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Development of cataract in hypertensive and non-hypertensive patients

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Abstract
Blindness is a public health problem in developing and developed countries. According to WHO global data for visual impairments 2010, common occurence of blindness was 20.5%.One of the major cause for this is Cataract. Cataract is responsible for about 62.6% of all cases of blindness in India. If cataract left untreated most of the people will in due course become acutely visionless. The motive behind the present study is to find the connection between hypertension and development of cataract. A comparative study was carried for the two months of duration. 200 patients divided in two groups (hypertensive and non-hypertensive) were included in our study. We observed that prevalence of cataract is significantly higher in hypertensive (83.15%) patients as compared to non-hypertensive (70.01%) patients. Hypertension is involved in the pathological pathway of cataract development through an inflammatory mechanism. Nuclear cataract was found to be most common followed by cortical and posterior subcapsular cataract.

Keywords: cataract, Hypertension, Nuclear cataract, PSC

Introduction
Blindness is a public health problem in developing and developed countries. According to WHO global data for visual impairments 2010, common occurence of blindness was 20.5%. The prevalence rate is significantly higher in India when compared to Europe (7%) and America (8%). Almost all of the blindness (80%) is preventable [1]. Cataract is opacity in the lens which can block or scatter light. Vision may become blurred or cloudy; colours may be seen in a different way. People suffering from cataract may encounter problems with sunlight or glare from lamps - for example, during night driving. If cataract left untreated most of the people will eventually become severely visually disabled [2].
Cataract is responsible for about 62.6% according to National Survey on blindness 2006-07of all cases of blindness in India. According to WHO cataract is responsible for nearly 50% of cases of blindness worldwide. Nearly 12 to 15 million individuals are thought to be blind by cataract worldwide. Cataract occurs a decade earlier in India than the Western world [1].
A recent meta-analysis concluded that the risk of cataract is increased by arterial hypertension, especially the posterior subcapsular subtype [3]. Inflammatory cytokines such as tumor necrosis factor-alpha (TNF-a), interleukin-6(IL-6) are found be elevated in hypertension. Apart from that when blood pressure rises, level of C- reactive protein also rises in an individual. Intense systemic inflammation is associated with cataract, hypertension is hence involved in pathological pathway of cataract development through an inflammatory mechanism [4].
The motive behind the present study is to find the connection between hypertension and development of cataract.

Material and methods
A comparative study was carried out in our hospital for two months of duration. Patients who fulfilled our inclusion criteria were included in the study. Total 200 patients were included in our study.

Inclusion criteria
1. Patients with age >=55 years visiting OPD of ophthalmology or general medicine of our institute
2. Patients who are willing to participate in the study.

Exclusion criteria

1. Patients who do not give consent for this study.
2. Patients with age< 55
3. Diabetic patients (Random blood sugar>200mg/dl) as well as known cases of Diabetes Mellitus.

This was a comparative study comprising of 200 patients. One group was classified as 'hypertensive' and other group as 'non-hypertensive'.

All eligible patients were measured for Systolic and diastolic blood pressure (after allowing them to rest for at least five minutes before measuring blood pressure) using a mercury sphygmomanometer in right arm sitting position using a cuff of appropriate size. The blood pressure recorded was graded as follows [5, 6].

After allowing them to rest for at least five minutes before measuring blood pressure

Blood Pressure classification	Systolic (mmHg)	Diastolic (mmHg)
Normal	<120	And <80
Pre-hypertension	120-139	Or 80-89
Stage 1	140-159	Or 90-99
Stage 2	>160	Or >100
Isolated systolic	>140	And <90

Observations and Results

At the end of the study duration, we got 200 patients for our study who were examined and interviewed for all the parameters in our questionnaire.

Table 1: Distribution of hypertensive and non-hypertensive

	No. of cases	Percentage
Hypertensive	100	50%
Non-Hypertensive	100	50%
Total	200	100%

Out of 200 patients, 100 (50%) were hypertensive and 100 (50%) were non-hypertensive.

Table 2: Prevalence of cataract in 'eyes' of study population

	No. of cases	Percentage
Cataract	286	82.18%
Clear lens	62	17.81%
Total	348	100%

Total 400 eyes of 200 patients were examined. Previous operated eyes for cataract and corneal opacities were excluded from study. Hence, we examined total 348 'eligible eyes'. Out of these, cataract was detected in 286 eyes. Hence prevalence of cataract was 82.18%.

Table 3: Comparison of prevalence of cataract in eyes of hypertensive and non-hypertensive patients.

Cataract	Eyes of HTN patients (%)	Eyes of non-HTN patients	Total
Present	237 (83.15%)	46 (73.01%)	283
Absent	48 (16.84%)	17 (26.98%)	65
Total	285	63	348

Out of 348 eyes, 285 eyes were of patients suffering from hypertension and 63 eyes were of non-hypertensive patients. Out of 285 eyes of hypertensive patients, in 237 eyes cataract was detected and in 48 eyes it was not detected. Hence, prevalence of cataract in hypertensive patients was 83.15%. Out of 348 eyes, 63 eyes were of normal i.e. non-hypertensive patients. Out of 63 eyes, in 46 eyes cataract was detected and 17 eyes cataract was not detected. Hence, prevalence of cataract in non-hypertensive patients is 73.01%. It indicates that prevalence of cataract is more in hypertensive patients as compared to that of non-hypertensive patients.

Table 4: Morphological types of cataract in eyes of hypertensive and non-hypertensive patients

Type of morphology	Eyes of HTN patients	Eyes of non HTN patients	Total
Brown cataract	3(1.14%)	5(4.03%)	8
Cortical	13(4.94%)	11(8.87%)	24
Nuclear	148(56.27%)	49(39.50%)	197
Anterior capsular	2(0.76%)	1(0.80%)	3
PSC	87(33.07%)	45(36.29%)	132
Total mature cataract	10(3.80%)	12(9.6%)	22
Hyper mature cataract	0	1(0.80%)	1
Total	263(100)	124(100)	387

By using slit lamp examination, we detected the most common type of cataract based on its morphology in hypertensive patients. All the morphological types of cataracts were considered separately. It was observed that most of the eyes of hypertensive patients were suffering from Nuclear cataract i.e. 148 (56.27%) eyes, followed by posterior sub capsular i.e. 87(33.07%) and then cortical13 (4.94%) cataract. Almost same pattern was found in non-hypertensive patients.

Discussion

From the above results, we observed that prevalence of cataract is significantly higher in hypertensive (83.15%) patients as compared to non-hypertensive (70.01%) patients. Hence risk of cataract is less in non-hypertensive patients than in hypertensive patients. Leske *et al*. also found the similar results in their studies. Hypertension can be considered as a risk factor for development of cataract. Many of the earlier studies showed similar results. However, M sharma *et al*. did not find hypertension as a risk factor in developing the cataract [7].

Hypertension is involved in the pathological pathway of cataract development through an inflammatory mechanism. Hypertension is considered to cause elevation of inflammatory cytokines such as tumor necrosis factor-alpha (TNF-a), interleukin-6(IL-6). Besides, an elevation of C-reactive protein (CRP) level has been detected when individual blood pressure rises. Considering that cataract is closely related to intense systemic inflammation. Some earlier studies by J. Kaur *et al*. found the role of oxidative stress in hypertension [8]. Hence, role of hypertension in development of cataract can be attributed to oxidative stress. Lee *et al*. observed in their study thatconformation structure alteration of protein in lens capsules can be induced by hypertension resulting in aggravating the cataract formation [9].

Mehta *et al*. quoted in their study that Smith PA *et al*. has revealed sympathetic hyperactivity play an integral role in the development of hypertension and its complications [1]. Similar results were found by Masuo K, *et al*. who conducted studies on heightened sympathetic nervous system activity contribute to elevation of blood pressure.[10]

Nuclear cataract was found to be the most common morphological cataract in our study. Hypertensive as well as

non-hypertensive patients showed this pattern. Tsai *et al*. also found the similar results in their studies [11]. Rate of prevalence of nuclear cataracts was not equal in both the patients, this observation was not similar as in the study done by Mehta *et al*. where they found the almost similar rate of prevalence [1].

Posterior sub-capsular was the next common type. The prevalence of posterior sub capsular cataract was higher in non-hypertensives (36.29%) as compared to hypertensives (33.07%). Tsai, *et al*. however found prevalence of cortical cataract higher than that of posterior sub capsular cataract in their study (12.9% and 9.2% respectively).

Conclusion

From our study, we have concluded that prevalence of cataract is significantly higher in hypertensive patients as compared to non-hypertensive patients. Also, there is increased risk of cataract in hypertensive patients as compared to non-hypertensive patients. Nuclear cataract is the most common morphological type seen in hypertensive patients; however there was a difference in prevalence of posterior sub capsular cataract in eyes of hypertensive and non-hypertensive patients.

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