

EFFECT OF VISUAL REHABILITATION ON QUALITY OF LIFE AND DEPRESSION AMONG PRIMARY GLAUCOMA PATIENTS

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DISCLAIMER

I hereby certify that the work in this dissertation is my own except for the quotations and summaries which have been duly acknowledged. I declare that I have no financial interest in the instruments in this study.

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ABSTRAK

PENGENALAN

Penyakit glaukoma merupakan penyakit kronik yang merosakkan saraf optik dan memberi kesan ke atas medan penglihatan. Kemerosotan medan penglihatan yang disebabkan oleh penyakit glaukoma dapat memberi kesan terhadap aktiviti harian seseorang. Masa yang diluahkan untuk melakukan aktiviti fizikal, bersosial dan aktiviti kognitif telah terbukti dapat meningkatkan tahap kemandirian di kalangan warga emas. Rehabilitasi visual adalah bertujuan untuk memaksimumkan aktiviti harian dengan penglihatan yang sedia ada serta dapat membantu seseorang untuk mengawal kehidupan mereka. Secara tidak langsung, ia juga dapat meningkatkan keyakinan diri, mengurangkan risiko kemurungan dan kebimbangan serta meningkatkan kualiti hidup seseorang.

OBJEKTIF

Kajian ini bertujuan menyelidik kesan rehabilitasi visual terhadap tekanan intraokular, kualiti hidup dan kemurungan di kalangan pesakit glaukoma primer.

KAEDAH KAJIAN

Satu kajian percubaan kawalan rawak telah dijalankan melibatkan pesakit glaukoma primer dari Disember 2020 hingga Disember 2021 melibatkan pesakit glaukoma primer khususnya POAG and PACG yang menjalani rawatan di Hospital Universiti Sains Malaysia. Pesakit yang memenuhi kriteria kajian dirawakkan kepada kumpulan A dan kumpulan B menggunakan sampul surat bernombor secara berturutan. Pesakit dalam kumpulan A menghadiri sesi rehabilitasi selama enam bulan. Manakala pesakit dalam kumpulan B dinasihatkan menjalani aktiviti harian seperti biasa. Borang soal selidik GlauQol-36 dan mGDS-14 diberikan kepada semua pesakit kumpulan A dan B untuk dilengkapkan pada peringkat permulaan dan selepas enam bulan intervensi. Analisis

deskriptif dan pengukuran berulang ANOVA (RM ANOVA) dijalankan dengan menggunakan SPSS Inc.

KEPUTUSAN

Seramai 72 pesakit glaukoma primer telah menyertai kajian dan dibahagikan kepada dua kumpulan. Tetapi hanya 67 pesakit yang telah melengkapkan kajian ini, di mana 5 pesakit telah tercicir di kumpulan A dan 1 pesakit tercicir di kumpulan B. Kebanyakan pesakit di kajian ini adalah kaum lelaki. Purata umur untuk pesakit adalah 63.8 ± 6.7 tahun. Tiada perbezaan yang signifikan untuk data demografik diantara kumpulan A and B. Purata tekanan intraokular untuk kumpulan A adalah tinggi bila dibandingkan dengan kumpulan B ($p=0.003$). Untuk GlauQoL36, purata skor untuk kumpulan A selepas 6 bulan adalah kurang daripada kumpulan B, namun tiada perbezaan yang signifikan ($p=0.309$) berdasarkan RM ANOVA. Kumpulan A menunjukkan perkembangan di skor selepas 6 bulan di 4 domain (kehidupan harian, kebimbangan, halangan and sokongan). Tetapi tiada perbezaan yang signifikan. Kumpulan B menunjukkan perkembangan di skor selepas 6 bulan di 3 domain (kehidupan harian, kebimbangan, and sokongan). Namun tiada perbezaan yang signifikan. Untuk mGDS14, hanya satu pesakit mendapat skor lebih daripada 8 (kemurungan) pada asas and selepas 6 bulan. Skor untuk pesakit lain adalah kurang daripada 7. Purata skor mGDS14 untuk kumpulan B pada asas adalah tinggi daripada kumpulan A. Namun tiada perbezaan yang signifikan ($p=0.371$) berdasarkan RM ANOVA.

KESIMPULAN

Rehabilitasi visual yang berpandukan rehabilitasi kepada pesakit strok adalah kurang sesuai untuk digunakan kepada pesakit glaukoma. Walaubagaimanapun, rehabilitasi visual masih berpotensi

memberi kesan yang baik terhadap kualiti hidup dan mengurangkan kemurungan di kalangan pesakit glaukoma.

ABSTRACT

INTRODUCTION

Glaucoma is an irreversible optic neuropathy characterized by corresponding visual field defects. Increasing visual field damage from glaucoma affects patient's daily living. Allocating time to physical, social, and cognitive activities has been widely attributed to a state of happiness in the elderly. The goal of visual rehabilitation is to maximize an individual's functional vision. It may help individuals to gain greater control of their environment, which leads to greater self-confidence, lowered risk of depression and anxiety, and improved quality of life.

OBJECTIVE

To evaluate effect of visual rehabilitation on IOP, quality of life and depression among patients with primary glaucoma.

METHODOLOGY

A randomized single-blinded control trial was conducted involving primary glaucoma patients, mainly POAG and PACG patients between Dec 2020 and Dec 2021 at Hospital Universiti Sains Malaysia, Malaysia. Patients who fulfilled inclusion and exclusion criteria were randomized into group A and group B using sequentially numbered, opaque sealed envelopes (SNOSE). Patients in group A were assigned to attend rehabilitation sessions for 6 months. The patients in group B were advised to carry out their normal routine activities. At baseline and 6 months post recruitment, both groups were given GlauQol-36 and mGDS-14 questionnaire to read and answer. Descriptive Analysis and repeated measures ANOVA were performed using SPSS.

RESULTS

A total of 72 patients were recruited and randomized into two groups (n=36). However, only 67 patients completed the study (5 dropouts). The mean age of the recruited patients with primary glaucoma was 64.0 ± 6.7 years old. There was no significant difference in all demographic data between groups A and B. There was a significantly higher mean IOP in Group A compared to Group B ($p=0.003$). For GlauQoL36, the total score for 6 months post intervention for group A was lower than group B but without statistically significant ($p=0.309$) based on RM ANOVA. Group A showed improvement in 6 months post intervention score in 4 domains (daily living, anxiety, treatment burden and confidence healthcare) but without significant difference based on paired T test. Group B showed improvement in 6 months post intervention score in 3 domains (daily living, anxiety and confidence health care) but without significant difference. For mGDS-14, only one patient from group A scored more than 8 points (depressed) at baseline. The score remain the same at 6 month post intervention. The remaining patient's mGDS14 questionnaire scoring was below 7 points. The mean mGDS-14 score at baseline was slightly higher in group B than in group A. There is no statistically significant difference ($p=0.371$) based on RM ANOVA.

CONCLUSION

In conclusion, visual rehabilitation based on the rehabilitation for patients with stroke may not be suitable for patients with glaucoma. However, there is potential benefit of visual rehabilitation to the QoL and reduction of depression among patients with glaucoma.

Chapter 1

Introduction

1.1 PRIMARY GLAUCOMA

Glaucoma is an optic neuropathy characterized by progressive degeneration of retinal ganglion cells which left untreated gradually progresses to visual damage and may lead to blindness (World Glaucoma Association, 2015). Primary glaucoma is often divided into two major types: primary open angle glaucoma (POAG) or primary angle closure glaucoma (PACG). Global glaucoma blindness is estimated to be 5.2 million people (15%) (Thylefors B & Negrel A-D, 1994). Blindness in the European population ranged from 2.5 to 8% whereas in African Americans it was 8.0% (Thylefors B et al., 1992). A study conducted on Chinese residents in Singapore documented the rate of uniocular blindness from POAG to be 27% and PACG 50% while binocular blindness is 9% for POAG and 29% for PACG (Foster PJ et al., 2000). Singapore Malay Eye Study revealed POAG accounted for 69.3% of glaucoma cases and PACG accounted for only 5.3% cases (Sunny YS et al., 2008). These two studies show a lower prevalence of PACG in Malays compared with Chinese people in Singapore. (Foster PJ et al., 2000 and Sunny YS et al., 2008).

POAG is characterized as a chronic, slowly progressive visual field loss and optic nerve cupping, often associated with an elevated IOP with visually open anterior chamber angles by gonioscopy, without the underlying secondary ocular disease (European Glaucoma Society, 2014). Advancing age is a risk factor for POAG (Gordon et al., 2001). Due to the improvement in life expectancy and healthcare, the number of people with glaucoma is expected to rise, which poses a substantial public health challenge worldwide (Ying P and Varma, 2011). Whereas PACG is characterized by elevated intraocular pressure (IOP) because of mechanical obstruction of the trabecular meshwork by either apposition of the peripheral iris to the trabecular meshwork or by a synechial closed angle (Yanoff and Duker et al, 2014). A study conducted on the Malay population

in Kelantan Malaysia revealed the majority of PACG patients 67% presented with optic neuropathy at the initial presentation and progressed further (Liza-Sharmini AJ et al, 2014).

Glaucoma patients often require lifelong treatment as it is a disease of longevity. Slowing disease progression and preservation of quality of life are the main goals for glaucoma treatment (Robert NV et al 2015). Several multicenter clinical trials have demonstrated the benefit of lowering intraocular pressure in preventing the development and slowing the disease's progression. Despite having the surgical and medical options to reduce intraocular pressure, current therapies remain imperfect, and novel treatment options are desired. The patient may experience progressive worsening of vision, initially peripherally but eventually involving the central vision (Khadka J et al., 2013). The rates of visual field progression in manifest glaucoma with field loss were highly variable with a mean rate of -0.80 dB/year and 5.6% of patients 16 progressed at rates worse than -2.5 dB per year (Anders Heijl et al., 2012). Disease progression in glaucoma is common and despite treatment, the majority of patients still progress (Rossetti L et al., 2010).

Vision loss exerts a negative impact on the physical activity of patients to perform activities of daily living such as reading, adapting to different levels of light, outdoor mobility, avoiding obstacles, etc (Labiris et al., 2011). The impact of glaucoma on quality of life (QoL) is substantial and early recognition and treatment are important. By preventing vision loss from glaucoma, secondary medical problems such as falls or developing depression are avoided. (Odberg T et al, 2001). There is a 58.6% risk of falls and accidents due to vision impairment (Odberg T et al, 2001).

1.2 QUALITY OF LIFE

The term “quality of life” is defined by the World Health Organization as individuals’ perception of their position in life in the context of culture and value systems in which they live with their goals, expectations, standards and concerns (World Health Group, 1995). Quality of life (QoL) has become a significant aspect and target for research and practice in the fields of health and medicine (Fayers PM, 2016). QoL is a complex concept that is interpreted and defined in several ways. Therefore, many different instruments are now used to assess QOL (Mayo N 2015). There are two ways to measure QoL: through structured and non-structured interviews. The structured instruments use scales of 0 - 5 to measure QoL comprising of very positive, positive, neutral, negative and very negative whereas non structured interviews allow individuals to identify the factors which contribute to their positive or negative attribution to the QoL (Farquhar M, 1995). In health related QoL, there are three broad domains of physical, psychological, and social wellbeing that make up the basis for most approaches (Philips D et al, 2006). Another important aspect of the concept of health-related QoL is connected to the subjective perception of health status, thus its measures do not focus on a specific dimension of health (Baron-Epel and Kaplan 2001).

1.2.1 GLAUCOMA AND QUALITY OF LIFE

In long term, glaucoma patient’s daily life is affected in a few ways (Quigley HA 1996). Glaucoma patients may experience diminished QoL for several reasons; understanding of diagnosis, fear of functional loss, inconvenience of treatment, side effects of treatment, and cost of treatment (Severn P et al, 2008). Due to the irreversible nature of the disease patients need to

spend the rest of their life attending follow-ups at an eye hospital and are expected to instill regular intraocular pressure lowering eye drops. Vision loss from glaucoma causes patients to have difficulty in all aspects of daily living including driving, walking, preparing meals, doing housework, reading; mental health including social withdrawal and depression; side effects of treatment and fear from blindness (Cardarelli WJ et al, 2013).

Based on a cross sectional study conducted in South Korea using EuroQol five dimension descriptive system (EQ-5D), glaucoma patients had a significantly higher risk of prevalence of impaired QoL (OR: 2.20; 95% CI: 1.31, 3.70) as compared to healthy subjects (Park et al, 2015). Glaucoma patients also had a significantly higher risk of impaired activity of daily living (OR 2.06; 95% CI: 1.14, 3.71) as compared to healthy subjects (Park et al, 2015). The number of glaucoma medications and the number of applications is associated with poorer QoL (Balkrishnan R et al, 2003; Montmeyer F et al, 2000; Sherwood MB et al, 1998). However, there have been few studies suggest that the number of glaucoma medications was not predictive of QoL (Rossi GCM et al, 2010; Wilson MR et al, 1998).

A cross sectional study comparing walking in patients with and without glaucoma demonstrated bilateral glaucoma walking 0.04m/second slower ($p < 0.05$) (Ramulu PY et al, 2012). However similar findings were not found in unilateral glaucoma as bilateral glaucoma missed more points on the visual field than did unilateral glaucoma (Friedman DS et al, 2006). Another aspect of QoL that is affected is near and central vision tasks i.e reading. It was noted that 43% of glaucoma patients complained of difficulty reading (Nelson P et al, 1999).

1.2.2 GLAUCOMA AND PHYSICAL ACTIVITY

Physical exercise can be classified as dynamic and isometric, depending on whether or not notice changes in the muscle length are present during muscle contraction. The dynamic exercise involves a change in muscle length, for example jogging and cycling, while isometric exercise is performed in static positions, such as weightlifting and hand gripping (Ming MZ et al, 2018). Published reports on the association between physical activity and glaucoma are limited (Willian PT, 2006). Physical activity is believed to indirectly lower the intraocular pressure (IOP) that decreases the progression of glaucoma. However, there were evidence of the transient rise of IOP during the initial stage of exercise (Yamabayashi S, 1991). This is due to contraction of abdominal and thoracic muscles, changes in body position, and increased respiratory volumes, especially when Valsalva manoeuver mechanisms are involved. The changes in IOP during physical activity are dependent on types of exercise such as weightlifting, sit-up and bench press (Ashkenazi I, 1992)

Based on a cross-sectional study was conducted Malay population using the International Physical Activity Questionnaire, physical activity showed an inverse association with the severity of primary angle closure glaucoma (Chong Seong, A Yaakub et al, 2019). Other studies show that exercise regimens improved physical fitness result in chronically lower resting IOP (RisnerD 2009). Unfortunately, the physiological mechanism by which exercise lowers IOP is not completely understood (Pasquale L, 2009)

1.3 DEPRESSION

Depression is defined as a feeling of depressed mood or loss of interest with at least five out of nine symptoms present for a diagnosis of major depression (DSM IV; American Psychiatric Association 2000). To label someone is having depressive episode symptoms should be present for at least 2 weeks and each symptom should be present at sufficient severity for most of the day. The key symptoms include low mood, loss of interest and pleasure, or loss of energy (DSM IV; American Psychiatric Association 2000). A depressive episode may be either idiopathic or secondary to another medical condition or drug (DSM IV; American Psychiatric Association 2000). Both the number, severity of symptoms, and degree of functional impairment determine its severity. The World Health Organization estimates that depression will be a major burden of illness in most developing countries (World Health Organization Depression, 2011).

1.3.1 DEPRESSION IN GERIATRICS

World Health Organization defines the elderly or aging population as individuals aged 60 years and older (Health of the Elderly, WHO 1989). Known risk factors for depression are female gender, older age, poorer coping abilities, physical morbidity, and impaired level of functioning, reduced cognition, and bereavement (Sivertsen H, 2015). Depression has been associated with an increased risk of mortality and poorer outcome of treatment of physical disorders (Helvik A et al., 2011)

The prevalence of depression in central Malaysia has been shown to range from almost 8% in rural communities and to 6% in urban communities (Sherina MS, 2002). The population of the elderly is the highest in northwest Malaysia (Sherina MS, 2002). In a cross sectional study done in the northern state of Malaysia, the prevalence of depression among the elderly was about 21%

had mild depression and almost 9% had severe depression (Rashid A et al, 2010). In the same study, more females have depression (32%) compared to males (27.7%) (Rashid A et al, 2010). The gender difference was similar to other studies worldwide (Sivertsen H, 2015).

1.3.2 DEPRESSION AND GLAUCOMA

Glaucoma patients coping with visual impairment, the anxiety associated with blindness, long-term follow-up and a heavy economic burden. These factors may lead to depression (Yu-Yuen C, 2018). In a retrospective cohort study conducted in Taiwan, glaucoma patients had a significantly higher cumulative hazard of depression compared to the control group (Yu-Yuen C et al, 2018). The same study also revealed within the glaucoma group, significant risk factors for depression included age, female, low income, substance abuse, and living alone. In another cross-sectional study done in Malaysia, depression was detected in 16% of older adults with POAG; a higher percentage of depression was seen in those with end stage disease (Sangeetha et al., 2021)

The association between depression and medication adherence has important implications for clinical practice and quality of care for chronic diseases (Jerry L, 2011). Problems with adherence are possibly due to the loss of hope for vision recovery, side effects of treatment, or loss of initiative to make the effort to adhere to treatment. This was compounded by the fact that elderly glaucoma patients have cognitive impairment resulting in impaired memory (Stryker et al, 2010; Sleath B et al, 2006; Hagerman KE et al; 2007).

1.4 PATIENT REPORTED OUTCOMES

Patient reported outcome (PRO) defined as any report of the status of a patient's health condition that comes directly from the patient, without interpretation of the patient's response by a clinician or anyone else (FDA Guidance for Industry, 2009). Its brief tools designed to assess the level of health or disability as perceived by patients (Higgins J, 2011; Makrinioti H, 2020). The measures that capture this information are known as patient reported outcome measures (PROMs). PROMs generally used to assess health-related quality of life, or to assess symptoms or perception of health status (Dennis et al, 2014). The most appropriate PROM for a study will depend on the study objectives and the target population.

The PROM can be a generic instrument, a vision-specific instrument, or a condition-specific instrument (Varma R et al, 2010). Generic instruments such as the SF-36 assess broad aspects of the quality of life and health status. Vision-specific instruments such as National Eye Institute Visual Function Questionnaire NEI VFQ-25, serve to identify the visual and emotional function. Vision specific instruments are more sensitive to issues experienced by ophthalmic patients (Keefe JE et al, 1999). Condition-specific instruments are targeted to the needs of patients with a single condition. Examples include the VF-14 for patients with cataracts or the GlauQoL36 for patients with glaucoma (Steinberg EP et al, 1994; Bechetoille A et al, 2006)

Glaucoma Symptom Scale (GSS) and Glaucoma Quality of Life 15 (GQL 15) are example of glaucoma specific instruments that developed specifically to assess visual field loss with quality of life in glaucoma patients (Spaeth G et al, 2006). GSS contains 10 items with regards to symptoms of glaucoma divided into nonvisual symptom subscale (burning/stinging, tearing, dryness, itching, soreness and foreign body sensation) and visual subscale (blurry/dim vision,

difficulty seeing in daylight, difficulty seeing in darkness, halos around light) (Lee BL et al, 1998). GSS scores was able to discriminate between patients with and without glaucoma (Lee BL et al, 1998). Visual acuity had modest correlation with GSS scores but did not demonstrate association with binocular visual field changes (Noe G et al, 2003). The disadvantage of GSS is that it only measures the symptom of glaucoma patients. Limitation of daily activity, burden of treatment and psychosocial aspect are not assessed which also contributes to glaucoma patients QoL (Khadka J et al, 2013).

GQL 15 is another glaucoma specific instrument. It was developed by choosing questions that correlate best with visual field loss (Nelson P et al, 1999). It consists of 15 questions divided into glare factor, peripheral vision factor, central/near vision factor and outdoor mobility factor (Nelson P et al, 1999). GQL 15 was able to detect decreased visual ability even in mild visual field loss (Nelson P et al, 2003). However, GQL does not truly assess QoL; which is a multidimensional concept as it contains only questions regarding visual activities (Nelson P et al, 1999; Nelson P et al, 2003) and not the psychosocial components.

Administering questionnaires in elderly people need to be done through a conversational approach (De Vries K et al, 2014). The use of closed questions and adherence to questionnaire protocol were barriers to communication with older people as they seldom express their concerns and emotions directly. The data validity obtained when using strict close ended questions is undermined (Isaksson U et al, 2007; Suchman L et al, 1990). Therefore, administering questionnaire to the elderly needs to be done in an engaged conversational manner to avoid missing cues (Suchman L et al, 1990).

1.4.1 GLAUCOMA QUALITY OF LIFE 36

The Glaucoma Quality of Life 36 (GlauQoL-36) questionnaire is the first available health related QoL tool specific to glaucoma that covers all stages of the disease (Bechetoille A et al, 2008). It comprises of 36 items, covering seven health related QoL domains relevant to glaucoma: physiological well-being, self-image, daily life, and burden of treatment, driving, anxiety and confidence in health care (Bechetoille A et al, 2008).

The initial pilot questionnaire contained 151 items covering all aspects of HRQoL and was written in French (Rouland et al, 2002). These questions grouped into 5 sections: (1) vision problems, physicians, and daily treatment (49 items); (2) activities of daily living (37 items); (3) self-expression (37 items); (4) vision problems and mood (14 items); and (5) other questions (14 items). Questions that were misunderstood by patients or unclear were eliminated leaving 36 questions (Rouland et al, 2002; Juniper et al, 1996). Responses by patients were ranked on a 4- or 5- mode scale and scored by summing each domain (Rouland et al, 2002). The construct validity (i.e analysis to assess if the questionnaire measures what it was intended to) is satisfactory (correlation coefficient >0.40) as different domains of the questionnaire assesses a specific aspect of QoL (Campbell et al, 1959; Bechetoille A et al, 2008).

Advantages of GlauQoL 36 compared to existing HRQoL questionnaires such as VF 14, NEIVFQ and GQL 15 is that, it not only covers aspects related to daily functioning but also on burden of treatment, mental health and self-image. This allows the questionnaire to be also used in ocular hypertensive patients and glaucoma patients that do not have problems in function yet (Sloane et al, 1992; Steinberg et al, 1994; Nordmann et al, 2004; Nelson et al, 2003).

This questionnaire has been used in a French study in 2002 (Rouland et al, 2002). This questionnaire was translated into the Malay language to aid in the understanding of the questions among local people. The internal consistency of the translated questions was measured by Chronbach alpha 0.85 (Chandramohan et al., 2017). It has been used in a study conducted in Universiti Kebangsaan Malaysia Medical Centre (UKMMC) in 2017. This questionnaire was also used in study conducted Hospital University Sains Malaysia (HUSM) in 2016 (Sangeetha T, Huwaina AS, Yaakub A et al, 2019). However, there are no known studies in English that have used GlauQoL 36 in assessing the QoL in glaucoma patients.

1.4.2 GERIATRIC DEPRESSION SCALE

The United Nations and Malaysian ministry of health defines the older adult or ageing population as individuals aged 60 years and older (Health of the Elderly, WHO 2021). It is difficult to diagnose depression in the older adults. The presence of multiple medical problems and cognitive impairment complicate the diagnosis (Imran A, et al, 2009; Kahn et al, 1975). There are numerous depression scales that have been developed such as Zung Rating Scale, Hamilton depression scale and Becks Depression Inventory (Hamilton M, 1960; Zung WWK, 1965; Beck AT, 1996). However, these depression rating scales have been developed and validated for the use of a younger population with many questions measuring somatic complaints. Its applicability with older individuals are limited as elderly population have multiple existing medical problems and the use may elevate the scores of non-depressed older persons (Yesavage JA & Brink TL, 1981; Heo M et al, 2007). Furthermore, the depression scales have not been validated for the use in the elderly population (Hamilton M, 1960; Zung WWK, 1965; Carroll et al, 1973).

Another widely available questionnaire to screen anxiety and depression is Hospital Anxiety and Depression Scale (HADS). This questionnaire was developed in 1983 by Zigmond and Snaith. It aid in screeing patients with anxiety and depression in a nonpsychiatric clinic. It is widely used in Turkey and Japan populatin to evaluate anxiety and depression among glaucoma patients (Gemma et al., 2013). However it's not suitable for older adults and improvement is needed to address its psychometric strength (Cosco et al., 2012).

The Geriatric Depression Scale (GDS) was developed with the recognition that depressive symptoms in elderly patients require a questionnaire that can discriminate depressive symptoms from the general characteristics of the older adults. It focuses instead on the psychosocial aspects of depression. GDS was created initially as a 30-item questionnaire (Yesavage JA & Brink TL, 1981). It can be self-administered or presented as an interview. It consists of a yes/no format to make the scale simple and easily understood by the elderly (Yesavage JA & Brink TL, 1981). GDS has a sensitivity of 92% and a specificity of 89%. (Koenig HG et al, 1998). A shorter version consisting of 15 items was later created to ease the process as it takes 5-7 minutes to complete (Sheik J & Yesavage JA, 1986). The shorter version was highly correlative to the long version ($r = 0.84$) (Herrman N et al, 1996; Leshner EL, 1994).

In patients with cognitive impairment, 2 studies found that the GDS score was valid for elderly with scores above 15 out of 30 on a Mini Mental State Examination (MMSE) (Jongenelis K et al, 2005; McGivney SA, 1994). However, Gerritsen et al (2007) noted that GDS was valid for MMSE scores of 5 or more suggesting that only severely demented patients were not able to complete GDS. This finding was echoed by Conradsson M et al (2013) where GDS was found to be valid

for MMSE score of 10 or more. Therefore, administration of GDS in cognitive impaired patients should be done with their caregiver. Some studies have demonstrated that the Geriatric Depression Scale is able to detect depression better than medical and nursing staffs (Rapp et al, 1988; Jackson R & Baldwin B, 1993).

1.4.1.2 MALAY VERSION-GERIATRIC DEPRESSION SCALE-14 (mGDS-14)

The shorter English version GDS consisting of 15 questions was translated and validated in the Malay language in 2004 by Teh EE et al (2004) to be used in local elderly population. mGDS-14 was translated and validated, leaving out question 9 (preference of living at home rather than going out) as most elderly in the local culture are relatively introvert and emphasis is on family rather than individual lifestyle (Teh EE & Hasanah CI, 2004). Therefore, most patients gave a positive response to question 9 despite their depressive state. The final questionnaire contained 14 questions which makes it easy to be administered in the elderly patients. Patients with the score of 8 and above are considered depressed (Teh EE & Hasanah CI, 2004). The mGDS-14 has satisfactory correlation with depression as a screening scale for depressed elderly patients when the score of mGDS-14 was compared to the clinical diagnosis of depression (Teh EE & Hasanah CI, 2004). This questionnaire was used in a study conducted in Hospital Universiti Sains Malaysia to assess depression and severity of glaucoma among older adults (Sangeetha T, Mohammad KM, Asrenee AR et al, 2021)

1.5 VISUAL REHABILITATION

Vision rehabilitation is the process of treatment and education that helps individuals who are visually disabled attain maximum function, a sense of well-being, a personally satisfying level of independence, and optimum quality of life (American Optometric Association Board of Trustees, 2004). In general, a visual rehabilitation programs can be divided into low vision therapy and occupational therapy (Wilkinson and Shahid, 2018). Quality of life and functional ability are negatively impacted by irreversible vision loss caused by advanced glaucoma and age-related macular degeneration (Bethesda et al, 1998). When pharmacological or surgical interventions play no role in advanced vision loss, low-vision rehabilitation may be the only option for improving functional vision in patients (Patodia Y et al, 2013).

The main of low vision aid is not to restore lost vision but rather fully utilize the remaining vision to its fullest potential, thus enabling patients to reclaim their ADLs and thereby their independence and optimized quality of life (MacKeben M, 2009). Orientation is the ability to locate oneself in one's environment. It is a skill that is related to the use of the remaining senses of a person to establish one's position in and to significant objects in the environment (Sage Clinical Rehabilitation, 2013). Mobility is defined as physical "movement" and the negotiation of any obstacles and hazards. It is the aim of obtaining the freedom of movement without coming to any harm, safety in traveling as well as minimizing the level of stress placed upon a visually impaired person (Sage Clinical Rehabilitation, 2013). The most common form is orientation and mobility (O&M) training that involves the use of remaining vision and other senses, commonly in conjunction with sighted guides or long or short canes (Blasch BB, 1997). Eye movement (scanning) training for mobility rehabilitation has been investigated for visual field defects such as hemianopia and tunnel vision (Kerkhoff G, 1992; Webster JS, 1984).

There is very limited research done addressing the effects of visual rehabilitation in glaucoma patients. The actual impact of visual rehabilitation in glaucoma patients has not been established to prove its importance in improving patients' quality of life.

1.6 RATIONALE OF STUDY

The main aim of glaucoma treatment is to halt the progression of the disease and improve patients' quality of life. Patient reported outcomes can be used to evaluate patients' perception of side effects of treatment, the impact of illness on daily life, and the psychological burden. Assessment of this will improve the QoL of the individuals as it can address psychosocial issues that affect the total well-being. Improvement in QoL consequently improves an individual's compliance to treatment and adherence.

Progressive constriction of the visual field has been found to increase dependency and reduce mobility. This will lead to psychological and emotional disturbance, in certain cases even resulting in depression. A combination of low vision therapy and occupational therapy is the ideal modality for visual rehabilitation in glaucoma patients. . Improvement in daily living and less dependency may improve their QoL.

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