

## Biochemical and Blood Profile amongst Hypertensive Subjects Reporting at a Tertiary Care Hospital

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### ABSTRACT

**Background:** Systemic hypertension is one of the most common cardiovascular disease affecting humans throughout the world. The endothelium is a favorite early target of cardiovascular risk factors in cardiovascular diseases like hypertension. The present study was conducted with the aim to determine the biochemical and blood profile amongst hypertensive subjects.

**Materials and Methods:** The present cross-sectional, descriptive, prospective study of assessment of endothelial dysfunction in young patients of systemic hypertension. Subjects fasted for at least 8 hours before the study and they were studied in a quiet, temperature-controlled room. The required biochemical and blood investigations were performed amongst all the subjects using standard protocol. All the data was arranged in a tabulated form and percentage of all the information was obtained. SPSS software was used for statistical analysis.

**Results:** Out of the total 50 subjects, there were 39 males and 11 females. Majority of subjects were between 31-35 years of age. There were 89.7% (n=35) euglycemic males and 90.9% (n = 10) euglycemic females. Serum cholesterol level was

normal i.e. less than 200 mg/dl amongst 76.92% (n=30) males and 72.7% (n=8) females.

**Conclusion:** From the study it can be concluded that majority of hypertensive subjects have normal glucose levels i.e. they were euglycemic.

**Keywords:** Cholesterol, Hypertensive, Euglycemic, Temperature.

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### INTRODUCTION

Systemic hypertension is one of the most common cardiovascular disease affecting humans throughout the world. Hypertension is often associated with many abnormalities, including obesity, dyslipidemia, insulin resistance, altered glucose metabolism, arterial stiffness and renal disease. Blood pressure is distributed in a typical bell shaped curve within overall population. As seen in Multiple Risk Factors Intervention Trial (MRFIT),<sup>1</sup> the long term risk for cardiovascular mortality associated with various levels of blood pressure rises progressively over entire range of blood pressure with no threshold that clearly identifies potential danger. Family studies show that children of two normotensive parents have 3% possibly of developing hypertension, whereas this possibility is 45% in children of two hypertensive parents. Blood pressure levels among first degree relatives also have been noted to be statistically significant.<sup>2</sup> The endothelium is a favorite early target of cardio-vascular risk factors in cardiovascular diseases like hypertension. This key role of the endothelium results from its

capacity to respond to numerous autocrine and paracrine stimuli and to mechanical factors like shear stress but also from the pathophysiological consequences of endothelial dysfunction on vasomotor tone, arterial stiffness, arterial remodeling, and inflammation, all of which are factors that play a critical role in atherosclerosis and target-organ damage.<sup>3</sup> In 1966, Lord Lorry advanced the concept that the endothelial cell serves as a barrier to protect the vascular wall and was thus "A cellphal wrapper of vascular tree".<sup>4</sup>

In 1996, the endothelium has emerged as a multifunctional active paracrine organ that plays a fundamental role in cardiovascular regulation.<sup>5,6</sup> Repeated investigations have established that the endothelial cells synthesize and release biologically active molecules that control underlying vascular smooth muscle tone and growth.<sup>7</sup> The present study was conducted with the aim to determine the biochemical and blood profile amongst hypertensive subjects.

**MATERIALS AND METHODS**

The present cross-sectional, descriptive, prospective study of assessment of endothelial dysfunction in young patients of systemic hypertension. The study included 50 Patients of hypertension of age 12-40 years attending CMD (cardio metabolic disease) clinic, cardiology OPD, General medicine OPD, medical wards in M.Y. Hospital, Indore, Madhya Pradesh, India. Pregnant females, seriously ill subjects, subjects with multiorgan failure or those with congenital anomaly of hands or feet were excluded from the study. Subjects fasted for at least 8 hours before the

study and they were studied in a quiet, temperature-controlled room. In addition, subjects did not exercise, didn't ingest substances that might affect flow mediated dilatation such as coffee, high fat food, and vitamin C or use tobacco for at least 4 to 6 hour before the study. The required biochemical and blood investigations were performed amongst all the subjects using standard protocol. All the data was arranged in a tabulated form and percentage of all the information was obtained. SPSS software was used for statistical analysis.

**Table 1: Distribution of patients of Systemic Hypertension according to blood glucose level**

Blood glucose level	Male (n=39)	Females(n=11)	Total(n=50)
Euglycemic	35(89.7%)	10(90.9%)	45(90%)
Diabetic*	4(10.3%)	1(9.1%)	5(10%)

**Table 2: Showing serum total cholesterol in patients of Systemic Hypertension**

Serum Cholesterol (mg/dl)	Male (n=39)	Females (n=11)	Total(n=50)
Normal <200mg/dl	30(76.92%)	8(72.7%)	38(76%)
Hypercholesterolemia >200mg/dl	9(23.08%)	3(27.3%)	12(24%)

**Table 3: Showing triglycerides in patients of Systemic Hypertension (N-50)**

Serum triglycerides (mg/dl)	Male (n=39)	Females (n=11)	Total (n=50)
Normal <150mg/dl	22(56.41%)	8(72.73%)	30(60%)
Hypertriglyceridemia $\geq$ 150mg/dl	17(43.59%)	3(27.27%)	20(40%)

**Table 4: Showing HDL cholesterol in patients of Systemic Hypertension (N-50)**

Serum HDL (mg/dl)	Male (n=39)	Female(n=11)	Total (n=50)
Normal	30(76.7%)	8(72.7%)	38(76%)
Low HDL <40 (male) <50 (female)	9(23.3%)	3(27.3%)	12(24%)

**RESULTS**

Out of the total 50 subjects, there were 39 males and 11 females. Majority of subjects were between 31-35 years of age.

Table 1 shows the distribution of hypertensive subjects according to blood glucose levels. There were 89.7% (n=35) euglycemic males and 90.9% (n=10) euglycemic females. Total 90% of the males were euglycemic. There were 10% (n=5) who were diabetic. Out of them 4 were males and 1 was female.

Table 2 shows the serum total cholesterol in patients of Systemic Hypertensive subjects. Serum cholesterol level was normal i.e. less than 200 mg/dl amongst 76.92% (n=30) males and 72.7% (n=8) females. There were only 24% (n=12) subjects with hypercholesterolemia. Out of these 9 were males and 3 were females.

Table 3 shows the serum triglycerides in patients of Systemic Hypertensive subjects. Serum triglyceride level was normal amongst 56.41% (n=39) males and 72.73% (n=8) females. There were only 40% (n=20) subjects with hypercholesterolemia. Out of these 17 were males and 3 were females.

Table 4 shows the serum HDL in patients of Systemic Hypertensive subjects. Serum HDL level was normal amongst 76.7% (n=30) males and 72.7% (n=8) females. There were only 24% (n=12) subjects with hypercholesterolemia. Out of these 9 were males and 3 were females.

**DISCUSSION**

Since the pioneering work of Furchgott and Zawadzki<sup>8</sup> in 1980, the endothelium has been recognized as a major regulator of vascular homeostasis. Endothelial dysfunction contributes to underlying disease process of a number of conditions, including essential hypertension, hypercholesterolemia, atherosclerosis, diabetes mellitus, congestive heart failure, and pulmonary hypertension. Because blood pressure is largely regulated by resistance vessels (microcirculation), an appropriate assessment of endothelial dysfunction in hypertension involves measuring changes in blood flow and vascular resistance, while changes in the diameter of coronary and other conductance arteries reflect endothelial dysfunction related to atherosclerosis.<sup>9,10</sup> Sattar N et al<sup>11</sup> in 1998 in their review article mention that triglyceride rich particles can cross the endothelial barrier and enter the arterial wall, thus placing them in a position to promote direct endothelial damage. By further reducing the LDL size, and HDL cholesterol concentrations, thereby further increase the endothelial oxidative burden, triglyceride rich particles may indirectly promote endothelial dysfunction. Schnell GB et al<sup>12</sup> in 1999 measured brachial artery endothelial functions in 40 health controls, 35 patients with elevated triglycerides, and 38 patients with elevated LDL cholesterol. It was found that in patients free from other cardiac risk factors, modest elevation of triglycerides or LDL

cholesterol does not significantly attenuate BA endothelial-dependent vasodilatation. They concluded that synergism with other cardiac risk factors may be required to significantly impair endothelial function in these patients. Hypercholesterolemia was recognized as a determinant in the pathogenesis of atherosclerosis, and endothelium-mediated relaxation was observed to be impaired in hypercholesterolemia vessels.<sup>13,14</sup> Reduced activity of endothelium-derived NO in hypercholesterolemic vessels may be an initiating factor in atherogenesis. Endothelium-derived NO is now recognized to inhibit several pathologic processes that are critical to the development of atherosclerosis. These include monocyte adherence and chemotaxis, platelet adherence and aggregation and vascular smooth muscle proliferation.<sup>15</sup> Vascular disorders are highly prevalent in persons with diabetes and may take several forms; accelerated atherosclerosis, occurring earlier in diabetic patients than in their healthy counterparts and tending to be more severe and more diffuse<sup>16</sup>, thrombosis, hypertension, and hyperlipidemia.<sup>17</sup> The common cellular denominator in this varied pathology may be endothelial cell dysfunction. Exposure to elevated levels of glucose may contribute to the aberrations of endothelium seen in persons with diabetes. When exposed to increased concentration of glucose in vitro, rings of isolated normal rabbit aorta are unable to relax normally in response to acetylcholine.<sup>18</sup> Reduced production of NO does not appear to be the cause of impaired vasorelaxation, rather it overcomes the normal vasodilator effect of NO released by the endothelium. Cyclooxygenase inhibitors restored impaired acetylcholine induced relaxation in the aorta of diabetic and normal rabbits exposed to elevated glucose in vitro. In humans, the administration of vitamin C improves endothelium-dependent vasodilatation, presumably by virtue of its antioxidant effects. According to a study of patients whose physical activity was limited by congestive heart failure, flow dependent dilation can be enhanced by physical training. After 4 weeks of hand-grip training flow-dependent dilation was restored, most likely by increased endothelial release of NO. The effect of physical training was local however, being limited to the trained arm, and lasted for only 6 weeks.<sup>19</sup>

## CONCLUSION

From the study it can be concluded that majority of hypertensive subjects have normal glucose levels i.e. they were euglycemic. The subjects also demonstrated normal triglyceride, cholesterol and HDL levels. Majority of the subjects showed normal blood and biochemical levels.

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