DO HYPERTENSIVES HAVE TENDENCY FOR LESSER HEMOGLOBIN CONCENTRATION?

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ABSTRACT

Introduction : The prevalence of Hypertension is increasing at an alarming rate worldwide. Hypertension is now considered as an 'Urban syndrome'. Major causes of hypertensive pattern are increasing work stress, strict deadlines and high expectations among corporate population. High blood pressure affects many systems of the body and can alter various hematological parameters. **Objectives :** The present study was undertaken to compare the arterial blood pressure (BP) and blood hemoglobin (Hb) concentration in software professionals. **Materials and Methods :** Male software professionals (74 in number) of Infosys software company, Mangalore, Karnataka, India in the age group of 21–45 years were divided into two groups based on their BP recordings. 21 were normotensives and 53 hypertensives. Their BP was recorded in supine position (JNC 7 Criteria) and Hb was estimated by Drabkin's spectrophotometric method. The relation between BP and Hb concentrations were analyzed statistically. **Results :** The mean age of normotensives and hypertensive group were 27.62±5.24 and 28.53 ± 6.25 years respectively. The mean BP of normotensives and hypertensives were 124±16.03/80±11.16 and 142±16.09/96±11.10mmHg respectively. The mean Hb of normotensives and hypertensives were 16.15±0.92 and 13.08±0.91gm% respectively. When this association was analyzed, results revealed that Hb was significantly lower in hypertensive group (p=0.001, Unpaired T test). **Conclusions :** Hypertensives tend to have lower Hb. Stress induced 'Hypothalamo-adreno-sympatho activity mediated increased sympathetic drive in hypertension influencing Renin-Angiotensin-Aldosterone system can be the underlying mechanism.

Keywords : Hypertension, Hemoglobin, Software professional, Stress, Sympathetic activity.

INTRODUCTION

Hypertension is becoming an important public health problem worldwide. The prevalence of Hypertension is increasing at an alarming rate worldwide. It is now considered as a chronic condition of concern due to its role in the causation of various complications. It is one of the leading risk factors for mortality and is ranked third as a cause for decrease disability adjusted life years[1]. In light of existing data suggesting an increase in prevalence of hypertension in developing countries[2], data of more than 2000 subjects from the CURES study by Mohan et al[3] (2007) showed that the overall prevalence of hypertension in the study population was 20%, being 23.2% in men and 17.1% in women. Even in young (20-29yrs) the prevalence of hypertension was 3.8% in men and 3.1% in women. Hypertension is now considered as an 'Urban syndrome' as more number of hypertensives are found in urban population. A recent report on the global burden of hypertension indicates that nearly

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one billion adults had hypertension in 2000, and this is predicted to increase to 1.56 billion by 2025[4]. Major causes of hypertensive pattern are increasing work stress, strict deadlines, high expectations, soaring competition among corporate adult. This type of hypertensive trend in India can increase the risk of heart attack by 2 times, congestive cardiac failure by 4 times and strokes by 7 times compared to the normal population[5]. High blood pressure is also a major risk factor for renal failure, stroke, and coronary artery disease. If left untreated even in mildest forms, hypertension is a progressive and lethal disease. Also Age, gender, race, smoking, serum cholesterol, glucose intolerance, sedentary life style, obesity will contribute to the prognosis of the disease in young individuals[6,7,8].

Hypertension is seen in all professions now- a- days. Software Industry is one such. Due to hectic, long and erratic work shifts, mental stress to achieve the fixed target, sedentary lifestyle, irregular food habits and changes in the lifestyle have contributed to the increased incidence of hypertension, obesity, diabetes mellitus, psychiatric disturbances, hypercholesterolemia and other related complications in this field[9,10,11]. High blood pressure affects kidneys, heart and many organs leading to chronic anemia[12,13]. Can high blood pressure in initial stages itself alter some of the hematological parameters like hemoglobin concentration?

OBJECTIVES

The present study was undertaken to compare the arterial blood pressure (BP) and blood hemoglobin (Hb) concentration in software professionals.

MATERIALS AND METHODS

Seventy four male software professionals of Infosys software company, Mangalore, Karnataka, India in the age group of 21–45 years were included in the study. Ethical Approval has been obtained for this study from the Institute's Ethical review committee. This study group was divided into control (n=21) and experimental group (n=53) based on their BP. General physical examination, vital signs, complete systemic examination was done.

Inclusion Criteria

1. Subjects with normal BP.
2. Healthy, age matched with experimental group.

For Hypertenisve group (Experimental group)

1. Subjects with BP of >140/90mmHg.
2. Those who were on antihypertensive treatment regardless of duration of treatment.

   Otherwise healthy, age matched with control group.

Exclusion Criteria in both groups

1) Cases of Cardiac, Vascular or neurological involvement.
2) History of diabetes mellitus.
3) History of drug treatment other than antihypertensive drugs if any.
4) History of any systemic illness.

Parameters like their Age, Work experience, Body mass index (BMI), calculated as weight (in kilograms) divided by standing height (in meters squared), Waist – Hip ratio, BP in mmHg (Sphygmomanometry), Hb in g/dl (Drabkin's spectrophotometric method) were considered for this study. The normotensive (control) group had 21 individuals whereas the hypertensive group (experimental) consisted of 53 software professionals. Their BP was recorded in supine position (JNC 7 Criteria) in the right arm to the nearest 2mm Hg using the mercury sphygmomanometer (Diamond Deluxe;

Industrial Electronic and Products, Electronic Co-op Estate, Pune, India). Two readings were taken 5 minutes apart and the mean of two was taken as the BP. For those whose BP> 140/190 mmHg, three BP recordings were recorded with a gap of 1 day in between. The average of second and third was considered as the final BP. The parameters were analyzed statistically by using the statistical software SPSS ver17 & MS Excel. All tests were two-tailed and $p< 0.05$ is considered as significant.

RESULTS

The mean age of normotensive and hypertensive group were 27.62±5.24 and 28.53 ± 6.25 years respectively (Table 1). The mean BP of normotensives and hypertensives were 124±16.03/80±11.16 and 142±16.09/96±11.10mmHg respectively (Table 1). The Parameters like Age, BMI and Waist – Hip ratio were not significantly different between the two groups (Table 2). The mean Hb of normotensives and hypertensives were 16.15±0.92 and 13.08±0.91gm% respectively (Table 3). Hb levels significantly differed between these two groups (Graph 1). When this association was analyzed, results revealed that Hb was significantly lower in hypertensive group (p=0.001, Unpaired T test).

Table 1: Mean ± SD of age between the two groups.

Parameters	Group 1 Normotersives (n=21)	Group 2 Hypertensives (n=53)
Age(Years)	27.62±5.24	28.53 ±6.25
BP(mm Hg)	124±16.03/80±11.16	142±16.09/96±11.10

Table 2: Age, work experience BMI and waist-hip ratio of normotensives and hypertensive subjects. (Values expressed in Mean ± SD)

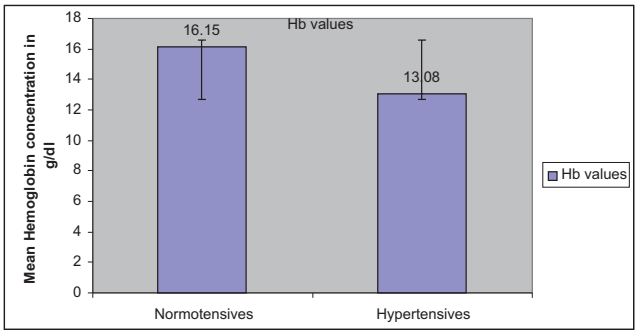
Parameters	Group 1 Normotersives (n=21)	Group 2 Hypertensives (n=53)
Work experience(Years)	3.58 ± 2.33	2.69 + 2.31
BMI	24.57 + 3.64	24.72 + 3.07
Waist-Hip ratio	0.89 + 0.05	0.89 + 0.05

Table 3: Hemoglobin concentration in two groups.

Parameters	Group 1 Normotersives (n=21)	Group 2 Hypertensives (n=53)
Hb	16.15 + 0.92	13.08 + 0.91
p Value	0.001**	

** Highly Significant.

Graph 1: Hemoglobin concentration in Normotensive and Hypertensive groups.



DISCUSSION

In this study, the age, work experience, BMI and waist-hip ratio were matched between normotensive and hypertensive groups. There was no statistical difference among the two groups. Only Hb concentration between these groups varied significantly. The hypertensives had lesser Hb percentage compared to the normotensives. This showed that low Hb may be due to hypertension which in turn might have resulted from stress associated with work culture. According to literature, the stress induced hypertension develops due to the over activity of hypothalamo- adreno- sympathetic axis[14]. The resultant effect of which is mainly brought through the renin-angiotensin system. Previous studies showed that, some of the patients with an elevated BP have renin-dependent angiotensinogenic hypertension[15].

S. Julius[16], (1993) in Corcoran lecture on sympathetic hyperactivity and Coronary risk in hypertension had stated that, in hypertension sympathetic activation is associated with higher plasma renin levels. M Esler et.al[17] had mentioned that elevated plasma renin activity in

essential hypertension expresses sympathetic neuronal system over activity. According to Richard D. Gordon, sympathetic activity is responsible for an increase in renal afferent arteriolar constriction leading to an increase in renin secretion and ultimately, an increase in aldosterone secretion[18]. Renin, through the effect of angiotensin on aldosterone, is an important factor for sodium and water retention in the body. The resultant increase in blood volume leads to haemodilution and may be the cause for low Hb level in hypertensives.

The other possible mechanism for the causation of low Hb levels in hypertension may be reduced production of Erythropoietin and resistance of the bone marrow to Erythropoietin stimulation[13,19]. If antihypertensive drugs like angiotensin-converting enzyme inhibitor and angiotensin receptor blockers are used, they inhibit the bone marrow response to erythropoietin[20]. Hypertension if not treated leads to cardiac and renal failure. Congestive Cardiac failure also may cause a low hemoglobin level due to hemodilution in later stages[21]. Renal failure, cardiac failure, and anemia therefore all interact to cause or worsen each other--the so-called cardio-renal-anemia syndrome[19]. Hence identification of anemia in hypertensives will enable for early treatment and prevention of cardio renal syndrome[22,23].

CONCLUSIONS

Sympathetic over activity which is related to the work stress has a major impact on the cardiovascular, autonomic and hematological parameters. Lesser Hb concentration due to stress induced hypertension can lead to Increased cardiac output and heart failure finally. Thus this study indicates that while addressing the complications of hypertension, the Hb level also has to be monitored in order to prevent the early onset of cardio-vascular diseases. A more aggressive public and corporate health policy, awareness is needed to prevent the development of risk factors and complications in younger subjects.

Limitations of the Study

1. This study was carried out in a small population.
2. All the subjects were males.
3. Study was conducted only in one organization.
4. The Mean age of the study group was less (28.47$\pm$6.99 years).
5. Many other blood parameters were not included in the study.

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