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# TO STUDY THE LEVELS OF SERUM LIPOPROTEIN (A) IN PATIENTS WITH ESSENTIAL HYPERTENSION

General Medicine

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## ABSTRACT

**Aim:** Aim of the study was to find out the level of serum lipoprotein (a) in healthy and hypertensive subjects and role of serum lipoprotein (a) as an independent marker of cardiovascular risk in patients with essential hypertension and to find its association with blood pressure and lipid profile

**Material and Method:** 50 patients with essential hypertension and 50 apparently healthy subjects were included in the study. Sera were collected from them and serum Lipoprotein (a) [Lp (a)] with immunoturbidometric assay and lipid profile were measured by standard biochemical methods on automated chemistry analyzer. Unpaired t-test was used to assess the significant difference in the means of the studied variables in the different groups.

**Result:** Serum lipoprotein (a) was found to be significantly increased ($p<0.001$) in hypertensive patients ($36.52 \pm 9.34$ mg/dl) as compared to healthy individuals ($17.96 \pm 8.42$ mg/dl). Total cholesterol, LDL, triglycerides were significantly increased ($p<0.001$) and HDL was significantly decreased ($p<0.001$) in cases compared to controls.

**Conclusion:** Elevated lipoprotein (a) in hypertensive patients can be an independent risk factor for development of cardiovascular disease.

## KEYWORDS

Essential hypertension, Lipoprotein

## 1. INTRODUCTION

Hypertension (HTN) is a very common disorder with a substantial impact on public health because of its complications[1, 2]. Despite the high prevalence of essential hypertension (eHTN) the basic causes remain unclear. Serum lipoprotein (a) [Lp (a)] is a complex lipoprotein particle which has homology structure with plasminogen of the fibrinolytic system .Little is known about the association of serum Lp(a) elevation with essential hypertension thus suggesting a possible role of Lp(a) in the genesis of eHTN[4] . The role of Lp(a) as an independent biomarker of vascular risk has been investigated for more than 20 years, but recently the European Atherosclerosis Society (EAS) has issued a new consensus statement endorsing routine measurement of Lp(a) among patients with moderate to high risk of cardiovascular disease[2].

## 2. MATERIAL AND METHOD

The aim of our study was to measure the serum concentrations of Lp (a) in a group of essential hypertensive patients with no clinical signs of organ damage.

**2(a) Study design:** It is a prospective observational study.

All statistical analyses were performed using the SPSS (version 11.00) software and statistical significance was inferred at a p value< 0.05.

**2(b).Setting & study duration**: This study was carried out in the Medical department of a tertiary care teaching hospital for 2 years.

**2(c).Sample size:** 50 patients with essential hypertension and 50 apparently healthy subjects were included in the study. Sera were collected from them and serum Lipoprotein (a) [Lp (a)] with immunoturbidometric assay and lipid profile were measured by standard biochemical methods on automated chemistry analyzer.

**2(d).Classification of Essential Hypertension**

Hypertension was defined according to the JNC VII classification of hypertension as those with SBP of < 120 mm Hg and DBP of < 80 mm Hg as normal, those with SBP of 120- 139 mm Hg or DBP of 80 - 89 mm Hg were labelled pre- hypertensive were not taken up for the study, those with SBP 140 -159 mm Hg or DBP of 90 -99 mm Hg were labelled as stage I were labelled as having stage 1 hypertension, and those with SBP ≥ 160 mmHg or DBP ≥ 100 mmHg were labelled as Stage 2 hypertension.

Group I – Control group (n=50): This group consisted of age and sex matched non-hypertensive subjects. They were free from any major ailment which could affect the parameters under study.

Group II –Essential hypertension patients (n=50)

**2(e). Inclusion criteria:**

1. Healthy normotensive subjects and hypertensive subjects who were on anti-hypertensive therapy.
2. Age group 20 to 60 years and gender for an appropriate match to avoid bias.
3. All biochemical and haematological investigations should be in normal limit.
4. Hypertension was diagnosed when on at least 3 separate occasions: Systolic Blood Pressure ≥ 140 mmHg. Diastolic Blood Pressure ≥ 90 mmHg.

**2(f) Exclusion Criteria:** The following patients were excluded from the study:

1. Patients with accelerated / malignant hypertension, Systolic blood pressure > 180 mmHg,Diastolic blood pressure >110 mmHg
2. Patients with secondary hypertension.
3. Patients with either of the following associated disease

**2(g) ESTIMATION OF SERUM LIPOPROTEIN (a) Lp (a)**

**Method:** Latex Turbidometric method

**Principle:** Latex particles coated with antibodies anti-Lp(a) are agglutinated when mixed with samples containing Lp(a). The agglutination causes an absorbance change, dependent upon the Lp(a) contents of the sample that can be quantified by comparing from the calibrator of known Lp(a) concentration.

**2(h) Statistics**

All statistical analyses were performed using SPSS version 16.0 software and Microsoft Office Excel 2007. Data are expressed as mean ± SD. Student's t-test and Anova test were used to compare mean values and calculate significance. Data were considered statistically significant if p values were <0.05. Pearsons coefficient of correlation was used to assess linear correlation between serum lipoprotein-a and other variables. Interpretation was done according to p-value as follows: $p<0.05$—significant $p<0.001$—highly significant $p<0.01$—very significant $p>0.05$ — not significant.

All the case records were collected in a specified proforma. Written, informed consent was obtained from all subjects.

### 3. Results and analysis

**Table 1** Age and sex distribution in control and cases.

It shows the age, sex distribution of hypertensive cases and healthy individuals. The control group consisted of 50 healthy individuals consisting of 36 males and 14 females. The study group consisted of 50 hypertensive patients consisted of 28 males and 22 females. Majority hypertensive were in the age group of 51-58 yrs

| | Controls | Cases |
|---|---|---|
| Age (yrs.) | 50.24±9.6 | 51.82±8.2 |
| Male: female | 0.6 | 0.6 |
| Systolic BP (mmHg)* | 110±8.81 | 148±18.21 |
| Diastolic BP (mmHg)* | 71±10.08 | 95±7.95 |

*Table 1: Baseline Characteristics of Study Population*

**Table 2: Mean Distribution of Lipid Profile and Lp (a) in Study Population**

| Biochemical parameter | Control (Mean±SD) | Cases (Mean±SD) |
|---|---|---|
| Total cholesterol (mg/dL) | 170.02±40.02 | 184±30.76 |
| Triglyceride(mg/dL) | 125.23±45.81 | 160±65.54 |
| HDL-C (mg/dL) | 40.21±10.99 | 35.14±5.77 |
| LDL-C(mg/dL) | 110±35.54 | 130.98±30.02 |
| Lp (a) (mg/dL)* | 20.21±6.45 | 33.95±8.22 |

Table 2: Mean Distribution of Lipid Profile and Lp (a) in Study Population

The plasma concentrations of TC, triglycerides, LDL-cholesterol and non-HDLcholesterol were significantly higher in the hypertensive group with atherogenic dyslipidemia than in the hypertensive group without atherogenic dyslipidemia ($p < 0.001$) and than in the control group ($p < 0.001$). The highest concentrations of Lp(a) were found in hypertensive patients with atherogenic dyslipidemia (70 ± 55.95 mg/dL) compared to those without atherogenic dyslipidemia (69 ± 52.33 mg/dL, $p = 0.04$) and to control subjects (19 ± 14.64 mg/dL, $p < 0.001$).

In the present study, it was found that the hypertensive patients had higher plasma concentrations of Lp (a) than in the controls

### 4. DISCUSSION:

The Lp (a) was described for the first time in 1963 by Berg.[5 It] consists of a set of lipoproteins with different molecular weights (from 350 to 900 KD) in which particles of Low density lipoprotein (LDL) are bonded to apoprotein(a) (apo(a)), which has a Cringle structure . The physiological function of this lipoprotein is still unknown but the importance attributed to it has increased considerably in the light of the evidence that high plasma concentrations of Lp (a) are associated with an increased risk of vascular diseases.

Elevated Lp (a) could be an independent risk factor for atherosclerosis, and could contribute towards increasing the incidence of cardiovascular disease in people with essential arterial hypertension. There are very limited case- control studies determining association between Lp (a) excess and essential hypertension. The data of the present study confirm the role of Lp(a) as predictor of the severity of coronary atherosclerosis, suggesting that Lp(a) levels should be determined in patients with arterial hypertension, especially in those with atherogenic dyslipidemia, since Lp(a) behaved as a predictive severity marker for coronary atherosclerosis.In primary prevention of cardiovascular disease, Lp(a) seems to add predictive value to lipid screening and enhances risk prediction based on established risk variables. Larger studies that assess the atherothrombotic risk due to the Lp (a) particle in hypertensive patients are needed. Here's how Lp (a) levels are looked at in terms of risk:

Desirable: < 14 mg/dL (< 35 nmol/l)
Borderline risk: 14 – 30 mg/dL (35 – 75 nmol/l)
High risk: 31 – 50 mg/dL (75 – 125 nmol/l)
Very high risk: > 50 mg/dL (> 125 nmol/l)

### 5. Conclusion

The above findings suggest that in addition to conventional lipid profile parameters, estimation of Lp(a) can prove to be a valuable tool in risk assessment of population with hypertension and their progression to cardiovascular disease. Further, long term studies in a large group of population are needed to establish the role of Lp (a) in assessing the risk of cardiovascular disease in hypertensive patients.

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