

# Gender Difference in Lipid Profile in Hypertensive Patients' Hospital-Based Study

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## Abstract

**Background and objectives:** Hypertension and dyslipidemia are the integral components of metabolic syndrome. It has emerged as cause of substantial mortality in both genders. The objective of the study was to find out the prevalence of dyslipidemia in both gender and difference in pattern of lipid profile in hypertensive patients.

**Methods:** This was an observational study conducted in 2018 to 2019 at Sir Syed university Hospital Karachi Pakistan. Sample size of 250 diagnosed cases of hypertension (comprising equal number of males and females) were collected. The lipid values were interpreted in normal or high-risk category by applying NCEP ATPIII criterion. Fasting sample were collected for sugar and lipid profile. Anthropometric, demographic and biochemical data was tabulated. Categorical variables were displayed as mean  $\pm$  standard deviation and percentage respectively, compared with chi-square test. Student 't' test was use to assess the difference for the lipid profile at 5% significance level. The prevalence of dyslipidemia was estimated for men and women, and pattern in lipid profile were compared. The factors associated with dyslipidemia in both genders were calculated by multiple logistic regression expressed as odd Ratio with 95% confidence interval (C.I). To evaluate the effect of age on dyslipidemia we made four age groups 25-65 years and lipid pattern was compared.

**Results:** Dyslipidemia was found 63% of hypertensive group, 72% women were dyslipidemia than 54% men and pattern of lipid in males showed low LDL and high cholesterol and in females' high triglycerides and low HDL. The Predictors of dyslipidemia in female were old age, BMI kg/m<sup>2</sup> high blood pressure level, depression and lack of physical activity and in men smoking intake of fried, salty food, smoking and obesity with increasing age. Females have more triglycerides total cholesterol and low HDL compared to men.

**Conclusion:** Dyslipidemia was more found in women with hypertension but as the age increasing more women have dyslipidemia. while treating hypertensive patient's lipid lowering management gender heterogeneity should be considered.

**Keywords:** Gender, Hypertension, Dyslipidemia Heterogeneity

## Introduction

It has been previously reported that the South Asian including Pakistan population displays a very high prevalence of coronary heart disease (CHD) [1]. South Asians develop CHD at younger age in the absence of traditional risk factors, according to the "Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III (ATP III)) [1,2]. The cardiovascular diseases account for 24% of all deaths among adults (25-69 years) [3]. An alarming increase in the prevalence of cardiovascular diseases have been observed in the Indian population [4]. The growing epidemic of CHD is not specifically observed in South Asia; a rapid rise in CHD burden is also observed in various other developing countries [5]. The epidemic of CAD in middle- and low-income countries is widely attributed, conventional risk factors like hypertension,

diabetes, dyslipidemia low socio-economic changes, acquisition of lifestyle-related risk factors [6]. Dyslipidemia is reported to be closely associated with the pathophysiology of CHD. It is considered as a major, independent, and modifiable risk factor for CHD. World Health Organization (WHO), estimates that around 2.6 million deaths are caused by dyslipidemia each year representing a global prevalence of 37% in males and 40% in females, respectively in Pakistan prevalence of dyslipidemia was high in men with diabetes High levels of total cholesterol (TC), triglyceride (TG) and low-density lipoprotein-cholesterol (LDL-C) and low high-density lipoprotein cholesterol (HDL-C) are associated with CVD, hypertension, and Stroke [7,8].

Dyslipidemia pattern in Western populations is mainly characterized by predominantly as increased levels of LDL-C in comparison to Asian populations specifically in Pakistan South

eastern counties having a mixed dyslipidemia pattern with a significant low HDL-C and high TG levels [9-11]. Prevalence of Isolated hypertriglyceridemia was 20.6%, highest in Baluchistan (29.4%) and lowest in Sindh (17.7%). Prevalence of Isolated Low HDL was 63.3%, highest in Baluchistan (70.9%) and lowest in Punjab (62.2%) [12]. The prevalence of various types of-dyslipidemias in two different genders not done so far to our knowledge the present study provides the first and estimation of the prevalence and gender difference in dyslipidemia in the Pakistani population although it is not population-based study but it will provide proper planning of health care resources for both primary and secondary prevention of dyslipidemia in Pakistan.

The gender difference in dyslipidemia reported from many studies that diabetic female patient has high risk of increased triglycerides, low HDL and high cholesterol in local study showed females have low HDL no significant difference in other parameters [13,14]. Therefore, early screening and management strategies of dyslipidemia should be of high priority for CVD prevention. Ten percent reduction in serum cholesterol may results in 50% reduction in risk of ischemic heart disease over a period of 5 years in both genders [14]. We need large preventive studies addressing urban and rural population to find gender heterogeneity in lipid pattern.

## Methodology

It is correctional study done at outpatient department of Sir Syed University on 500 hypertensive patients' data was collected by manual Performa by using prospective sampling method

### Inclusion criteria

- Patients of essential hypertension without any complication.
- 25 years of Age and above consented for study

### Exclusion criteria

- Patients with intercurrent illness like febrile illness, liver failure, renal failure and nephrotic syndrome.
- Patient with Diabetes Mellitus
- Patients on steroids, beta-blockers, thiazide diuretics and oral contraceptives.
- Patients with primary metabolic and endocrine disorders like gout and hypothyroidism
- Patients with myocardial infarction and stroke
- Incomplete filled questionnaire

## Physical Examination and Questionnaire Interview

Patients were seen in outpatient clinic first they will explain about the study, consents were filled and measurement of hypertension. BMI Kg/m<sup>2</sup> was done the validated questionnaire was filled by trained Residents assessing the clinic. Blood sample was taking for lipid profile in fasting was taken in second setting

## Measurements and Questionnaire

Blood pressure was measured twice while patients were sitting

for 10 minutes. According to American heart Association (AHA) criteria, the patients having blood pressure >140/90 mm/hg were considered as hypertensive. MI was measured according to formula of weight in Kg divided by the square of height in meters: Classifying overweight (BMI 25-29) and obese (BMI>30). The questionnaire was then conducted by well-trained interviewers to collect information on personal characteristics (e.g., age and gender) and socioeconomic status (level of education, family size, work type, annual income per capita and marital status), lifestyle factors (cigarette smoking, alcohol consumption and physical examination was done regarding hypertension related target organ damage and ECG was also done in all patient to rule out old Myocardial infarction. For lipid measurement fasting blood sample of ~5 mL was collected from each participant in a heparin sodium anticoagulant tube. These tubes were then centrifuged at 1000 rpm for 5 min and the supernatant was sent for lipid measurement of TC, LDL-C, HDL-C and TG and for FBS within 4 h in the clinical laboratory.

## Definition of Dyslipidemia Lipid Level According to ATP 1112

- Total cholesterol level >200 gm/dl.
- LDL cholesterol level >130 gm/dl.
- Triglyceride >200 gm/dl.
- HDL cholesterol level >35 gm/dl.

## Statistical Analysis

Data was double entered in Epi Data version 3,1 SPSS version 19 categorical variables were described as means, quantitative as median, percentages and variables were compared with chi square and in independent T test with p value <0.5 taken as significant. Gender stratified prevalence of lipid abnormalities was estimated first than parameters of lipid profile like TC, TG, LDL-C, HDLC by independent t test., difference for the lipid profile at 5% significance level. Effect of age on pattern of dyslipidemia in both genders were compared using t test and factors associated with dyslipidemia in both genders were estimated by odd ration with 95% Confidence interval (C.I) using multivariate logistic regression

## Results

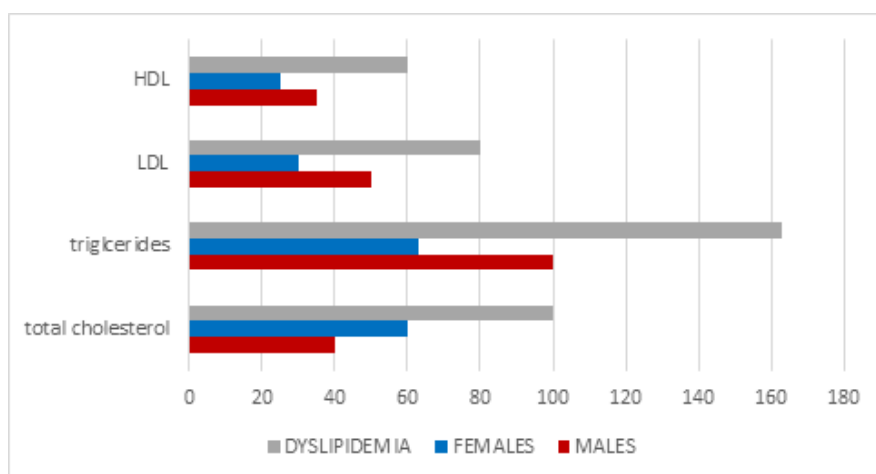
In this we evaluated 250 patients with essential hypertension equal number 150 female and 150 males for lipid disorder. 23 patients were excluded because incomplete filled questionnaire. Patients observed in this study were between 25-64 years of age. They were divided into four age groups in both genders (25-34, 35-44, 45-54 and 55-64 years). Baseline characteristics are defined in Table1. Mean age of females are significantly higher than men, they have uncontrolled blood pressure mean BP 150/90, high BMI depression. lack of physical activity. Males had lower mean age is 40 years, more smokers, obese and consuming more food from outside interestingly salt intake was high in both groups

**Table 1: Baseline Characteristics**

Variables	Females n 125	Males n 125	P value
Mean age 50 years	50yrs	40 years	0,04
Mean BMI Kg/m <sup>2</sup>	28KG/m <sup>2</sup>	25KG/m <sup>2</sup>	0.05
Mean BP mm HG	150/90	130/90	0.04
Smoking	25%	65%	0.05
Lack of physical activity	60%	40%	0.03
Alcohol consumption	2%	30%	0.01
Increased intake of salt > 6 gm	70%	80%	0.1
Increased intake of food from outside	35%	65%	0.05
Depression	50%	30%	0,05
Use of fruits and vegetable	15%	25%	0.05

Out of these 250 hypertensive patients' hypertension 63% dyslipidemia in both genders' females with 62% and 38% in males with p value of 0.05. Specifically, females had a higher proportion of abnormalities in TG, TC but a lower proportion of

HDL-C which are statistically significant abnormalities compared with males which had high LDL and total cholesterol is higher in females but there is no significant difference in Figure.

**Figure:** Frequency of Lipid Disorders in 250 Patients of Essential Hypertension**Table 2: Factors Associated with Gender Heterogeneity in Dyslipidemia**

Factors	Males	Females	Odd Ratio 95% CI	P value
BMI > 25kg/m <sup>2</sup>	25%	28%	0.7 with CI (0.5-1.1)	<0.05
BP reading 150/100	33%	53%	1.0 with CI (1.1-1.7)	<0.03
Lack of physical activity	40%	58%	0.9 with CI (0.9-1.5)	<0.05
Smoking	60%	12%	1.5 with CI (0.9-1.7)	<0.01
Increased salt intake	40%	30%	0.8 with CI (0.6-1.4)	<0.05
Increased food from outside	43%	22%	1.1 with CI (0.9-1.3)	<0.02
Depression	30%	60%	1.2 with CI (0.9-1.5)	<0.01
Use of Fried food	40%	30%	0.86-1.0 with CI (0)	0.05

Age related difference in lipid seen in both genders out of older group (62%) have lipid disorder, while only (42%) of younger age group have lipid disorder. With increasing age women

in older hypertensive females had more triglycerides, low total cholesterol and low HDL compared to men of same age group 55-64 years in Table 3.

**Table 3: Mean Lipid Parameters According to Age in Males and Females**

Age group	Triglycerides		P value	Total cholesterol		P value	HDL		P value
	Male	Female		Male	Female		Male	Female	
25-34	167	184	0.78	184	195	0.4	34	32	0.78
35-44	169	189	0.1	197	200	0.8	36	33	0.68
45-54	173	217	0.48	167	210	0.05	38	31	0.04
55-64	159	220	0.05	176	220	0.05	34	30	0.58

## Discussion

A significant finding of this study was the increased prevalence of dyslipidemia in hypertensive patients which double the risk of cardiovascular disease in both genders. The study was designed to compare the core component of metabolic syndrome, hypertension, dyslipidemia (hypercholesterolemia, decrease HDL-C, increased triglycerides) among males and females. Our results had paramount importance as our female population group was found to be more dyslipidemia as compare to men and have more uncontrolled hypertension which have increased the risk of CAD. Our study results are consistent with study done by M Alamgir study they compared the metabolic parameters in Diabetes men and women they have same results [14]. It is advantageous here to compare with recent database information reported by international organization. According to large population survey conducted by ADA/AHA, Women in our study had higher level of blood pressure and high BMI kg/m<sup>2</sup> and lack of physical activity which is reported by previous studies [2,15]. So our female cohort had significantly elevated level of total cholesterol and triglycerides along with low HDL-C. If we compare with age trends women in age group of 50-60 had higher percentage of lipid parameters high triglycerides, total cholesterol and low HDL same results described by Basit in a sub analysis from second National Diabetes Survey of Pakistan (NDSP) in similar study by Syed Yasir Hussain from Ayyub medical college on gender difference in dyslipidemia in diabetic found female have high triglycerides [15,16].

Dyslipidemia in our study in male cohorts was because increased obesity smoking and increased intake of food from outside and increased salt intake were more common as compared to females had high BMI, increased level of hypertension and lack of physical activity and females were older than males' same results showed by study done by Mohsin A and Zafar J et al their females were affected more than males in all aspects [8]. Out of 106 patients, 91 had metabolic syndrome and majority (95%) were females. Low HDL-C was present in all females. 78% females had elevated TGs as well. Their 50% female had all components of metabolic syndrome except hypertension and difference was statistically significant. In a local study conducted by Nazeer M et al and Alamgir et al, in his thesis, had also shown these risk factors in females and particularly in postmenopausal age [17]. Their patients had uncontrolled hyperglycemia, hyperlipidemia, and increased weight these findings bear important public health implications and demands urgent consideration. Highlighted by risk factor coronary artery disease in diabetic patients by local studies results of our study was also similar to the study of Nadeem in diabetic patients [18-20]. A population-based study from rural China has been published 2020 on

gender heterogeneity in lipid disorders in population, greater attention should be given to males aged 45-50 years and females over 50 in both dyslipidemia screening and intervention were at the highest risk of having dyslipidemia in males and females aged 45-69, respectively similar result in our study [21]. This study identified several well-established contributing factors for dyslipidemia (e.g., nonphysical work, obesity, hypertension) as well as several gender specific factors. Gender-specific risk factors included alcohol consumption and salty food intake in males, and spicy food intake and self-reported diabetes history in females. It is of interest that the association of dyslipidemia with BMI and blood pressure is modified by gender like female with high BMI have more dyslipidemia and hypertension. The gender specific risk factor patterns may be useful in identification of a target population for dyslipidemia screening or intervention in the lipid management project. prevalence of HDL-C abnormality had a completely different age-related trend as compared to that of TC, TG and LDL and lower in old age group females. Still we controversies' regarding and future directions in management is needed as highlighted by study [22]. We need more population-based studies for see gender heterogeneity with hormonal changes and gender-based therapeutics.

## Strength of Study

- This study showed gender difference in dyslipidemia patient with hypertension which help in early screening specially females as they have less access to health care facility.
- This study will provide a ground for population-based studies including both genders will help to make separate intervention for both genders.

## Limitations of Study

- This was a single-center cross-sectional study hospital-based study non-randomized study
- The diabetes was excluded from the study which may give more information regarding prevention of metabolic syndrome in both gender
- The results of study cannot be generalized to whole population as it was an observational study.

## Conclusion

The Dyslipidemia was significantly associated with female hypertensive as compared to male counter parts. The healthcare providers should focus on integrated approach to the patients for lifestyle modifications, exercise and heart healthy diet. Hope is the engine of soul. These preventive measures along with lipid lowering drugs are essential to help combat the incidence of cardiovascular mortality.

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