International Journal of Medical Research Professionals
P-ISSN: 2454-6356; E-ISSN: 2454-6364
DOI: 10.21276/ijmrp

IJMRP

Original Research Article.

Effect of Calcium Channel Blocker Drugs on Lipid Profile of Rabbit Serum

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ABSTRACT

Background: Hypertension and Hyperlipidemia are proved to be major risk factors for coronary artery disease (CAD)[1]. CAD is caused by impaired blood flow to heart because of obstructive changes in the coronary artery which is due to hyperlipidemia.[2] The present study was aimed to find out the effect of calcium channel blocker drugs on lipid profile to decrease the incidence of CAD apart from lowering the blood pressure.

Materials & Methods: The present study was carried out over 25 male albino rabbits, the study subjects were divided into 5 groups of 5 rabbits in each group and marked as A, B, C, D & E group. Apart from experimental group of B, C, D, and E the Group A was control group on standard laboratory diet. The experimental Groups were put on high fat/cholesterol diet and on different drugs amlodipine (Group B), nimodipine (Group C), nitrendipine (Group D), & felodipine (Group E). High cholesterol diet was given for one month and after one-month data were collected for lipid profile, then drug is given for 1 month in each experimental group. Then effect of these drugs were seen on lipid profile of rabbit serum. Results were analyzed by SPSS.

Results: The present study showed that amlodipine decreased LDL-C by 1.69% & increased HDL-C by 4.07%. Similarly, Nimodipine decreased LDL-C by 37.14% % increased HDL-C by 6.6%, Nitrendipine decreased LDL-C by 0.94% & increased HDL-C by 1.06%, and Felodipine decreased LDL-C by 47.6% & increased HDL-C by 22.37%. The significant effect was observed by the drugs Nimodipine and Felodipine whereas the change is insignificant with amlodipine and Nitrendipine.

Conclusion: The present study concluded that there is a significant effect of Nimodipine and Felodipine in lowering Bad Cholesterol whereas in increasing HDL-C. No significant effect was observed in amlodipine & nitrendipine groups.

Key words: Calcium Channel Blocker Drugs, Lipid Profile.

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Article History:

Received: 09-10-2018, **Revised:** 03-11-2018, **Accepted:** 26-11-2018

Access this article online	
Website: www.ijmrp.com	Quick Response code
DOI: 10.21276/ijmrp.2018.4.6.037	

INTRODUCTION

The incidence of coronary heart disease is increasing in India. Known risk factors are many such as: Smoking Hypertension raised serum cholesterol, DM, type A personality and many more. Hypertension is a major risk factor for development of CAD.[1] CAD is caused by obstructive changes in the coronary circulation & these changes are mainly due to hyperlipidemia. Present study emphasizes the effect of calcium channel blocker drugs on lipid metabolism. We know LDL cholesterol is directly associated with CAD while HDL cholesterol is protective against development of CHD.[3,4] Hypertension is a major risk factor of CHD and hyperlipidemia is another risk factor of CHD.[5] The present study was aimed to observe the effect of Ca-channel blocker drugs as antihypertensive[6] on lipid profile. This study will help to reduce the drug therapy load to the patients having both Hypertension and Dyslipidemia, ultimately to reduce the incidence of CAD.

The primary objective of this study was to compare the effect of drugs Amlodipine Nimodipine, Nitrendipine, and Felodipine on lipid profile of rabbit serum.[7]

MATERIALS & METHODS

Present study was carried out in M.G.M. Medical college Jamshedpur in department of pharmacology.

The dose of drugs was calculated on the basis of the dose used for human beings in per kg body weight. All the study subjects were adult male rabbits each of about 1 kg weight.

1) Drugs: dose in mg/kg/day

Amlodipine	0.2
Nimodipine	0.6
Nitrendipine	0.2
Felodipine	0.5

2) Albino Rabbit 25 in no.
3) Reagent- Accurex Diagnostic kit for lipid profile.

All drugs are available in tablet form. Tables were powered to fine dust and gum acacia was added as emulsifying agent mixed with measured amount of water to make stock solution of each drug in the strength of 1 mg/dl. Subject 25 male albino rabbits all of about 1 kg wet. taken & divided into 5 groups each containing 5 rabbits.

Group A is control group on standard laboratory diet. Group B, C, D, & E are experimental group on high fat diet and on drug Amlodipine, Nimodipine, Nitrendipine & Felodipine respectively.

In all groups each rabbit's serum lipid profiles was measured on lst day and at the end of lst and 2nd month. Serum total cholesterol HDL-C & Triglyceride was estimated by using an enzymatic kit method while serum LDL-C were calculated by Friedwald's formula. The difference in finding obtained at base line and during drug treatment was statistically analyzed using SPSS software. A 'p" value of <0.05 is considered significant. Each value was mean ± standard error of mean (SEM). The sample size of each group i.e. value of n = 5. 'p' value of <0.01 when compared to control level before is represented by one asterisk (✡) while 'p' value < 0.05 when compared to control level is represented by two asterisks (✡✡)

Statistical Analysis

The data was analysed on SPSS software and the effect of drug on serum lipid profile was assessed by difference of the mean of the result obtained before and after drug treatment within the group.

Table 1: Lipid Profile In GROUP A control group

	Total Cholesterol	HDL-C	TG	LDL-C	VLDL-C
Basal Value	68.76±2.41	24.24±1.76	100.16±1.76	24.48±1.14	20.03±0.85
After 1 month	69.66±2.29	24.16±1.46	100.24±4.95	25.25±1.07	20.04±0.48
After 2 months	69.92±1.83	23.57±1.22	101.17±4.05	25.62±1.03	20.23±0.48
% Change	1.68%↑	2.76↓ed	1.01↑ed	4.65↑ed	0.84↑ed

Table 2: Lipid Profile In Group B Study Group Given Amlodipine

	Total Cholesterol	HDL-C	TG	LDL-C	VLDL-C
Basal Value	70.14±2.65	24.03±1.00	102.86±3.13	25.53±1.45	20.56±0.62
After 1 month	c10.4.4±2.54	27.09±0.97	141.20 3.52	49.07 1.10	28.23 0.07
After 2 months	104.79±2.57	28.24 1.10	141.50 3.59	48.25 1.70	28.29 0.72
% Change	0.36%↑	4.07%↑	0.21%↑	1.69%↓	.002%↑

Table 3: Lipid Profile In Group C Study Group Given Nimodipine

	Total Cholesterol	HDL-C	TG	LDL-C	VLDL-C
Basal Value	69.93± 2.34	23.95± 1.64	100.33± 4.75	25.98± 1.21	19.99± 0.93
After 1 month	103.80± 3.13	26.76± 0.60	141.27± 4.55	48.78± 2.88	28.25 ± 0.09
After 2 months	79.19± 1.38	28.41± 1.16	100.58± 1.35	30.66 ± 1.66	20.11± 0.15
% Change	23.7%↓ *	6.6%↑**	28.8%↓*	37.14%↓*	28.81%↓*

Table 4: Lipid Profile in GROUP D study Group Given Nitrendipine

	Total Cholesterol	HDL-C	TG	LDL-C	VLDL-C
Basal Value	67.64± 2.46	22.99± 1.49	103.11± 4.45	24.03±0.45	20.61± 0.88
After 1 month	105.68± 2.03	27.95± 0.77	143.30± 2.71	49.35± 2.86	27.97± 0.37
After 2 months	106.07± 2.08	28.25± 0.79	143.71± 1.05	48.89± 0.62	29.92± 0.54
% Change	0.37%↑	1.06%↑	0.28%↑	0.94%↓	6.51%↑

Table 5: Lipid Profile in Group E Study Group Given Felodipine

	Total Cholesterol	HDL-C	TG	LDL-C	VLDL-C
Basal Value	65.58± 2.17	21.05± 1.00	99.81± 4.14	24.36± 0.45	19.95± 0.82
After 1month	105.18± 2.12	27.26± 0.91	140.32± 3.72	49.12± 2.20	28.05± 0.74
After 2 months	78.73± 0.63	33.36± 1.07	98.14± 0.67	25.73± 1.22	19.64± 0.12
% Change	25.14%↓*	22.37%↑*	30.05%*↓	47.6%*↓	33.54% *↓

*=>p<0.01 **=> p < 0.005 when compared to control level before value are mean ± SEM (Standard Error of Mean)

Figure 1: Effect of Drugs on Total Cholesterol Level (in mg%)

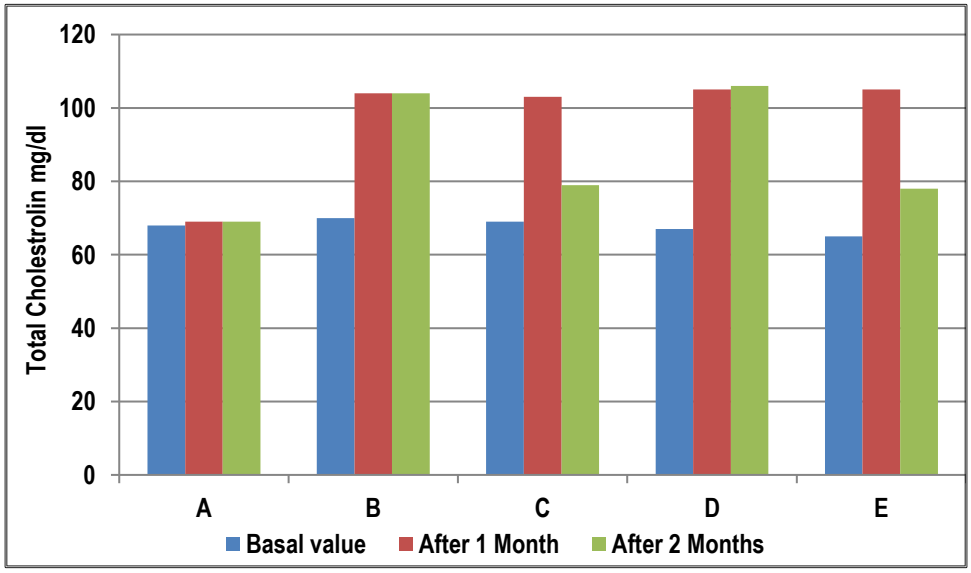


Figure 2: Effect of Drugs on HDL Cholesterol Level (in mg%)

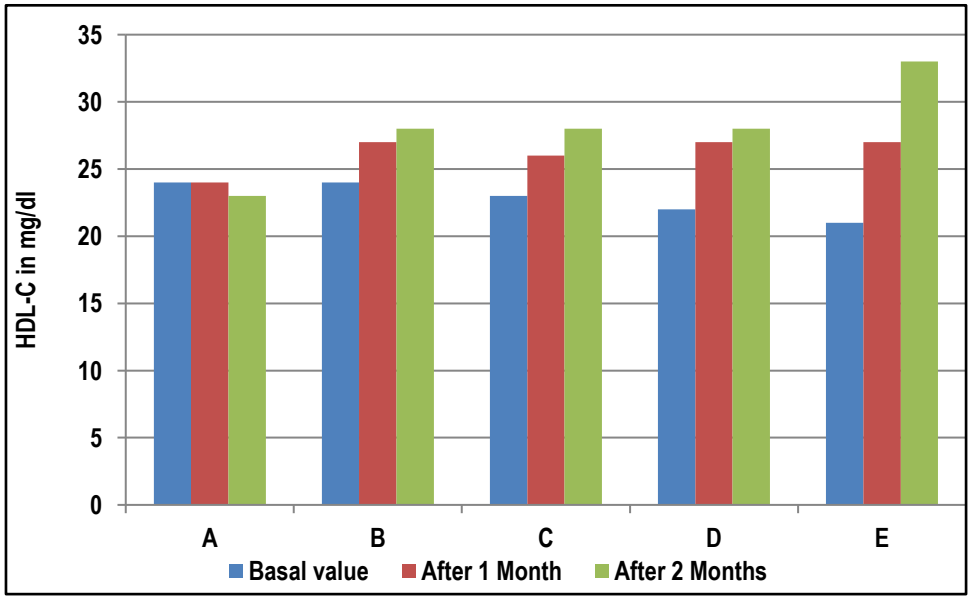


Figure 3: Effect of Drugs on Triglycerides Level (in mg%)

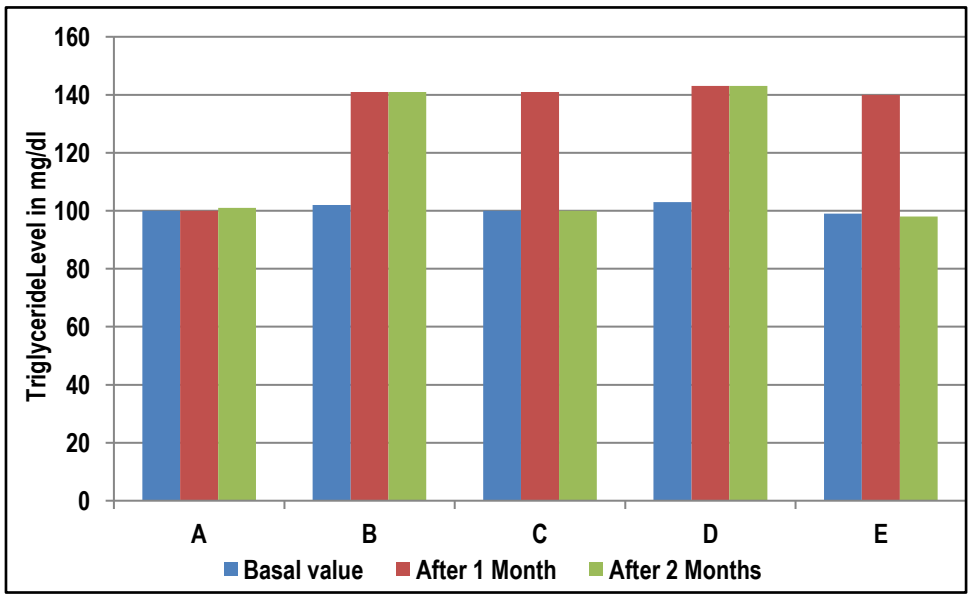


Figure 4: Effect of Drugs on LDL-C Level (in mg%)

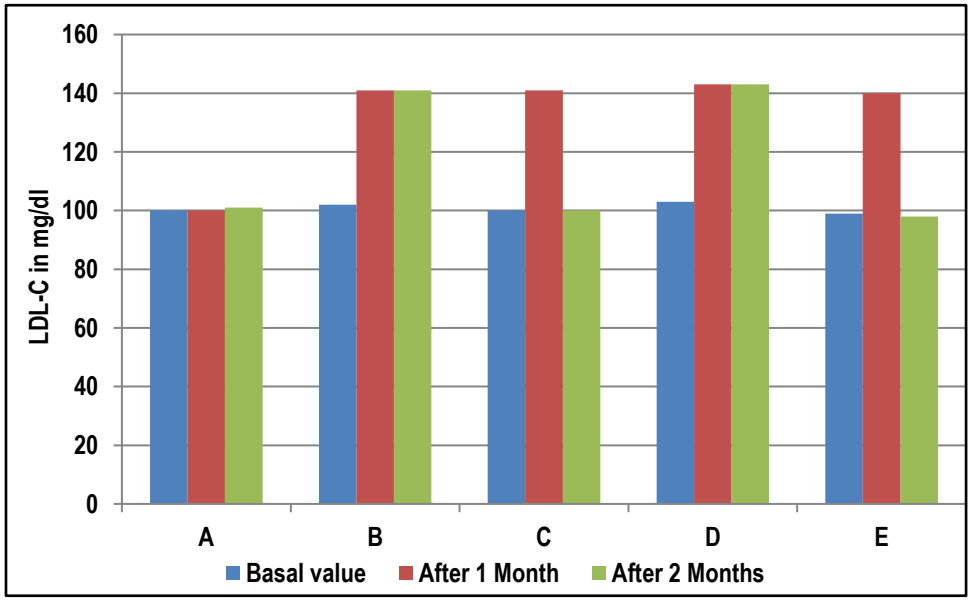
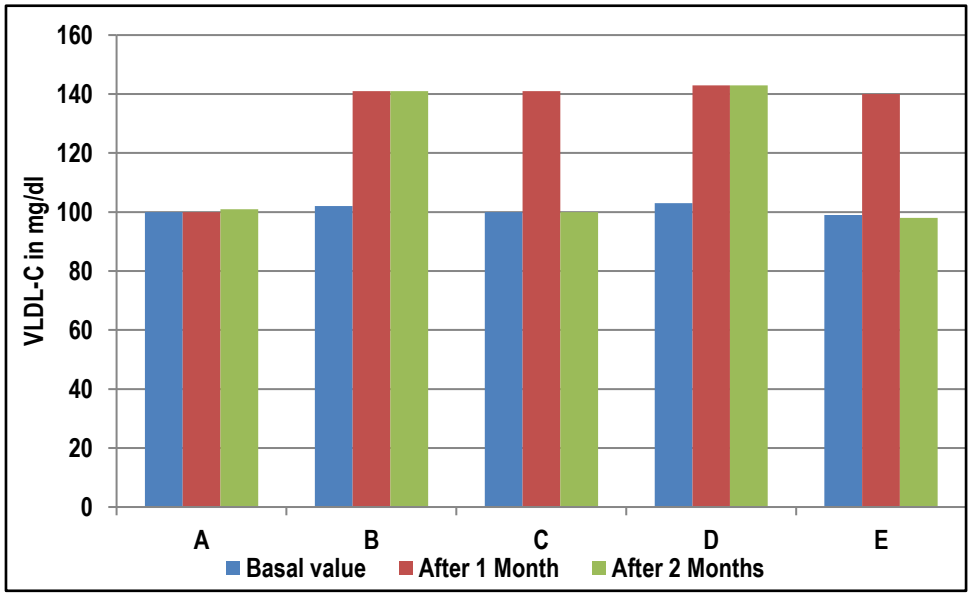


Figure 5: Effect of Drugs on VLDL-C Level (in mg%)



RESULTS AND DISCUSSION

The findings of present study revealed that in

1) In Table-1 Group A total cholesterol was 68.76±2.41 mg/dl, HDL-C was 24.24±1.76 mg/dl, TG was100.16±1.76 mg/dl, LDL-C was 24.48±1.14 mg/dl & VLDL-C was 20.03±0.85 mg/dl and these value of lipid profile remained in a this range after 1 & 2 months of standard laboratory diet).
2) InTable-1 group B total cholesterol was 104.0±2.57 &104.79±2.57 mg/dl before & after treatment with amlodipine i.e. increases of 0.36%which was not significant. HDL-C was 27.09±0.97 & 28.24±1.10 mg/dl before & after treatment i.e. increases of 4.07%which was not significant. TG was 141.20±3.52 & 141.50±3.59 mg/dl before & after treatment i.e. increases of 0.21% which is not significant. LDL-C was 49.07±1.10 & 48.25±1.70 mg/dl i.e. decreases of 1.69% which is not significant. VLDL-C was 28.23±0.07 & 28.29±0.72 mg/dl i.e. increases of .002% which is not significant.
3) In Table1 group C total cholesterol was 103.80±3.13 & 79.19±1.38mg/dl before & after treatment with nimodipine i.e. decreases of 23.71% which is statistically significant. HDL-C was 26.76±0.06 & 28.41±1.16 mg/dl before & after treatment i.e. increases of 6.6% which is significant.TG was 141.27±4.55 &100.58±1.35 mg/dl before & after treatment i.e. decrease of28.8% which is significant. LDL-C was 48.78±2.88 $30.66±1.66 mg/dl before after treatment with drug i.e. decreases of 37.14% which is significant. VLDL-C was 28.25±0.09 &20.11±0.15 mg/dl before & after treatment i.e. decrease of 28.81% which is significant.[7]
4) In Table 1 group D total cholesterol was 105.68±2.03 & 106.07±2.08 mg/dl before & after treatment i.e. increases of 0.37% which is not significant. HDL-C was 27.95±0.77 & 28.25±0.79 mg/dl before & after treatment i.e. increases of 1.06% which is not significant. TG was 143.30±2.71 & 143.71 ± 1.05 mg/dl before & after treatment i.e. increase of

0.28% which is not significant. LDL-C was 49.35±2.86 & 48.89±0.62 before & after treatment i.e .0.94% decrease which is not significant. VLDL -C was 27.97±0.37& 29.92±0.54mg/dl before & after treatment i.e. 6.51% increase which is not significant.

5) In Table 1 group E total cholesterol was 105.18±2.12 & 78.73±0.63 before & after treatment with felodipine i.e. 25.14% decrease which is statistically significant. HDL-C was 27.26±0.91 & 33.36±1.07 before and after treatment with drug i.e.22.37% increase which is significant.TG was 140.32±3.72 & 98.14±0.67 before and after treatment i.e.30.05% decrease which is significant. LDL-C was 49.12±2.20 & 25.73±1.22 before & after treatment i.e. 47.6% decrease which is significant. VLDL-C was 28.05±0.74 &19.64±0.12 before and after treatment i. e. decrease of 33.54% which is significant.[7-11]

CONCLUSION

In control group (A) (as shown in table and fig. 1-5) total cholesterol Triglyceride and HDL-C and VLDL –C, LDL-C are in a particular range.

In group B & D (as shown in table and fig 1-5) drug Amlodipine & Nitrendipine respectively show no significant effect on lipid profile. While in group C & E (as shown in table-1 & fig. 1-5) drug Nimodipine & Felodipine respectively decrease the level of total cholesterol, TG, LDL-C & VLDL-C and increase the level of HDL-C. Drugs nimodipine & felodipines have favorable effect on lipid profile of rabbit serum which was statistically significant.

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Source of Support: Nil. **Conflict of Interest:** None Declared.

Cite this article as: Vinita Kumari, Gajendra Kumar Singh, A.N. Mishra. Effect of Calcium Channel Blocker Drugs on Lipid Profile of Rabbit Serum. Int J Med Res Prof. 2018 Nov; 4(6):178-82. DOI:10.21276/ijmrp.2018.4.6.037