

THE TREND OF OPTOMETRIC DIAGNOSES AND THEIR MANAGEMENT IN THE IIUM OPTOMETRY CLINIC

NURUL NAJWA ATHIRAH MOHD JAFFAR, BOptom
DEPARTMENT OPTOMETRY AND VISUAL SCIENCE, KULLIYAH OF ALLIED HEALTH
SCIENCE, INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA. JALAN SULTAN AHMAD
SHAH, BANDAR INDERA MAHKOTA, 25200 KUANTAN, PAHANG, MALAYSIA

najwaathirah@gmail.com

ILYANOON ZAHARI, PhD (CORRESPONDING AUTHOR)

DEPARTMENT OPTOMETRY AND VISUAL SCIENCE, KULLIYAH OF ALLIED HEALTH
SCIENCE, INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA. JALAN SULTAN AHMAD
SHAH, BANDAR INDERA MAHKOTA, 25200 KUANTAN, PAHANG, MALAYSIA

ilya@iium.edu.my

ABSTRACT

Introduction: The study aimed to identify the type and frequencies of optometric diagnoses in IIUM Optometry Clinic, Indera Mahkota Campus (IMC) in Semester 2 2016/2017. The relationship between age, gender and ethnicity with the three most common optometric diagnoses in IIUM Optometry Clinic has been studied. The management given in IIUM Optometry Clinic was also recorded. **Methods:** The study involved 223 subjects aged between 1 to 80 years old and gender independent. This study used universal sampling and retrospective design. Age, gender, race, diagnosis, and management of patients were noted from the case records. Some of the patients had more than one diagnosis. Hence, the diagnoses were more than the number of patients examined. **Results:** The top three classifications of optometric diagnoses were refractive problems (217, 45.2%), ocular diseases (198, 41.2%) and vergence problems (26, 5.4%). From these three classifications, they were divided into their own specific diagnoses in which myopia (96, 20.0%) was found to be the most common diagnosis followed by dry eyes (91, 19.0%) and convergence insufficiency (14, 2.9%). From the chi-square test, the results revealed a significant association between age with myopia ($p=0.029$) and dry eyes ($p=0.022$). The three most common management given were refractive management (226, 43.8%), prescribing artificial tears (77, 14.9%) and patient education (71, 13.8%). **Conclusions:** In conclusion, since refractive errors remain the leading cause of global visual impairment, better intervention strategies can be planned and implemented, especially in visual screening. A higher occurrence of certain cases can encourage optometrists to be very competent in managing the case.

KEYWORDS: optometry cases, optometry clinic, diagnosis

INTRODUCTION

Often, it was said cases managed by the students are stereotyped. Hence, this study was conducted to know about the trend of optometric diagnoses and their management in IIUM Optometry Clinic in Semester 2 2016/2017. Knowledge of the trend of optometric diagnoses could provide some overview of how often the students in IIUM Optometry Clinic could encounter the diagnoses. Thus, this can be helpful in planning the management. The trend of common specific disorders and problems may help practitioners and students to contemplate who is at a higher risk for a disorder and to better diagnose any pathological problem (Elam & Lee, 2013). This study also gave information about the management given in IIUM Optometry Clinic. Thus, a standard of procedures (SOP) can be produced or updated for the common optometric diagnoses in the IIUM Optometry Clinic.

Previous studies have done studies about the trend of optometric diagnoses in other eye care centres. For example, in the State College of Optometry, New York, optometrists found and diagnosed many refractive error problems (Soroka et al., 2006). Increased prevalence of myopia had been found during the late teens and 20s due to genetic and environmental factors (Williams et al., 2015). A study by Reddy, Tajunisah, Low & Karmila (2008) mentioned that the most common eye problems seen in University of Malaya Medical Centre were cataract (385, 32.9%), glaucoma (274, 23.4%), uncorrected refractive errors (126, 10.8%), diabetic retinopathy (113, 9.7%), visual impairment (105, 9.6%) and

blindness (11, 0.9%). Another study by Lara et al. (2001) reported that 22.3% of patients presented in the general clinic population with accommodation and convergence excess as the two most common disorders. A study by Garza-León et al. (2016) reported that dry eyes had become one of the most common eye diseases and the main cause for patients to seek prevention and treatment.

This current study also focused on the management provided in the IIUM Optometry Clinic. Since the management of optometric diagnoses varies among practitioners, a standard of procedure would be very useful as clinical practice guidelines to be referred to. A clinical practice guideline produced by the Ministry of Health Malaysia comprises management for glaucoma, diabetic retinopathy, post-operative infectious endophthalmitis and retinopathy of prematurity. During the run of this study, IIUM Optometry Clinic also very recently came out with several SOPs for clinic flow and management to be used internally.

MATERIALS AND METHODS

This study was conducted in IIUM Optometry Clinic, Indera Mahkota Campus (IMC), Kulliyah of Allied Health Sciences, IIUM Kuantan, Pahang. It was a retrospective study and utilised a universal sampling technique, where all the records of patients that attended IIUM Optometry Clinic in Semester 2 2016/2017 were retrieved and reviewed. Only signed informed consent records were included as participants in this study.

Data Collection and Analysis

Data recorded by Optometry students on all patients who underwent optometric examination at IIUM Optometry Clinic (IMC) in Semester 2 2016/2017 had been retrieved and reviewed. Each optometry student in IIUM would record all the patients' results during the eye examination in a standardised form. The results had been kept as patients' records. In this study, age, gender, race, diagnosis, and management of patients were noted from the case records. Some of the patients had more than one diagnosis, and others also had more than one management. Hence, the total number of cases and management was more than the number of patients examined. The total number of diagnoses and management had been counted manually and inserted into the data collection form.

The obtained data had been keyed into Statistical Package for the Social Science (SPSS) for analysis. Statistical analysis was performed by using SPSS Version 12.0.1 for Windows. In all tests, a p-value of less than 0.05 was considered to indicate statistical significance.

RESULTS

The Trend of Optometric Diagnoses in IIUM Optometry Clinic (IMC) in Semester 2 2016/2017

Figure I shows refractive problems as the most common classification of optometric diagnosis seen in this study (217, 45.2%) followed by ocular diseases (198, 41.2%), vergence problems (26, 5.4%), accommodation problems (18, 3.8%), other diagnoses-discomfort/disability glare, bad dispensing, colour vision defect and migraine (10, 2.1%), visual disturbances- amblyopia, nystagmus and optic tract lesion (7, 1.5%) and strabismus (4, 0.8%).

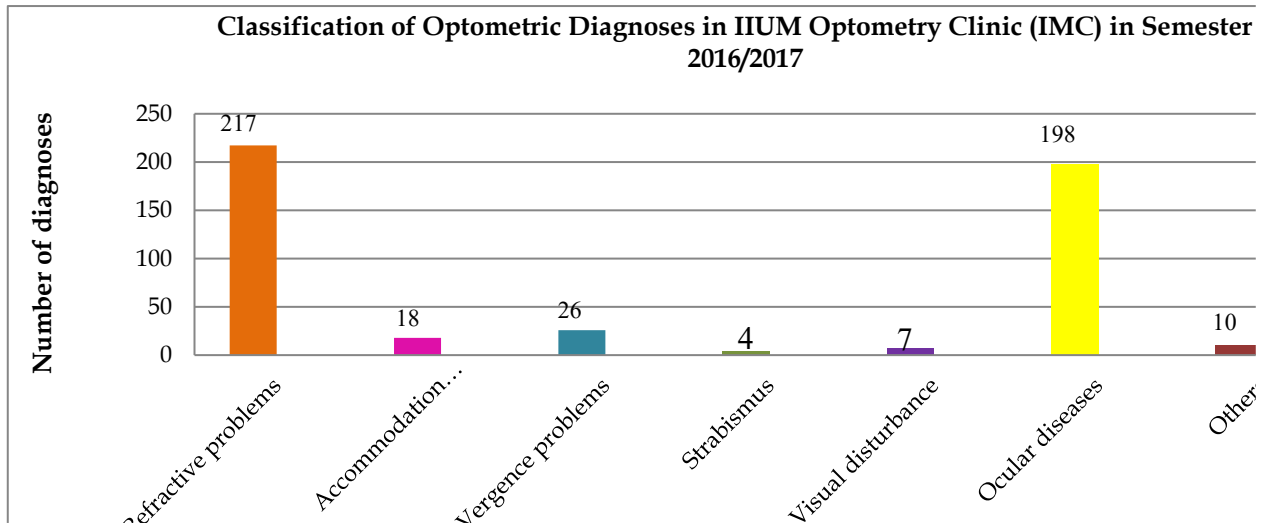


Figure I Classification of Optometric Diagnoses in IIUM Optometry Clinic (IMC)

The top three classifications of optometric diagnoses which were refractive problems, ocular diseases and vergence problems, had been divided into their specific diagnoses to get the results for the three most common optometric diagnoses. From the total of 480 diagnoses, myopia (96 cases, 20.0%) was the most common diagnosis followed by dry eyes (91, 19.0%) and convergence insufficiency (14, 2.9%) (Table I).

Table I Type and Frequencies of Optometric Diagnoses in IIUM Optometry Clinic (IMC)

OPTOMETRIC DIAGNOSES	NO. (%)
Refractive Problems	217 (45.2%)
Myopia	96 (20.0%)
Hyperopia	12 (2.5%)
Emmetropia	55 (11.5%)
Astigmatism Alone	21 (4.4%)
Anisometropia	12 (2.5%)
Antimetropia	3 (0.6%)
Presbyopia	18 (3.8%)
Accommodation Problems	18 (3.8%)
Accommodation Insufficiency	12 (2.5%)
Accommodation Excess	2 (0.4%)
Accommodation Infacility	3 (0.6%)
Accommodation Weakness	1 (0.2%)
Vergence Problems	26 (5.4%)
Basic Esophoria	4 (0.8%)
Basic Exophoria	1 (0.2%)
Divergence Weakness	2 (0.4%)
Divergence Excess	1 (0.2%)
Convergence Insufficiency	14 (2.9%)
Convergence Excess	3 (0.6%)
Hyperphoria	1 (0.2%)

Strabismus	4 (0.8%)
Visual Disturbances	7 (1.5%)
Amblyopia	5 (1.0%)
Nystagmus	1 (0.2%)
Optic Tract Lesion	1 (0.2%)
Ocular Diseases	198 (41.2%)
Chalazion	6 (3.0%)
Trichiasis	2 (1.0%)
Dry Eyes	91 (46.0%)
MGD	12 (6.1%)
Allergic Conjunctivitis	2 (1.0%)
Bacterial Conjunctivitis	1 (0.5%)
Papillary Conjunctivitis	12 (6.1%)
Conjunctival Concretion	7 (3.5%)
Pinguecula	5 (2.5%)
Pterygium	6 (3.0%)
Conjunctival Cyst	1 (0.5%)
Corneal Neovascularization	2 (1.0%)
Superficial Punctate Keratitis	7 (3.5%)
Corneal Staining	5 (2.5%)
Keratoconus	3 (1.5%)
Arcus Senilis	1 (0.5%)
Cataract	14 (7.1%)
Iris Pigmentosa	1 (0.5%)
Iris Synechiae	1 (0.5%)
Retinal Haemorrhage	1 (0.5%)
Retinitis Pigmentosa	1 (0.5%)
ARMD	1 (0.5%)
Glaucoma	15 (7.6%)
Papilloedema	1 (0.5%)
Others	10 (2%)
Glare (Disability and Discomfort Glare)	5 (1.0%)
Bad Dispensing	3 (0.6%)
Colour Vision Defect	1 (0.2%)
Migraine	1 (0.2%)

The Association of Demographic Data with Common Optometric Diagnoses in IIUM Optometry Clinic (IMC)

The association of age, sex and ethnicity with myopia, dry eyes and convergence insufficiency were analysed using the Chi-square test in Tables II, III and IV.

Table II Association of Age, Sex and Ethnicity with Myopia

Variable	Myopia		p-value
	Present (n = 96)	Absent (n = 127)	
	n (%)	n (%)	
Age:			
Below 40	90 (93.8)	107 (84.3)	*0.029
Above 40	6 (6.3)	20 (15.7)	
Sex:			
Male	24 (25.0)	42 (33.1)	0.191
Female	72 (75.0)	85 (66.9)	
Ethnicity:			
Malay	92 (95.8)	119 (93.7)	0.508
Chinese	4 (4.2)	7 (5.5)	
Others	0 (0.0)	1 (0.8)	

*significant, $p < 0.05$

Myopia shows a significant association with age whereas no significant association was found with sex and ethnicity.

Table III Association of Age, Sex and Ethnicity with Dry Eyes

Variable	Dry eyes		p-value
	Present (n = 91)	Absent (n = 132)	
	n (%)	n (%)	
Age:			
Below 40	75 (82.4)	122 (92.4)	*0.022
Above 40	16 (17.6)	10 (7.6)	
Sex:			
Male	27 (29.7)	39 (29.5)	0.984
Female	64 (70.3)	93 (70.5)	
Ethnicity:			
Malay	86 (94.5)	125 (94.7)	0.564
Chinese	5 (5.5)	6 (4.5)	
Others	0 (0.0)	1 (0.8)	

*significant, $p < 0.05$

Dry eyes show a significant association with age whereas no significant association was found with sex and ethnicity.

Table IV Association of Age, Sex and Ethnicity with Convergence Insufficiency

Variable	Convergence insufficiency		p-value
	Present (n = 14)	Absent (n = 209)	
	n (%)	n (%)	
Age:			1.000
Below 40	13 (92.9)	184 (88.0)	
Above 40	1 (7.1)	25 (12.0)	
Sex:			1.000
Male	4 (28.6)	62 (29.7)	
Female	10 (71.4)	147 (70.3)	
Ethnicity:			0.876
Malay	13 (92.9)	198 (94.7)	
Chinese	1 (7.1)	10 (4.8)	
Others	0 (0.0)	1 (0.9)	

Convergence insufficiency shows no significant association with age, sex and ethnicity.

Management of Optometric Diagnoses in IIUM Optometry Clinic (IMC)

In Figure II, refractive management (226, 43.8%) was the most common management that had been given to the patients followed by prescribing of artificial tears (77, 14.9%), patient education (71, 13.8%), referral for further test (33, 6.4%), follow-up care (30, 5.8%), advised on ocular hygiene (30, 5.8%), co-management (27, 5.2%), vision therapy (21, 4.1%), and other management (1, 0.2%). Meanwhile, Table V shows the specific type of management given.

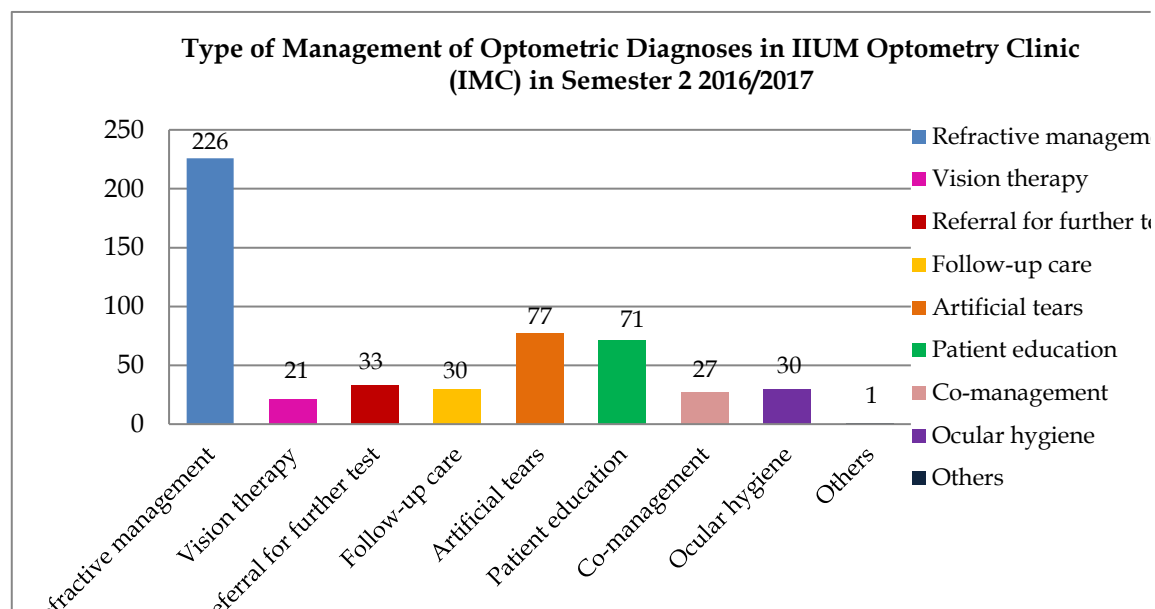


Figure II Type of Management of Optometric Diagnoses in IIUM Optometry Clinic

Table V Specific Type of Management of Optometric Diagnoses in IIUM Optometry Clinic

Classification	Specific Type of Management
Refractive management	New prescription
	No prescription
	Continue current prescription
Binocular vision	Vision therapy
Referral for further test/management	Refractive assessment (cycloplegic)
	Anisometropia assessment
	Dry eyes assessment
	Glaucoma assessment
	Keratoconus assessment
	Binocular vision assessment
Follow-up care	Visual acuity
	Accommodation and vergence
	Monitor progression
	Monitor compliance
Dry eyes symptoms	Artificial tears
Patient education	Patient education
Co-management	With ophthalmologist
	With medical officer
Ocular hygiene	Warm and cold compression
	Lid hygiene
Others	Epilation

DISCUSSION

Optometry diagnosis trend

Myopia was found to be the most common optometric diagnosis in IIUM Optometry Clinic (IMC), seen in Semester 2 2016/2017. This was supported by Goh, Abqariyah, Pokharel and Ellwein (2005), in which myopia was the most prevalent among the other types of refractive errors in the school-age population in the Gombak district. However, according to Wen et al. (2013), there was a significant number of hyperopic patients in both Asian and non-Hispanic white children, but the prevalence decreased after the infancy stage and then increased during late adulthood. Nevertheless, refractive errors remain by far the leading cause of major global visual impairment (Pascolini & Mariotti, 2012). This current study revealed that there was a significant association between age and myopia in the population. This result was supported by Williams et al. (2015) in which there was an increment in the prevalence of myopia during the late teens and 20's with the peak prevalence of myopia found during the age of 25–29 years old. However, there was no significant association between sex and ethnicity with myopia that had been found in this study. On the contrary, a study by Goh, Abqariyah, Pokharel and Ellwein (2005) found that myopia was higher in females than males. In addition, a study by Pan et al. (2013) revealed that the Chinese population were most affected by myopia compared to the Malay and Indian population.

Dry eyes were the second most common optometric diagnosis in IIUM Optometry Clinic (IMC) and the most common diagnosis among ocular diseases. A significant association was found between age and dry eyes in the population. The percentage of dry eyes in patients below 40 years old was higher compared to patients above 40 years old. However, if the total of patients with dry eyes was evaluated within the population of more than 40 years old, it was found that more than half of the patients above 40 years old had been diagnosed with dry eyes. Females and increasing age were found to be risk factors for dry eye disease (Mohd Ali et al., 2011). Even so, no significant association was found between sex and dry eyes in this current study. Besides dry eyes, a study by Reddy et al. (2008) included cataracts and glaucoma among the most common eye problems at the University of Malaya Medical Centre. However, in this study, even though glaucoma and cataracts were the second and third most common ocular diseases after dry eyes, they only accounted for 7.6% and 7.1% among the ocular diseases respectively compared to dry eyes which accounted for about 46% in the population. Cataracts and glaucoma were included as age-related eye diseases (Voleti & Hubschman, 2013). However, the current study only had 26 patients above 40 years old, which is insufficient to show any prevalence of age-related eye diseases, including diabetic retinopathy and age-related macular degeneration.

Another common optometric diagnosis in IIUM Optometry Clinic was convergence insufficiency. Convergence insufficiency is the most prevalent dysfunction among accommodative and binocular problems (Garcia et al., 2016). Since there was only a total of 14 patients with convergence insufficiency, no significant association was found between demographic data and convergence insufficiency. This result was supported by Hashemi et al. (2017), which showed no statistically significant association of age and gender with the diagnosis of convergence insufficiency. On the contrary, Rouse et al. (1999) stated that ethnicity was significantly associated with convergence insufficiency with Hispanic, Asian, white and black people as the study populations.

Types of optometry management

The management given within the study period was classified into nine categories. Refractive management was given depending on the type of refractive errors and patients' needs. A new prescription was prescribed to patients who presented with symptoms and showed improved acuity and comfort. Patients without any complaints and have optimum acuity were advised to continue wearing their current spectacle.

Meanwhile, most patients with accommodation/vergence problems had been prescribed new prescriptions and vision therapy and were asked to attend the follow-up care session. Examiners would advise and educate those who presented with no symptoms with visual hygiene. Even

though some of the patients came to IIUM Optometry Clinic with no specific symptoms, a comprehensive eye check-up must be performed. This is because a significant number of new diagnoses have also been found in asymptomatic patients, thus affecting the management (Irving et al., 2016).

The most common management for ocular diseases was prescribing artificial tears to manage dry eyes. For patients diagnosed with any ocular diseases at an early stage and asymptomatic, often the management given was patient education and visual hygiene. They also had been advised to come for follow-up care to monitor the progression of the ocular diseases. Co-management with ophthalmologists and other healthcare practitioners was also part of the optometric management at IIUM Optometry Clinic.

Besides that, to confirm the diagnosis, some of the diagnoses such as dry eyes, glaucoma and keratoconus had been referred for further assessment. These diagnoses would be further investigated and evaluated through the diagnostic procedures in the IIUM Optometry Clinic. Therefore, through various forms of diagnostic procedures performed, it can be seen here that optometrists play an important role as primary eyecare practitioners.

CONCLUSION

The three most common optometric diagnoses in IIUM Optometry Clinic (IMC) during Semester 2 2016/2017 were myopia, dry eyes and convergence insufficiency. In relation to that, the most common management given was refractive management, followed by prescribing artificial tears and patient education. Therefore, knowledge of the trend of optometric diagnoses is helpful for resident optometrists, especially the optometry students in training, to prepare themselves for the common cases possibly encountered in the clinic. It is helpful that the practising optometry students, including optometrists, are competent in managing the high occurrence cases. A proper and complete referral to other healthcare providers can be conducted to avoid incorrect diagnosis and unnecessary treatment (Nari et al., 2017). A standard of procedure (SOP) was produced and can be updated for the common optometric diagnoses in the IIUM Optometry Clinic.

The limitation of this study is that it did not specify the demographic of the patients attending the clinics which may be predominantly the university students and staff of IIUM.

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