

ORIGINAL ARTICLE

The Etiology and Pattern of Low Vision Patients in UiTM

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ABSTRACT

Introduction: Rehabilitation services for low vision patients are important to provide training of residual vision. This study reviewed the causes of visual impairment and low vision aids prescribed at the UiTM Low Vision Clinic. This study also assessed their visual improvement after prescribing low vision aids. **Methods:** A retrospective study was conducted at the UiTM Low Vision Clinic from January 2016 to January 2022. **Results:** A total of 113 low vision patients aged between 7 and 88 years old, with a mean age of 49.17 ± 23.06 years old, were involved in this study. Half of the patients had visual acuity of less than 6/18 and is classified as moderate visual impairment. The leading causes of visual impairment were cataracts (61.1%), diabetic retinopathy (5.6%), chorioretinitis (5.6%), Leber's Hereditary Optic Neuropathy (5.6%), Ocular Albinism (5.6%), Retinitis Pigmentosa (5.6%), nystagmus (5.6%), and keratoconus (5.6%). Less than half of the patients were prescribed low vision aids (44.4%), and the remaining patients (55.6%) were referred to an ophthalmologist. Post-intervention, 87.5% of patients showed improvement in visual acuity with low vision aids. **Conclusion:** Cataract is the leading cause of visual impairments in the UiTM Low Vision Clinic. The improvement in visual acuity can be seen in a majority of the patients prescribed with low vision aids. Hence, low vision aids are beneficial for low vision patients to improve their quality of life, especially in performing daily tasks. *Malaysian Journal of Medicine and Health Sciences* (2022) 18(SUPP15): 233-239. doi:10.47836/mjmhs18.s15.32

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INTRODUCTION

The International Statistical Classification of Diseases (ICD-11th revision) and Related Health Problems by the World Health Organization (WHO) stated that visual impairment is classified into distance vision impairment and near vision impairment. Distance vision impairment can be categorised into mild, moderate, and severe vision impairment. The presenting visual acuity (VA) for mild vision impairment is less than 6/12, while a VA worse than 6/18 is classified as moderate vision impairment. Severe vision impairment is presented by VA that is worse than 6/60 but equal to or better than 3/60. Blindness is considered when VA is less than 3/60. Near vision impairment is indicative when a patient's near VA is less than N6 or M0.8 with correction (1).

WHO reports that about a billion of the world's population had vision impairment (1). In Malaysia, the prevalence of bilateral blindness, severe visual impairment and moderate visual impairment was 1.2%, 1.0% and 5.9% respectively. The state of Sabah has

the highest prevalence of blindness and moderate and severe vision impairment (2).

Cataract is the leading cause of visual impairment and blindness in both the global and Malaysian populations, followed by uncorrected refractive error and diabetic retinopathy, respectively (1,2). Meanwhile, refractive error, amblyopia, strabismus, and ocular abnormalities are the causes of visual impairment among the pediatric population in Malaysia (3).

Low vision or visual impairment may cause difficulty in performing daily routines. Patients may have trouble in hygiene care, eating, drinking and walking. Low vision patients with reduced visual acuity, visual field and contrast sensitivity usually report difficulties in mobility, leading to unsafe navigation within their surroundings (4). Apart from mobility, visual impairment may affect a patient's dependency, mental health and increase the risk of injury and fractures. Therefore, low vision rehabilitation services are essential to provide for the visually impaired (5).

Low vision rehabilitation is a service that offers methods and treatments for remaining visual function and assists patients in performing tasks independently (6-8). Several organisations in Malaysia offer rehabilitation services

including the Ministry of Health Optometry Clinic, special schools under the Ministry of Education, the National Council for the blind, the Malaysian Association for the Blind and St Nicholas Home, Penang.

Low vision devices are one of the options in rehabilitation services. Low vision devices are grouped into optical and non-optical low vision devices. Optical low vision devices have a lens placed between the patient's eye and the object or the target and works by the principle of optical magnification to multiply the target's size (9). Spectacles, hand-held magnifiers, stand magnifiers, closed circuit television (CCTV) and telescopes are examples of optical low vision devices. Typoscope, table lamp and large print texts are examples of non-optical low vision aids. However, although no optical intervention is needed for non-optical devices, alteration to rectify the weaknesses of the low vision aids is needed (10).

All low vision devices are found to help improve vision and quality of life (11). Despite improvements, patients still need to be trained to better adapt to low vision aids. With additional training, the rehabilitation services not only allows for the optimal use of remaining vision, but also help low vision patients to gain control of their environment, boost their self-confidence, and minimise the risk of depression, thus improving their quality of life (12).

There are still limited studies on the causes of low vision and patterns of low vision prescription from the UiTM Low Vision Clinic. Hence, the objective of this study was to review the causes of visual impairment, and the prescribing trend of low vision aids at the UiTM Low Vision Clinic from January 2016 to January 2022. Moreover, this study also assessed the visual improvement after prescription of low vision aids among low vision patients at the clinic. This was done by comparing mean visual acuity before and after the prescription of low vision aids. To our knowledge, no study has been done in the UiTM Low Vision Clinic on the etiology and patterns of low vision prescription. The evaluation of etiology and pattern of low vision patients could provide important information on the most recent causes of low vision among the patients. The information about the etiology and pattern of low vision patients can be useful in developing strategies to ensure that all low vision patients in UiTM Low Vision clinic are prescribed the optimal low vision aids and to reduce the prevalence of visual impairment caused by preventable and curable diseases.

MATERIALS AND METHODS

Data and sample population

A retrospective study was conducted at the UiTM Low Vision Clinic. The clinic acts as a referral centre for low vision patients. The patient's optometric case records at

the clinic were reviewed from January 2016 to January 2022. The inclusion criteria is the record of all patients who attended the UiTM Low Vision Clinic between January 2016 and January 2022 and fulfilled the criteria of visual impairment, according to the definition by the WHO. WHO classified the presenting visual acuity for mild vision impairment as less than 6/12. Visual acuity less than 6/18 is classified as moderate vision impairment. Severe vision impairment presented visual acuity less than 6/60 but equal to or better than 3/60. Blindness is considered when visual acuity was less than 3/60 (1). Patient records with missing information on age, gender, low vision causes, the visual acuity without low vision aids, prescription of low vision aids for distance and near impairment, and visual acuity with current low vision aids were excluded. Data were collected in a retrospective manner and reviewed as secondary data.

Data collection

Information extracted from the patient's case record were age, gender, causes of low vision, the visual acuity without low vision aids, prescription of low vision aids for distance and near impairment, and visual acuity with current low vision aids.

The cause of the visual impairment and presented visual acuity were also reviewed. The presented visual acuity was classified into groups according to the severity of the low vision according to the WHO classification criteria. The prescribed low vision aids and VA after prescription of low vision aids were also reviewed. Visual acuity was tested and analysed before and after the prescription of low vision aids to review the improvement of visual acuity.

All demographic and other data were recorded and analysed using the IBM SPSS Statistics software, version 26. The result of the analysis is discussed in the results section. A Wilcoxon Signed-Ranks Test was used to compare means before and after the prescription of low vision aids. The status of visual acuity before and after the prescription of low vision aids is also discussed. Fig. 1 shows a layout of the data collection procedure.

This study used only secondary data and the approval was obtained from the UiTM Vision Care and Centre of Optometry Studies, UiTM [100 FSK (14/3)]. This study adhered to the tenets of the Declaration of Helsinki.

RESULTS

Data revealed that 44.4% of the patients used the recommended low vision aids by optometrists. The remaining 55.6% of patients were referred to an ophthalmologist for further management.

According to the patients' visual acuity data, 18 patients were diagnosed as low vision patients. The remaining patients were excluded, as their visual acuity improved

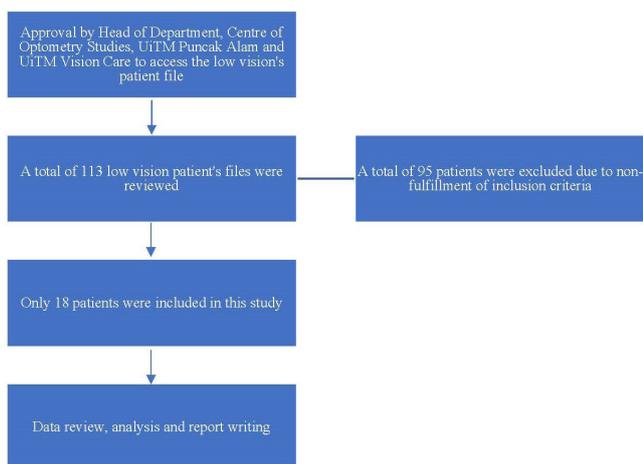


Figure 1: Flow chart of the procedure

better than 6/12 after subjective refraction. Out of the 18 low vision patients, 8 were males (44.4%), and 10 were females (55.6%). The percentage of the gender distribution for male and female subjects in this study were 44.4% and 55.6%, respectively. The age range of low vision patients at the UiTM Low Vision Clinic was 7 to 88 years old, with a mean of 49.17 ± 23.06 years. Patients were classified into different age groups: schooling age, working-age and retired age group. Table I shows a summary of age distribution according to age groups.

In presenting distance visual acuity of low vision, patients with visual acuity less than 6/18 (55.6%, n=10) represents the highest percentage compared to other level of visual acuity. Meanwhile, 72.2% of patients had near visual acuity better than 2M. Table II shows the summary of presented distance and near visual acuity among patients.

Results show that the leading causes of visual impairment in patients who visited the UiTM Low Vision Clinic were cataracts (11 cases), which made up 61.1% of the study population. For other causes, frequencies were reported at the same value for diabetic retinopathy (5.6%), chorioretinitis (5.6%), Leber's Hereditary Optic Neuropathy (5.6%), Ocular Albinism (5.6%), Retinitis Pigmentosa (5.6%), nystagmus (5.6%), and keratoconus (5.6%). Meanwhile, 5.6% of the participants suffered from two causes of visual impairment; cataract and diabetic retinopathy. Fig. 2 shows the summarised causes of visual impairment at the UiTM Low Vision Clinic.

Table I: Age distribution among low vision patients in UiTM Low Vision Clinic

Age Group (years)	Total number of patient (%)
School-age (0-20)	2 (11.1%)
Working-age (21-60)	10 (55.6%)
Retired age (60 and above)	6 (33.3%)
Total	18 (100%)

Table II: Presenting distance and near visual acuity among patient at UiTM Low Vision Clinic

Presenting visual acuity (distance)	Percentages of the patient (%)
Visual acuity worse than 6/12	33.3
Visual acuity worse than 6/18	55.6
Visual acuity worse than 6/60 but equal to or better than 3/60	5.6
Visual acuity worse than 3/60	5.6
Total	100

Presenting visual acuity (near)	Percentages of the patient (%)
Up to 2.0M	72.2
Worse than 2.0M but equal to or better than 4.0M	22.2
Worse than 4.0M but equal to or better than 6.0M	5.6
Total	100

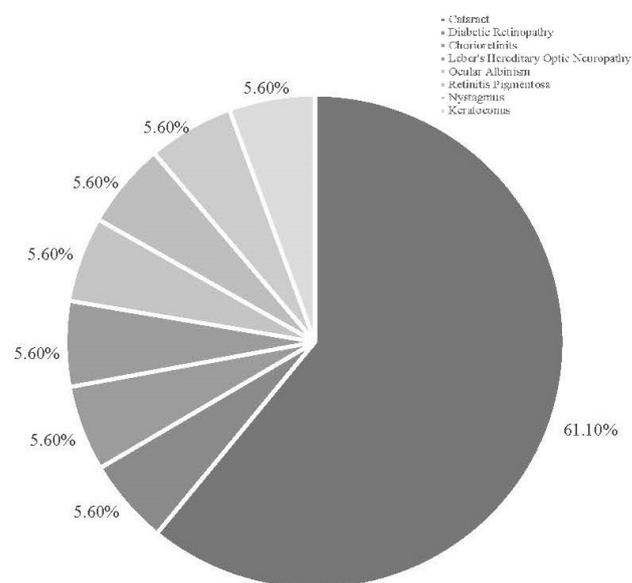


Figure 2: Causes of visual impairment at the UiTM Low Vision Clinic

When based on age group, the cause of low vision among school-aged patients was Retinitis Pigmentosa and nystagmus. Meanwhile, among the working-age patients, the causes of low vision were Leber's Hereditary Optic Nerve, Ocular Albinism, Chorioretinitis, Diabetic Retinopathy, Cataract, and keratoconus. Cataract, on the other hand, is the only cause of visual impairment among retired patients.

Fig. 3 shows the types of low vision aids prescribed to the patients at the Clinic. It was found that 44.4% of the participants were prescribed low vision aids. The low vision aids prescribed to patients for distance impairment were distance spectacles (37.5%). Prescription of low vision aids at near to patients were near spectacles (25.0%), electronic pocket magnifier (25.0%) stand magnifier (12.5%) and contact lens (12.5%).

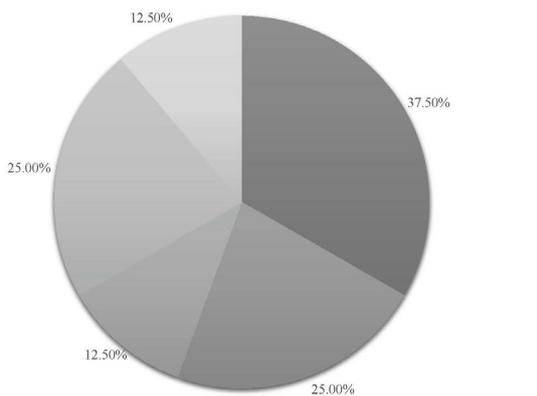


Figure 3: Types of low vision aids prescribed at the UiTM Low Vision Clinic

From Table III, negative ranks indicates that the patients had improved visual acuity (LogMAR) after being prescribed with low vision aids. Positive ranks indicates that the patient’s visual acuity (LogMAR) worsened after being prescribed low vision aids, while ties indicates the patient’s visual acuity remained constant before and after the prescription of low vision aids. In comparing means from the ranks table, the mean of negative ranks (mean=4.00) is larger than positive ranks (mean=0). It indicates here that seven patients had improvement of visual acuity after prescription of low vision aids and thus was grouped into negative ranks. A Wilcoxon-Signed Rank Test indicated that patient’s visual acuity had a significantly greater influence after prescription of low vision aids, $T = 28.0$, $z = -2.39$ with $p\text{-value} = 0.02$.

Table III: Ranks table on visual acuity(LogMAR) after being prescribed low vision aids among low vision patients

	Visual Acuity with low vision aids prescribed – Presenting Visual Acuity		
	n	Mean ranks	Sum of ranks
Negative ranks	7 ^a	4.00	28.00
Positive ranks	0 ^b	0.00	.00
Ties	1 ^c		

^a VA (LogMAR) After LV Aids Prescribed < VA(LogMAR) Before LV Aids Prescribed

^b VA (LogMAR) After LV Aids Prescribed > VA(LogMAR) Before LV Aids Prescribed

^c VA (LogMAR) After LV Aids Prescribed = VA(LogMAR) Before LV Aids Prescribed

DISCUSSION

The 6-year review of 113 low vision patients at the UiTM Low Vision Clinic showed that more male patients came to the clinic than females. This finding is consistent with other research from Korea and Nepal Eye Hospital, which revealed that male patients were more likely than female patients to visit low vision clinics (13,14). According to this data, there are higher rate of male patients who underwent low vision treatment than female patients.

Countries such as Malaysia, Nepal, and India may have limited access to eye services due to insufficient information about low vision services, as well as a lack of social support among females, which leads to difficulty in seeking care and the inability to make own decisions regarding personal finances (15,16). However, in countries such as Australia, female patients who attended low vision clinics were higher than males (17), indicating that perhaps more efforts could be made to help improve the rate of female patients in getting the necessary treatment. A previous study in Australia also stated that the lack of awareness regarding low vision services among low vision patients has led to a misunderstanding about low vision services and an unawareness of the service’s benefits (18).

Most of the low vision patients who attended the UiTM Low Vision Clinic were aged between 21 and 60 years old. Within this age range, people are usually in the working phase. This demographic data was also similar to a previous study in the Nepal Eye Hospital, which showed that most of the low vision patients attending the low vision clinic came from the working-age group (14). The current findings also agreed with a previous study conducted at the Universiti Kebangsaan Malaysia Low Vision Clinic. The study revealed that most of the low vision patients were 50 years old and below (19). In some populations, many might not be aware of low vision among the working-age group, but the impact of visual impairment in this group was actually higher (20). In addition, the older generation might have difficulties attending their appointment due to financial or physical factors, apart from being dependent on family members (21). Moreover, the elderly may also experience other physical disabilities caused by ageing, such as hearing problems. Consequently, the older population will have lower accessibility to low vision services.

Based on the severity of visual impairment, one patient was considered blind. Meanwhile, others were included under the low vision category. Based on the findings, most low vision patients had visual acuity less than 6/18 or moderate vision impairment. In a retrospective study in Thailand, visual acuity of less than 6/18 was most reported among patients, while a lower number of blind patients were reported compared to visually impaired patients. In the Thailand study, about 41.6% of adult low vision patients had visual acuity of less than 6/18 (22). This finding was similar to a report from a low vision clinic in Trinidad and Tobago. The study revealed that visual impairment patients were higher in number than blind patients, and about 67.6% of low vision patients had visual acuity that is worse than 6/18 (23). Consequently, this observation can be related to the world’s prevalence of visual impairment and blindness. It is reported that the people with moderate to severe visual impairment were higher than the blind (24).

For near visual acuity, WHO defined that patients with

N20 or 0.8M with the best correction are to be classified as having a visual impairment (1). In this study, all patients had near visual acuity of 0.8M and worse. A higher number of patients had near visual acuity from 0.8M and up to 2.0M, making up 72.2% of the low vision patients at the UiTM Low Vision Clinic. This trend was similar to the low vision clinics in Trinidad and Tobago, in which about 35.6% of the low vision patients had a near visual acuity of better than 2.0M (23).

Furthermore, cataract was the leading cause of visual impairment. Globally, the main causes of visual impairment are uncorrected refractive errors and cataracts (1). For the older generation aged 50 years and above, about 15.2 million of the 33.6 million low vision patients worldwide suffer from cataract (25). This study indicates that cataract is the most typical cause of visual impairment for the retired age group. Cataract mainly occur due to the ageing process. As the older population continue to increase, cataract may continue to be the major cause of visual impairment (26). The situation worsens as the elderly may have difficulties and barriers to undergoing cataract surgery. This is due to the lack of family support, misunderstanding on the need for cataract surgery and fear towards surgery (27). These reasons may also contribute to the cataract to remain a major cause of visual impairment in most countries. By contrast, the leading cause of low vision in the UKM Low Vision Clinic was ocular pathology involving retinal, optic nerve and posterior visual pathway diseases. In the UKM study, retinal diseases demonstrated the highest percentage (19). Meanwhile, pathological media were the second leading cause of visual impairment at the UKM Clinic (19).

The current data also revealed that one patient had visual impairment due to more than one cause. The patient was visually impaired due to cataracts and diabetic retinopathy. A retrospective study that was conducted at the Nepal Eye Hospital also revealed that most of the low vision patients suffered from multiple visual impairment causes (14).

Diabetic retinopathy was one of the causes of visual impairment in this study. In Trinidad and Tobago, diabetic retinopathy was the second leading cause of visual impairment and blindness (23). Diabetic retinopathy was also the third main cause of visual impairment at the Kooyong Low Vision Clinic, Australia (28). The American Academy of Ophthalmology estimated that about 28.54 million adults worldwide suffer from vision-threatening diabetic retinopathy. This number is expected to rise to 44.82 million in 2045 (25). Diabetic retinopathy was the second leading cause of visual impairment in Malaysia (2). The National Health and Morbidity Survey in 2019 revealed the increasing prevalence of diabetes patients in Malaysia. This prevalence data would imply a concurrent increase of diabetic retinopathy (29).

Diabetic retinopathy is a preventable cause of visual impairment. Therefore, all preventive measures should be considered and applied to prevent the rising cases of visual diabetic retinopathy (30). One proven measure to reduce the risk of diabetic retinopathy is to not only control blood glucose levels but to also simultaneously control blood pressure or lipid levels (31).

44.4% of the current subjects have received a prescription for low vision aids. The most prescribed low vision aids are distance low vision aids. In the UiTM Low Vision Clinic, the distance spectacles is commonly prescribed for distance low vision. Apart from spectacles, telescopes are also common low vision aids prescribed for distance vision (20). Similarly, a retrospective study at UKM showed that more than half of the low vision patients were prescribed with distance low vision aids. 63.4% were prescribed with a telescope, and 36.6% with distance spectacles (19). However, based on the reviewed file records and to the best of our knowledge, telescopes were not prescribed for low vision patients in UiTM Clinic.

Additionally, near low vision aids are also prescribed in UiTM Low Vision Clinic, this includes spectacles at near (high addition power), electronic magnifier, and stand magnifier. This observation was similar to a previous study at a low vision clinic in Trinidad and Tobago (23). This can be due to doctors mainly receiving complaints of patients having difficulty reading something nearer (32). Therefore, the main concern for low vision patients is performing tasks that required near vision. Hence, in Australia, the primary aim with the rehabilitation of adult low vision patients is to prescribe low vision aids, followed by being able to read and perform tasks at a near distance. (33). These two goals show a higher number of near low vision devices prescriptions than distance low vision aids. The low vision patient's goals in Thailand were also concerned with reading and near tasks for adults and kids. Therefore, higher amount of stand magnifier devices (low vision aids) were prescribed among adults (22). The percentages of near low vision aids prescribed at the UKM Low Vision Clinic also showed similar patterns, whereby the highest number of patients were prescribed with near low vision aids (19). From the Wilcoxon test, visual acuity improvement was seen in 87.5% of the patient after prescription of low vision aids. Only a patient showed no improvement of visual acuity after the prescription of low vision aids. Moreover, the p values were less than 0.05, which indicated that visual acuity before and after prescription of low vision aids was statistically related. Previous study at a low vision clinic in Saudi Arabia also indicated improvement in visual acuity after prescription of low vision aids for most of the low vision patients. However, the study also revealed that 69 patients had no visual acuity improvement with low vision aids (11). Nonetheless, in this study, the patients' visual function improved with the independent performance of daily

tasks. The patients needed to come for a follow-up or come to the rehabilitation centre for training with low vision aids and learn some adaptive skills to improve their quality of life (20).

From this study, a low vision clinic functions for clinical assessment especially in prescribing low vision aids. It helps the low vision patients receive proper management of their rehabilitation and referrals that optimally help their vision. Consequently, rehabilitation could help the low vision patients to perform their daily tasks independently. A study was done by Omar et al. (19) also agreed that proper referrals could optimally help low vision patients use their visual function to perform daily tasks independently and live a better quality life.

CONCLUSION

In conclusion, the causes of visual impairment of patients visiting the UiTM Low Vision Clinic were mainly due to cataracts. The pattern of prescribing low vision aids was also varied, but a limited number of patients was prescribed with low vision aids. The prescription of low vision aids helped improve the patient's visual performance. Low vision aids were beneficial for low vision patients to improve their quality of life, mainly to perform daily tasks. Proper management and referrals should be provided to the patients to ensure that they receive maximal visual function and improve their quality of life. The Social Welfare Department (JKM) referral is important for new low vision patients to receive financial assistance to purchase low vision devices and receive other benefits, such as community training. Other rehabilitation approaches could also be suggested to the low vision patients. Training is also necessary for patients with prescriptions of low vision aids to maximise their visual function.

There were some limitations in this study. Firstly, the number of low vision patients who attended the clinic and were involved in this study is small. Some of the patients were rejected as their visual acuity status for distance, and near vision did not meet the definition provided by the WHO. Other patients were excluded from this study due to missing data. A disadvantage of this study was that clinical examination and recording of each patient were performed by different examiners. Thus, errors in medical diagnoses or approaches may cause patients to be excluded from this study.

This study focused on the causes of visual impairment and the pattern of prescribing low vision aids with the exception of the other demographic data, such as occupation, hobby, and patient's rehabilitation goals. Hence, it is recommended to investigate the data further to study the relationship between prescription of low vision aids and patient's goals.

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