyes to allow measurement of the phoria. The method by which the phoria is quantified may also affect the results for example different in near targets may result in different phoria findings, because the adequacy of the target as a stimulus to accommodation is also dependent upon the quality of the target detail.

To obtain a more reliable sign for asthenopia, it has been suggested to search under natural viewing conditions called " fixation disparity". Fixation disparity testing is a more recent method in assessing binocular vision and can provides additional information in the evaluation of binocular vision status. Examples of instruments used in this method are the mallett unit and the disparometer which have been widely used in clinical practice. In addition, nowadays the use of computers also allows one to measure fixation disparity with stimuli presented on the computer's screen.

Measurement of positive and negative fusional vergence

The second part is the assessment of positive fusional vergence (PFV) and negative fusional vergence (NFV). Before this, the evaluation of fusional vergence involves only measurement of smooth vergence range or vergence

amplitude using Risley prism in the phoropter. But, recently the additional ways of evaluating fusional vergence has been proposed called step vergence testing, where done by using prism bar outside the phoropter (M Scheiman et al., 1996)(Wesson, 1982). There measurement in fusional vergence can divided into two types which are direct and indirect measures. In direct measures, the test is done by objectively assessed and example of the tests are smooth and step vergence testing. Meanwhile indirect measures refer to tests primarily done for assessing different function such as the negative relative accommodation (NRA), positive relative accommodation (PRA), and monocular estimates method (MEM) that generally thought of tests of accommodation function.

In clinical practice, the rotary prism in phoropter and prism bars are two technique commonly use to assess the amplitude of PFV and NFV. Furthermore, there are three important data must be taken in vergence measurement, that is blur point, break point and recovery point. The blur point is the amount of relative fusional vergence, meanwhile the break point measures the total amount of fusional vergence and lastly the recovery point which is provides information about the person's ability to regain binocular single vision after diplopia occurs. Rotary prisms is the best instrument for smooth vergence measurement because it provide fairly repeatable results in young adults (Penisten, Hofstetter, & Goss, 2001). But the result using rotary prism in children is less variable (Rouse, Borsting, & Deland, 2002). Measuring vergence ranges in free space using a prism bar is very useful especially for measurements in young children because it more closely resembles habitual conditions and patient eye movements can be observed.

Another function that must be assessed in vergence measurement is vergence facility that is usually performed outside the phoropter using a specially designed vergence facility prism. The purpose of this technique is to measure patient's ability to make rapid changes in fusional vergence over a specific period of time. Usually a prism that is fixed in plastic flipper frames will be used in this technique but in certain conditions, the prism may also be held loosely in front of the patient's eyes for vergence facility measurement. There are a lot of studies using different test parameters such as amount of prism and type of target used to investigate vergence facility. But in a study by (Delgadillo, H. M., Griffin, 1992), from comparison results between prism flippers of 8BI/8BO and 5BI/5BO, they found that there is no significant difference in vergence facility results among the powers they used.

Accommodation evaluation

Next is evaluation of accommodation function that includes aspect evaluation of accommodation amplitude, accommodation facility and accommodation response. The most common evaluation test for accommodation amplitude is using the subjective "push-up" test with the RAF rule. Another method is using minus lenses, where the target is placed in front of the patient at a constant distance and then the power of the minus lens will be increased until the patient can no longer clear the target. But (Atchison, Capper, & McCabe, 1994) found that this method usually will give lower results of measurement than the push-up method.

Accommodative facility is also one of the important aspects of accommodative function because monocular accommodative facility (MAF) and binocular accommodative facility (BAF) can give a direct evaluation of the dynamics of accommodative responses (Liu et al., 1979). Besides that, BAF also provides

information about the interactive nature of the relation between accommodation and vergence (Siderov & Johnston, 1990).

The third aspect is accommodative response and it can be divided into two types, subjective and objective clinical techniques. For subjective techniques are includes binocular cross-cylinder and duochrome test, but their results are not reliable (Rosenfield, Portello, Blustein, & Jang, 1996). Meanwhile examples for objective clinical techniques are Monocular Estimated Method (MEM), Nott retinoscopy and Cross retinoscopy. The MEM retinoscopy is done by measure the monocular accommodation response in binocular condition using spherical lenses. In Nott method, the fixation target is held at constant distance and the retinoscope is moved until neutral reflex is observed. Meanwhile Cross retinoscopy method just like MEM method that need the patient to fixate at a target and the difference just examiner adds spherical lenses over the spectacle correction until get neutral reflex. (Tassinari, 2000) reported that Nott retinoscopy is more appropriate technique to assess lag accommodation in young adults compare to MEM dynamic retinoscopy because the method has least contaminates the results.

Measurement of convergence amplitude

The third area that should be evaluated in BV evaluation is convergence amplitude. Generally it is referred to near point of convergence and this test very essential in the diagnosis of convergence insufficiency. The test is done as the subject tracks the target that placed on the subject's midline that moved closer to the subject until the subject report double or when examiner sees deviation one of the patient's eye from the target. Then the recovery for binocularity is accomplished by moving the target away from the subject

until the subject report the target become one or when examiner sees the eye deviate back to the target. A normal value for the break is 5 cm or more and 7 cm or more on the recovery has been recommended as a norm value for an adult because 85% of test sample fell at the value from a study by (Mitchell Scheiman et al., 2003).

Evaluation of sensory status

Then is the part of evaluation sensory status. Assessment suppression and stereopsis are crucial areas to evaluates in this part. Sensory fusion anomalies can be very severe in cases of strabismus but in cases of non-strabismus it is vice versa, sensory anomalies are less severe. Most of the time the stereopsis for patients with non-strabismic binocular anomalies are normal or only mildly reduced and suppression is commonly found in patient with heterophoria. Information about suppression can be obtained from many different of test such as near mallet unit, bagolini striated lenses, 4 base-out test and a specific test that considered one of most accurate method to assess suppression, the worth four-dot test. For stereopsis evaluation the traditional evaluation of stereopsis includes measurement by stimulation of retinal disparity using polarized targets and polarized glasses. Recently targets without requiring the use of any glasses have also been developed, and stereopsis measurements with these targets have been shown to correlate well with those requiring polarized glasses (Hatch & Richman, 1994). Another format for measuring stereopsis involves the use of red/green cancellation to induce exclusive, disparate images to the right and left eyes. This red/green testing often is referred to as anaglyph testing. These targets have been developed so that target properties, such as

disparity, shape, and size, are similar to those found in the polarized equivalents.

Evaluation of eye movement

The last part is evaluation of eye movement and involve three distinct assessment that is assessment of stability of fixation, saccadic function and pursuit function. The main reason for clinical assessing eye movement function is that reading consists of a series of saccadic and fixations. Previous research has demonstrated that poor reader read slowly and exhibit smaller and more numerous fixation and regression. There are three common methods for assessing eye movement ability, this is includes objective eye movement recording devices like visagraph, standardized tests such as the development eye movement (DEM) test and direct observations by examiner using NSUCO oculomotor test. Because saccadic eye movements are believed to play a significant role in reading, school performance and in workplace, a great emphasis has been placed on diagnostic testing for saccades. Meanwhile fewer clinical assessment technique are available for evaluating pursuit function and the most common method is direct observation.

In optometric practice, the method most frequently used to assess eye movements is observation and grading of fixation stability, pursuit and saccadic eye movements, where the smoothness and accuracy of these movements are rated on a scale from 1 to 4. Two normative data have been provided for some of these grading scales, including the North Eastern State University College of Optometry Oculomotor Test and the Southern California

College of Optometry rating system. However, although the advantages of grading scales are that they

are simple to administer and require no special equipment, their reliability, repeatability, and ability to quantify clinical observations of eye movements has been questioned.

Other clinical approaches to evaluating eye movements involve the indirect assessment of saccadic eye movements during tasks that simulate reading. Some of these tests include the Pierce Saccadic Test, the King-Devick Saccadic Test, and the DEM Test. These tests share a similar design, with the patient being required to name a series of single digits arranged in rows as quickly as possible, without using a finger or pointer as a guide. The time taken to report the digits and the number of errors made are compared with normative data tables.

2. 2 Conceptual framework

CHAPTER 3

RESEARCH METHODOLOGY

Research design

A systematic review from journals published from 1990 to 2012 using several health science databases: Medline, Cinahl, Science Direct, Pubmed, Ovis, Sage, Google Scholar and Wiley. Those papers that analyzed the assessment and treatment of binocular anomalies were included.

Measurement/Instrumentation

About 400 articles/ journal will be subscribe from some selected database besides the data from books will be used for this study review. The article/journal chosen are related to the binocular vision anomalies, strabismic and non strabismic and related to assessment or techniques used in binocular vision examination.

Study period

The study started from September 2012 to May 2013. The journals will be collected and read along the time study progression.

Data collection

All the data are collected from reports published from 1990 to 2012 using several health science databases: Medline, Cinahl, Science Direct, Pubmed, Ovis, Sage, Google Scholar and Wiley.

-

Selection criteria

The journals articles are selected based on previous study that are related to the reliability and efficacy of the binocular vision technique.

The journal and articles used are subscribed from 1990 to 2012.

Data analysis

All the data from previous research journal are analyzed based on the techniques used in the binocular assessment with different types of technique and compare the reliability and efficacy based on the result obtained. Data entry and analysis is implementing using Microsoft Excel. The <https://assignbuster.com/efficacy-of-binocular-vision-psychology-essay/>

comparison also will be using this software to do comparison on findings from the previous studies. The statistical terms and value that will be used in this study will be taken from the previous study for data analysis.

Ethical consideration

This study will refer to the previous study and research that conducted since the year 1990- 2012. Therefore this study is not involving direct human and living things. Every information from each article is treated with respect and quoted as per mentioned by the source.

CHAPTER 4

4. 1 Budgeting

Items

Amount (RM)

Paper

20. 00

Internet

50. 00

Printing

50. 00

TOTAL

120. 00

4. 2 Gantt's Chart

TASK TO BE PERFORMED

2012

2013

Sept

Oct

Nov

Dec

Jan

Feb

Mar

Apr

May

June

July

Literature review

Developing objective and hypothesis

Plan for data collection

<https://assignbuster.com/efficacy-of-binocular-vision-psychology-essay/>

Submit proposal

Data collection

Data analysis

Report writing

1st draft &

2nd draft report

Final Report&

Submit report