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Original Article

A Prospective Study to Determine the Prevalence of Type 2 Diabetes Mellitus and Hypertension in Cataract Patients at a Tertiary Care Hospital

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ABSTRACT

Objectives: This study was conducted to evaluate the prevalence of hypertension and diabetes mellitus in patients diagnosed with cataract in low-income category. **Materials and Methods:** The study included 100 cataract patients based on inclusion and exclusion criteria from the Department of ophthalmology, Shadan Institute of medical sciences, Teaching Hospital and Research Centre. During a period of 6 months, patients were assessed based on the following risk factors: diabetes mellitus, hypertension, both or none. **Results:** Majority of our patients did not have any co-morbidities (34%). Having both hypertension and diabetes (31%) was seen to be a major risk factor for the cataract development as compared to having only hypertension or only diabetes. Female patients seem to be at a slightly higher risk in all age groups. The age group of 45-50 years had the most patients. **Conclusion:** Female patients seem to be at a slightly higher risk of cataract with and without co morbidity as compared to male patients. The highest prevalence of cataract was reported in the patients suffering from both Hypertension and diabetes which was 31%. Most of the patients belonged to 45-50 years age group. In conclusion, the overall prevalence of hypertension was 25% and that of diabetes mellitus was 10%. Hence, hypertension (25%) seemed to be more prevalent as compared to diabetes mellitus.

Keywords: Cataract, Prevalence, Hypertension, Diabetes mellitus.

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INTRODUCTION

Cataracts continue to be the leading cause of blindness in many nations due to insufficient surgical services. According to a report by the WHO (World Health Organization) and NPCB (National Programme for Control of Blindness), there are currently 12 million blind people and over 22 million blind eyes in India, 80.1% of whom are blind due to cataract. In India, there are over 3.8 million cataract-related blindness cases every year. The current yearly performance level is in the range of 1.6-1.9 million cataract surgeries. One of the major causes of cataract are diabetes mellitus and hypertension. Patients having diabetes are upto five times more likely to develop cataract at an earlier age.[1] Aldose Reductase (AR) is an enzyme which catalyses the conversion of glucose to sorbitol via the polyol pathway, a mechanism linked to the development of diabetic cataract. It has been established that the sorbitol build-up inside the cells results in osmotic changes that weaken hydropic lens fibres. Diabetes-induced lens oxidative stress has been linked to the polyol pathway as its principal mediator. The main location of protein synthesis i.e., the Endoplasmic Reticulum (ER), experiences osmotic stress brought on by the accumulation of sorbitol, which eventually causes the generation of free radicals and cataract onset.[2,3] On the other hand, hypertension seems to be present in two thirds of patients undergoing cataract surgery. Hypertension is thought to contribute to increase in inflammatory cytokines including interleukin-6 (IL-6) and tumour necrosis factor-alpha (TNF-alpha). A person's BP has also been linked to an increase in C-Reactive Protein (CRP) levels. Given that systemic inflammation is closely associated with cataract, hypertension contributes to the degenerative process of cataract production via a mechanism of inflammation.[4,5]

As for now, there are various studies on how diabetes mellitus and hypertension do and do not contribute largely to the formation of cataracts. Multiple researches with different conclusion regarding diabetes mellitus or hypertension being more responsible for the formation of early onset cataract made it clear that more in depth studies are required in different population groups of various ethnicities. This study was conducted to evaluate the prevalence

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of diabetes mellitus and hypertension in cataract patients of poorer background.

MATERIALS AND METHODS

A 6-month prospective cross-sectional study was conducted at the Department of Ophthalmology, Shadan Teaching Hospital and Research Centre, involving 100 cataract patients. The study included patients of both genders aged 45 and above, diagnosed with cataract, having hypertension, diabetes, both or none. Those who've had cataract surgery and consent to sharing information are included. Patients below 45, pregnant/lactating women and those unwilling to share health information are excluded. Data for the study was sourced from patient information collected through forms completed by patients. The data collection form was designed to comprehensively document various aspects, including patient demographics, cataract details, medical history, vital signs, and co-morbidities like diabetes and hypertension, along with associated factors and contact information. The collected data encompassed a range of information relevant to the study objective. Prior to commencing the study, ethical committee approval was obtained from Shadan Teaching Hospital and Research centre. A group of 100 cataract diagnosed patients (59 Females, 41 Males) from ophthalmology's inpatient and outpatient departments were enrolled after taking informed consent. Participant information including demographic data, medical history, and medication details, was collected using a Performa and subsequently analysed. Patients were also counselled on post-op complications and care.

RESULTS

During the six months study period, data from 100 cataract patients was collected of which 59 were female and 41 were male. Six parameters were assessed which are as follows:

Gender

Having both hypertension and diabetes (n=31) was proven to be a major risk factor for the cataract development as compared to having only Hypertension (HTN) or only Diabetes (DM). Female patients seem to be at a slightly higher risk in all groups (Table 1).

Age

The 45-50 years age group exhibited the highest patient count across all categories, some having prior ocular trauma; while our study found HTN to be a more significant risk factor than DM for cataract formation across all ages, the combination of HTN and DM posed a considerable risk for early cataract development (Table 2).

Based on the Time of Diagnosis of Cataract

63% of patients had HTN and/or DM before the cataract was diagnosed, which also means that the co-morbidities have increased the risk of development of cataract. 37% were diagnosed with cataract, in which few of them diagnosed with Denovo HTN and/or Denovo DM, while others were having no known comorbidities and vitals being normal (Figure 1).

Use of Supplements

68% of cataract patients had not used any supplements. 32% of patients used various dietary supplements which were irrelevant to the study.

Insulin dependent and non-insulin dependent diabetes mellitus

57% of patients were not insulin dependent while 43% of patients were insulin dependent. Use of insulin in diabetics did not show to increase the risk of early cataract formation as patients were distributed among all age groups.

DISCUSSION

In our study 25% of patients had only hypertension and 10% had only diabetes mellitus which is in accordance with Ionna Mylona *et al.*[6] who published a study on "Hypertension is the Prominent risk factor in cataract patients" where diabetes did not show to be a single risk factor effecting the formation of cataract, as of hypertension.

Table 1: Prevalence of patients based on gender.

	No comorbidities	HTN	T2DM	Both HTN and T2DM
Female prevalence	23%	14%	5%	17%
Male prevalence	11%	11%	5%	14%
Overall prevalence	33%	25%	10%	31%

Table 2: Prevalence of patients based on age.

	45-50 yrs	51-55 yrs	56-60 yrs	61-65 yrs	66-70 yrs	71-75 yrs	>75 yrs
No Comorbidities	11	3	7	4	2	4	3
HTN	6	5	1	6	3	2	2
T2DM	3	1	2	2	1	0	1
Both HTN and T2DM	8	8	4	3	3	3	2

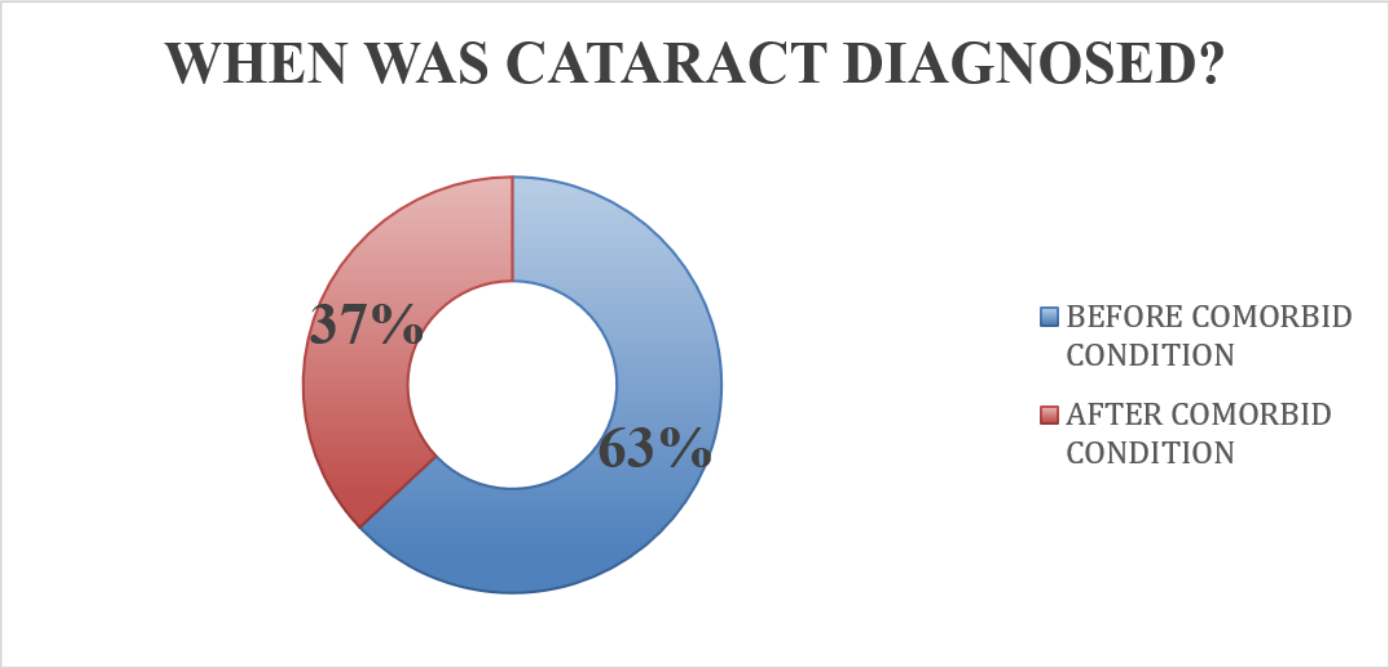

Figure 1: Distribution of patients based on the time of diagnosis of cataract. (before or after the comorbid condition).

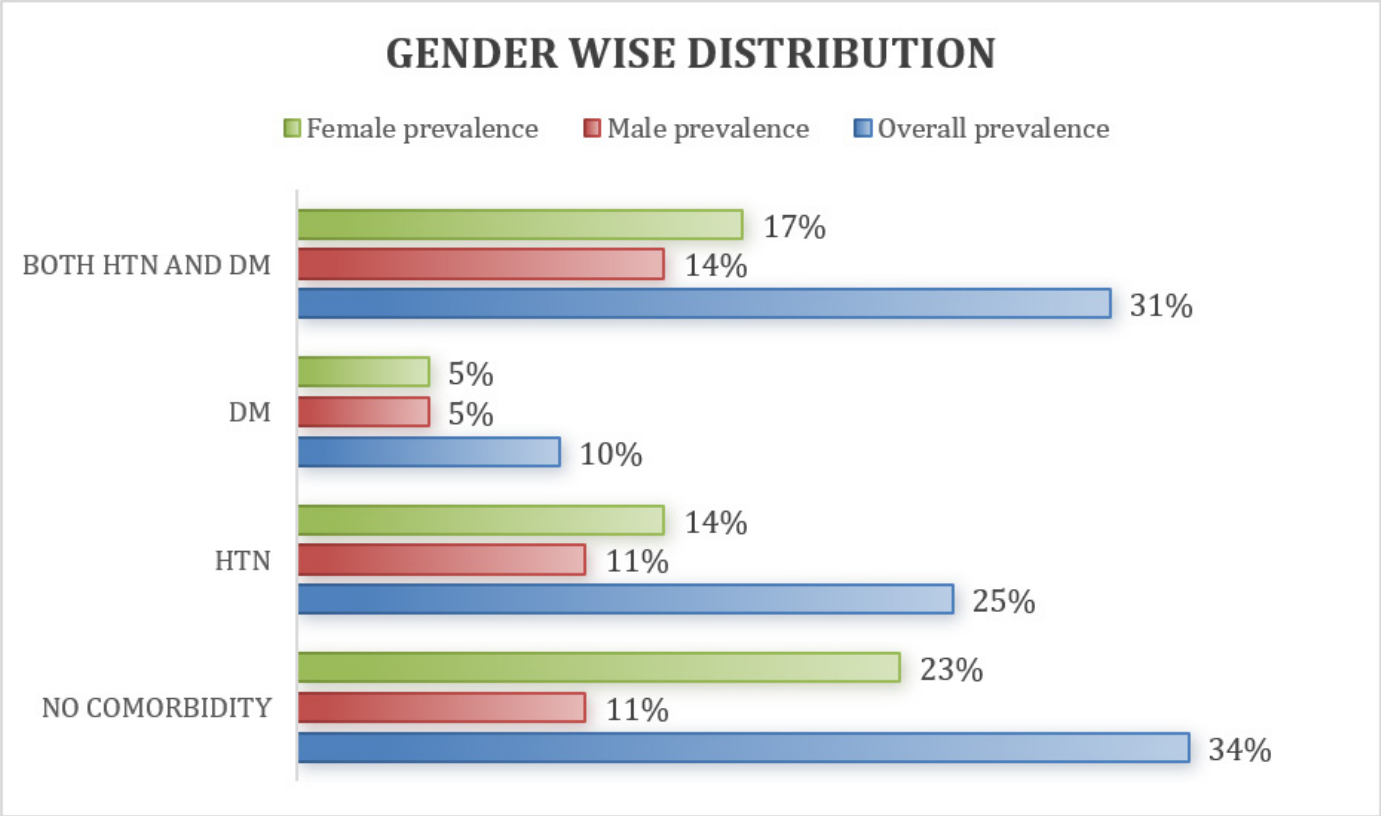

Figure 2: Patient distribution according to gender based on co morbidities.

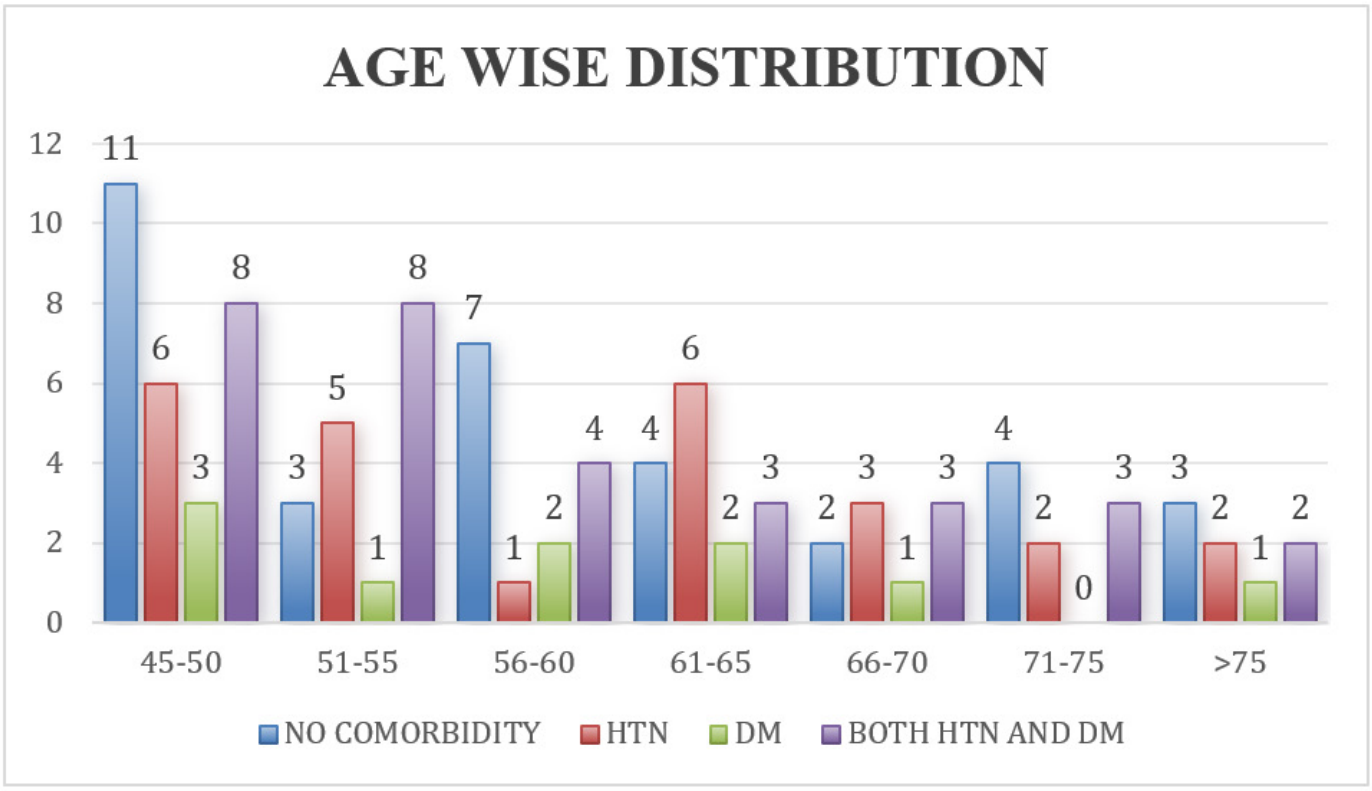

Figure 3: Patient distribution according to age based on co morbidities.

The highest prevalence of cataract was found in the patients suffering from both hypertension and diabetes which was 31% which is in accordance with the study published by Jin-Jin Li[7] on "Hypertension and diabetes synergistically strengthen the association with cataract" in which it is stated that if both are present the risk of cataract increases.

Women were found to have a higher risk of cataract irrespective of co morbidities (Figure 2) which affirms the study published by Madeleine Zetterberg *et al.*[8] on "Gender and cataract-the role of estrogen". Its states that many population-based studies noted that lens opacities are more common in women than in men and are unrelated to lifestyle factors. Therefore, cataract might be related to elevated oestrogen in females.

Duration of diabetes varied throughout all age groups thus long-standing diabetes did not show a link to cataract in our study as compared to the study published by Seong Il Kim *et al.*[9] on "Prevalence and risk factors for cataracts in persons with type 2 diabetes mellitus" which concluded that the most prominent risk factor is diabetes duration.

In our study, men who got cataract at a relatively early age (45-55 years) (Figure 3) were exposed to direct sunlight on a regular basis due to their occupation (farmer, labour, coolie, watchman, truck driver etc.,) whereas majority of females who got cataract at an early age were housewives who did a lot of cooking. The continuous exposure to smoke from stoves might be a risk factor for the cataract development in women which is confirmatory with the study published by Amod K Pokhrel *et al.*[10] on "Case-control study of indoor cooking smoke exposure and cataract in Nepal and India". It stated that lack of kitchen ventilation could cause cataract especially using wood and dung as solid fuels for cooking.

CONCLUSION

Female patients seem to be at a slightly higher risk in the hypertension group, both hypertension and diabetes group as well as having no co-morbidity. More number of cataract cases are observed after the incidence of comorbid condition while highest prevalence of cataract was reported in the patients suffering both hypertension and diabetes which was 31%. Men who got cataract at a relatively early age (45-55 years) were exposed to direct sunlight on a regular basis due to their occupation. Whereas majority of females who got cataract at an early age were housewives who did a lot of cooking. The continuous exposure to smoke from stoves might be a risk factor for the development of cataract. Diabetes did not seem to be an influencing risk factor for the formation of cataract in our study as compared to that of hypertension. Therefore, we conclude that, hypertension is more prevalent in cataract patients than type 2 diabetes mellitus.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ETHICAL APPROVAL

The study was approved by the institutional ethics committee.

SUMMARY

Cataract, being the most prominent condition in older individuals, it can also be affected by other health problems like hypertension and diabetes. Patients with both, HTN and T2DM are at higher risk of developing cataract before time. The prevalence of diabetes mellitus and hypertension in cataract patients, educate them on post-op complications, and rule out nutritional factors.

ABBREVIATIONS

HTN: Hypertension; **DM:** Diabetes Mellitus.

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