



STUDY OF BIO-CHEMICAL PARAMETERS IN HYPERTENSION

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ABSTRACT

Essential hypertension is becoming increasingly common amongst adult population irrespective of race and community. Dietary habits play a major role in that including diets low in calcium and vitamin D apart from high salt intake. So biochemical parameters play an important role in assessing severity of hypertension and also have got role in assessing co-morbidities associated with hypertension

Aims And Objectives Of The Study- The aim of the study is to compare the biochemical parameters between hypertensives and normotensives in patients admitted to Karnataka Institute of Medical Sciences, Hubli (Karnataka) between November 2010 to November 2011

Material And Methods- The study has been a prospective study which included 50 cases and 50 controls. With right consent of the patients, blood pressure was measured by mercury sphygmomanometer in the right arm sitting position and biochemical profile was measured using appropriate scientific methods

Results- In the study, it was found that serum calcium and vitamin D serum albumin were significantly low amongst hypertensives and they also had high levels of creatinine along with dysglycemia

Conclusion- From the study it can be conclude that in hypertensives significant changes can be seen with respect to serum calcium and vitamin D and also creatinine and blood glucose which can be used for early detection of hypertension and its associated complications.

KEYWORDS : Hypertension, calcium, vitamin D, creatinine

INTRODUCTION

Hypertension, defined as blood pressure of 140/90 is one of the most common risk factor for cerebrovascular and cardiovascular disorders and it's treatment lowers the risk of stroke, IHD, CKD and death. Globally around 30% of persons are affected with hypertension and the figures are similar for India. Indian Global Burden of diseases (GBD) study has reported that high systolic BP, poor dietary intake and tobacco are the most important risk factors for morbidity and mortality. GBD has reported that in 2017 high SBP was the leading factor for 1.6 million deaths and 33.9 million disability adjusted life years (DALY).

Many patients are unaware of the presence of BP and the presence of it's complications until they undergo blood tests mainly for biochemical parameters. These parameters helps us in guaging the hypertension and it's complications and also to guide us in changing the therapy if and when required. In our study we made an attempt to study the parameters such as serum calcium, vitamin D, serum creatinine and serum albumin and their relation with hypertensives compared to normotensives.

RESULTS

Table 1

| Serum Creatinine levels | Normotensive | | Hypertensive | |
|-------------------------|--------------|-------------|--------------|-------------|
| | < 1.36 mg/dL | >1.36 mg/dL | < 1.36 mg/dL | >1.36 mg/dL |
| | 47 94% | 3 6% | 40 80% | 10 20% |
| Vitamin D levels | < 20 ng/mL | >20 ng/mL | < 20 ng/mL | >20 ng/mL |
| | 26 52% | 24 48% | 32 64% | 18 36% |

| | | | | |
|--------------------------------|------------|------------|------------|------------|
| Serum albumin levels | <3.5 mg/dL | >3.5 mg/dL | <3.5 mg/dL | >3.5 mg/dL |
| | 2 4% | 48 96% | 10 20% | 40 80% |
| Serum Calcium levels | <8.5 | >8.5 | <8.5 | >8.5 |
| | 6 12% | 44 88% | 40 80% | 10 20% |
| Corrected Serum Calcium levels | | >8.5 | <8.5 | >8.5 |
| | 6 12% | 44 88% | 39 78% | 11 22% |

DISCUSSION

Table 2

| | Serum Creatinine levels | |
|--------------|-------------------------|--------------|
| | < 1.36 mg/dL | > 1.36 mg/dL |
| Normotensive | 47 94% | 3 6% |
| Hypertensive | 40 80% | 10 20% |

In our study, 20 percent of the hypertensive patients were found to have higher creatinine levels in contrast to only 6 percent patients having high creatinine levels amongst normotensive patients. In a study done by Candace D. McNaughton et al, 261 patients were included in the primary analyses, 65 patients had elevated serum creatinine, i.e 24.9% had chronic renal insufficiency².

In another study done by Josef Coresh et al, the estimated burden of hypertension related chronic renal disease using 16589 participants aged 17 years and older in NHANES III, 4917 (22.7%) were hypertensive and 11672 (77.2%) were

normotensive. Elevated serum creatinine level was 8 times more common in hypertensive (9.1%) than normotensive (1.1%) individuals³.

Table 3

| | Vitamin D levels | |
|--------------|------------------|-----------|
| | < 20 ng/mL | >20 ng |
| Normotensive | 26 52% | 24 48% |
| Hypertensive | 32 64% | 18 36% |

In our study, 64% of the hypertensive patients were found to have severe vitamin D deficiency whereas amongst normotensive patients, 52% patients were found to have severe vitamin D deficiency.

In a study done by Dr Krishnaswamy Prasad and et al, In our study around 85% of all hypertensive patients had vitamin-D level below the target 73 level (< 75nmol/L) and 57.5% of all hypertensive patients had vitamin D levels < 37.5 nmol/L⁴.

In another study conducted by Rose Mary J. Vatakencherry and et al, 520 participants were included. Prevalence of hypertension in our study was 86.2%(448). Participants were classified as vitamin D deficient, insufficient, and sufficient on the basis of vitamin D concentration of <20 ng/ml, 20-30 ng/ml, and >30 ng/ml, respectively, according to recent consensus. Prevalence of severe and mild-moderate vitamin D deficiency in hypertensive patients were 77% (345) and 8.7% (39), respectively. Prevalence of severe and mild-moderate vitamin D deficiency in normotensives were 22.2% (16) and 13.9% (10), respectively.

Prevalence of vitamin D insufficiency and sufficiency in hypertensive patients were 6% (27) and 8.3% (37), respectively. Prevalence of vitamin D insufficiency and sufficiency in normotensives were 20.8% (15) and 43.1% (31), respectively⁴.

Table 4

| | Serum Albumin Levels | |
|--------------|----------------------|-----------|
| | <3.5 | >3.5 |
| Normotensive | 2 4% | 48 96% |
| Hypertensive | 10 20% | 40 80% |

In a study done by Arne T. Høstmarka and et al, the albumin concentration was positively associated with blood pressure. Linear regression analysis showed a significant increase in both SBP and DBP, with increasing albumin concentration in all age groups and in both sexes. It was found that an increase in the albumin concentration within the physiological range from about 40 to 50 g/l was associated with an increase in SBP between 4.8 and 16.9 mmHg depending on gender and age group.

However, in our study no significant correlation was found between blood pressure and albumin levels⁵.

Table 5

| | Serum Calcium levels | |
|--------------|----------------------|-----------|
| | <8.5 | >8.5 |
| Normotensive | 6 12% | 44 88% |
| Hypertensive | 40 80% | 10 20% |

Table 6

| | Corrected Serum Calcium levels | |
|--------------|--------------------------------|-----------|
| | <8.5 | >8.5 |
| Normotensive | 6 12% | 44 88% |
| Hypertensive | 39 78% | 11 22% |

In a study done by Vidya Subash and et al, among 100 individuals with newly detected hypertension, corrected serum calcium levels were less than 8.5 mg/dL in 64% of the patients. Our study, echoes similar observation that is 78% of the hypertensive patients were found to have serum calcium levels of less than 8.5 mg/dL⁷.

CONCLUSION

Biochemical parameters in hypertension have got important role in detecting complications associated with hypertension at early stage and also can modify the treatment⁸.

In our study, we stressed upon the serum calcium, vitamin D, creatinine and albumin. And as mentioned above in the results, hypertensives had low serum calcium and vitamin d, high creatinine and albumin levels were equivocal. High creatinine can be an indication that pt might have kidney dysfunction and allows for further assessment. Low serum calcium and vitamin d might require additional supplementation which could also help osteoporosis which are commonly seen in essential hypertensives

Limitations- In our study, we couldn't measure PTH as the facility was not available in our hospital

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