EVALUATION ON KNOWLEDGE AND PRACTICE OF TARGET INTRAOCULAR PRESSURE IN THE MANAGEMENT OF GLAUCOMA PATIENTS AMONG OPHTHALMOLOGISTS AND MEDICAL OFFICERS

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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.

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ABSTRAK

Tujuan

Kajian ini bertujuan untuk menilai pengetahuan dan amalan penggunaan sasaran tekanan bola mata (IOP) di kalangan pakar oftalmologi dan pegawai perubatan di Malaysia berdasarkan Garis Panduan Amalan Klinikal Malaysia untuk rawatan pesakit glaukoma.

Metodologi

Kajian dua fasa telah dijalankan dari 1 Januari 2020 hingga 31 Disember 2021 di kalangan 279 subjek (139 pakar oftalmologi dan 140 pegawai perubatan) yang bekerja di klinik/hospital oftalmologi di Malaysia. Fasa pertama terdiri daripada pembangunan dan pengesahan borang soal selidik untuk menilai pengetahuan dan amalan penggunaan sasaran IOP. Soal selidik ini kemudiannya digunakan dalam fasa kedua. Fasa kedua melibatkan kajian rentas keratan melalui soal selidik atas talian. Min jumlah skor pengetahuan dan amalan penggunaan sasaran IOP dibandingkan antara pakar oftalmologi dan pegawai perubatan dengan menggunakan ujian-t.

Keputusan

Sebanyak 323 pakar oftalmologi dan pegawai perubatan telah dijemput untuk mengambil bahagian, tetapi hanya 279 (139 pakar oftalmologi dan 140 pegawai perubatan) subjek menjawab borang soal selidik (86.4%). Purata pengalaman dalam perkhidmatan oftalmologi adalah 7.42 (5.51) tahun. Sebanyak 225 responden (80.6%) mengamalkan penggunaan sasaran IOP. Terdapat perbezaan yang signifikan dalam amalan penggunaan sasaran IOP antara pakar oftalmologi (125, 89.9%) dan pegawai perubatan (100, 71.4%) ($p<0.001$). Min jumlah skor pengetahuan di kalangan pakar (21.03 [95% CI: 20.52, 21.54]) adalah jauh lebih baik daripada pegawai perubatan (20.24 [95% CI: 19.78, 20.69]) $p=0.022$.

Terdapat perkaitan yang signifikan bagi purata skor pengetahuan dan amalan dalam menetapkan sasaran IOP (p=0.002). Tiada perkaitan yang signifikan antara bilangan pesakit glaukoma yang dirawat dengan pengetahuan IOP (p=0.376) dan amalan (0.083) penggunaan sasaran IOP. Kekurangan pemahaman (27.8%) dan kekeliruan dalam memilih kaedah penetapan sasaran IOP (35.2%) adalah sebab utama bagi mereka yang tidak mengamalkan penetapan sasaran IOP. Kaedah penetapan IOP yang paling popular adalah peratusan pengurangan IOP daripada IOP asal.

Kesimpulan

Terdapat perbezaan dari segi pengetahuan dan amalan penggunaan sasaran IOP di kalangan pakar oftalmologi dan pegawai perubatan di Malaysia. Program intervensi harus dirancangkan untuk meningkatkan pemahaman dan amalan menetapkan sasaran IOP di Malaysia.

ABSTRACT

Purpose:

To evaluate the knowledge and practice of target intraocular pressure (IOP) among ophthalmologists and trainees in Malaysia based on Clinical Practice Guideline for management of glaucoma by Ministry of Health, Malaysia.

Methods:

A cross-sectional study was conducted between ~~from~~ 1 January 2020 and~~to~~ 31 December 2021 involving~~among~~ 279 subjects (139 ophthalmologists and 140 trainees) working in ophthalmology fraternity in various institutions in Malaysia. This study was divided into two phases. Phase I involved~~was~~ the development and validation of questionnaire on knowledge and practice in setting target IOP. This questionnaire was later used in the phase II. Phase II involved an online survey of the validated questionnaire. Mean score of knowledge and adherence to setting target IOP in clinical practice was compared between ophthalmologists and trainees using independent t-test. ~~a questionnaire while phase II was the cross-sectional study whereby the validated questionnaire was filled up online via Google form. All data was entered and analyzed using SPSS version 26.0.~~

Results:

A total of 323 ophthalmologists and trainees were invited to participate, but only 279 (139 ophthalmologists and 140 trainees) responded (86.4%). ~~Among the 279 subjects, 139 (49.8%) were ophthalmologists while 140 (50.2%) were trainees.~~ Mean years of experience in ophthalmology practice was 7.4~~2~~ (5.5~~1~~) years. A total of 225 respondents (80.6%) adhered to setting target IOP. There was significant difference in the incidence of adherence between ophthalmologists (125, 89.9%) and trainees (100, 71.4%) ($p<0.001$). ~~The~~ M~~m~~ean ~~of~~ total score

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of knowledge ~~score~~ among ophthalmologists ((~~M=~~21.03 [95% CI: 20.52, 21.54]) was significantly higher~~better~~ than trainees (~~M=~~20.24 [95% CI: 19.78, 20.69]) (p=0.022~~22~~). There was significant association of mean total score of knowledge and adherence in setting target IOP in clinical practice (p=0.002). There was no association between number of patients with glaucoma seen in their practice with their knowledge (p=0.376) and adherence (0.083) in setting target IOP. Poor understanding (27.8%) and confusion in selecting the method of setting target IOP (35.2%) were the commonest reason among the non-adherences. The most popular method was the percentage of IOP reduction from baseline. ~~The mean knowledge score among those who practice setting target IOP (20.09) were significantly higher than those who don't (19.52) p=0.002. Among the 279 respondents, 225 (80.6%) (125 ophthalmologists and 100 trainees) practiced setting target IOP. There was a significant association between practice of setting target IOP and work status (p<0.001). Ophthalmologists had higher percentage of practicing setting target IOP as compared to trainees.~~

Conclusions:

There is the discrepancy of knowledge and adherence to setting target IOP between ophthalmologists and trainees in Malaysia. An intervention program should be planned to address the discrepancy of standard clinical practice and prevention of glaucoma progression in Malaysia.~~This study clearly showed a difference in adherence with use of target IOP among ophthalmologists and trainees in Malaysia. An intervention program should be developed to promote the understanding and practice of setting target IOP in order to improve glaucoma patients' care.~~

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Keywords: glaucoma, target intraocular pressure~~pressure~~, knowledge, practice, ~~guidelines,~~ adherence, clinical practice guidelines, good health and well-being

Chapter 1
Introduction

1.1 Glaucoma

Glaucoma is defined as a progressive optic neuropathy associated with structural damage to the optic nerve and manifested as visual field dysfunction (Weinreb, Aung, & Medeiros, 2014). It is characterised by specific pattern of optic nerve head changes and visual field damage (Siesky et al., 2020). Classically, the earliest visual field defect in glaucoma begins at the mid periphery and progress slowly to affect the central field (Broadway, 2012).

Glaucoma, affecting at least 90 million people worldwide and 9 million in Europe, is the second most common cause of all blindness after cataracts (Wang et al., 2018). As per current estimates, there will be 23.73 million people worldwide affected by angle closure glaucoma by the year 2040 with 71.9% of them residing in Asia (Zhang, Wang, Chen, Li, & Jiang, 2020). In Malaysia, based on National Eye Survey II, the estimated prevalence of blindness in those aged 50 and above was at 1.2%, of which 6.6% was caused by glaucoma (Chew et al., 2018).

The proposed theories for pathogenesis of glaucoma include pressure dependent and pressure independent theory (Caprioli, 2007). Studying the various mechanisms of glaucoma pathogenesis plays an important role to help refine current practice of glaucoma management.

Increase intraocular pressure (IOP) causes direct mechanical force on the optic nerve head (ONH) and disrupt the function of retinal ganglion cell axons. Subsequently, this leads to the development of glaucomatous cupping of the optic disc. Vision loss in glaucoma is attributed to retinal ganglion cell (RGC) death, and intraocular pressure (IOP) is the major modifiable risk factor (Weinreb et al., 2014). For pressure dependent, an established theory is that elevated IOP induces optic nerve axonal compression at the lamina cribrosa, blockage of axoplasmic

flow, and interference in retrograde neurotrophin transport to RGCs which leads to cell death and manifested clinically as optic disc cupping (Quigley, 2016).

For pressure independent theory, several potential causative factors were identified such as, vascular degeneration (Ahmad, 2016), inadequate ocular blood flow (Kurvinen, Kyto, Summanen, Vesti, & Harju, 2014), neurodegenerative, genetics (Allingham, Liu, & Rhee, 2009) and oxidative stress (Danesh-Meyer & Levin, 2015). Vasospasm may lead to inadequate blood flow and ischemia to the optic nerve due to inappropriate constriction or insufficient dilatation in the microcirculation (Flammer, Konieczka, & Flammer, 2013). Vascular degeneration also play a role in contributing to a progressive decline in cerebral and ocular perfusion which has been observed with increasing age (Ahmad, 2016). Chronically reduced blood flow by atherosclerosis in patient with hypertension, diabetes mellitus and hyperlipidemia may lead to low perfusion pressure and insufficient autoregulation of the blood supply of the ONH (Luo, Shen, Jiang, Lou, & Shen, 2015).

1.2 The importance of IOP in glaucoma management

Despite of the dispute on mechanical theory, IOP reduction is still the aim of treatment for medical, laser and surgical therapy in glaucoma patients (Sihota, Angmo, Ramaswamy, & Dada, 2018). IOP is the primary modifiable risk factor for glaucoma development and progression. Studies have shown that IOP reduction can retard or prevent the progression of glaucoma (Sihota et al., 2018). According to Clinical Practice Guideline on management of glaucoma, IOP reduction is the only proven efficient approach to prevent progression of glaucoma (Feiner, Piltz-Seymour, & Collaborative Initial Glaucoma Treatment, 2003; Maier, Funk, Schwarzer, Antes, & Falck-Ytter, 2005). IOP control has been identified as an important factor in preventing visual field progression in all stages of glaucoma as proven in Ocular

Hypertension Treatment Study (OHTS), Early Manifest Glaucoma Trial (EMGT), Collaborative Initial Glaucoma Treatment Study (CIGTS) and Advanced Glaucoma Intervention Study (AGIS) (AGIS, 2000; Feiner et al., 2003; Jayaram, 2020; Kass et al., 2002; Leske, Heijl, Hyman, & Bengtsson, 1999). IOP lowering can be achieved by either medication, laser treatment, surgery or any combination of these modalities.

According to Clinical Practice Guidelines Management of Glaucoma 2017 (Second Edition) (http://www.acadmed.org.my/index.cfm?menuid=67#Ophthalmology), medical treatment is usually the initial treatment of choice in glaucoma. It includes the use of topical and systemic anti-glaucoma medications that increase aqueous outflow, reduce aqueous production or both. Prostaglandin analogues should be used as first-line treatment in glaucoma. If the target IOP is not achieved in glaucoma, consider switching anti-glaucoma medications or adding adjunctive treatment either non-fixed or fixed combination.

Laser trabeculoplasty lowers intraocular pressure by inducing biological changes in the trabecular meshwork resulting in increased aqueous outflow. The procedure has an excellent safety profile and can be performed as an outpatient procedure. Although substantial intraocular pressure reductions can be achieved in the majority of patients, the effect decreases gradually over time with a failure rate of about 10% per year (Wong, Lee, Choy, Chan, & Lai, 2015).

In trabeculectomy surgery, aqueous outflow is facilitated via a partial thickness sclerostomy. Clinical trials from the Moorfields Eye Hospital indicated surgical trabeculectomy was the most effective IOP-lowering treatment. The Collaborative Initial Glaucoma Treatment Study (CIGTS) (Feiner et al., 2003) found successful lowering of IOP, where surgical group was 2–

3 mmHg lower than that for the medical group. However, visual field and visual acuity outcomes were similar in both groups. Surgical intervention induced formation of cataract significantly compared to medical treatment (CIGTS) (Feiner et al., 2003). On secondary analysis, patients with moderate disease had less visual field loss when treated with surgery first (Musch et al., 2011).

Glaucoma drainage devices (GDD) providing external reservoirs in drainage of aqueous humor are effective in lowering IOP (Gedde et al., 2012). Several alternatives to these procedures have been proposed and investigated. These include minimally invasive glaucoma surgeries (MIGS) potentially incur less risk of sight-threatening complications (Ayyala, Chaudhry, Okogbaa, & Zurakowski, 2011). However, the success of MIGS remain elusive with less effective in providing IOP reduction and higher risk of complications compared to trabeculectomy (Rulli et al., 2013).

1.3 Target Intraocular Pressure

According to Malaysia Clinical Practice Guidelines Management of Glaucoma 2017 (Second Edition) (http://www.acadmed.org.my/index.cfm?menuid=67#Ophthalmology), target IOP is an estimate of mean IOP at which further glaucomatous damage is likely to be prevented. It should be tailored to individual patients and may be adjusted during the course of the disease. Based on the European Glaucoma Society Guidelines, target IOP is defined as an estimate of the mean IOP obtained with treatment that is expected to prevent further glaucomatous damage ("European Glaucoma Society Terminology and Guidelines for Glaucoma, 4th Edition - Chapter 3: Treatment principles and options Supported by the EGS Foundation: Part 1: Foreword; Introduction; Glossary; Chapter 3 Treatment principles and options," European Glaucoma Society Terminology and Guidelines for Glaucoma 2017). In other words, target

IOP is the level of IOP, which is associated with minimal likelihood of glaucoma progression with optic nerve damage or visual field defect (Sihota et al., 2018). Therefore, the concept of target IOP reflects an IOP that can prevent further progression of glaucomatous damage and corresponding visual field defect, without compromising patient's quality of life. Aiming for low IOP needs aggressive treatment which may compromise patient’s quality of life, mainly due to the side effects and financial burden of the medications, and perhaps the risks of glaucoma surgery (Sihota et al., 2018). Therefore, the goal of glaucoma treatment is to preserve vision at a cost that is acceptable to patient and community (Clement, Bhartiya, & Shaarawy, 2014).

With the goal of optimizing care, the practice guidelines proposed by the European Glaucoma Society recommend setting target IOP levels for each patient based on several factors; stage of glaucomatous damage, rate of progression, baseline IOP before treatment, patient’s visual requirement, age and life expectancy of the patient, and the presence of other risk factors ("European Glaucoma Society Terminology and Guidelines for Glaucoma, 4th Edition - Chapter 3: Treatment principles and options Supported by the EGS Foundation: Part 1: Foreword; Introduction; Glossary; Chapter 3 Treatment principles and options," European Glaucoma Society Terminology and Guidelines for Glaucoma 2017). For patients with advanced glaucoma or for whom the disease is more likely to interfere with patient’s normal function, more aggressive treatment is suggested to reach relatively lower target IOPs. Periodic evaluation and monitoring to track the rate of progression is necessary to determine whether the target IOP should be revised and adjusted during the course of treatment (Vorwerk, Thelen, Buchholz, & Kimmich, 2008).

1.4 Methods of Setting Target Intraocular Pressure

There are many proposed methods to derive a target IOP. These includes threshold/absolute cut off value, percentage reduction or formula-based values. Threshold IOP are absolute value that are relatively fixed. It can be applied to a large number of patients with similar degree of glaucomatous damage (Sihota et al., 2018). A level of 12mmHg is often chosen and it derives from a post-hoc analysis of the Advanced Glaucoma Intervention Study (AGIS, 2000).

Percentage of reduction from baseline is another option. Determination of target IOP using percentage reduction is based on the pre-treatment baseline IOP at which glaucomatous damage occurred (Clement et al., 2014). Percentage reduction is used to calculate target IOP in several notable trials. The Ocular Hypertension Treatment Study (OHTS) aimed for at least 20% reduction from baseline and this has halved the risk of progression over 5 years (Kass et al., 2002). The Early Manifest Glaucoma Trial (EMGT) aimed for a 25% reduction from baseline IOP (Bengtsson, Leske, Hyman, & Heijl, 2007; Leske et al., 2007). Collaborative Normal-Tension Glaucoma Study (CNTGS) aimed to reduce IOP by 30% (CNTGS, 1998).

There is another acceptable mode; formula-based. Calculation of target IOP has to be individualized based on patient's clinical profile (Shefali Parikh, 2010). In the formula proposed by Jampel and later modified by Aquino, target IOP can be calculated using this formula:

Target Pressure = Initial Pressure (1-Initial Pressure/100) – Z ± 2

Z scores can range from 0 for a glaucoma suspect to 7 for advanced glaucoma. The addition of ± 2 ensures that the result is generated as a range of IOP rather than a fixed single value (Aquino, 2004; Jampel, 1997).

In ocular hypertension (OHT), an IOP reduction of ≥20% from baseline and a target IOP of ≤24 mmHg is recommended (Gordon & Kass, 2018). Non-progression is seen in early glaucoma with a 25% IOP reduction from baseline and mean IOP of <20mmHg (Leske et al., 2007). In moderate glaucoma, a mean IOP of 16.5mmHg with reduction of at least 30% from baseline is protective against progression (Bengtsson et al., 2007). For advanced glaucoma, an IOP of >14mmHg is associated with greater worsening of visual field defect (AGIS, 2000). In normal-tension glaucoma (NTG), a 30% IOP reduction from baseline is protective against progression ("Comparison of glaucomatous progression between untreated patients with normal-tension glaucoma and patients with therapeutically reduced intraocular pressures. Collaborative Normal-Tension Glaucoma Study Group," Collaborative Normal-Tension Glaucoma Study Group 1998). In local Malaysian population, non-progression is seen in mild to moderate primary angle closure glaucoma (PACG) with IOP <12mmHg (Sharmini, Yin, Lee, Jackson, & Stewart, 2009).

1.5 Rationale of Study

Glaucoma is a disease commonly diagnosed and managed by all doctors working in ophthalmology department, not glaucoma specialists alone. Glaucoma is the fourth most common cause of blindness in Malaysia based on National Eye Survey II (Chew et al., 2018). Therefore, it is essential that guidelines for the management of glaucoma should be easy to apply at any level of eye care (Sihota et al., 2018). Concerted effort from all level of eye care giver is important to reduce the blindness from glaucoma.

As we know, setting a target IOP has been a mainstay of glaucoma management as recommended in guidelines by the World Glaucoma Consensus (Robert N. Weinreb, 2019). The use of target IOP is widely promoted in glaucoma guidelines from professional societies

around the world. However, this is still not widely practised in Malaysia. Understanding of target IOP is important to ensure more aggressive treatment to prevent progression of glaucoma.

According to a study by Solano-Moncada et al. (Solano-Moncada, Dymerska, Jefferys, & Quigley, 2016), target IOP was recorded in the majority of the patient charts, but its use varied by physician. There is difference in adherence with the use of target IOP among ophthalmologists and medical officers. As shown in the Early Manifest Glaucoma Trial (EMGT), therapeutic reduction of IOP is beneficial in individuals with established glaucoma (Bengtsson et al., 2007; Heijl et al., 2002; Leske et al., 2007). The gap between guidelines and clinical practice may result in patients not receiving appropriate care.

This study would establish the knowledge and practice of target IOP among eye doctors in Malaysia based on the Clinical Practice Guidelines Management of Glaucoma 2017 (Second Edition) (http://www.acadmed.org.my/index.cfm?menuid=67#Ophthalmology). Based on this finding, appropriate step can be taken. Perhaps, an intervention program can be developed in future to improve the understanding and practice of setting target IOP in order to improve patients' care.

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Chapter 2
Objective

STUDY OBJECTIVES

2.1 General Objective

To evaluate the knowledge and practice of setting target intraocular pressure in patients with glaucoma among ophthalmologists and trainees in Malaysia.

2.2 Specific Objective

2.2.1 To develop and validate questionnaire on knowledge and practice of setting target intraocular pressure.

2.2.2 To compare the knowledge on target intraocular pressure between ophthalmologists and trainees in Malaysia.

2.2.3 To compare the practice of target intraocular pressure between ophthalmologists and trainees in Malaysia.

Chapter 3
Manuscript

Title: EVALUATION ON KNOWLEDGE AND PRACTICE OF TARGET INTRAOCULAR PRESSURE IN THE MANAGEMENT OF GLAUCOMA PATIENTS AMONG OPHTHALMOLOGISTS AND TRAINEES

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3.1 ABSTRACT

Purpose:

To evaluate the knowledge and practice of target intraocular pressure (IOP) among ophthalmologists and trainees in Malaysia based on Clinical Practice Guideline for management of glaucoma by Ministry of Health, Malaysia.

Methods:

A cross-sectional study was conducted between 1 January 2020 and 31 December 2021 involving 279 subjects (139 ophthalmologists and 140 trainees) working in ophthalmology fraternity in various institutions in Malaysia. This study was divided into two phases. Phase I involved the development and validation of questionnaire on knowledge and practice in setting target IOP. This questionnaire was later used in the phase II. Phase II involved an online survey of the validated questionnaire. Mean score of knowledge and adherence to setting target IOP in clinical practice was compared between ophthalmologists and trainees using independent t-test.

Results:

A total of 323 ophthalmologists and trainees were invited to participate, but only 279 (139 ophthalmologists and 140 trainees) responded (86.4%). Mean years of experience in ophthalmology practice was 7.4 (5.5) years. A total of 225 respondents (80.6%) adhered to setting target IOP. There was significant difference in the incidence of adherence between ophthalmologists (125, 89.9%) and trainees (100, 71.4%) ($p<0.001$). Mean total score of knowledge among ophthalmologists (21.03 [95% CI: 20.52, 21.54]) was significantly higher than trainees (20.24 [95% CI: 19.78, 20.69]) ($p=0.022$). There was significant association of mean total score of knowledge and adherence in setting target IOP in clinical practice

(p=0.002). There was no association between number of patients with glaucoma seen in their practice with their knowledge (p=0.376) and adherence (0.083) in setting target IOP. Poor understanding (27.8%) and confusion in selecting the method of setting target IOP (35.2%) were the commonest reason among the non-adherences. The most popular method was the percentage of IOP reduction from baseline.

Conclusions:

There is the discrepancy of knowledge and adherence to setting target IOP between ophthalmologists and trainees in Malaysia. An intervention program should be planned to address the discrepancy of standard clinical practice and prevention of glaucoma progression in Malaysia.

Keywords: glaucoma, target intraocular pressure, knowledge, practice, adherence, clinical practice guidelines, good health and well-being

3.2 INTRODUCTION

Intraocular pressure (IOP) is the only modifiable risk factor for development and progression of glaucoma (He et al., 2015, Sultan et al., 2009). Many prospective longitudinal studies have proven the importance of lowering IOP in various type of glaucoma (Anderson and Normal Tension Glaucoma, 2003, AGIS, 2000, Kass et al., 2002, Azuara-Blanco et al., 2016). The benefit of lowering IOP is also proven in various severity of glaucoma (AGIS, 2000, Kass et al., 2002, Leske et al., 2003). For example, the intervention group in Advanced Glaucoma Intervention Study (AGIS) shown that lower IOP can reduced progression of visual field defect (AGIS, 2000). Lowering IOP to 20% reduction from baseline in patients with ocular hypertension (OHT) reduces the conversion to primary open angle glaucoma (POAG) in Ocular Hypertension Treatment study (OHTS) (Kass et al., 2002).

Various mode of treatment has also been proven to effectively reduced IOP and prevent progression in various type of glaucoma. Laser trabeculoplasty and topical betaxolol was found to reduce the visual field progression in Early Manifest Treatment Trial (EMGT) (Leske et al., 2003). Early cataract extraction in primary angle closure glaucoma (PACG) has also shown significant reduction of IOP and delayed in progression of the disease (Azuara-Blanco et al., 2016). Both trabeculectomy and medical treatment have significantly reduced IOP and retard the progression in Collaborative Initial Glaucoma Treatment study (CIGTS) (Musch et al., 2009).

It remains a controversial issue on how much reduction of IOP is most effective to halt the progression of glaucoma. Current management guidelines from the American Academy of Ophthalmology Preferred Practice Pattern recommended lowering the IOP toward certain target level known as target pressure (Weinreb et al., 2014). The American Academy of

Ophthalmology defined target pressure as a value or range of values of IOP that slows the rate of disease progression and functional impairment from the disease (Prum et al., 2016). The goal of glaucoma treatment is to maintain the IOP in a range at which visual field defect is unlikely to significantly affect patient's quality of life during their lifespan (Mahabadi et al., 2021).

Setting the target IOP has recently became the 'holy grail' in management of glaucoma worldwide. Target IOP has been included in various guidelines in the world including World Glaucoma Consensus (Robert N. Weinreb, 2019). Target IOP has also been recommended by Clinical Practice Guidelines (CPG) for management of glaucoma in Malaysia (http://www.acadmed.org.my/index.cfm?menuid=67#Ophthalmology). However, despite the popularity, setting target IOP has not been widely included in clinical practice just yet. In a survey, target IOP was recorded in majority of the patients' clinical chart, but discrepancy of practice is still wide (Solano-Moncada et al., 2016). There is significant difference in adherence of adopting target pressure between ophthalmologists and trainees.

The gap between guidelines and clinical practice may result in patients not receiving appropriate care. Subclinical care may lead to the progression of glaucoma especially among those with advanced cases. In this study, we aimed to understand and compare the knowledge and practice of setting target IOP according to CPG between ophthalmologists and trainees in Malaysia. We planned to use the finding to improve the knowledge gap and discrepancy in clinical practice through an intervention program in the future.

3.3 MATERIALS AND METHODS

A cross sectional study was conducted in two phases between 1 January 2020 and 31 December 2021. Phase 1 involved the development and validation of the questionnaire on knowledge and practice of target pressure in clinical practice. Phase II was a cross sectional study on the validated questionnaire as self-administrated online survey by ophthalmologists and trainees practising in Malaysia. The sample size was determined using G Power 3.1.9 with a minimum sample size of 96 ophthalmologists and 96 trainees based on the mean of Solano-Moncada et al. (Solano-Moncada et al., 2016). However, since the study involved self-administered online survey. We anticipated at least 30% of non-response rate and incomplete data, the corrected sample size was 274 (137 ophthalmologists and 137 trainees). This study received ethical approval from the Universiti Sains Malaysia Ethical Committee (USM/JEPeM/20010057) and was conducted in accordance to World Medical Association Declaration of Helsinki ethical principles for medical research involving human subjects.

Knowledge was defined as awareness or familiarity gained by experience of a fact or situation (dictionary, 2022). Practice was defined as the actual application or use of an idea, belief, or method, as opposed to theories relating to it (Oxford English and Spanish Dictionary, 2022). Ophthalmologist is defined as a medical practitioner who has completed training as ophthalmology and conferred a postgraduate degree. This includes senior and junior ophthalmologists, and glaucoma specialists. Senior ophthalmologists are those who have at least six months experience as ophthalmologists, while junior ophthalmologists were those who were still in the gazettement period (less than six months of completion of training). Glaucoma specialists are ophthalmologists who have completed subspecialty training in glaucoma. Trainees are medical practitioners who are working in department of ophthalmology in any hospital of Ministry of Health, teaching and private hospitals in Malaysia

and they must have at least six months ophthalmology working experience at the time of recruitment. This includes trainees in training program as well as trainees in service. Trainees in training program includes trainees who are still under the training by the local universities or international degree recognised by Malaysian Medical Council while trainees in service were medical practitioners working in the ophthalmology fraternity. These criteria were included in the self-administered questionnaire to ensure the eligibility of respondents.

Phase I: Development and Validation of Questionnaire

A self-administered, structured questionnaire was developed to evaluate the knowledge and practice of setting target IOP in management of glaucoma patients among ophthalmologists and trainees working in ophthalmology departments. A team comprised of ophthalmologist, master trainee and biostatistician were involved in the development of the questionnaire. The language used in the questionnaire was English. The questionnaire was divided into 3 sections:

Section A: Demographic data

Section B: Knowledge on target IOP

Section C: Practice of setting target IOP in the management of glaucoma

For a more objective measurement, content validity of the questionnaire was determined. Content validity was defined as the ability of the selected items to reflect the variables of the construct being measured. It addressed the degree to which items of an instrument sufficiently represent the content domain (Zamanzadeh et al., 2015). The team of experts consisted of 3 ophthalmologists. The questionnaire and content validation form were given to the experts. The content of the questionnaire was reviewed by the experts and the items were rated based on a 4-point ordinal scale; 1 for ‘not relevant’, 2 for ‘somewhat relevant’, 3 for ‘relevant’ and 4 for ‘highly relevant’. Score of 3 and 4 were re-categorized as 1 (relevant) and need no

amendment, while score of 1 and 2 were re-categorized as 0 (not relevant) and revision was done. Then, the Content Validity Index (CVI) which was an acceptable indicator of content validity (Polit et al., 2007) was calculated.

For a more objective assessment to evaluate the clarity and comprehensibility of the questions, Face Validity Index (FVI) was assessed among 10 trainees working in ophthalmology department in Hospital USM. The respondents were asked to rate the items based on a 4-point ordinal scale; 1 for 'not clear and comprehensible', 2 for 'somewhat clear and comprehensible', 3 for 'clear and comprehensible' and 4 for 'very clear and comprehensible'. Score of 3 and 4 were re-categorized as 1 (valid) and need no amendment, while score of 1 and 2 were re-categorized as 0 (not valid) and revision was done. Then, the Face Validity Index (FVI) was calculated.

In determining the construct validity, exploratory factor analysis (EFA) was done separately for knowledge and practice domain using Statistical Package for the Social Sciences (SPSS) version 26 software. For extraction method, the principal component method was used. The Kaiser-Meyer-Olkin (KMO) was computed to test the partial correlation among items to ensure the sampling adequacy and to test whether the variables in the sample were adequate to correlate. Item selection was based on communalities, correlation and factor loading values. For removing items in this study, items with communalities <0.3 and items with factor loading of <0.5 were removed as recommended by Hair Jr et al. (Hair et al., 2006). However, some items were retained in the questionnaire for content validity even though the items do not meet any criteria above.