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Original Article

EFFECT OF LABETALOL ON LIPID PROFILE AND ITS COMPARATIVE EFFECTS BETWEEN MALE AND FEMALE

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ABSTRACT

Objective: Labetalol, a combined alpha-and beta-blocker, is commonly used for the management of hypertension. However, its effects on serum total cholesterol (T-cholesterol) and high-density lipoprotein (HDL) levels remain an area of interest. This study evaluates the impact of labetalol on these lipid parameters over a 6-month period.

Methods: A total of 70 hypertensive patients were recruited, comprising 32 males and 38 females. Serum T-cholesterol and HDL levels were measured at baseline (0 mo), 3 mo, and 6 mo post-labetalol administration. Data were analyzed across different age groups to assess trends and statistical significance.

Results: In males, T-cholesterol levels showed a general increasing trend with advancing age, with the highest mean value recorded in the 61-70 y group (280.0 mg/dl). A minor reduction of 4% at 3 mo and 10% at 6 mo was observed in this age group, but these changes were not statistically significant. Female patients exhibited relatively stable T-cholesterol levels across all age groups, with no significant alterations over time. HDL levels remained relatively unchanged in both males and females throughout the study period. In males, the initial mean HDL levels ranged from 50.0 mg/dl in the 21-30 y group to 65.0 mg/dl in the 61-70 y group, with no significant variations after 3 or 6 mo. Similarly, female HDL levels remained stable, with no noticeable effect of labetalol administration.

Conclusion: Labetalol administration over a 6-month period did not produce significant changes in serum T-cholesterol or HDL levels in hypertensive patients. These findings suggest that labetalol does not adversely impact lipid profiles in the short term, supporting its use as a safe antihypertensive agent without major concerns regarding cholesterol management. Future studies with larger sample sizes and longer follow-up periods are warranted to further validate these observations.

Keywords: Labetalol, Hypertension, Total cholesterol, HDL, Lipid profile, Antihypertensive therapy

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INTRODUCTION

Hypertension is known for long to the medical science, but it was only the early 20th century since when it is related to diseases. It is known to be a "Silent killer", producing long-term complications resulting in morbidity and mortality. Antihypertensive drugs came into existence in early 20th century. Since then different groups of drugs have been used to control hypertension [1].

Though the incidences of strokes and renal complications have decreased but incidence of coronary heart disease remained same despite treatment in hypertensive. These drugs, apart from that have got lot of side effects and in many cases drug's side effects have been more troublesome than the disease itself. Even a few workers have questioned should a mild hypertension be treated or not [2].

Beta-blockers have been in the treatment of hypertension for long. Propranol, the first in the series, came as antihypertensive drug with lot of hope, but it could not live up to the expectations because of side effects. Many other beta blockers were discovered, replacing propranol with hopes. Of these, few have become out of date, while others are used with mixed reaction. Labetalol is amongst the recent in the series, having special property to block alpha-receptors as well [3].

Recently many of the beta blockers have been discarded because they adversely affect the lipid profile, often giving a balance towards genesis of atherosclerosis rather than good effects of normotensive state [4].

In the present study, we tried to evaluate the effect of labetalol on lipid profile and also compare the effect between male and female.

MATERIALS AND METHODS

The study was carried out in 70 patients of hypertension attending hypertension clinic or admitted to the indoor wards of Medical College Hospital Meerut. The study included 32 male and 38 female patients of hypertension receiving Nifedipine as monotherapy.

Diagnosis of hypertension

Diagnosis of hypertension was made according to the criteria laid down by the expert committee of technical report series (628) of WHO, 1978, which defines hypertension as a systolic blood pressure of 160 mm Hg or more and diastolic blood pressure of 95 mm Hg or more.

Exclusion of cases

The subjects having disease or past history of disease known to affect lipid profile such as diabetes, Nephrotic Syndrome, hypothyroidism or patient on anti lipaemic agents or oral contraceptives were excluded from the study.

Total fat intake and type of fat intake remained unaltered during the study period. The lipid profiles we are estimated at the start, after 3 mo and after 6 mo of study.

History

A detailed history was taken from each patient to establish the cause; special stress was given to find out general symptoms (headache, palpitation, chest pain, breathlessness). Other symptoms as blurring of vision and dizziness etc. were also inquired. Previous drug history, its efficacy and its side effects were also inquired in detail.

Clinical examination

The blood pressure of each patient was recorded with a standardized mercury manometer in lying and standing posture after 15 min of rest. Special attention was paid to the presence of puffiness of face, edema over feet, and evidence of cardiac involvement in the form of LVH or any evidence of cardiac decompensation. Kidneys were palpated and auscultated over renal angle for the presence of bruit. All the peripheral blood vessels were examined and blood pressure was also taken in lower limb at the time of first assessment and later, the right upper limb blood pressure was recorded.

Laboratory investigation

The following investigations were done to assess the patient, to rule out the diseases affecting lipid profile and lipid profile and to confirm diagnosis of ischemic heart disease.

A. Serum total cholesterol-by method of ZAK *et al.* (1953)

B. High-Density Lipoprotein cholesterol (HDL_c)

Collection of sample

Venous blood sample was collected in fasting stage and 4 h after lunch. The blood was allowed to clot undisturbed for one to two hours at 37 °C. Serum was separated and following tests were performed.

RESULTS

In this study, a total of 70 patients were recruited. There were 32 males and 38 females. Majority of male patients (n=14) were from 51-60 y age group and female patients (n=16) belonged to 41-50 y age group table 1.

Table 1: Age and sex distribution of patients received labetalol

Age group (Y)	Male	Female	Total	Percentage
21-30	2	1	3	4.3%
31-40	4	7	11	15.7%
41-50	9	16	25	35.7%
51-60	14	11	25	35.7%
61-70	3	3	6	8.6%
Total	32	38	70	100%

However, there is a lot of overlapping in values of Cholesterol among males but overall impression appears to be a higher value with advancing age. In 21-30 y age group, the mean value was 231.0 mg/dl with a standard deviation of 55.1. In age group 31-40 y initial levels mean value was 247.0 mg/dl with a standard deviation of 18.3. In age group 41-50 y initial mean value was 249.6 mg/dl with a standard deviation 24.3. In age group 51-60 y initial mean value was 254.8 mg/dl with a standard deviation of 14.7. In age groups 61-70 y, the initial mean was 280.0 mg/dl with a standard deviation of 5.6. There was hardly any change in 3 as well as 6 mo in different age groups except in 61-70 y age group, which showed a fall of 4% in first 3 mo and 10% in six months. The changes were not statistically significant because the no. of patients in the group was small there was not much difference in the levels of initial T-cholesterol in different age groups of females. In the age group 31-40 y the mean value was 244.1 mg/dl, standard deviation 17.4 table 2.

In the age group 41-50 y mean value was 246.9 mg/dl, standard deviation 25.9. In age group 51-60 y the mean 253.8 mg/dl, standard deviation 19.1. In age group 61-70 y mean value was 237.5 mg/dl, standard deviation 38.9. The change observed after 3 as well as 6 mo were statistically non-significant in different age groups table 2.

Table 2: Effect of labetalol on T. cholesterol in patients of different age groups followed for 6 mo ($\bar{X}$±SD) mg%

Age	At the start			After 3 mo			After 6 mo		
group (Y)	Male	Female	P	Male	Female	P	Male	Female	P
21-30	231.0±55.1	180.0	-	228.0±45.2	175.0	-	229.0±41.1	184.0	-
31-40	247.0±18.3	244.1±17.4	0.861	240.0±0	232.1±15.7	0.273	243.5±12.0	239.0±12.5	0.698
41-50	249.6±24.3	246.9±25.9	0.843	243.4±21.7	239.5±19.7	0.739	239.0±26.0	245.1±18.4	0.651
51-60	254.8±14.7	253.8±19.1	0.903	250.7±19.5	248.5±19.9	0.816	251.7±15.1	244.8±18.7	0.402
61-70	280.0±5.6	237.5±38.9	0.362	268.0±2.8	238.0±45.3	0.521	250.5±21.9	237.0±35.4	0.699

Table 3: Effect of labetalol on HDL in patients of different age groups ($\bar{X}$±SD) followed for 6 mo

Age	At the start			After 3 mo			After 6 mo		
group (Y)	Male	Female		Male	Female		Male	Female	
21-30	50.0±11.3	59.0	-	50.0±8.4	60.0	-	53.0±7.0	62.0	-
31-40	63.0±25.4	59.5±4.8	0.878	65.0±21.2	63.6±7.2	0.941	63.0±21.2	65.0±6.7	0.916
41-50	57.4±13.1	59.9±10.4	0.717	57.2±9.1	59.8±8.9	0.605	56.8±9.4	60.3±10.9	0.522
51-60	61.1±12.2	57.1±11.4	0.483	62.0±11.7	57.9±11.5	0.464	63.0±11.2	58.6±10.0	0.393
61-70	65.0±4.2	62.5±3.5	0.586	64.0±8.4	66.0±0	0.793	59.0±15.5	63.0±1.4	0.777

Table 4: Comparison of effect of labetalol on HDLc/T. Cholesterol in patients of different age groups followed for 6 mo ($\bar{X}$±SD) mg%

Age group	At the start			After 3 mo			After 6 mo		
(Y)	Male	Female	P	Male	Female	P	Male	Female	P
21-30	0.21±0	0.32	-	0.22±0.01	0.34	-	0.23±0.01	0.33	-
31-40	0.24±0.07	0.24±0.03	1.00	0.26±0.09	0.27±0.04	0.902	0.25±0.07	0.27±0.04	0.757
41-50	0.22±0.04	0.24±0.03	0.353	0.23±0.03	0.24±0.04	0.584	0.23±0.03	0.24±0.05	0.621
51-60	0.23±0.05	0.22±0.04	0.646	0.25±0.05	0.22±0.04	0.18	0.24±0.04	0.23±0.03	0.558
61-70	0.22±0.01	0.26±0.03	0.289	0.27±0.03	0.28±0.06	0.858	0.24±0.02	0.27±0.04	0.472

There was no gross difference in the initial levels of HDL in different age groups of females. In the age group 31-40 y the mean value was 59.5 mg/dl with a standard deviation of 4.8. In 41-50 y age group, the mean value was 59.9 with a standard deviation of 10.4. In the age group 51-60 y mean value was 57.1 mg/dl, standard deviation 11.4. Inage group 61-70 y mean value was 62.5 mg/dl, standard deviation 3.5. There was hardly any change in these values in 3 as well as in 6 mo table 3.

Initial level of HDL in 21-30 y age group of males was mean50.0 mg/dl (SD 11.3). In 31-40 y age group 63.0 mg/dl (SD 25.4). In 41-50 y age group 57.4 mg/dl (SD 13.1). In 51-60 y age group 61.1 mg/dl (SD 12.2) and in age group 61-70 y 65.0 mg/dl (SD 4.2). There was hardly any change in initial value of HDL in different age groups. Labetalol, after 3 as well as 6 mo, did not produced any change in HDL table 3.

DISCUSSION

In the present study, we observed variations in total cholesterol (T-cholesterol) levels across different age groups in both male and female patients. Although there was considerable overlap in cholesterol values among males, an overall trend of increasing cholesterol levels with advancing age was noted. This aligns with previous studies indicating that aging is associated with alterations in lipid metabolism, potentially contributing to higher cholesterol levels [5, 6].

Among males, the highest initial mean T-cholesterol level was observed in the 61-70 y age group (280.0 mg/dl), followed by a gradual decline over the 3-and 6 mo follow-up periods. Notably, this age group was the only one exhibiting a decline in cholesterol levels, with reductions of 4% at 3 mo and 10% at 6 mo. However, these changes were not statistically significant, likely due to the small sample size in this subgroup. The other age groups showed minimal fluctuations in cholesterol levels over time, suggesting that short-term follow-ups may not be sufficient to capture significant trends in lipid profile changes [7, 8].

In females, the initial mean T-cholesterol levels remained relatively consistent across age groups, with the highest value recorded in the 51-60 y age group (253.8 mg/dl). Unlike the male cohort, the 61-70 y age group in females had lower cholesterol levels (237.5 mg/dl), suggesting potential gender-based physiological differences in lipid metabolism with aging. Similar to the male patients, cholesterol levels in females did not exhibit significant changes over the follow-up period [9, 10]. The lack of statistically significant changes over time in both males and females could be attributed to several factors, including sample size limitations, individual variations in diet, lifestyle, and medication use. Additionally, cholesterol levels are influenced by genetic predisposition, hormonal changes, and other comorbid conditions, which were not explored in depth in this study [11]. Our findings highlight the importance of continuous monitoring of cholesterol levels, particularly in older individuals, as age-related dyslipidemia poses a significant risk factor for cardiovascular diseases.

Analysis of HDL levels across different age groups revealed no significant initial differences among females. The mean HDL values remained relatively stable, ranging from 57.1 mg/dl in the 51-60 y age group to 62.5 mg/dl in the 61-70 y age group. Over the 3-and 6 mo follow-up periods of labetalol administration, no substantial changes were observed, indicating stability in HDL levels across age groups in females, which was similar to Sommers *et al.* [7]. In males, HDL levels showed some variation, with the lowest mean level observed in the 21-30 y age group (50.0 mg/dl) and the highest in the 61-70 y age group (65.0 mg/dl). However, these variations were not statistically significant. Additionally, treatment with labetalol over 3 and 6 mo did not produce any notable changes in HDL levels in any of the age groups [12, 13]. The stability of HDL levels in both males and females suggests that short-term interventions may not significantly influence HDL concentrations [14].

CONCLUSION

The patients receiving Labetalol did not show any significant change after 3 and6 mo, except a significant rise in HDL/cholesterol ratio after first 3 mo in patients receiving labetalol which was not consistent, and after 6 mo the value came to the initial level. But still it gives an edge to labetalol over other beta-blockers used in IHD, because it did not have any atherogenic effect. Taking all cases together lipid profile does not appear to change by Labetalol. In male patients receiving labetalol in 61-70 y, cholesterol showed falling trend while HDL showed a rising trend. Thus leading to an increase in HDL/cholesterol. These changes indicate overall anti-atherogenic effect.

While an increasing trend of cholesterol levels with age was observed in males, no significant variations were noted in females. The minimal changes over time suggest that short-term fluctuations may not be clinically relevant, and a more comprehensive approach, including lifestyle interventions and pharmacological management, may be necessary to address cholesterol-related health risks effectively.

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AUTHORS CONTRIBUTIONS

All authors have contributed equally

CONFLICT OF INTERESTS

Declared none

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