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Research Article

**HYPERINSULINEMIA IN PATIENTS WITH ESSENTIAL
HYPERTENSION****Dr. Mukhtiar Hussain Jaffery¹, Dr. Ghulam Hussain Baloch¹, Dr. Syed Zulfiqar Ali Shah², Dr. Zulfiqar Ali Qutrio Baloch*³, Dr. Muhammed Ayyaz³ and Dr. Sumera Bukhari**¹Department of Medicine, Liaquat University of Medical and Health Sciences (LUMHS).²Department of Medicine, Liaquat University Hospital, Hyderabad.³Brandon Regional Hospital, Brandon, Florida.⁴St. Francis Medical Center, Trenton, New Jersey.**Received:** 12 February 2016 **Accepted:** 24 February 2017 **Published:** 28 February 2017**Abstract:****OBJECTIVE:** To determine the frequency of hyperinsulinemia in patients with essential hypertension.**PATIENTS AND METHODS:** This cross sectional study of six months was conducted from July 2016 to December 2016 at LUMHS Jamshoro Sindh Pakistan. All the patients with essential hypertension were evaluated for serum insulin level by taking fasting 2 ml venous blood sample and send to laboratory for analysis. The frequency / percentages (%) and means \pm SD computed for study variables.**RESULTS:** During six months study period, total seventy two (47 males and 25 females) patients of essential hypertension were screened for hyperinsulinemia. The mean age \pm SD for whole population was 48.97 \pm 5.98 while the mean serum fasting insulin level in hyperinsulinemic and normoinsulinemic was 35.87 \pm 8.65 and 20.76 \pm 3.72 respectively. The hyperinsulinemia was observed in 45 (62.5%), of which 31 (68.9%) males and 14 (31.1) females. Regarding complications 53 (73.6%) had ischemic heart diseases and 19 (26.3%) had history of stroke.**CONCLUSION:** Hypertensive individuals had hyperinsulinemia that fluctuates with duration of hypertension and associated complications**Key words:** Hypertension, Insulin and Hyperinsulinemia.**Corresponding Author:*****Dr. Zulfiqar Ali Qutrio Baloch,**

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INTRODUCTION:

Various factors responsible for essential hypertension includes age, gender, salt intake, dyslipidemia, genetics, smoking, diabetes and obesity [1]. Beside all of these the hyperinsulinemia has also considerable potential factor[2]. The association of essential hypertension and hyperinsulinemia was also reported formerly and insulin role in hypertension was extensively studied [3]. Insulin causes retention of renal sodium and hence water retention from the proximal tubular cells [4]. Despite of this the insulin increases sympathetic, having mitogenic effect on vascular smooth muscle cells results in vascular hypertrophy, modifies transport of ions across the cell membrane leads to increase in the cytosolic calcium levels and causes nonmodulation, i.e., salt restriction or excess not modulate any effect on renal vascular system by angiotensin II or renal tubular cells. In the past various investigators have reported hyperinsulinemia in hypertensive subjects [5-7]. The exact association between the two is still a matter of concern [8], although two possible theories have been documented; the first presupposes an insulin induced rise in plasma catecholamines whereas the second relates to insulin induced renal tubular sodium reabsorption. This study was conducted to evaluate the serum insulin level in patients with essential hypertension at tertiary care hospital as early identification strategy will be helpful as far as management is concerned & to prevent complications.

PATIENTS AND METHODS:

This cross sectional study of six months (July 2016 to December 2016) was conducted in department of Medicine, Liaquat University Hospital Hyderabad. The subjects with essential hypertension of varying duration visited to medical wards were recruited

randomly for the study after taking informed consent. The hypertension was labeled according to the JNC-8 criteria. The ≥ 2 readings separated by two minutes were averaged while in newly detected hypertensive patients the diagnosis was done by the average of ≥ 2 readings at each of ≥ 2 visits after initial screening. The detail history, clinical examination and relevant investigation were advised to ruled out secondary causes for hypertension. The exclusion criteria for the study were patients with diabetic mellitus, smokers and alcoholic, renal and liver disorders, familial dyslipidemia and insulinoma. The patients already on insulin and oral hypoglycemia and steroidal therapy and pregnant / lactating ladies were also excluded from the study. The history related to hypertension complications were recorded while the data was saved on predesigned proforma. The ECG and echocardiography were advised to evaluate the complications of hypertension. All the subjects with essential hypertension were observed for serum insulin level by taking 2 cc fasting venous blood sample and sent to laboratory for analysis estimated by radioimmunoassay method. The normal fasting serum insulin levels is 2.1 to 30 μ /ml. The data was saved and analyzed in SPSS 16, the frequency, percentages and means \pm SD was computed for study variables.

RESULTS:

During six months study period, total seventy two patients had essential hypertension were screened for fasting serum insulin level to observe the frequency of hyperinsulinemia. The mean age \pm SD for whole population was 48.97 \pm 5.98 while the mean serum fasting insulin level in hyperinsulinemic and normoinsulinemic was 35.87 \pm 8.65 and 20.76 \pm 3.72 respectively. The frequency and percentages for age, gender, hyperinsulinemia and related complications in patients with essential hypertension are shown in Table 1-6

Table 1: Demographical Distribution

	AGE (yrs)	GENDER		TOTAL
		MALE	FEMALE	
	25-29	2	1	3
		4.3%	4.0%	4.2%
	30-39	12	4	16
		25.5%	16.0%	22.2%
	40-49	15	11	26
		31.9%	44.0%	36.1%
	50-59	9	6	15
		19.1%	24.0%	20.8%
	60-69	7	3	10
		14.9%	12.0%	13.9%
	70+	2	0	2
		4.3%	.0%	2.8%
Total		47	25	72
		100.0%	100.0%	100.0%

Table 2: The Age and Hyperinsulinemia

	AGE (yrs)	HYPERINSULINEMIA		Total
		Yes	No	
	25-29	1	2	3
		2.2%	7.4%	4.2%
	30-39	10	6	16
		22.2%	22.2%	22.2%
	40-49	15	11	26
		33.3%	40.7%	36.1%
	50-59	10	5	15
		22.2%	18.5%	20.8%
	60-69	7	3	10
		15.6%	11.1%	13.9%
	70+	2	0	2
		4.4%	.0%	2.8%
Total		45	27	72
		100.0%	100.0%	100.0%

Table 3: The Age and Complications

	AGE (yrs)	COMPLICATION		Total	
		IHD	Stroke		
	25-29	2	1	3	
		3.8%	5.3%	4.2%	
	30-39	11	5	16	
		20.8%	26.3%	22.2%	
	40-49	19	7	26	
		35.8%	36.8%	36.1%	
	50-59	12	3	15	
		22.6%	15.8%	20.8%	
	60-69	7	3	10	
		13.2%	15.8%	13.9%	
	70+	2	0	2	
		3.8%	.0%	2.8%	
	Total		53	19	72
			100.0%	100.0%	100.0%

Table 4: The Gender and Hyperinsulinemia

	GENDER	HYPERINSULINEMIA		Total
		Yes	No	
	Male	31	16	47
		68.9%	59.3%	65.3%
	Female	14	11	25
		31.1%	40.7%	34.7%
Total		45	27	72
		100.0%	100.0%	100.0%

Table 5: The Gender and Complications

	GENDER	COMPLICATION		Total
		IHD	Stroke	
	Male	35	12	47
		66.0%	63.2%	65.3%
	Female	18	7	25
		34.0%	36.8%	34.7%
Total		53	19	72
		100.0%	100.0%	100.0%

Table 6: The Hyperinsulinemia and Complications

HYPERINSULINEMIA		COMPLICATION		Total
		IHD	Stroke	
Yes		33	12	45
		62.3%	63.2%	62.5%
No		20	7	27
		37.7%	36.8%	37.5%
Total		53	19	72
		100.0%	100.0%	100.0%

DISCUSSION:

Hyperinsulinemia observed more frequently in hypertensive individuals than it was found earlier[9]. The hypertension and its complications such as ischemic heart disease and cerebrovascular diseases are (CVD) associated with hyperinsulinemia [10]. Several former studies found an association that hyperinsulinemia might be the etiological factor for the hypertension its pathogenesis and complications [11-12]. The present study was conducted to evaluate the role of insulin in hypertensive individuals and intensity of hypertension as far as insulin levels is concerned. In Pakistan, no any study had reported in the said context, thus the study was carried out to establish the relationship between hypertension and insulin. In current series, 72 hypertensive subjects were recruited; hyperinsulinemia were seen in 45 (62.5%) patients while remaining 27(37.5%) had normal insulin levels.

The mean insulin level in hyperinsulinemic and normoinsulinemic individuals was 72.85 ± 5.65 and 22.64 ± 3.74 respectively. The study conducted by Bhatnagar MK, et al showed 74% of the hypertensive subjects had hyperinsulinemia [13]. Reaven GM, et al [14] study shown 41% were hyperinsulinemic, Ferrannini E, et al [15] study concluded more than 80% hypertensive subjects were found to have hyperinsulinemia. Harper R, et al [16] observed that > 60% hypertensive patients were hyperinsulinemic. The present study has the highest insulin level as compared to former studies. The reason might be the age factor and frequency of complicated cases.

In our study, out of 72 patients, 20 cases had hypertension for less than 2 years, 30 had since 2-5 years, 10 had since 5-10 years while 12 had >10 years. The subjects had hypertension since >5 years had a higher insulin levels than other groups; the observations are consistent with the previous studies [17,18] In our series, the male population was predominant 47(65.3%) had higher serum insulin level when compared to female hypertensive. The observation was similar to the study by Kahleova R,

et al [19]. In present series the hypertensive cases were also assessed for complications based by electrocardiography and echocardiography and brain imaging. The findings were consistent to the study by Prakash O, et al [20]. Thus, the present study indicates that the hyperinsulinemia is a direct cause of left ventricular hypertrophy. In the study by Poirier P, et al [21], logistic-regression analysis shown that the insulin concentration remained associated to the ischemic heart disease. The study conducted by McNulty PH, et al [22], shown >40% hypertensive hyperinsulinemic had history of left ventricular hypertrophy and cerebro-vascular accidents (stroke). The study by Lakka HM, et al [23], showed a casual association between hyperinsulinemia and risk of cardiovascular mortalities.

CONCLUSION:

It was concluded that hypertensive individuals had hyperinsulinemia that fluctuates with duration of hypertension and associated complications. Hyperinsulinemia is directly related to complications like left ventricular hypertrophy (ischemic heart disease) and cerebrovascular accidents (strokes) detected by electrocardiography, echocardiography and brain imaging.

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