Acute Effect of Fansidar and Antioxidant Vitamin C Co- administration on Serum Lipid profile of Wistar Albino Rats

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ABSTRACT

Purpose: Assessment of the lipid profile of fansidar and antioxidant Vitamin C co-administration in albino wistar rats.**Methodology:** Thirty (30) Wistar albino rats ranging from 175-200g were randomly assigned into six (6) study groups of five (5) rats each Viz: I, II, III, IV, V and VI of ten rats per group. Group I served as male control group. Group II served as female control group. Group III served as male fansidar alone treated group. Group IV served as female fansidar alone treated group. Group V served as male fansidar and Vitamin C treated group while group VI served as female fansidar and vitamin C treated group. Each rat was housed in a wooden cage. The animal room was ventilated and kept at room temperature and relative humidity of 29°c and 40-70% respectively with 12 hours natural light-dark cycle and were allowed free access to food and water ad libitum. Good hygiene was maintained by constant cleaning and removal of faeces and spilled from cages daily. Rats in all groups were weighed daily and sacrificed 24hours after the experimental periods of 14 days of oral administration and the serum were collected for lipid profile determination. **Results:** The body weight parameters of both male and female albino rats, showed significant increase ($P<0.05$) in both the control groups and fansidar + Vitamin C treated group when compared with their initial weights while the group treated with fansidar alone, showed a significant decrease ($P<0.05$) in weight when compared with the initial weight for both genders. Likewise, the fansidar treated groups showed a significant increase ($P<0.05$) in serum cholesterol when compared with the control while the fansidar + Vitamin C treated group showed no significant difference in total serum cholesterol when compared with the control. The group treated with fansidar alone showed a significant decrease in serum HDL when compared with the control while the group treated with fansidar + Vitamin C showed a significant increase when compared with the control. The treated groups also produced a significant ($P<0.05$) decrease in serum LDL, VLDL and TG when compared with the control. Also, in female albino rats, both treated groups produced a significant ($P<0.05$) decrease in serum total cholesterol when compared with the control. Though the group treated with fansidar alone produce a significant ($P<0.05$) decrease in serum HDL, a significant increase ($P<0.05$) was observed in groups treated with fansidar and antioxidant Vitamin C. The group treated with fansidar alone produce a significant ($P<0.05$) reduction in serum LDL while groups treated with fansidar and antioxidant Vitamin C produced a significant ($P<0.05$) increase when compared with the control .Likewise, both treated groups produced a significant ($P<0.05$) decrease in serum VLDL when compared with the control. The serum triglyceride in fansidar treated group was significantly($P<0.05$) decreased in fansidar+ Vit.C treated group when compared with the control. **Conclusion:**The biochemical alterations and responses above from this study are indications that fansidar and Vitamin C exhibits a synergistic reaction which might aid hypocholesterolaemic effect or cholesterol clearing or lowering ability which can reduce the risk of predisposition to atherosclerosis, coronary heart disease and other cardiovascular related disorders.

Keywords: Coronary heart disease**,** Fansidar (sulpphadoxine and pyrimethamine), Lipid profile,Vitamin C

1. INTRODUCTION

Malaria is a major killer disease sub-Saharan Africa [1, 2]. It is believed to be a major hindrance of social and economic development in Africa causing enormous misery and suffering in the lives of victims .

It has been reported that there are about 300 million acute cases of malaria worldwide and about one million deaths reported each year. Ninety percent of these deaths occur in sub-Saharan Africa, and most of the victims are children aged less than five years [3]. The disease does not only results in loss of lives premature deaths, but also distorts educational development of children and affects the per capital income of the affected nation [3,4]. Fansidar (sulphadoxine and pyrimethamine) is a sulphonamide drug that belongs to t he anti folate family of anti malaria drugs [5].Fansidar is among the commonest pharmaceutical anti malaria drugs alongside with artesunate, chloroquine etc. Though fansidar is one of the commonly used and effective anti folate anti malaria drug, it has also been associated with adverse effects like haemolytic anaemia, skin reactions, fatigues, headaches, dizziness, fever, polyneuritis and gastrointestinal disorders [6].

Vitamin C is one of the water soluble vitamins [7]. It is an effective and potent antioxidant [8]. It prevents oxidative damage to the walls of the intestine (although not directly credited for this action) [7]. It also helps to prevent or reduce haemolytic anaemia by donating its hydroxyl group to reduce the radical oxygen species that causes oxidation and destruction of red cell membrane in blood. Vitamin C is also an important pro-oxidant because it can donate it hydroxyl group to reduce and recycle vitamin E (an antioxidant) and other antioxidants while its free radical products semi-aldehyde ascorbic acid and dehydroascorbic acid are generally unreactive [9].

The causal agent of malaria has four different strains. These are plasmodium falciparum**,** plasmodium ovale, plasmodium vivax and plasmodium malarae. Fansidar is an anti malaria agent which act by reciprocal potentiating of its two components, achieved by a sequential blockage of two enzymes involved in the biosynthesis of folinic acid in the parasites. With fansidar, the risk of resistance development is reduced by this means. Fansidar acts on asexual intra erythrocytic forms of the human malaria parasites. Fansidar is effective against strains of plasmodium resistant to chloroquine [3]. However, plasmodium falciparum resistant to both chloroquine and fansidar has been reported with increasing frequency in parts of South East Asia, South America, East and Central Africa. Fansidar attacks the different developmental stages of the parasite. It is long-acting and effective concentrations are obtained with a single dose. Trophozoites and Schizonts are rapidly eliminated from the blood. The pre-erythrocytes stages are also affected and the gametocytes are rendered ineffective in the mosquito. The protective effect of a single dose last for approximately four weeks.

Therefore,this present research determines the acute effect of fansidar and antioxidant vitamin c co-administration on serum lipid profile of wistar albino rats

2. MATERIALS AND METHODS

2.1 Drugs and Chemicals

Fansidar card (sulphadoxine 500mg, pyrimethamine 25mg) marketed by Swidar and Vitamin C were obtained from a registered pharmacist, EDOH pharmacy Ogoja, Cross River State, Nigeria, and used for the study. Chemicals produced by both local and foreign Pharmaceutical companies were also purchased and used for the experiment.

2.2 Preparation of stock solution

2.3 Experimental animals

The design consists of thirty (30) Wistar albino rats randomly assigned into six study groups Viz: i, ii, iii, iv, v and vi of ten rats per group. Group 1contained 5 male rats and served as male control group. Group 11 served as female control group. Group 111 contained 5 male rats and served as male fansidar alone treated group. Group IV contained 5 female rats and served as female fansidar alone treated group. Group V contained 5 male rats and served as male fansidar and Vitamin C treated group. Group VI contained 5female rats and served as female fansidar and vitamin C treated group. The design was done in the following pattern

Group I Male control group

Group II Female control group

Group III Male fansidar alone treated group

Group IV Female fansidar alone treated group

Group V Male fansidar and Vitamin C treated group

Group IV Female fansidar and vitamin C treated group

2.4 Statistical analysis

Statistically analysed data used was presented as mean ± SD of five (5) determinations. Statement analysis was carved out using one way analysis of variance (ANOVA). Differences were statistically significant at $P<0.05$.

3.0 RESULTS

In the effect of fansidar and antioxidant Vitamin C on body weight parameters of male albino rats, the final weight showed a significant increase ($P<0.05$) in both the control groups and fansidar + Vitamin C treated group when compared with their initial weight at the start of the administration. In contrast to this, is the group treated with fansidar alone, which showed a significant decrease ($P<0.05$) in weight when compared with the initial weight (Table 1). Similar trends were also shown by the effect of fansidar and antioxidant Vitamin C on body weight parameters of female wistar albino rats (Table 2).

Likewise the effect of fansidar and antioxidant Vitamin C on lipid profile level in male wistar albino rats. The fansidar treated groups showed a significant increase ($P<0.05$) in serum cholesterol when compared with the control while the fansidar + Vitamin C treated group showed no significant difference in Total serum cholesterol when compared with the control . The group treated with fansidar alone showed a significant decrease in serum HDL when compared with the control while the group treated with fansidar + Vitamin C showed a significant increase when compared with the control (Table 3).

The treated groups (i.e. fansidar and fansidar + Vitamin C treated groups) produced a significant ($P<0.05$) decrease in serum LDL, VLDL and TG. When compared with the control.

More so, the effect of fansidar and antioxidant Vitamin C on lipid level in female wistar albino rats showed that both treated groups produced a significant ($P<0.05$) decrease in serum total cholesterol when compared with the control (Table 4). Though the group treated with fansidar alone produce a significant ($P<0.05$) decrease in serum HDL, a significant increase ($P<0.05$) was observed in groups treated with fansidar and antioxidant Vitamin C. (Table 4). The group treated with fansidar alone produce a significant ($P<0.05$) reduction in serum LDL while groups treated with fansidar and antioxidant Vitamin C produced a significant ($P<0.05$) increase when compared with the control (Table 4). Likewise, both treated groups produced a significant ($P<0.05$) decrease in serum VLDL when compared with the control (Table 4). The fansidar treated group also revealed a significant increase ($P<0.05$) in serum triglyceride while the fansidar + antioxidant Vitamin C treated groups displayed a significant decrease in serum triglyceride when compare with the control.

4.0 DISCUSSION

The assessment of serum lipid profile reveals the clinical basis for understanding the metabolism of lipids and their role in predisposing humans to atherosclerosis, coronary heart diseases and other cardiovascular related disorders [10]. The transient lipid profile changes in parasitemic phase might act as adjuvant diagnostic tool for malaria. Transient lipid profile changes by plasmodium vivax suggest that changes in high density lipoprotein (HDL) and very low density lipoproteins (VLDL) in human serum are related to lipid metabolism of the parasite which suggests that malaria parasite use cholesterol and phospholipids from its host, resulting in a decrease of serum HDL [11].

Therefore, the observed increase in weight of the group treated with antioxidant Vitamin C support the report that antioxidant enhance growth and development [10].The antioxidant vitamin also triggers cell division, proliferation and replication thereby enhancing recovery from ailments and effectively reduce susceptibility to anemic condition[12] . Also the antioxidant Vitamin protects the liver tissue against oxidative damage and may stimulate repair mechanism present in the liver [13]. Therefore, the observed weight increase in antioxidant vitamin C treated group may be attributed to the stimulation of repair mechanism present in the liver by the antioxidant while the observed decrease in fansidar treated groups suggest that fansidar might have an inhibiting or inimical role on protein synthesis which in turn result in decrease weight.

More so, the significant increase in serum cholesterol in the fansidar + vitamin C treated male albino rats attributed to an increased concentration of acetyl-CoA is a key substrate in the biosynthesis of cholesterol [14]. While the observed decrease in serum cholesterol of male and female albino rats treated with fansidar alone suggests that there may be a decrease in absorption from the intestine by binding with bile acid within the intestine and increasing bile acid secretion due to the drug .

HDL-cholesterol is known to have a protective effect against cardiovascular disease due to its ability to remove excess cholesterol from circulation and carries it back to the liver where it is degraded or converted into the bile acid [15]. The observed significant increase in serum HDL following co-administration of fansidar with antioxidant Vitamin C is an indication that patient who are co-administered with fansidar and Vitamin C might not be predisposed to atherosclerosis and other cardiovascular diseases which is evident in both male and female wistar albino rats. This observation is in consonance with the report of [16].

More so, the observed reduction in low density lipoprotein cholesterol (LDL-cholesterol) following administration of both fansidar and fansidar + vitamin C in male albino rats, and fansidar suggest that fansidar possess a cholesterol lowering or clearing ability. It also suggests that it possess an antilipidaemic effect a hypocholesterolaemic agent which might be helpful tool in the management of cardiovascular related disorders. Though fansidar treated group appears to increase serum triglyceride in female albino rats suggest that fansidar and Vitamin C exhibit a synergistic effect which in turn lowers the serum triglyceride levels. The induced hypotriglyceridaemic effect may be due to decrease in fatty acid synthesis , enhaced catabolism of LDL, activation of Lipid catabolism and tissue lipase [11]. and or inhabitation of acetyl-CoA caboxylase and production of triglycerides precursors such as acetyl – CoA and glycerol phosphate [17].

5.0 CONCLUSION

The biochemical alterations and responses above from this study are indications that fansidar and Vitamin C exhibits a synergistic reaction which can aid hypocholesterolaemic effect or cholesterol clearing/lowering ability which can reduce the risk of predisposition to atherosclerosis, coronary heart disease and other cardiovascular related disorders.

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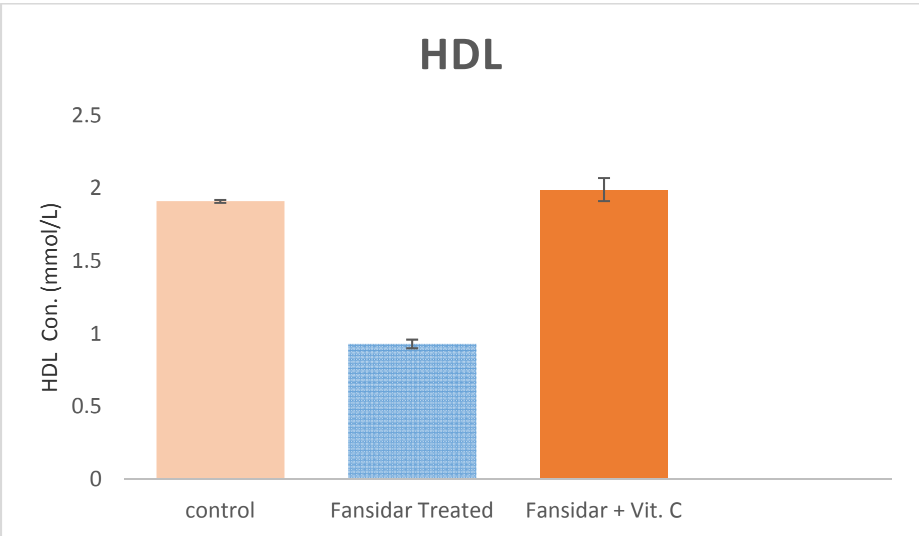

Fig. 1 Effect of Fansidar and Vitamin C co-administration on serum HDL of female albino wistar rats.

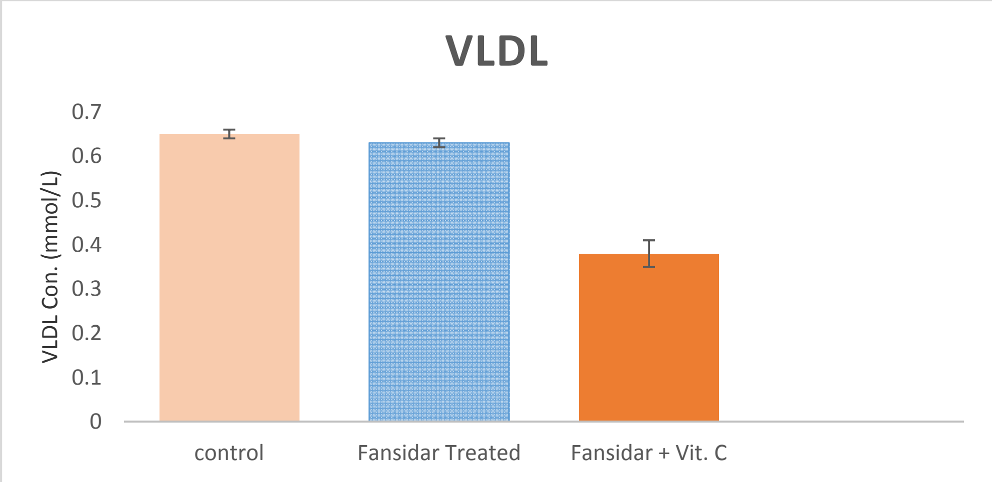

Fig. 2 Effect of Fansidar and Vitamin C co-administration on serum VLDL of female albino wistar rats.

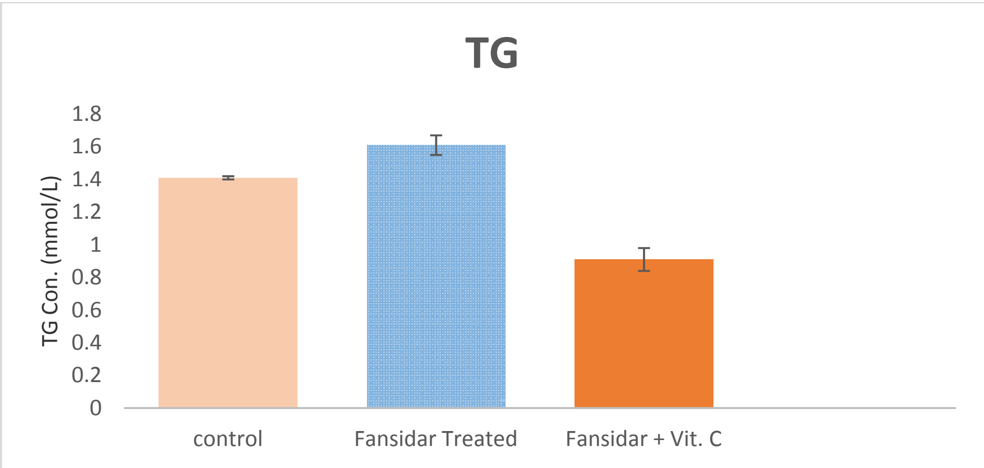

Fig. 3 Effect of Fansidar and Vitamin C co-administration on serum TG of female albino wistar rats

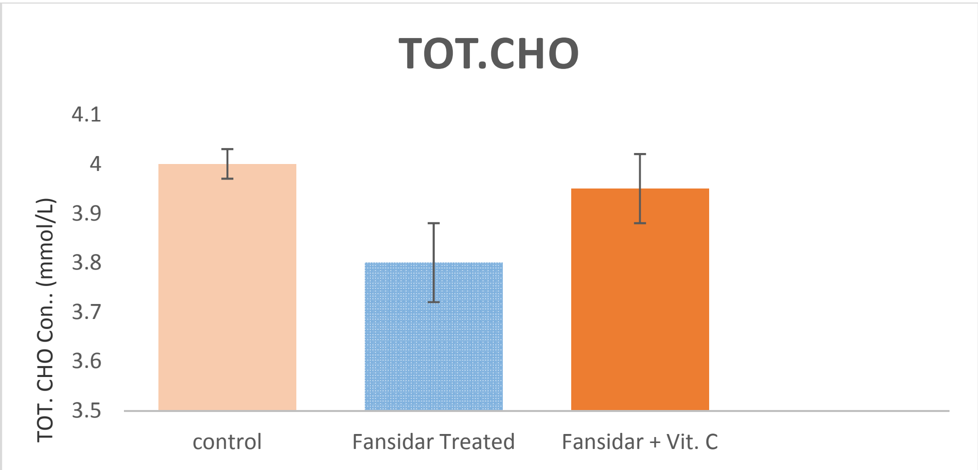

Fig. 4 Effect of Fansidar and Vitamin C co-administration on serum Total Cholesterol of female albino wistar rats.

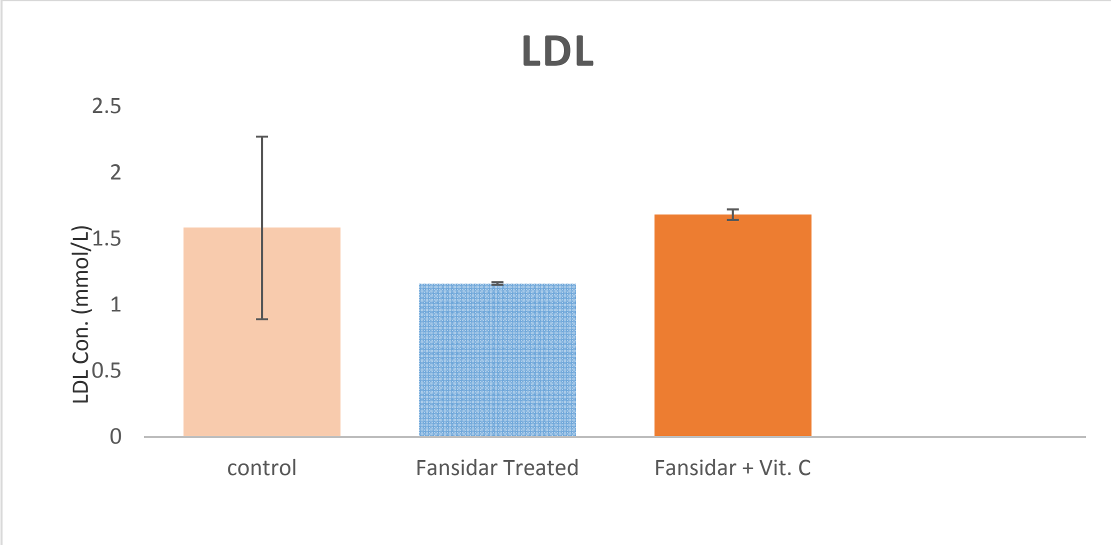

Fig. 5 Effect of Fansidar and Vitamin C co-administration on serum LDL of female albino wistar rats

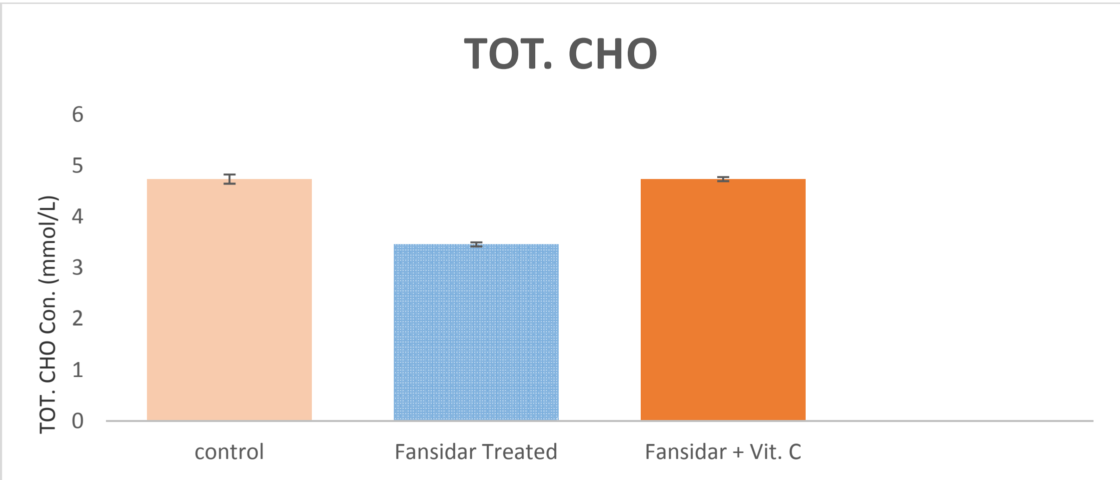

Fig. 6 Effect of Fansidar and Vitamin C co-administration on serum Total Cholesterol of male albino wistar rats.

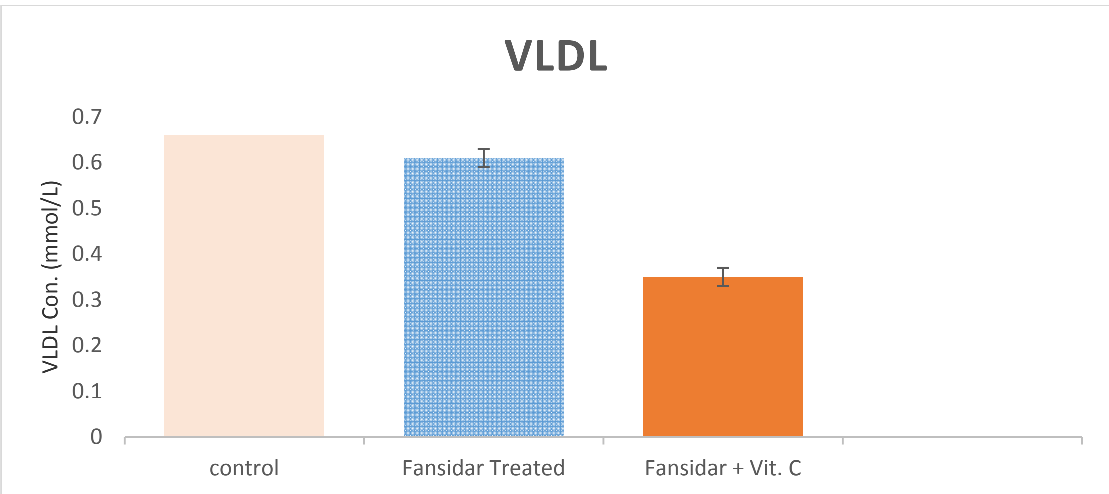

Fig. 7 Effect of Fansidar and Vitamin C co-administration on serum VLDL of male albino wistar rats.

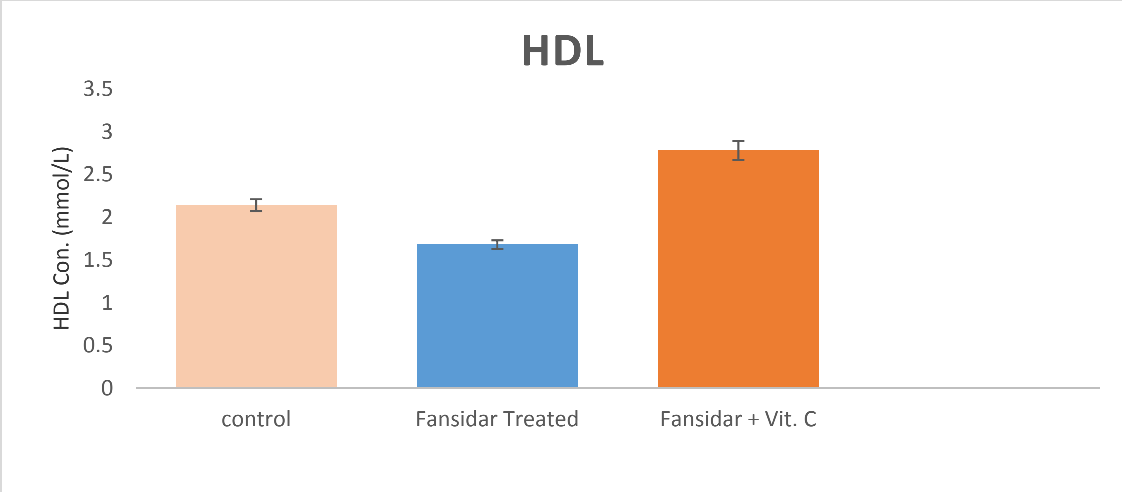

Fig. 8 Effect of Fansidar and Vitamin C co-administration on serum HDL of male albino wistar rats.

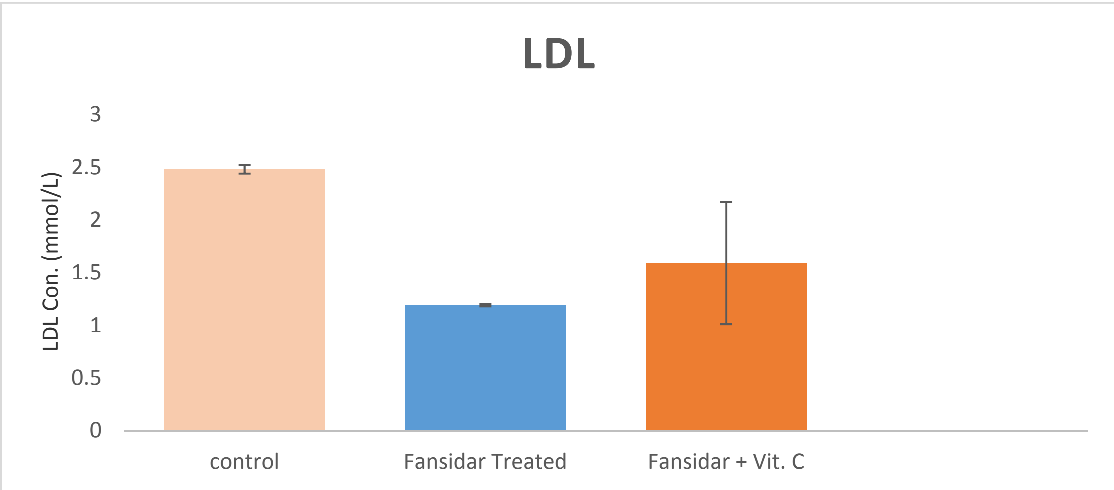

Fig.9 Effect of Fansidar and Vitamin C co-administration on serum LDL of male albino wistar rats.

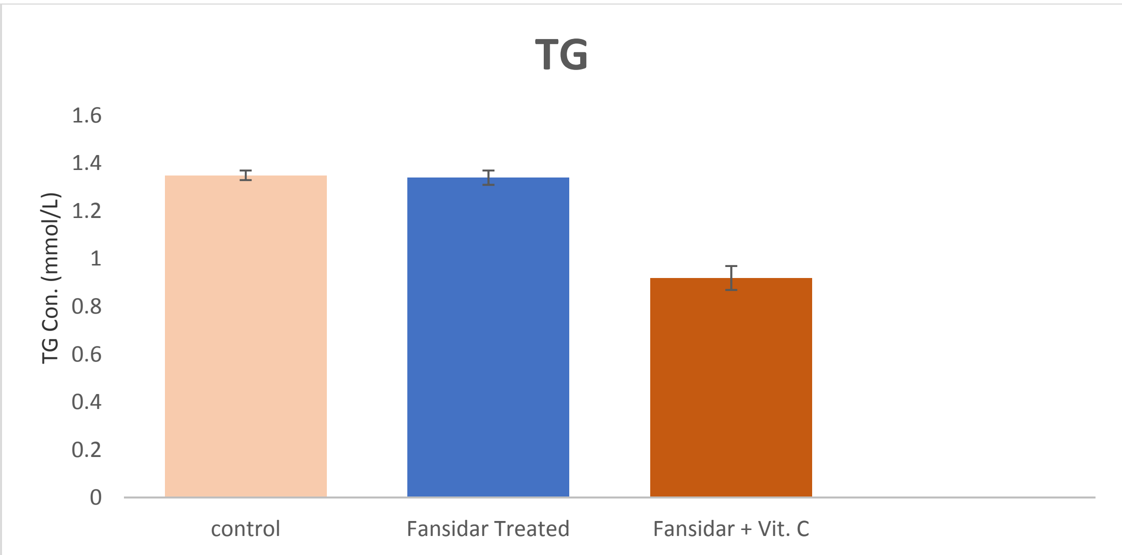

Fig. 10 Effect of Fansidar and Vitamin C co-administration on serum TG of male albino wistar rats