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RESEARCH ARTICLE

FACTORS ASSOCIATED WITH ADHERENCE TO RECOMMENDED GLAUCOMA MEDICATIONS AMONG PATIENTS WITH GLAUCOMA AT NATIONAL EYE HOSPITAL, SRI LANKA

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Glossary of Abbreviations

ACG: Angle closer glaucoma

IOP: Intraocular pressure

NEH: National Eye Hospital

POAG: Primary open-angle glaucoma

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INTRODUCTION

Glaucoma is an emerging health threat to the world. Glaucoma is also the second-largest cause of preventable blindness of the world (Jayasekara, 2016). Furthermore, glaucoma is second to cataract as a leading cause of global blindness and a leading cause of irreversible visual loss. In the United States, more than three million Americans are projected to have glaucoma by the year 2020 (Giangiacomo, 2009). Meanwhile, the total numbers of people with glaucoma worldwide will increase to 111.8 million in 2040 (Chan, 2018). Among them, it is predicted that 70% will be women, and 87% will be Asian (Giangiacomo, 2009). Sri Lankan situation is compatible with South-East Asian statistics where around 12% of the population is said to be affected by glaucoma in Sri Lanka

(Jayasekara, 2016). Glaucoma is a disease that damages the optic nerve permanently. It usually happens when fluid builds up in the front part of the eye. That fluid absorbed by eye but extra fluid can increase the pressure of eye-damaging the optic nerve. There are two major types of glaucoma, such as primary open-angle glaucoma (POAG) and Angle closer glaucoma (ACG) (Thimothy, 2018). Furthermore, glaucoma is a leading cause of blindness among people over 60 years old. However, blindness due to glaucoma can often be prevented with early treatment (Boyd, 2018). Treatment is indicated for all patients with elevated intraocular pressure (IOP) and characteristic optic disk changes or visual field defects. Glaucoma usually controlled with glaucoma medications, and it helps to keep the vision. Medication adherence generally defines as how well a patient takes his/her prescribed medication according to the

ABSTRACT

Background: Glaucoma is rising as a global health issue. Adherence to recommended medication is a challenge for patients and recognized as an essential component of the management of glaucoma. There are not enough data regarding factors associated with adherence to recommended glaucoma medication among patients with glaucoma in Sri Lanka. Therefore this study was conducted to determine factors associated with adherence to recommended glaucoma medications among patients with glaucoma at National Eye Hospital, Sri Lanka. **Method:** A descriptive cross-sectional study was conducted among purposively selected patients (n=300) with glaucoma who admitted to the National Eye Hospital, during the study period. Data were collected using a pre-tested an interviewer-administered glaucoma medication self-efficacy scale questionnaire. Descriptive statistics were used. Ethical approval was obtained from the Ethics Review Committee of KAATSU International University, and further permission was obtained from the National Eye Hospital. **Results:** Nearly half of the participants (50.7%, 152) were Females. Most of them had glaucoma over 1-10 years and belong to ≥60 age group. Most of them (60.3%; 181) were adherent to the recommended medications, and 39.7% (n=119) were non-adherent. There was a significant association between participants' lifestyle; medications instilled techniques (p < 0.05), marital status (socio-demographic factor), and having other non-communicable diseases with adherence to the recommended glaucoma medications. **Conclusion:** Majority of the participants (94.3%; 283) had good glaucoma outcome expectations such as follow the clinic visits and continues the medications regularly. Participant's lifestyle, medication instilled techniques, socio-demographic factor (marital status) and other non-communicable diseases are associated factors to adherence of glaucoma medications. Appropriate patient education might positively affect the patient's adherence to recommended glaucoma medications.

recommended dosing schedule (Muir, 2018). Multiple clinical trials have shown that with adequate medical treatment, much (but not all) vision loss can be prevented. According to data self-report or medication, the monitor has indicated that adherence to glaucoma medication is often poor (Muir, 2011). Studies on medication adherence have identified that various factors related to poor adherence of recommended eye drop, including more frequent and complex dosing and situational factors, such as competing activities and forgetfulness as well as patient-centred factors, such as lack of knowledge, low health literacy (Muir, 2011). Inappropriate eye drop application technique is a significant impediment to keeping reasonable control of intraocular pressure in glaucoma (Scotee, 2018). Identification of the factors adherence to recommended medications and non-adherence is essential to facilitate an understanding of the barriers which cause to take necessary to possible interventions to reduce non-adherence. If patients take the recommended medications at the appropriate time of the day can be reduced short-term fluctuation in intraocular pressure (Muir, 2018).

Glaucoma is being a disease with much more high prevalence worldwide. According to the blindness survey data in 2017, the prevalence of blindness in Sri Lanka is 1.7% among age 40+ populations. Similarly, around 12% of the population is said to be affected by glaucoma in Sri Lanka (Jayasekara, 2016). In Sri Lanka, most of the patients with glaucoma take their treatments from government hospitals due to free of charges and treatments. National Eye Hospital (NEH), is the hospital, especially for eye diseases in Sri Lanka. In 2014 total numbers of clinic visits were 1, 68 291 and out of the 16,125 were diagnosed with glaucoma (<https://nationaleyehospital.health.gov.lk/downloads/Annual%20Report-2014.pdf>). According to the medical records 2015, 2016 and 2017 clinic visit by patients with glaucoma were 9465, 8207 and 8594 respectively, at NEH. The burden due to glaucoma is substantial not only for the patients, family but for the health system. Therefore, screening and earlier diagnosis can lessen the cost of disease management and increase adherence to treatment. Apart from that, reduce the prevalence of blindness attributed to glaucoma are essential. These would improve the quality of life of the patient and reduce personal, national expenditure and help to increase the national economy. Studies of factors associated with adherence to recommended glaucoma medications among patients with glaucoma have been conducted in several countries in the world.

However, there was not much information on factors associated with adherence to recommended glaucoma medication among patients with glaucoma in Sri Lanka. Therefore, the present study was aimed to determine factors associated with adherence to recommended glaucoma medications among patients with glaucoma. The finding of this study will be useful to take necessary actions to improve patients' adherence to recommended glaucoma medications in order to prevent them from blindness and reduction of health care expenditure. This study was conducted to determine factors associated with adherence to recommended glaucoma medications among patients with glaucoma, to determine the level of knowledge regarding glaucoma among patients with glaucoma, to assess factors related to adherence for recommended glaucoma medication among patients with glaucoma and to determine factors related to non-adherence for recommended glaucoma medication among patients with glaucoma at National Eye Hospital, Sri Lanka.

MATERIALS AND METHODS

A descriptive cross-sectional design was used, and Data were collected using a purposively selected sample. The sampling population included people aged 18 years and above, diagnosed with glaucoma for more than three months period and patients who visit clinics and admitted at National Eye Hospital, Sri Lanka during the study period. National Eye hospital is only one National hospital which facilitates with new technology and treatments for eye disease. This hospital serves for patients with eye disease from all over the country. Data were collected using pre-tested (n=10) and interviewer-administered questionnaire which was taken with permission from Sleath (2015). This questionnaire included three parts, such as Part A-Socio-Demographic characteristics of participants. (e.g. age, gender, marital, status, religion, education level, nationality, residence district). Part B-Disease related information of participants. (e.g., When your doctor did diagnose you with glaucoma? What do you think regarding treatment? etc...). Part C-Glaucoma Medication adherence Self-Efficacy Scale such as (a=How confident are you that you can take your glaucoma medication, b=How confident are you that you can carry out the following tasks. c=Glaucoma outcome expectation scale). The ethical approval was obtained from the Ethics review committee at KAATSU International University, Sri Lanka and further permission were obtained from the director, National Eye Hospital, Sri Lanka. The participant was fully informed about the purpose of the study before collecting data. Participants' written informed consents were obtained before administering the questioner. Descriptive statistics such as mean and standard deviation were used to analysis participants' socio-demographic characteristics percentages. Medications adherence and significance associated factors analysis was done using the chi-square test with statistical packages for social sciences (SPSS) 23.

RESULTS

The socio-demographic characteristics of the participants are summarized in Table 1. A total of 300 participants participated in the study. There were 152 (50.7%) females and 148 (49.3%) males. The mean age group was above 60 years. Majority of the participants were married and belonged to Sinhalese. More than two-thirds of participants were Buddhist. Half of them were educated level up to grade eleven. (n=151) 96% of the participant's monthly income was less than 45,000 LKR. Disease-related information of the participants is summarized in table 2. Majority of the participants (n=174, 58%) had been suffered from glaucoma over 1-10 years period. Nearly one-third of the participants (n=104, 34.6%) had to get checked their eyes within a month when having visual acuity changes. (n=174) 59% of the participant had been instilling the recommended eye drops within 1-10 years duration. Approximately (139) 50 % of participants had not a non-communicable disease and (n=46)16% with diabetes mellitus. Most of them do not have a family history of the disease. (n=64) 21.3% of participants had short-sighted. One-third of the participants had not aware of medications. As shown in figure 1 (n=232), 77.3% of the participants' known glaucoma is the controllable disease condition. (n=35)11.7% did not know about disease besides (n=33) 11% of them known glaucoma as a curable disease condition. According to figure 2, the majority of the participant (n=181, 60.3%) were adherence to the recommended glaucoma eye drop medications.

Table 1. Socio-demographic characteristic of the participants (n= 300)

Characteristics	Frequency	%
Gender		
Male	148	49.3%
Female	152	50.7%
Age Groups		
18-28	24	8%
29-39	15	5%
40-49	20	6.7%
50-59	68	22.7%
≥60	173	57.7%
Marital status		
Single	48	16%
Married	244	81.3%
Widowed	7	2.3%
Divorce	0	-
Separated	1	0.3%
Educational Level		
Up to grade 5	84	28.8%
Up to grade 11	136	45.3%
Up to grade 13	63	21%
Diploma	8	2.7%
Graduate	9	3%
Monthly Income Level(LKR)		
≤ 15000	151	50.3%
15,000-45,000	129	43%
45,000-75,000	19	6.3%
75,000-1,000,000	-	-
≥ 1,000,000	1	1%

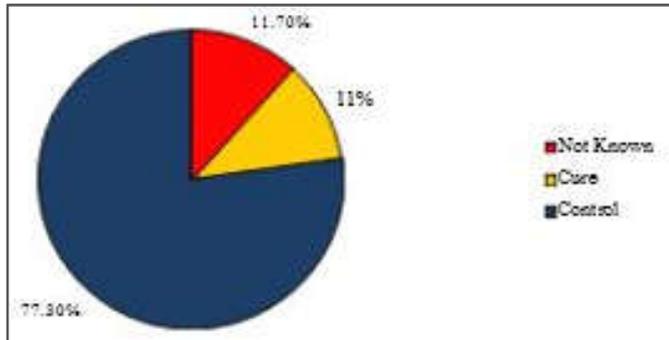
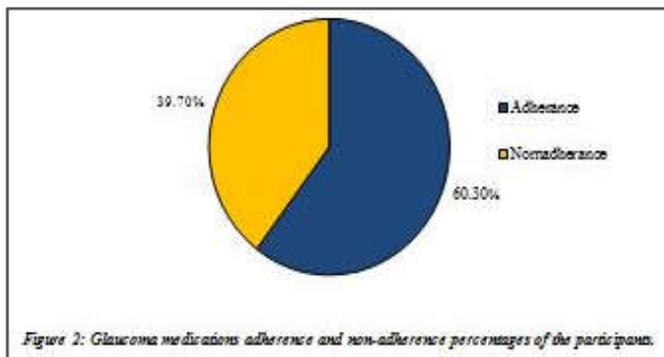
Table 2. Disease-related information of the participants (n=300)

Diseases related information	frequency	%
Duration of diagnosed the disease		
Not known	2	0.7%
≤ 1 year	55	18.4%
1-10 year	174	58%
10-20 year	56	18.6%
≥ 20 year	13	4.3%
The time duration to get checked eye after feeling visual problems		
Not known	58	19.3%
≤ 1 month	104	34.6%
1 month to 1 year	120	40%
≥ 1 year	18	6%
Duration of the eye drops are used		
Not known	1	0.3%
≤ 1 year	59	19.7%
1-10 year	174	58%
10-20 year	53	17.6%
20 year	13	4.3%
Family history with glaucoma		
Yes	53	17.7%
No	247	82.3%
Short-sighted participants		
Yes	64	21.3%
No	236	78.7%
Participants with non-communicable disease		
Not any diseases	139	46.3%
Diabetes mellitus	48	16%
Hypertension	45	15%
Cholesterol	11	3.7%
Bronchial Asthma	4	1.3%
Ischemic Heart Disease	1	0.3%
More than one NCD	52	17.3%
Past history of eye surgery or injury		
Not any history	224	74.7%
Surgery	47	15.7%
Injury	22	7.3%
Surgery and injury	7	2.3%
Knowledge of glaucoma medications		
Yes	190	63.3%
No	110	36.7%

Table 3. Factors associated with glaucoma medications adherence

Factors	Chi-square value	P-value
Gender	1.815	.178
Age	6.977	.137
Marital status	7.953	.047*
Having other non-communicable diseases	20.300	.041*
Participants lifestyles	12.694	.000*
Medication instilled techniques	9.349	.002*

P=0.05 * significance association

**Figure 1. Knowledge of disease condition percentages****Figure 2: Glaucoma medications adherence and non-adherence percentages of the participants.**

They had instilled eye drops without missing one dose in the past week. Nearly 40% of participants (n=119) were non-adherence to the eye drop medications. They had missed at least one dose during the past week. Most of the participants, 80%, had been instilling the eye drop medications though they are away from the resident and busy at the home or tied up with work. (n=72) 24% of the participants responded that they were not at all confident when they had to instill medications in between meals. More than (185) 50% of them did not feel dry eyes, red eyes, and stickiness after using drops. 45% of them had complained they were not very confident when they feeling grittiness or sandiness in the eye after using eye drops medications. Most of the participants have to had continued their medications although they had no symptoms, feel well from the disease and to take other medications. (n=76) 25.3% of participants had afraid to depend on medications for a long time. Nearly 65% of participants could not buy eye drops medications from the outside pharmacies as the cost of the medications is high. However, (n=180) 60% of the participants had taken the medications before running out the previous bottles. Only (n=100) 33.3% of them could buy medications whatever medications cost. Majority of the participants had self-efficacy to instilling eye drops in their eyes. (n=138) 46% of participants had not kept the correct angle of the head when they were administering eye drop medications in eyes as patients' answers. 98% (n= 294) of the participants had delivered the too much drops into the eyes in one time as same 80% (n=240) of participants had responded that they were not

able to follow correct techniques without professionals help. Out of 300 participants (n=283), 94% had good outcome expectation such as follow up the clinic visits and continue the recommended medications regularly. Participants had good outcome expectation with good medications adherence. Table 3 summarized significance associations with glaucoma medications adherence and associated factors. As shown in the table, there were significant associations between adherence medications and participant's lifestyles, marital status, and having other non-communicable disease as well as medication instilling techniques. Apart from the adherence knowledge on disease condition was a significant association with educational level (p=.005*) and the duration of the treatment (p=.000*)

DISCUSSION

Glaucoma medications help to keep normal eye pressure to patients with glaucoma. Adherence to the recommended medications causes to the prevention of surgical interventions of the patients; besides, it helps to protect the patient's good visual acuity. This study aimed to determine associated factors with adherence to recommended glaucoma medications among patients with glaucoma at National Eye Hospital, Sri Lanka. Various studies have done to find the associated factors to adherence to recommended glaucoma medications. While some factors are significant in some studies, the same factors have been non-significant in other studies. In this study, majority of the participants were female (Table 1), and the most of the participants were adherence (60.3%) to the recommended medications and were non-adherence (39.7%) (Figure 2). 22% of glaucoma patients were unaware of disease condition correctly (Figure 1). Glaucoma medications adherence associated factors were marital status, participants' lifestyles, having other Non-communicable diseases and the medications instilling techniques.

Furthermore, 54% of the participants were able to instil eye drops correctly, 19 % of the participants depending on another person to instil their eye drop medications. Similar studies were undertaken in America Muir et al. (2018) on glaucoma medication adherence among patients with glaucoma. Findings of this study, most of the participants were (93%) of experienced drops users reported no problems instilling eye drops. Only 31% were able to instil an eye correctly drops. 20% of participants with glaucoma depend on another person to instil their drops. Stryker et al. (2011) conducted a study on factors influencing glaucoma treatment adherence in America among 80 participants with glaucoma. Findings of the study, compared to adherent participants, non-adherent participants were less. Non-adherent participants' main associated factor was to medications non-adherence was difficulty remembering to take their medications. Comparatively, findings were similar study was conducted on determinants of medication adherence to topical glaucoma therapy in America Deer, et al. (2012) One-hundred and sixteen participants participated in the study and adherence were measured using electronic dose monitoring. Out of the 116 participants, 56.9% were female, and 43% male. In his study, findings also show the nearly 40% of the participants were non-adherence to the medications and 64% were adherence. Moreover, age, the total number of eye diseases and race were significantly associated with medications adherence. Another study, done by Tamart, et al., (2015) on adherence to topical glaucoma medications among Ethiopian patients. The objective of the study was to determine

the adherence to glaucoma medications and factors associated with non-adherence among participants with glaucoma. A hospital-based cross-sectional study was conducted with 200 participants. Findings of the study showed that a much higher level of non-adherence 67.5% significantly. As well age, advanced stage of glaucoma, more extended frequency of follow up and financial problem were associated factors with non-adherence. Gender, level of education and marital status were not statistically significant association with non-adherence to the glaucoma medications in the present study gender and Educational status were not statistically significant, but the marital status was a significant association with medication adherence($P=0.047$). Besty *et al.* (2015) in America have done a study regarding patient's communications, self-efficacy and glaucoma medications adherence. Two hundred seventy-nine participants participated in 6 ophthalmology clinics. Their results also showed that there high glaucoma medications adherence. While self-efficacy was positively associated with better adherence and the black race was associated negatively. Kholdebin *et al.* (2008) have been conducted a multicenter study on compliance and drop administration in glaucoma in Canada. Five hundred patients participated from 10 centres across Canada participated in the study. Of these, 25.6% reported missing at least one drop of medication per week. The overall proportion of noncompliance was 27.9%. The most common reasons given for missing eye drops were forgetfulness and being away from drops.

Conclusion

Most of the study, most of the participants were adherence to the recommended medications (60.3%). More than 50% of the participants had good knowledge of medications and disease. Participant's lifestyle and medications instilling techniques, marital status of the participants' and having other non-communicable diseases were affecting the medication adherent. Educational level affects the participant's knowledge of medications and the disease. Monthly income level helps participants get refilled their medications. 95% had good glaucoma expectation outcome, and they will continue clinic visits regularly.

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