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Prevalence of Coexisting Systemic and Ocular Diseases among Cataract Surgery Patients: A Study in a Teaching Hospital in North East Malaysia

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Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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ABSTRACT

Aim: To determine the prevalence of coexisting systemic and ocular diseases among the cataract surgery patients in a teaching hospital in north east Malaysia.
Method: in this retrospective study, the medical records of patients who were operated for cataract over a period of three years by a single surgeon in the teaching Hospital University Sains Malaysia were analyzed for the coexisting systemic and ocular diseases. Some patients were operated in both eyes.
Results: Out of 218 patients who underwent cataract surgery, one or more systemic diseases were present in 113 patients (51.8%). The most common associated systemic disease was diabetes mellitus (24.3%), followed by hypertension (22.4%). A total of 324 eyes were operated in these patients. In addition to cataract, one or more ocular diseases were present in 129 eyes (39.8%). The most common ocular disease in cataract eyes was pterygium (9.8%), followed by diabetic retinopathy (9.5%).
Conclusion: Ophthalmologist has to identify the coexisting systemic and ocular diseases present among cataract surgery patients. These diseases should be adequately controlled before surgery in order to avoid intraoperative and postoperative complications, and to achieve better quality of life for the patients.

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Keywords: Cataract; diabetes mellitus; hypertension; ischemic heart disease; pterygium; open angle glaucoma; diabetic retinopathy; age related macular degeneration.

1. INTRODUCTION

Globally, the leading causes of vision impairment are uncorrected refractive errors and cataracts. The majority of people with vision impairment are over the age of 50 years [1]. Excellent potential for good visual outcome (6/12 or better) has been reported after cataract extraction and intraocular lens implantation in the developed [2] and developing countries [3]. Cataract surgery is one of the most common and safe ophthalmic operation performed all over the world. Presence of preoperative systemic and ocular diseases can have a significant effect on the outcomes of cataract operation [4].

The literature search revealed varying prevalence of preoperative coexisting systemic diseases in cataract patients ranging from 32.81% to 92.52% in different countries [5-12]. There is a need for extra health care services and availability of resources for cataract patients with systemic comorbidities. Wide range of prevalence of coexisting ocular diseases in cataract operated patients (8.0%-71.81%) has been reported from different countries [5-10,12]. The associated ocular diseases should be treated adequately before undertaking cataract surgery to avoid intraoperative and postoperative complications and to achieve useful vision after the operation.

The literature search revealed only one report from Ministry of Health Malaysia hospital [10] in which the data of Melaka hospital were taken from the national cataract surgery registry and analyzed for the coexisting systemic and ocular diseases along with many other variables. Therefore, this retrospective study was undertaken to determine the prevalence of coexisting systemic and ocular diseases among the cataract operated patients in a teaching university hospital in north east Malaysia.

2. MATERIALS AND METHODS

Kelantan is one of the states located in north east Malaysia with population of 1.86 million (0.94 million males and 0.92 million females) [13]. It is an agricultural state and majority of people live in rural areas. There are two tertiary hospitals in this state viz Hospital Kota Bharu (ministry of health state hospital) and Hospital University Sains Malaysia (teaching hospital of School of Medicine, University Sains Malaysia in Kubang Kerian, Kota Bharu district). The patients from different health centres of the state are referred for cataract surgery to these two hospitals.

In this retrospective study, the medical records of cataract patients operated, over a period of three years, in the teaching University Sains Malaysia hospital were reviewed for the coexisting systemic and ocular diseases. There were six medical lecturers and ten postgraduate students in the ophthalmology department of the teaching hospital. The operation days were twice a week and thus the theatre facilities were shared by three specialists and five postgraduate students on each day.

Two hundred and eighteen patients aged above 50 years with cataract causing visual disability in daily occupational work and scheduled for surgery were included in this study. Those patients with traumatic cataract, eyes with signs of inflammation, and eyes with no perception of light were excluded. The gender, age and race of patients, eye operated, coexisting systemic and ocular diseases were noted. Cases operated by a single surgeon (author) only were included in this study. After the routine work up, informed consent was taken for surgery. Standard microsurgical procedure of exrcapsular cataract extraction with polymethyl methacrylate posterior chamber intraocular lens implantation was performed in all the patients under infiltration local anaesthesia.

The data variables were analyzed by SPSS programme using version 16 software. Categorical variables were presented as frequencies (%). Prevalence rates for systemic diseases were person specific and ocular diseases were eye specific.

3. RESULTS

Out of 218 patients who underwent cataract surgery, females were slightly more (52.3%) than males (47.7%). Majority of patients were Malays (70.6%). Nearly three-fourths (73.4%) of patients were above the age of 60 years. A total of 324 eyes were operated; 106 patients underwent operation in both eyes (Table1). One or more coexisting systemic diseases were present in 113 out of 218 cataract patients (51.8%). The most common systemic disease was diabetes

mellitus (24.3%), followed by hypertension (22.4%), and ischemic heart disease (4.5%), Table 2. In addition to cataract, one or more coexisting ocular diseases were present in 129 out of 324 eyes (39.8%). The most common ocular disease was pterygium (11.1%), followed by diabetic retinopathy (8.9%) and open angle glaucoma (7.1%), Table 3.

Table 1. Demographic characteristics of cataract patients (n=218)

Parameter	Number	Percentage
Gender		
Male	104	47.7%
Female	114	52.3%
Age		
51 – 60 years	58	26.6%
61 – 70 years	94	43.1%
71 – 80 years	58	26.6%
81 – 90 years	8	3.7%
Race		
Malay	154	70.6%
Chinese	52	23.8%
Indian	12	5.5%
Eye operated		
Right eye	62	28.4%
Left eye	50	22.9%
Both eyes	106	48.6%

Table 2. Coexisting systemic diseases in cataract patients (n=218)*

Systemic disease	Number	Percentage
Diabetes mellitus	53	24.3%
Hypertension	49	22.4%
Ischemic heart disease	10	4.5%
Asthma	8	3.6%
Leprosy	3	1.4%
Gout	3	1.4%
Hemiplegia	3	1.4%
Tuberculosis	2	0.9%
Hyperthyroidism	2	0.9%
Syphilis	1	0.4%
Breast carcinoma	1	0.4%
Non Hodgkins lymphoma	1	0.4%

** some patients had more than one associated systemic disease*

4. DISCUSSION

Cataract is the most common cause of preventable blindness in the world. Most of these patients are elderly and are likely to have various associated systemic diseases. Preoperative assessment is important to determine the prevalence of systemic diseases to prevent preoperative, operative and postoperative complications and mortality in patients undergoing cataract surgery. Persons undergoing cataract extraction may have higher mortality than patients of comparable age, sex and race undergoing other surgical procedures [14].

The prevalence of systemic diseases in the present study (51.8%) is higher than the figures reported in some studies [6,11,12] and lower than other studies reported from different countries (Table 4).

The percentage of the common systemic diseases that include diabetes mellitus, hypertension and heart disease (ischemic heart diseases, angina, myocardial infarction, cardiac arrhythmia, cardiac failure) reported from different countries in cataract patients is shown in Table 5.

The following are the probable factors for the varied prevalence of coexisting systemic diseases in the population in different countries: (1) genetic and racial predisposition for disease - diabetes, coronary heart disease, (2) socioeconomic status, physical inactivity and eating habits of different groups of people - diabetes, hypertension, ischemic heart disease, (3) environmental air pollution - asthma, and (4) obesity and hyperlipidemia-diabetes, hypertension, ischemic heart disease, (5) availability of good health care facilities for prevention, early diagnosis and treatment - more detection of these diseases in the population. The frequency of different diseases depends on the number of patients examined in the study.

Cataracts in patients with diabetes most commonly present as cortical or posterior subcapsular cataracts that occur at an earlier age in patients with poor blood sugar control as compared to age-matched controls. These cataracts often progress more rapidly and are more closely related to poor glucose control than duration of the disease. Classic diabetic cataracts consist of snowflake cortical opacities that may either resolve spontaneously or mature rapidly within a short period of time. These cataracts occur due to a high level of glucose present in the aqueous humor, which diffuses into the lens. Within the lens, glucose is metabolized by aldose reductase into sorbitol, which then accumulates within the lens. This results in a subsequent osmotic over-hydration of

the lens substance. In mild cases, this change may affect the refractive index of the lens, which can then lead to fluctuations in refraction related to changes in plasma glucose levels. Cortical fluid vacuoles can also develop in these patients, which can evolve into more dense opacities [15].

Haddad et al. [16] reported that cataract extraction in diabetic patients as compared to non-diabetic patients is associated with higher risks of reported complications such as capsular contraction and opacification as well as post-surgical worsening of macular edema and diabetic retinopathy. Therefore, the surgeon has to be vigilant in a cataract operated eye in diabetic patient during postoperative follow up.

Eyes of diabetic patients showed more severe corneal endothelial cell damage following cataract surgery and delayed recovery of corneal edema as described previously [17]. Other anterior segment complications such as severe iritis, posterior synechiae, pupillary block, and pigmented precipitates on the intraocular lens are more frequently observed in diabetic patients [18]. Diabetic patients may have increased risk of postoperative endophthalmitis which may be associated with a poor visual prognosis [19].

Significant bleeding is extremely rare during phacoemulsification cataract surgery and even large incision extracapsular or intracapsular cataract surgery. In a study of 734 hypertensive patients, who had no perioperative intervention for elevated blood pressure, had no significant difference in surgical complications compared with normotensives [20]. In a prospective study of 108 cases of suprachoroidal haemorrhage complicating cataract surgery from 13 centres participating in the United Kingdom British Ophthalmological Surveillance Unit [21], univariate analysis of potential risk factors found no significant effect of hypertension. However, good control of hypertension preoperatively as

Table 3. Coexisting ocular diseases in cataract eyes (n=324 eyes)*

Eye disease	Number	Percentage
Pterygium	32	9..8%
Diabetic retinopathy	31	9.5%
Open angle glaucoma	23	7.1%
Central corneal opacity	14	4.3%
Pseudo exfoliation of lens	8	2.4%
Hypertensive retinopathy	6	1.8%
Myopic degeneration	6	1.8%
Acute congestive glaucoma	6	1.8%
Chronic dacryocystitis	4	1.2%
Age related macular degeneration	4	1.2%
Retinitis pigmentosa	2	0.6%
Divergent squint	2	0.6%
Healed central choroiditis	2	0.6%
Optic atrophy	2	0.6%
Macular hole	1	0.3%
Coloboma of iris	1	0.3%

** some eyes had more than one associated eye disease*

Table 4. Prevalence of systemic diseases in cataract patients in different countries

Author	Place & country	Total No. of patients	Percentage of systemic diseases
Arthur et al. [5]	Pondichery, India	448	32.81%
Shrestha et al. [6]	Pokhara, Nepal	675	59.4%
Riley et al. [7]	Auckland, New Zealand	480	80.0%
Pham et al. [8]	Sydney, Australia	615	92.52%
Abdelmoaty et al. [9]	Kuwait, Kuwait	325	61.5%
Thevi & Godinho [10]	Melaka, Malaysia	12992	33.79%
Ram et al. [11]	Chandigarh, India	6103	17.2%
Al-Qahtani et al. [12]	Riyadh, Saudi Arabia	421	82.66%
Present study	Kelantan, Malaysia	218	51.8%%

Table 5. Frequency of common systemic diseases in cataract patients in different countries

Author	Diabetes mellitus	Hypertension	Heart disease	Asthma
Arthur et al. [5]	13.62%	9.38%	1.12%	1.79%
Shrestha et al. [6]	14.7%	17.8%	7.7%	---
Riley et al. [7]	20.41%	45.83%	22.5%	11.25%
Pham et al. [8]	27.47%	56.26%	35.12%	12.0%
Abdelmoaty et al. [9]	37.53%	36.3%	15.38%	---
Thevi & Godinho [10]	42.30%	55.23%	9.93%	3.3%
Ram et al. [11]	3.75%	2.7%	1.39%	3.67%
Al-Qahtani et al. [12]	61.04%	64.13%	15.67%	10.45%
Present Study	24.3%	22.4%	4.5%	3.6%

well as postoperatively is important to prevent the possibilities of post operative bleeding in the eye (hyphema, vitreous haemorrhage, and suprachoroidal haemorrhage) in a cataract eye.

In a population based cohort study, Hu et al. [22] reported that the cataract patients undergoing cataract surgery were associated with a higher risk of ischemic heart disease compared with those cataract patients without surgery ($P<0.05$). If asthma is not controlled adequately before the cataract operation, there is usually cough in these patients. Adequate control of asthma is very important before cataract operation to avoid the possible postoperative complications such as wound gape, shallow anterior chamber/ iris prolapse, hyphema and raised intraocular pressure because of persistant cough in these patients.

The prevalence of ocular comorbidities in the present study (39.8%) is lower than the figures 71.81% [11] and higher than the other studies reported from different countries (Table 6).

The percentage of the common ocular diseases that include open angle glaucoma, diabetic retinopathy and age related macular degeneration reported from different countries in cataract patients is shown in Table 7.

The varied prevalence of coexisting ocular diseases could be due to (1) genetic predisposition of the eye diseases-open angle

Table 6. Prevalence of coexisting ocular diseases in cataract patients in different countries

Author	Place & country	Total No. of eyes	Percentage of ocular diseases
Arthur et al. [5]	Pondichery, India	448	14.73%
Shrestha et al. [6]	Pokhara, Nepal	675	8.0%
Riley et al. [7]	Auckland, New Zealand	488	26.0 %
Pham et al. [8]	Sydney, Australia	653	35.98%
Abdelmoaty et al. [9]	Kuwait, Kuwait	350	9.7%
Thevi & Godinho [10]	Melaka, Malaysia	12992	71.81%
Al-Qahtani et al. [12]	Riyadh, Saudi Arabia	421	15.43%
Present study	Kelantan, Malaysia	324	39.8%

Table 7. Frequency of common ocular diseases in cataract patients in different countries

Author	POAG	DR	ARMD
Arthur et al. [5]	1.12%	3.35%	---
Shrestha et al. [6]	1.04%	0.3%	0.3%
Riley et al. [7]	9.2%	7.6%	5.1%
Pham et al. [8]	10.6%	9.0%	12.6%
Abdelmoaty et al. [9]	2.85%	1.42%	0.57%
Thevi & Godinho [10]	6.78%	10.8%	1.55%
Al-Qahtani et al. [12]	4.6%	5.1%	0.2%
Present study	7.1%	9.5%	1.2%

POAG= primary open angle glaucoma, DR= diabetic retinopathy, ARMD= age related macular degeneration

glaucoma, diabetic retinopathy, (2) racial occurence-age related macular degeneration, (3) smoking-age related macular degeneration, (4) associatd systemic diseases like diabetes, hypertension-open angle glaucoma, diabetic retinopathy, hypetensive retinopathy, (5) dry and dusty weather and environment-pterygium. The frequency of different diseases depends on the number of patients examined in the study.

Open angle glaucoma is quite often associated with cataract in the same eye. If the intraocular pressure is not controlled adequately before cataract surgery with medications, the eye is at high risk for intraoperative vitreous loss/ suprachoroidal haemorrhage during operation. Uncontrolled post operative intraocular pressure will lead to glaucomatous cupping and possibility of not achieving good vision in these eyes. Earlier, trabeculectomy was performed in the eyes with uncontrolled pressure on glaucoma medications. Recently, after control of intraocular pressure with medication, glaucoma triple procedure (cataract extraction + IOL implantation + trabeculectomy) is the treatment practiced by many surgeons.

Breakdown of the blood-aqueous and blood-retinal barriers may worsen postoperative inflammation after cataract surgery in both extracapsular cataract extraction and phacoemulsification, and this vicious cycle may instigate or expedite diabetic retinopathy progression [23]. Dowler et al. [24] reported that uncomplicated phacoemulsification cataract surgery does not accelerate progression of diabetic retinopathy as smaller incision size and shorter surgical time in phacoemulsification decrease inflammation and may induce less breakdown of the blood–ocular barrier. Similarly, Shah and Chen [25] reported that recent studies do not support the generalized conclusion that phacoemulsification causes progression of retinopathy and macular oedema in all diabetic patients.

The UK diabetic retinopathy electronic medical record users group authors found that the risk of “treatment-requiring diabetic macular oedema (DME)” increased sharply after surgery and peaked in the 3–6 months' period. The risk of macular oedema was associated with preoperative grade of retinopathy; the risk of DME in the 1st year postoperatively was 1.0% (no diabetic retinopathy preoperatively), 5.4% (mild non proliferative diabetic retinopathy - NPDR), 10.0% (moderate NPDR), 13.1% (severe NPDR), and 4.9% (proliferative diabetic retinopathy). This large real-world study proves that the risk of treatment requiring DME increases sharply in the 1st year after cataract surgery and that those with moderate and severe NPDR are most at risk of such progression [26].

All patients diagnosed with NPDR should undergo detailed retinal examination within 3 months before cataract extraction. Patients with diabetes, especially those with proliferative retinopathy or those with inadequate view of the retina before cataract extraction, should be evaluated closely after surgery for monitoring retinal status [27].

Wang et al. [28] reported that pooled findings from two large population-based cohorts (Bever Dam and Blue Mountain Eye studies) support the hypothesis that cataract surgery in older persons without pre-existing neovasular ARM or gyrate atrophy may be associated with an increased subsequent risk for developing late-stage ARM, particularly neovascular type. In such patients, the operating surgeon should inform guarded visual prognosis after cataract surgery.

Pterygium (9.8%) was the most common ocular disease seen in cataract patients in the present study. It causes visual problems due to induced corneal astigmatism (in most of the cases) or direct encroachment onto the visual axis (in advanced cases). Astigmatism is increased with increase in the size of the pterygium. Pterygium surgery (bare sclera technique or with additional conjunctival autograft technique) will improve visual acuity significantly by reducing the astigmatism. Amniotic membrane graft and conjunctival autograft are better surgical techniques than bare sclera technique to reduce the astigmatism [29].

If the pterygium surgery is done before cataract surgery and the power of intraocular lens (IOL) is calculated four weeks later (after complete corneal healing), the power of the IOL will be more accurate. Some surgeons tend to excise the pterygium in one sitting (excision of pterygium done first and then cataract operation) so that the patient need not come second time for pterygium surgery. The combined operation procedure leads to change in the corneal astigmatism after the cataract surgery which requires optical correction postoperatively to achieve better vision.

6. CONCLUSION

Ophthalmlogists come across systemic diseases and other ocular diseases quite often in cataract patients in their surgical practice. Comprehensive medical assessment is important to detect the coexisting systemic diseases in order to prevent preoperative, operative and postoperative complications and mortality in patients undergoing cataract surgery. Adequate control of the coexisting ocular diseases is important before undertaking cataract surgery to avoid intraoperative and postoperative complications, and to achieve useful vision after the operation. In case of advanced stage of the concurrent eye disease present before the cataract operation, guarded visual prognosis should be explained to the patient. If the surgeon treats the possible post-operative complications in time, the patient's quality of life can be improved.

5. LIMITATIONS

The number of cataract patients in this study was small. This was mainly because only single surgeon (author) cases were included in this study. Many surgeons and postgraduate trainees in the department shared the operation theatre time, which was only twice a week. Moreover, there was another government state hospital to which patients from ministry of health centers and district hospitals were referred for cataract surgery.

CONSENT

Informed written consent was taken for surgery.

ETHICAL APPROVAL

This study was approved by ethics committee of School of Medicine, University Sains Malaysia.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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