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Distribution of Ocular Perfusion Pressure in Hypertensive Patients

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Author's contribution

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

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ABSTRACT

Aim: To describe the distribution of ocular perfusion pressure hypertensive patients.
Design: Cross-sectional observation study.
Materials and Methods: Hospital-based, case control cross-sectional study conducted on 100 patients. Systolic and diastolic blood pressure (SBP and DBP) was measured with a Mercury Sphygmomanometer. Mean ocular perfusion pressure (MOPP) = ⅔ (mean arterial pressure − IOP), where mean arterial pressure (MAP) = DBP + ⅓ (SBP − DBP), systolic perfusion pressure (SPP) = SBP – IOP and diastolic perfusion pressure (DPP) = DBP − IOP was calculated.
Results: High values of diastolic BP (>90 mmHg) and low values of OPP (<40 mmHg) were associated to an increased risk of confirmed POAG.
Conclusion: There is a close relationship between OPP and confirmed glaucoma in hypertensive patients.

Keywords: Diastolic Perfusion Pressure (DPP); Intraocular Pressure (IOP); Ocular Perfusion Pressure (OPP); Primary Open-Angle Glaucoma (POAG).

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1. INTRODUCTION

Intraocular pressure (IOP) has been distinguished as the most significant modifiable hazard factor for the improvement of POAG, anyway recognizing other conceivably modifiable hazard factors have likewise been order in treatment of these conditions. Ailments like foundational hypertension additionally contributes towards expanded IOP through overproduction or disabled surge of fluid cleverness. Not many investigations have discovered measurably noteworthy relationship between foundational hypertension and IOP. Notwithstanding, the writing on the relationship between pulse BP and POAG is by all accounts conflicting [1].

Ocular perfusion pressure (OPP) can be characterized as the contrast between mean blood pressure in the ophthalmic supply route and IOP. Tissue perfusion is basic to keeping up retinal capacity as it doesn't store glucose and furthermore the changing IOP in the eyes depends upon vascular auto guideline to repay this. Albeit high intraocular pressure was viewed as the most significant hazard factor being developed of well glaucoma, anyway even without high IOP, numerous patients still show movement of glaucoma. This illuminates the way that in certain patients, visual perfusion pressure (circulatory strain – intraocular pressure) might be a sole significant factor as intraocular pressure alone. Accordingly, fundamental hypertension is viewed as being defensive against glaucoma. Epidemiological examinations done in the past have uncertain outcomes about the previously mentioned actuality. An elective hypothesis expresses that hypertension may not ensure against raised intraocular pressure, disregarding expanding visual perfusion pressure [2].

At the point when the vessels become excessively thin from this thickening, the retina doesn't get enough blood stream and become unhealthy in light of the fact that it doesn't get enough oxygen and sustenance. Side effects of hypertensive retinopathy are some of the time exceptionally gentle yet some understanding:

a. Decreased vision or obscured vision.
b. Bursting veins outwardly of the eye.
c. Double vision.

Visual perfusion pressure determined as distinction between the target esteems for the diastolic or systolic foundational circulatory strain (BP) and IOP [3].

Mean OPP (MPP) = 2/3 [diastolic BP + 1/3 (systolic BP – diastolic BP)] – IOP

Systolic OPP (SPP) = Systolic BP – IOP

Diastolic OPP (DPP) = Diastolic BP – IOP

A low mean visual perfusion pressure (MOPP) can hinder perfusion of optic nerve head prompting glaucomatous measuring and visual field misfortune. All statistical analysis were carried out in SPSS software.

2. MATERIALS AND METHODS

Patient in the age group of 40-60 years with essential hypertension presenting to the Ophthalmology outpatient department of SreeBalaji medical college, Chennai – 600 044.

2.1 Study Design

Cross-sectional study [4].

2.2 Study Period

March 2017 to October 2018.

2.3 Study Place

Ophthalmology outpatient department of SreeBalaji medical college, Chromepet, Chennai – 600 044.

2.4 Sample Size

100 patients.

2.5 Data Collection Method

A complete clinical and ocular examination was done to all eligible participants [5].

2.6 Inclusion Criteria for Cases

Patients with OAG (known cases or recently diagnosed) in the age group of 40–60 years of both sexes, taking no treatment for glaucoma, and with or without family history of glaucoma were included in the study.

High BP was defined as systolic BP (SBP) >140 mmHg or diastolic BP (DBP) >90 mmHg. Low BP

was defined as SBP <90 mmHg and DBP <60 mmHg. Mean arterial BP (MABP) was calculated as 1/3 SBP + 2/3 DBP. The OPP was defined as 2/3 MABP minus IOP, while diastolic OPP (DPP) and systolic OPP (SPP) were defined as DBP or SBP minus IOP, respectively. The highest IOP value between the two eyes was used to calculate OPP.

3. RESULTS

Total of 100 individuals were screened, of which, the mean age of the participants was 52 years, minimum and maximum age is 40 and 60 years (Table 1).

These revelations lead to the conclusion of the U-frame interaction between BP and the growth of glaucoma. The important idea is the interaction between BP, IOP and POAG. The increased IOP is known to be the greatest risk factor for the advancement of POAG. The correlation between BP and IOP should therefore be seen as a measure of the relationship among POAG and hypertension. In addition, OPP is seen as another causal factor for progression of the disease and growth.

4. DISCUSSION

Visual perfusion pressure is a measure for the close by intraocular circulation system, decided as differentiation between the objective regards for the diastolic or systolic key blood Glaucoma is a multifactorial illness.

The connection among POAG and BP is confusing and confused. A few massive epidemiological assessments looked at this relationship, with most of the examinations delineating conflicting reports. A few tests revealed a mostly healthy glaucoma in individuals with elevated BP, while others reported an enormous link between high critical BP and POAG using cross-sectional data.

Table 1. Distribution of BP*OPP*IOP

Descriptive statistics					
	N	Minimum	Maximum	Mean	Std. deviation
SBP	100	15	160	134.76	17.510
DBP	100	70	95	82.43	4.710
OPP	100	38	60	49.29	5.648
IOP	100	12	20	15.70	1.224

Note: SBP- systolic blood pressure; DBP- diastolic blood pressure; OPP- ocular perfusion pressure; IOP- intraocular pressure

The above table shows the mean value of the SBP, DBO, OPP and IOP of the study participants.

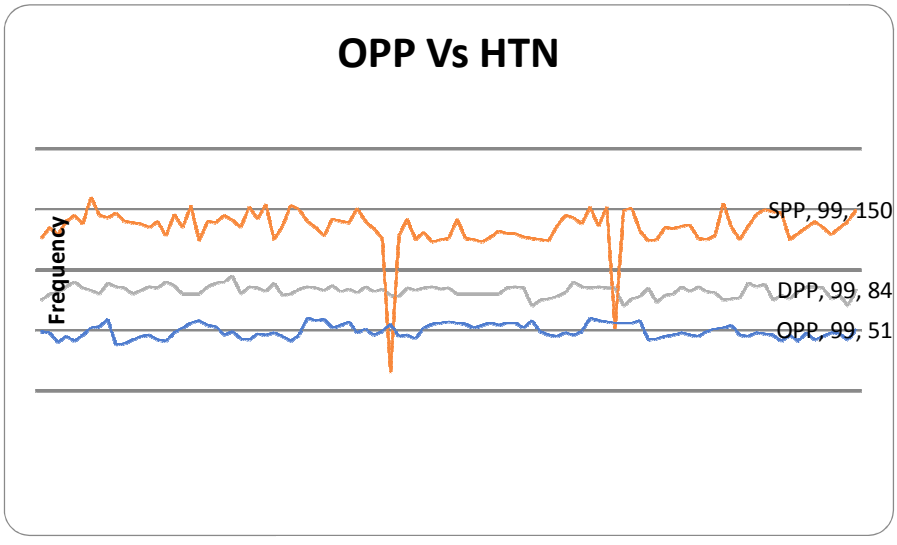

Fig. 1. OPP (ocular perfusion pressure) Vs HTN (Hypertension)

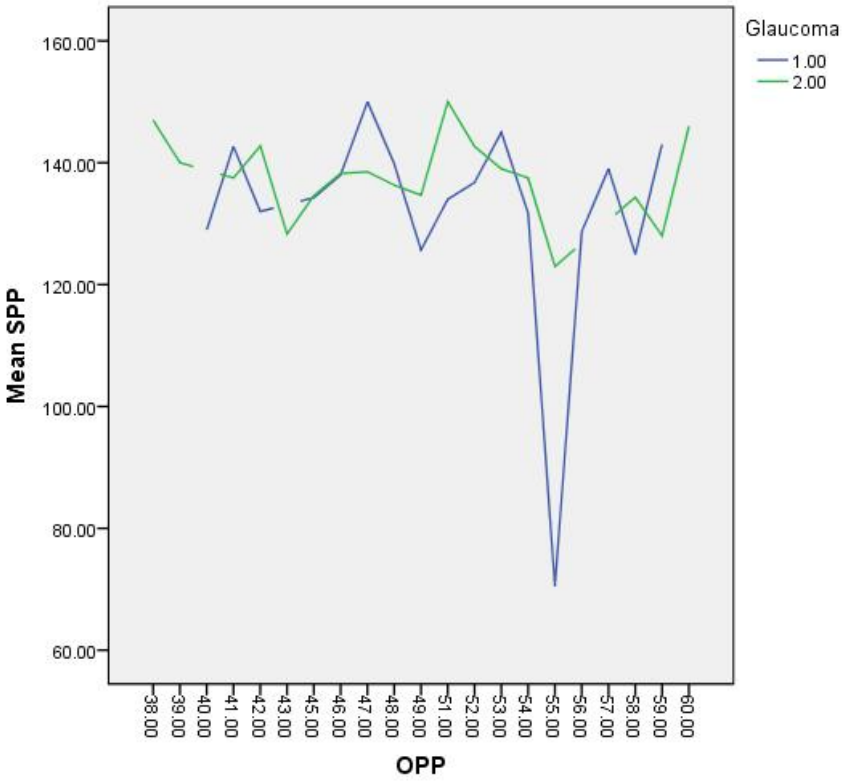

Fig. 2. Correlation of SBP (systolic blood pressure) and OPP (ocular perfusion pressure)

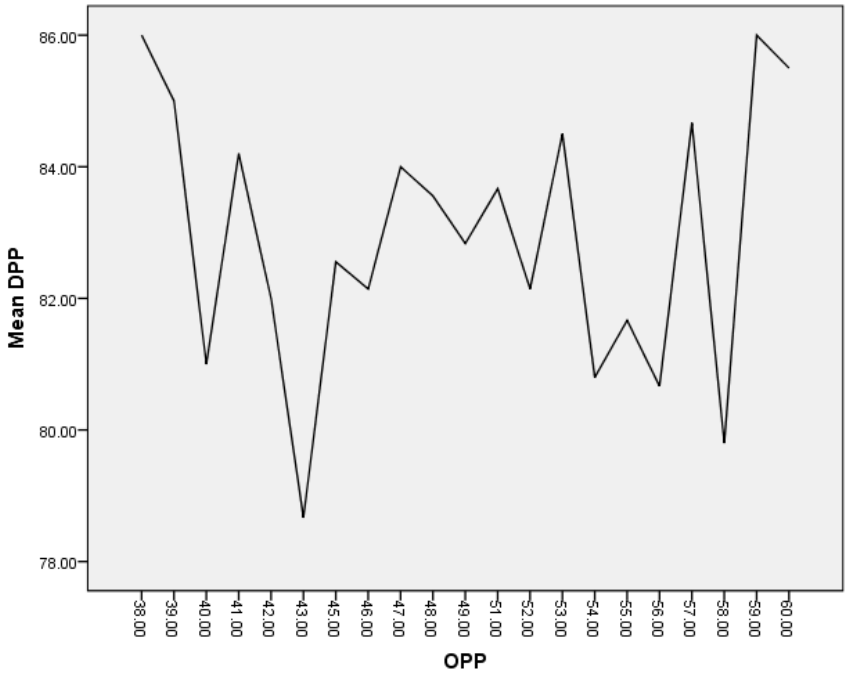

Fig. 3. Correlation of DBP (diastolic blood pressure) and OPP ((ocular perfusion pressure) Comparison of Mean DBP with and OPP shows that there was no correlation observed

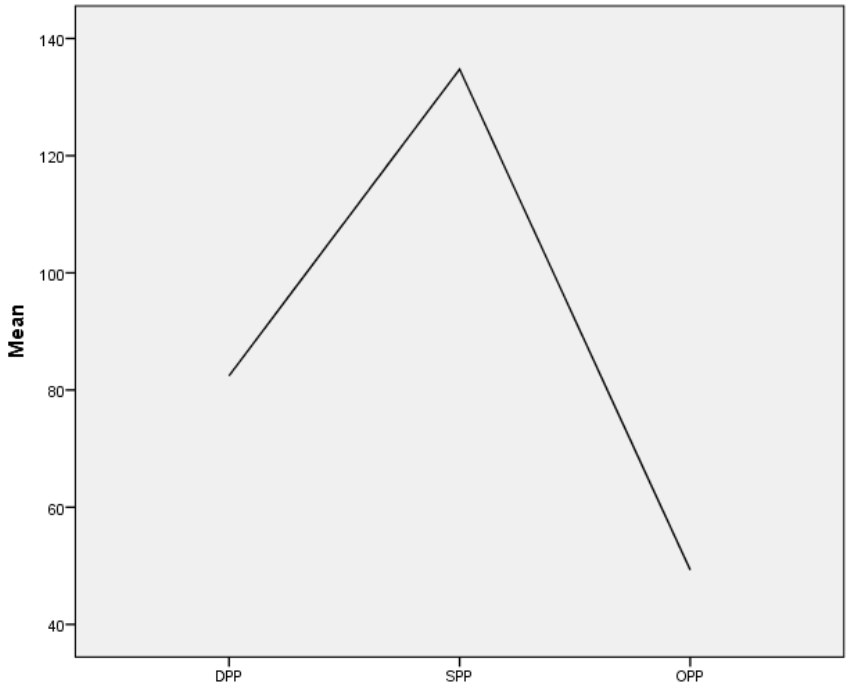

Fig. 4. The above graph shows the mean value of OPP with SBP and DBP

Despite the way that the effect of basic hypertension on glaucoma is awesome, a couple of frameworks are proposed. In increasingly young Patients with hypertension had a guarded effect that could improve OPP. In any case, in progressively-prepared patients, this valuable outcome is lost and an increased risk of glaucoma is seen, without a doubt, as a result of vein changes initiated by venous hypertension with upset oxygen supply and sustenance.In the case of central hypertension, continuously raised BP may develop arteriosclerosis, changes in the size of the precapillary arterioles, and a thin drop-out, inducing extended assurance from the circulatory system and, in this way, reduced perfusion. Furthermore, aggravation of the autoregulatory instruments of circulation system In addition, ONH vascular beds with elevated BP levels may introduce decreased perfusion, which may alter any guarded effect controlled by high perfusion force. As of late cited, when OPP fuses IOP, it is possible that the portion of disclosures assigned to OPP is just merely an assist to IOP.

Pache and Flammer have Declared hypotension and, in particular, a night time drop in BP as a significant risk factor for OAG. Randomized clinical primers have suggested that low BP is associated with risk and development of glaucoma. Higher SBP in the Early Manifest Glaucoma Trial was associated with faster OAG development in patients with lower IOP design [6]. Nonetheless, this J-shape relationship between systolic and diastolic BP and IOP may be congested by antihypertensive care status, as treated or overtreated hypertensive patients may have a normal or low BP but may have improved POAG capacity. In the Thessaloniki Eye Study, low DOPP was associated with an increased risk of POAG in subjects receiving antihypertensive treatment [7].

In the Baltimore Eye Report, a DOPP of less than 35 mmHg was correlated with a critical contribution to the strength of glaucoma. The inescapability of glaucoma decreased consistently with extended DOPP, but no association with either systolic or mean OPP was found. As far as the relationship between BP and glaucoma is concerned, late-night hypotension can reduce the development of visual field difficulties in glaucoma patients [8]. Precisely when the sunset of BP matches the IOP increase, an extensive OPP decline is thought to result in an unexpected attack that increases the threat of infection. DOPP is particularly useful in displaying the lowest OPP values and is seen as a free risk factor for OAGs. A continuous report suggests that evening BP could be a modifiable

risk factor for the truth and growth of glaucoma [9].

5. CONCLUSION

It can be concluded that lowering the perfusion pressure can improve the condition in glaucoma patients. More research on effects of medication on ocular perfusion pressure in glaucoma is recommended to be done in future. Hypotension is mainly due to relaxation, potentially inferable from thoughtful withdrawal. However, physiological hypotension is seen as a defensive instrument during rest; thus, the false guideline of the evening time BP should be considered with caution. Complementary studies are needed to evaluate the influence of the types of antihypertensive drug in the ocular blood flow.

CONSENT

Informed consent was obtained from all study participants.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the authors.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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