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Original Research Article

Study of Serum Cholesterol Level and Fasting Blood Glucose Level among the Essential Hypertensive Patients Visiting Jorhat Medical College & Hospital - A Cross-Sectional Hospital Based Study

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ABSTRACT

Essential hypertension leads to altered lipid profile, especially cholesterol level in blood. There are reports showing hypertension and diabetes are the leading co-morbidities in general population as there is substantial overlap between hypertension and diabetes in both aetiology and diseases mechanism. There are only few reports worldwide showing dysglycemia during high blood pressure, which has recently got interest the body uses cholesterol to help build cells and produce hormones. In essential hypertension, too much cholesterol in the blood can build up inside arteries, forming what is known as plaque. Large amounts of plaque increase your chances of having a heart attack or stroke. The study has been carried out among clinically diagnosed essential hypertension patients in Jorhat Medical College and Hospital, Jorhat. A Cross-Sectional hospital based Study of 680 patients of essential hypertension who have been examined for serum cholesterol and fasting blood glucose level. During the study period, the quality control has been maintained according to prescribed norms and standards. Considering that the Essential hypertension to be more common in young adults, the study group was restricted to 20 years to 40 years. It is seen that serum cholesterol level showed a positive correlation with fasting blood glucose levels, that was statistically significant ($p<0.05$). The Pearson Correlation Coefficient "r" which was found to be 0.533591 established a strong positive correlation between the two parameters.

Keywords: Hypertension, dysglycemia.

INTRODUCTION

Hypertension is a common and major health problem in India and worldwide. It is the most common factor of cardiovascular diseases (CVD) which increases the risk of stroke, myocardial infarction and renal failure. According to world health report of 2003, CVDs will be the largest cause of death and disability by 2020 in India. [(1)] The changes in serum lipid profile levels should be actively investigated & a few studies have established relation between hypertension and hyperlipidemia. In 2020, 2.6 million people in India are predicted to die due to coronary artery disease which constitutes 54.1% of all CVD deaths. Dyslipidemia and hypertension are one of the commonest risk factors for coronary artery disease. Hypertensive patient have higher lipid profile than normotensive patient. [(1-5)]

There are reports showing hypertension and diabetes are the leading co-morbidities in general population as there is a substantial overlapping between hypertension and diabetes in both aetiology

and diseases mechanism. There are only few reports worldwide showing dysglycemia during high blood pressure, which recently got interest. [6-9]

Hypertension is grossly divided into essential hypertension or primary hypertension or idiopathic hypertension and secondary hypertension. Essential Hypertension, by definition, has no identifiable cause. It is the most common type of hypertension, affecting 95% of hypertensive patients. Essential hypertension is likely to be consequences of an interaction between environmental factors and genetic factors. Prevalence of essential hypertension increases with age and with relatively high blood pressure at younger ages is at increased risk for the subsequent development of hypertension and some of them lead to secondary hypertension in later stages of life. [10-12] Some modifiable risk factors are high salt intake, saturated fat, less dietary fibre, alcohol intake, less physical activity etc [4] Abnormalities in serum lipid and lipoprotein levels are recognized major modifiable cardiovascular disease and essential hypertension risk factors. [13-15] In north east, prevalence of essential hypertension is 33.3%. [6,16] The body uses cholesterol to help build cells and produce hormones. Too much cholesterol in the blood can build up inside arteries, forming what is known as plaque. Large amounts of plaque increase your chances of having a heart attack or stroke. [17,18] The Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC VI) defined and classified hypertension in adults. The diagnosis of hypertension is made when the average of 2 or more diastolic BP measurements on at least 2 subsequent visits is ≥90 mm Hg or when the average of multiple systolic BP readings on 2 or more subsequent visits is consistently ≥140 mm Hg. Isolated systolic hypertension is defined as systolic BP ≥140 mm Hg and diastolic BP <90 mm Hg. Individuals with high normal BP tend to maintain pressures that are above average for the general population and are at greater risk for development of definite hypertension and cardiovascular events than the general population. [18]

MATERIALS AND METHODS

Method sampling: The cross sectional hospital based study has been carried out among clinically diagnosed essential hypertension patients in Jorhat Medical College and Hospital, Jorhat. Cases has been selected among the Essential hypertension patients attending the OPD and in patients WARD of MEDICINE department of Jorhat Medical College, Ethical clearance & clinical history has been taken before the blood sample has taken.

Sample size: 680 PATIENTS

Study period: one year (1.6.2015-31.5.2016)

Aims and objective:

To measure the changes of serum cholesterol and fasting blood glucose level in clinically diagnosed patients with essential hypertension between 20 years to 40 years visiting JMCH

Design of the study:

Study design: cross sectional hospital based study.

Subjects: The study has been carried out among clinically diagnosed essential hypertension patients in Jorhat Medical College and Hospital, Jorhat. The consent form was provided to the patients to obtain prior approval before their inclusion in the study.

CRITERIA FOR SELECTION OF CASES:

Cases has been selected among the Essential hypertension patients attending the OPD and in patients WARD of MEDICINE department of Jorhat Medical College, Jorhat fulfilling the below mentioned inclusion and exclusion criteria. A brief history of the patient has been taken including demographic profile.

Inclusion criteria

1. Patients of age group 20 to 40 years of both sexes.
2. Newly and already diagnosed cases

of essential hypertension with or without medications.

Exclusion criteria

1. Patients with other associated major disorders and in which hypertension diagnosed later
2. Patients with systemic illness like diabetes, hypertension, hypothyroidism, renal disease, liver disease, obesity and cancer.
3. Already diagnosed case of Secondary hypertension
4. Patients on contraceptive pills (OCP) for longer duration around 10 years.

COLLECTION OF BLOOD SAMPLE

All samples were collected under aseptic and antiseptic measure in CCL collection center JMCH. The sample was collected after overnight fasting of around 10 hours to 12 hours. The samples were collected in fluoride vial for Fasting glucose and clot vial for serum cholesterol. Fasting glucose and serum cholesterol was tested in vitreous 250 auto analyser based on principle of reflectance spectroscopy. Samples were made to stand for 20 minutes at room temperature and centrifuged at 3200rpm.for 5-10 minutes. Serum was separated into secondary cup and then analysed. During the study period, the quality control was maintained according to prescribed norms and standards. The PV1 & PV2 of reference range of every parameter was run daily. The external & internal quality control was properly maintained during the study period

Statistical method

The data were analysed using Microsoft Excel. Statistical significance of the study was tested online calculator.

RESULTS

In the present study, total of 680 patients were selected for estimation of serum cholesterol and fasting blood glucose of having essential hypertension. There was equal distribution of male and female in each group. Normally, desired serum cholesterol level is upto 200mg/dl & fasting blood glucose is 70-110mg/dl. Total number of patients in each group was equal. The serum cholesterol (229 ±25.84 mg/dl) and fasting blood glucose (116.57 ± 27.40mg/dl). It was seen from the table 3 that serum cholesterol level showed a positive correlation with fasting blood glucose levels, that was statistically significant ($p<0.05$). The Pearson Correlation Coefficient "r" which was found to be 0.533591 established a strong positive correlation between the two parameters.

Table 1: Showing Number Of Patients In Each Groups:

Age(years)	Case	Male: female Percentage
20-40	680	50

Table 2: Level of Serum Cholesterol and Fasting Blood Glucose

	SERUM CHOLESTEROL MEAN(mgdl) ±SD	FASTING BLOOD GLUCOSE(mg/dl) ±SD
Cases	**229** ±25.84	116.57 ± 27.40

Table 3: Correlation Between Fasting Blood Glucose And Serum Cholesterol Level In Cases

Fasting blood glucose (F.B.G)	Serum Cholesterol (S.C.)	
	r-value	p- value
	0.533591	<0.05

DISCUSSION

In one study conducted on north Indian population in 2013 shows hypertensive subjects were characterized by increased fasting insulin levels (16.77±7.62 vs. 8.84±2.04μIU/ml, $p<0.01$), and dyslipidemia, i.e. increased total cholesterol. There was a positive correlation of fasting insulin levels, & total cholesterol. [(1)]

In a study from General Medicine department of Government hospital, Rishikesh from May 2009 to May 2010. Hypertension was defined as per the recommendations of JNC7th Report**.** A total of 120 volunteers were recruited for this study. Out of them 70 were hypertensive subjects (38 males and 32 females) and 50 were normotensive subjects (27 males and 23 females). The results concluded that total cholesterol, was higher and statistically significant in hypertensive subjects than normotensive subjects ($p<0.05$). [(2)]

In a study of Two hundred and fifty newly diagnosed adult hypertensive patients and an equal number of age- and sex-matched controls without hypertension were consecutively recruited from the Medical

and General Outpatient Clinics of Nnamdi Azikiwe University Teaching Hospital, Nnewi. Result. 126 males and 124 females were in each of the two groups. Mean age was comparable in both groups. Hypertensives had significantly higher mean systolic blood pressure, diastolic blood pressure and fasting blood sugar than the controls. The mean of total cholesterol (TC), was significantly higher among the hypertensives. This study showed that lipid abnormalities are highly prevalent among newly diagnosed hypertensives in South-East Nigeria. [(4)]

In another attempt was made by N Lakshmana kumar, J. Deepti, YN rao, M Kiran deedi, department of biochemistry, GSL medical college, Andhra Pradesh, India. To study the role of lipid profile serum blood glucose in hypertension individuals. Moreover, all the parameters are analyzed biochemically. In about 80 samples (50cases and 30 controls) and it is observed that dyslipidemia is seen in Hypertensive. Fasting blood glucose of hypertensive cases (101.62mg/dl ±33.78) is higher than that of Controls (82.46 mg/dl±10.8). This increase is statistically significant ($p<0.001$). [(5)]

Another study was done in spain in 2005 in 270 patients by Stiefel P, Miranda ML, Muñiz O, Nieto MD, Jiménez L, Villar J. Out of which, An impaired fasting glucose was present in 4.1% of subjects. Patients with intolerance or type 2 diabetes had a worse plasma lipid profile, and those with impaired fasting glucose. [(6)]

CONCLUSION

From the present study, it was observed that Serum Cholesterol increases with increase in blood glucose level in Essential hypertensive patients & the Pearson correlation coefficient which was found to be strongly positive between these parameters & it was highly significant. The serum cholesterol level showed a positive correlation with fasting blood glucose levels, that was statistically significant ($p<0.05$). The Pearson Correlation Coefficient "r" which was found to be 0.533591 established a strong positive correlation between the two parameters.

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