



ORIGINAL RESEARCH PAPER

Ophthalmology

A STUDY ON ASSOCIATION OF MEAN PLATELET VOLUME WITH HYPERTENSIVE RETINOPATHY:

KEY WORDS: Hypertensive retinopathy, Mean platelet volume, screening ocular complications

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ABSTRACT

Research says Hypertensive retinopathy is associated with increased cerebro and cardiovascular risk. To assess the risk, MEAN PLATELET VOLUME can be used. Our aim was to determine the association of MPV with HTR. Ethical committee clearance obtained. After getting consent, the sitting BP after 5 min rest and complete ophthalmological examination was done. HTR was graded using KEITH-WAGNER-BARKER CLASSIFICATION. Ocular complications of HTR recorded. 12 hour fasting blood was taken for MPV. Out of 150 subjects, most belonged to 46-50 yrs. Most common HTR grading was GRADE II. Around 37.3% had increased MPV values. Our study signifies that as hypertensive duration increases, the grading of HTR and MPV levels also increased. 8% had ocular complications of HTR. 56% patients with MPV 12.1-13.0 fL and all patients with MPV 13.1-14.0 fL had these complications. MPV is an affordable test of platelet activation, hence it may be a potential tool for screening HTR complications.

INTRODUCTION:

HYPERTENSIVE RETINOPATHY is a bilateral small vessel end organ manifestation in people with elevated BP. Among HTR signs, the most common lesions observed are retinal haemorrhages (3%-17%).¹ Generalized retinal arteriolar narrowing and A-V nicking appear in patients with long-term hypertension.² In contrast, focal arteriolar narrowing and other retinopathy changes indicate transient BP changes and are related to concurrent BP.³⁻⁷ There is growing evidence that increased platelet activation also contributes to hypertensive complications. Martin and colleagues showed in 1980 that larger platelets demonstrate increased reactivity.⁸ These active platelets express high levels of P-selectin and glycoprotein GPIIb/IIIa receptors and aggregate more quickly,⁹⁻¹³ thereby contributing to vascular complications of hypertension. Hence it is important to assess the role of platelet activation as a predictor for HTR complications. In order to better assess these risks, MEAN PLATELET VOLUME (MPV), a marker of platelet activity and a measure of average platelet size can be used¹⁴ Normal: 7 – 11 fL. Platelets with higher MPV are larger, enzymatically more active, therefore having higher thrombotic potential. Increased MPV is associated with pro-thrombotic and pro-inflammatory diseases.¹⁵⁻¹⁷ and is an independent risk factor for cardio and cerebrovascular diseases associated with poor clinical outcomes.¹⁸ Hence our study aims to find the association between MPV and HTR.

INCLUSION CRITERIA:

Essential hypertensives with HTR and its ocular complications.

EXCLUSION CRITERIA:

Patients with other co- morbidities, bleeding, clotting disorders, on anti-platelets, anti- coagulants, statins, history of active infection, major surgery like splenectomy in the last six months.

MATERIALS AND METHODS:

It is a cross sectional study done in hypertensives attending our Ophthal OPD during 1 year period. Ethical committee clearance obtained. After getting patient consent, a thorough history taken and case selection done. The sitting BP recorded after 5 minute rest. A complete ophthalmological examination including dilated fundus examination (using 1% tropicamide eye drops) done. Hypertensive retinopathy was graded by KEITH-WAGNER-BARKER CLASSIFICATION¹⁹. All the cases with HTR and its complications like BRVO, non-arteritic AION,

optic neuropathy, choroidopathy were chosen. In them, 12 hour fasting whole blood sample (with EDTA) was taken and analysed for MPV values within 30min in our Path lab.

RESULTS:

AGE DISTRIBUTION

Fig 1 show that maximum number of hypertensives in this study belonged to 46-50 year group, attributable to the fact this age group form a major part of working population prone for stress and sedentary lifestyle.

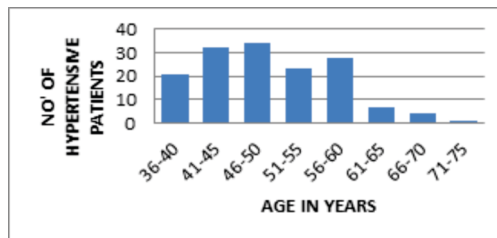


Figure 1: Age distribution

SEX DISTRIBUTION

Fig 2 show that out of 150 patients - 89 (59.3%) were males and 61 (40.7%) were females.

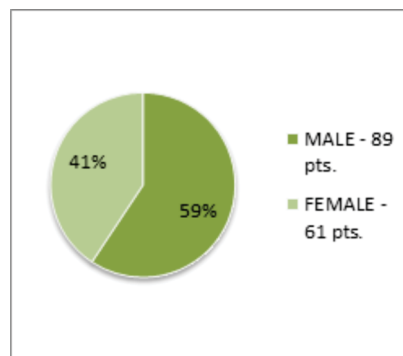


Figure 2 – Sex distribution

DURATION OF HYPERTENSION:

Figure 3 shows that 79 out of 150 patients (52.7%) had a history less than 4 years of hypertension and only 4 (2.6%) had longer duration 10-12 years of hypertension, explained by the fact that as ours is a tertiary hospital, we were able to screen patients in the earlier years of hypertension itself.

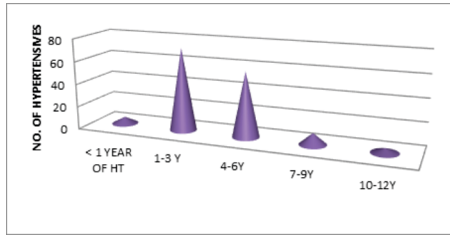


Figure 3 Duration of hypertension

HYPERTENSIVE RETINOPATHY GRADING:

Majority (50%) had grade II HTR. Only 5 patients (3.3%) had grade IV HTR. This may be attributed to the fact that only few patients of malignant hypertension presented to us in OPD.

MEAN PLATELET VOLUME:

56 patients had increased MPV. 24% - MPV 11.1-12.0 fL, 10.7% - 12.1-13.0 fL and only 2.6% - 13.1 – 14.0 fL.

CORRELATION BETWEEN AGE AND HTR GRADING:

Grade IV HTR – more (60%) in the youngest age range 36- 40 years, attributable to the fact that accelerated hypertension occurs in the young without gradual progression.

CORRELATION BETWEEN AGE AND MPV:

In our study, higher MPV values was found more in 36 to 40 age range (31.1% - 12 - 13 fL, 50% - 13-14fL) because accelerated hypertension presented mostly in the young eventually contributing to increased MPV.

CORRELATION BETWEEN DURATION OF HYPERTENSION AND MPV, HTR GRADING:

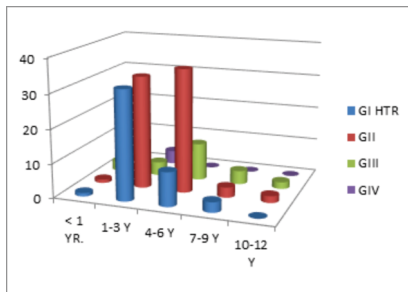


Figure 4 correlation between hypertensive duration and grading of HTR

Grade IV HTR was highest in people with shorter duration of hypertension (80% in 1-3 years of hypertension) proving that younger the age, more chance of developing grade IV HTR in a short duration and the correlation was statistically significant.

Duration of hypertension did not influence MPV.

CORRELATION OF MPV WITH HTR GRADING:

Grade II HTR had MPV between 11 -12 fL. 50% of Grade III HTR had MPV 12- 13 and 8.4% between 13-14MPV. All patients with Grade IV HTR had MPV > 12fL.

RELATIONSHIP BETWEEN OCULAR COMPLICATIONS AND HTR GRADING:

8% had ocular complications of HTR. 8 patients - GRADE III HTR and 4 showed GRADE IV HTR.

RELATIONSHIP BETWEEN OCULAR COMPLICATIONS OF HTR AND MPV:

Out of 7 patients with BRVO, 4 (25%) had MPV 12.1-13.0 fL and 3 (75%) had MPV 13.1-14.0 fL. All 3 patients with optic neuropathy had MPV 12.1-13.0 fL. 1 patient with choroidopathy and 1 with non-arteritic AION had MPV 12.1-13.0 fL. Hence, 9 out of 16 (56%) patients with MPV 12.1-13.0 fL

and all the 4 patients (100%) with 13.1-14.0fL had complications of HTR.

DISCUSSION:

Research states that hypertensive retinopathy can predict risk of stroke, cardiovascular disease and even mortality.^{20,21} The Atherosclerosis Risk in Communities (ARIC) study says that subjects with HTR were at an increased risk of developing incident stroke²²⁻²⁵ even after risk factor control. Studies say that patients with moderate HTR have more than twice the risk of developing congestive heart failure.²⁶⁻²⁷ There is growing evidence that in addition to hypertension, increased platelet activation may also contribute significantly to these complications. Thus, it is important to assess its role by using MEAN PLATELET VOLUME as a predictive tool for complications. Measurement of MPV is an easy and cost-effective test that can be used extensively in developing countries like India. For these reasons, our study was conducted to study the association of MPV with Hypertensive retinopathy and thereby predict the possibility of ocular, cerebrovascular and cardiovascular complications in them.

There was a statistically significant association between increasing grades of hypertensive retinopathy and increasing levels of Mean platelet volumes, which was the main aim of our study, comparable with VISHAL YADAV et al.²⁸ (37.3% vs 33.6% in their study), ADNAN BASHIR et al²⁹ and AAMIR HUSSAIN et al³⁰ (37.3% vs 29.7%). Highest percentage of increased MPV was found in the Grade IV hypertensive retinopathy group compared to all others (60% - MPV 12.1-13.0, 40% - MPV 13.1-14.0).

Our study results are comparable to that showed by Coban and his colleagues in his study.³¹

Nadar et al. found that MPV in hypertensives was significantly higher than in normotensives and within the hypertensives, those with evidence of target organ damage had significantly larger platelets.³² Scuteri et al. reported that MPV seems to be associated with increased left ventricular mass.³³ Platelet activation and hyperactivity has been proved by Varol et al. as one of the possible mechanisms causing hypertensive target organ damage.³⁴

These studies favour an increased MPV in relation to hypertensive target organ damage – thereby emphasizing the need for hypertensive retinopathy patients with increased MPV to be screened for ocular complications and referred for cardiovascular and cerebrovascular screening.

Our study shows that ocular complications of hypertensive retinopathy were found in 8%. 8 patients (33.3%) showed GRADE III hypertensive retinopathy and 4 patients (80%) showed GRADE IV. The complications recorded were hypertensive BRVO (4.6 vs 4.7%), CHOROIDOPATHY (0.6 vs 0.8%), OPTIC NEUROPATHY (2 vs 2.5%) AND NON-ARTERITIC AION (0.6 vs 0.6%) as compared to the Sunday Tunji et al study³⁵

9 out of 16 (56%) patients with MPV 12.1-13.0 fL and all the 4 patients (100%) with MPV 13.1-14.0fL had complications of hypertensive retinopathy.

CONCLUSION:

Measurement of MPV is an easy and affordable test of platelet activation thus it can serve as a potential tool for screening ocular, cerebrovascular and cardiovascular complications in patients with hypertensive retinopathy.

DISCLOSURE:

No author has a financial/ proprietary interest in any material or method mentioned in the study.

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