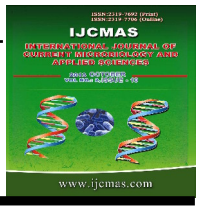
International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 2 Number 10 (2013) pp. 154-171**
http://www.ijcmas.com



Original Research Article

Study of Polyphenolic Extracts of *Prunus Domestica L.* Wall Nuts As Hypolipidemic Agents

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A B S T R A C T

The goal of this study is to investigate the effect of polyphenolic in order to extract *Prunus domestica* red (PDR) and *Prunus domestica* yellow (PDY) wall nuts on some physiological and biochemical parameters in female rats in vivo and anti-bacterial activity in vitro. The working of this thesis involves the following terms: Analytical study: the Analytical study demonstrates the presence of polyphenols in PDR and PDY. The UV-Vis Spectra and high performance liquid chromatography of extracted poly-phenolic are proved for presence of (Tannic acid, Gallic acid, Caffeic acid, Vanillic acid, Ferulic acid, amygdalin, Chlorogenic acid). Bio-chemical parameters: all rats in Bio-chemical parameters are divided into normal control group (A), hyperlipidemia positive control group (B), and the rest of the two groups (C & D) are served as experimental groups. Group(C) of hyperlipidemic experimental rats received the extracted poly-phenolic of PDR at 25 mg/kg of body weight for 30 days on daily basis. While group (D) rats is received the extracted poly-phenolic of PDY at 25 mg/kg of body weight for 30 days on daily basis. Whilst blood samples collects after 30 days. Lipid profile: the positive hyperlipidemic control group's rats showed variable increases in serum triglycerides, LDL, VLDL and total cholesterol levels. Serum HDL levels are decreases in positive hyperlipidemic control groups. PDR and PDY are significantly decreased the levels of these parameters in rats. Consequently the PDR reduces the lipid levels more and in effectively way than PDY do.

K e y w o r d s

Prunus domestica L.; polyphenols; Wall Nuts; hypolipidemic**.**

Introduction

The term hyperlipidemia refers to hypercholesterolemia, hypertriglycerid emia and hyperlipoproteinemia, is a major risk factor for the development of cardiovascular diseases. hyperlipidemia, mainly an increased level of total cholesterol (TC), triglycerides (TG) and low-density lipoprotein cholesterol (LDL-C) along with a decrease in high-density lipoprotein cholesterol (HDL-C), is the predictor of coronary artery disease, fatty liver disease, and carcinogenesis, which is associated with the formation of reactive oxygen species (Roberts *et al.*, 2006). Hypercholesterolemia encourages atherosclerosis and therefore represents a major risk factor for cardiovascular disease (Liu *et al.*, 2006). Atherosclerosis

is a multifactorial disease, exacerbated by external factors such as dietary foods high in cholesterol, sedentary lifestyle, smoking and stress (Cooper *et al.,* 2000). The treatment of hypercholesterolemia and related cardiovascular diseases with medicinal plants has increased in recent years (Asaolu *et al.,* 2010). Phenolic compounds have been proven to be successful in attenuating hypercholesterolemia (Bok *et al.,* 1999; Kumar *et al.,* 2005; Rehrah *et al.,* 2007). Plant-derived foods and beverages are rich in phenolic compounds which show protection properties against cancer, cardiovascular disease and aging (Hollman and Katan, 1999). LDL oxidation (oxLDL) is considered to be a major risk factor for the development of atherosclerosis and CVD (Witztum, 1994). Both human and animal in vivo studies have shown that the level at which LDL oxidizes, decreases linearly with increasing phenolic concentration (Covas *et al.,* 2006; Weinbrenner *et al.,* 2004; Marrugat *et al.,* 2004).

Polyphenols are a large group of phytochemicals wide spread in the plant kingdom (María *et al.,* 2011). In plants, polyphenols minimize the effects of UV radiation and protection against herbivory (Daglia, 2012) ,as wall as, are important for pigmentation, reproduction, growth, and protection against pathogens. In industry, polyphenols are used in the production of paints, paper, and cosmetics as well as in food additives (Bravo, 1998). phenolic compound seem to play an important role in the natural defense mechanisms in fruit (e.g., antifungal effects) (Tomas-Barberan. and Espin, 2001). Polyphenols are usually solid, crystalline, toxic and with low solubility in water. Many of these substances are classified as natural antioxidants and have therapeutic properties, being present in food and medicine plants (Boudet, 2007). phenolic compound is the large group of phytochemicals present in plant, so far more than 8 000 structurally known phenolic compounds have been reported (Gaurav *et al.,* 2013). Phenolic compounds are secondary metabolites which synthesize in plants. They posses biological properities such as:antioxidant, anti-aging, anticarcinogen, anti-inflammation, anti-artherosclerosis, cardiovascular protection, improvement of the endothelial function (Han *et al.,* 2007). *Prunus domestica* commonly known as Plum Alu-Bukhara, Alucha found commonly in Pakistan, India, Afghanistan and Persia (Gupta, 2003; Narayan and Kumar, 2003). *P.domestica* belongs to rosaceae family which is one of the largest family includes 100 genera and 200 species, researchers have paid attention towards rosaceae family because many plant of the family possess immense therapeutic potential (Trease and Trease, 2002). Generally, plum refers to the fruits of the genus *Prunus*, such as *P.domestica*, *P. salicina*, *P. subcordiata,* and *P. Insititia* (Pijipers *et al.,* 1986). *P.domestica* are considered as healthy food because of lower fat contents and contain considerable amount of important nutrients like carbohydrates, vitamins and minerals. Consumption of fruits, like prunes, is useful in blood circulation problems, measles,anticancer, antidiabetes, antiobesity, cardiovascular problems, dyspepsia, nausea, vomiting, thirst, in bilious fevers, headache, jaundice and hepatitis, leucorrhea, miscarriage, antioxidant, antihyperlipidemic, anxiolytic, asthma (Li, 2008; Qaiser and Naveed, 2011; Soni *et al.,* 2011). *P. domestica* are high in potassium contents and have beneficial effects in cardiovascular problems (Stacewicz *et al.,*

2001). Prunes are significant source of major nutrients, including carbohydrates, several amino acids, vitamin A, vitamin B, vitamin K, potassium, calcium, magnesium, zinc, copper, manganese, selenium, boron and dietary fibers. Prunes fiber consist mainly of soluble fraction (80%) including pectin, hemicellulose, cellulose and lignins. Drying process increases the total dietary fibers (Siddiq *et al.,* 2006). *P.domestica* are fruits rich in phenolic compounds, characterized by relatively high antioxidant activity, higher than oranges, apples or strawberries (Kayano *et al.,* 2002; Leong and Shui, 2002).

Materials and Methods

Study Plant

Prunus domestica L. wall nut were collected in July 2012 from local markets in Nasiriyah City at Iraq, then it was authenticated and specimen of plant was classified in biological department-college of science at university of Thi qar in Iraq by Asst. prof. Hayder Radhi . The seeds were cleaned , washed by distilled water, dried at room temperature for four weeks, ground as powder and kept in Dark glass containers for further use.

Chemicals

Chloroform, ethanol, sodium hydroxide, hydrochloric acid, ferric chloride, acetic acid, lead acetate, α- naphthol, sulphuric acid, Potassium citrate, mercuric chloride, Potassium hydroxide, n-hexane.

Extraction of Polyphenols from Conocarpus Leaves

(500 g) of the powder dry leaves were defatted by washing several times with hexane(1L) at (60°C) , then it was macerated with (800mL) of acetic acid (2% v/v), the mixture were placed in sterile conical flask volume (2000mL) and put in water bath(60°C) for 8h, then the extraction process done by reflex condenser. The mixture was heated at 50□C and then left to cool. The suspension was filtered by Buchner funnel by Whatman no.1 filter paper and use vacuum pump. The precipitate was canceled and the filtrate volume was measured then n-propanol was added into filtrate with the same volume of filtrate. Then (NaCl) added until to become solution super saturated. Then, it was evaporator by using rotary evaporator until drying (Gayon, 1972).

Primary Qualitative Analysis

Isolated polyphenols were underwent a number of different tests such as:

Phenolic compounds test: was carry out by using (1%) ferric chloride. (Waterman and Mole, 1994).
Flavonoids test: was achieved by using (5N) alcoholic potassium hydroxide (Al-Assadi, 2001)
Tannins : was achieved by using (1%) lead acetate (Molan *et al.,* 1997).
Carbohydrates test: was done by using Molish□ s reagent (Harborne, 1984).
Glycosides test: was carried out by using Benedict□ s reagent (Harborne, 1984).
Alkaloids test: was done by using Wagner□ s reagent (Harborne, 1984).
Saponin test: was carried out by using (5%) mercuric chloride (Harborne, 1984).
Triterpinoids test: was achieved by using concentration sulfuric acid(Harborne, 1984).
Triterpines and Setrols test: was achieved by using Liebermann – Burchard reagent. (Harborne, 1984).

Investigation of Polyphenolic Extract by UV-VIS (spectrophotometer)

The absorption spectra of plant constituents was measured in very dilute solution against a blank solvent by using an automatic recording spectrophotometer. The solvent was used for UV spectroscopy is water : the method was performed by using polyphenolic. The sample solutions absorbance (A), was recorded by measuring the range scan from 190nm to 800nm on a double beam UV-VIS spectrophotometer (Ikbal, 2004).

Investigation of Polyphenolic Extract by HPLC Technique (Ikbal, 2004).

The extract were separated on FLC (Fast Liquid Chromatography) column, C-18, 3 µm particle size (50×4.6 mm ID), mobile phase 40:60, 0.1%(V/V) methanol : water : acetic acid using linear gradients from 0-100%B in 10 minutes, detection UV set at 264 nm,flow rate 1.4 mL/min the sequences of the eluted material of the standard were as follow, each standard was 25 µg/mL. 1.0g of each sample was weighted, then dissolved in 10 mL HPLC methanol, the sample shaking and agitated in ultrasonic bath for 10 minutes, then concentrated by evaporating the solvent with stream of liquid N_2 until reach 0.2 µm (supelco company cat No16534K) then 20 µL were injected on HPLC column .The concentration for each compound were quantitatively determined by comparison the peak area of the standard with that of the samples. The separation occurred on liquid chromatography Shimadzu 10 AV-LC equipped with binary delivery pump model LC-10A Shimadzu, the eluted peaks were monitored by UV-Vis 10 A-SPD spectrophotometer.

Animals and Housing

Twenty four healthy adult female rats weighting (85-100 gm) of 7 weeks old were used in the present study. Animals were housed in the animal house of biology Dept. College of Science, Thi-Qar University. Experiments were achieved between May-2013 & June-2013. Animals were housed in iron boxes bedded with wooden chips. During the experimental period six animals were kept in each box and they were housed under standard laboratory conditions (12h light: 12h dark photoperiod (LD) at 22 ± 2 Cº and relative humidity 45-55% (Coskun *et al.*, 2004). Animals were fed on standard rabbit pellet and tap water *ad libitum*. The standard pellet contains wheat 66.6%, soya 25.6%, and sun flower oil 4.4%, lime stone 1.5%, salt 0.63%, methionine 0.158%, choline chloride 0.062% and trace elements 0.05% (Krinke, 2000).

Method of food preparing (high cholesterol diet)

50 g of cholesterol dissolved in 200 grams of olive oil hot in a water bath, and after soluble cholesterol in the oil were added to 1 kg of feed, and then was cut into small pieces fit with the size of the holes in the lid iron to boxes, to facilitate the process taken upby rats (Cook and Thomson, 1950).

Administration of Laboratory Animals (Metwally *et al.*, 2009)

Experimental animals were divided into four groups (6 rats in each group) upon the following designed:

Group A: control (normal) that were treated with DMSO

Group B: Rats were treated with daily high cholesterol diet (prepared according to *cook et al., 1950*) for 30 days

Group C: Rats were treated with (25 mg/kg B.W). of PDR besides high cholesterol diet.
Group D: Rats were treated with (25 mg/kg B.W). of PDY besides high cholesterol diet.

Blood Samples

5mL of blood were drawn from each animal of experimental groups, by heart puncture method after 12 hours fast. Using 60 gauge syringes, the sample was transferred into clean tube, left at room temperature for 15 minutes for clotting, centrifuged at 3000 rpm for 15 minutes, and then serum was separated and kept in a clean tube in the refrigerator at 2-8ºC until the time of assay.

Biochemical Parameters

Several considerable methods were used to measure the studied parameters. It is notable that all measurements were duplicated for each sample.

Measurement of serum lipid profile

The used reagents were supplied by Biolabo (France), and Serum total cholesterol was measured according to (Allan and Dawson, 1979) and Serum TG was measured according to (Tietz *et al.*, 1994, 1999). while serum HDL was measured according to (Lopes-Virella , 1977) and measurement of LDL and VLDL according to (Friedwald *et al.*, 1972). LDL , VLDL and atherogenic index concentration was measured as follows :

LDL (mg/dL) = total cholesterol – (HDL + VLDL)
VLDL(mg/dL) = serum TG /5
Atherogenic Index = LDL / HDL

Statistical Analysis:

Statistical analysis was done using the software **SPSS** version 15.0; the results were expressed as mean ± standard deviations (mean ± SD). One way ANOVA-test was used to compare parameters in different studied groups. P-values ($P < 0.01$) were considered statistically significant.

Results and Discussion

P.domestica are fruits rich in phenolic compounds, characterized by relatively high antioxidant activity, higher than oranges, apples or strawberries (Kayano *et al.*, 2002; Leong and Shui, 2002).

The chemical qualitative analysis tests results are shown in table (1) which indicate the presence of polyphenols and glycoside but the flavonoids, carbohydrate, tannins, saponins, alkaloids, terpinoids, terpenes and sterols gave a negative test, this ensure that polyphenolic compounds are pure. From table (1), it was found that glycosides because polyphenols is found normally connected with sacharids units .

Figure (1,2) illustrates the UV-Vis spectra for PDR and PDY with λ_{max} at (202nm) and another peak at (284 nm) (280nm) respectively,the spectrum of UV-Vis of polyphenols appears intensity and very clear Absorption peak at (202nm) for π-π^* electronic transitions due to founding of multi double bounds in aromatic rings for these compounds. The other peak at (284 and 280 nm) which low intensity appear in wave length longer from the first peak due to n- π^* electronic transitions for contain these compounds on non bonding electrons for oxygen atoms.

Table.1 Preliminary qualitative analysis tests of polypenols isolated from *C.lancifolius* leaves

Reagent	**Test result**	**Chemical Notes**	**Conclusions**
FeCl3(1%)	+	Formation of bluish green colour	Phenols are present
Alchohol KOH (5N)	-	No yellow precipitate	Flavonoids are absent
Wagner	-	No reddish brown precipitate	Alkaloids are absent
Pb(Ac)2	-	No light brown precipitate	Tannins are absent
Molish	-	No Formation of violate ring	Carbohydrate are present
Benedict	+	Formation of red precipitate	Glycosides are present
HgCl2	-	No white precipitate	Saponins are absent
Conc. H2SO4	-	No purple red color	Terpinoids are absent
Liebermann – Burchard	-	No green colour	Terpenes and sterols are absent

Table.2 Concentration of polyphenolic compounds in the standard

S.No.	**Polyphenolic contents in the standard**	**Retention time (min)**	**Area**	**Conc. of phenolic compounds µg/mL**
1	Tannic acid	1.29	28145	25µg/mL each
2	Gallic acid	2.10	33825	
3	Caffeic acid	3.25	18984	
4	Vanillic acid	4.77	35799	
5	Ferulic acid	6.08	31299	
6	amygdalin	7.26	48537	
7	Chlorogenic acid	8.40	35543	

Table.3 concentration of polyphenolic compounds in PDR extract

S.No	**Polyphenolic contents in the extract**	**Retention time (min)**	**Area**	**Conc. of polyphenolic compounds µg/mL**
1	Tannic acid	1.29	49466	131.81
2	Gallic acid	2.10	75466	167.33
3	Caffeic acid	3.25	83245	328.87
4	Vanillic acid	4.77	63266	132.54
5	Ferulic acid	6.08	81783	195.97
6	amygdalin	7.26	746118	1152.91
7	Chlorogenic a cid	8.40	171890	362.70

HPLC chromatogram of eight standard phenolic compounds mixture(Tannic acid, Gallic acid, Caffeic acid, Vanillic acid, Ferulic acid, amygdalin, Chlorogenic acid) was obtained after several trials to get good separation. The presence or absence of the seven standard phenolic compounds in the n-butanol fraction were done by

comparing the HPLC chromatograms of them with the HPLC chromatogram of standard based on the retention time at the same conditions. Figure (3) and table (2) .In this study and from HPLC results it is found that polyphenol extract contains some important compounds that include *(*Tannic acid, Gallic acid, Caffeic acid, Vanillic acid, Ferulic acid, amygdalin, Chlorogenic acid*)* as shown in Figure (4,5) , table (3,4) and the structures of these compounds were shown in table(5). The peaks of the mentioned chromatogram also pointed to presence of some unknown compounds that are thought represent derivatives of polyphenolic compounds.

Effects of Polyphenolic Extracts on Serum Lipid Profile and Atherogenic Index Levels.

Serum TC concentration was changed as shown in table (6) and figure (6) , at 30 day there was significant increase in the serum concentration of TC in group (B) as compared with normal control group(A) ($P < 0.01$) . At these times, there was significant reduction in the serum concentration of TC in groups (C and D) as compared with group (B) ($P < 0.01$), with greater decrement in TC concentration in PDR extract treated group (C) as compared with PDY extract treated group(D) ($p < 0.01$). On the other hand, no significant differences can be observed between(C and D) groups as compared to control group (A), after having been treated for (30) days with (25 mg /kg B.W) of PDR and PDR extracts respectively. This result is similar to the result of Nishi, *et al*. (2013) who reported that a more pronounced effect was found with low-dose chlorogenic acid than with high dose in elevated plasma cholesterol .Various studies have reported that the chlorogenic acid from walnut leaf indirectly interferes in cholesterol synthesis pathway and inhibit HMG-CoA reductase enzyme, reduce cholesterol production, also increase its bile secretions (Namasivayam, 2002). In a previous study, a more pronounced effect was found with low-dose ferulic acid than with high dose in elevated plasma lipid (Sri Balasubashini *et al.*, 2003).

At 30 day there is a significant increase in the serum concentration of TG and VLDL in group (B) as compared with normal control group (A) ($P < 0.01$).Table (6) and figure (7,10), illustrate a significant decrease ($P < 0.01$) in concentration TG and VLDL in groups (C and D) after having been treated for (30) days with (25 mg /kg B.W) of PDR and PDR extracts respectively when compared to group (B). On the other hand, no significant differences can be observed between (C) groups as compared to control group (A). Whereas serum concentration of TG and VLDL decrease significant difference ($P < 0.01$) in group (D) compared to control group (A). This result was matched with the study of Nishi, *et al*. (2013)[48]. Polyphenolic extract exhibited significant hypolipidemic effect through the reduction of VLDL levels (Chidambaram, *et al.*, 2007).

Changes in the serum concentration of HDL is shown in table (6) and figure (8), at 30 day, HDL concentration decreased significantly in group (B) as compared with normal control group (A) ($p <$

Table.4 concentration of polyphenolic compounds in PDY extract

S.No.:	Polyphenolic contents in the extract	Retention time (min)	Area	Conc. of polyphenolic compounds µg/mL
1	Tannic acid	1.29	32518	86.65
2	Gallic acid	2.10	106438	236.004
3	Caffeic acid	3.25	49111	194.02
4	Vanillic acid	4.77	22201	46..511
5	Ferulic acid	6.08	32814	78.63
6	amygdalin	7.26	41608	64.29
7	Chlorogenic a cid	8.40	11311	23.86

Table.5 Names and structures of phenol compounds of extract

Communally name	Organizational name
Tannic acid	3,5-dihydroxy-2-(3,4,5 trihydroxybenzoyl)oxy-6-[(3,4,5-trihydroxybenzoyl)oxymethyl]oxan3,4,5-trihydroxybenzoate
Caffeic acid	3-(3,4-Dihydroxyphenyl)-2-propenoic acid
Gallic acid	3,4,5-trihydroxybenzoic acid
Vanillic acid	4-Hydroxy-3-methoxybenzoic acid
Ferulic acid	3-(4-hydroxy-3-methoxy-phenyl)prop-2-enoic acid
amygdalin	[(6-*O*-β-D-glucopyranosyl-β-D-
Chlorogenic acid	(1*S*,3*R*,4*R*,5*R*)-3-{[(2*Z*)-3-(3,4-dihydroxyphenyl)prop-2-enoyl]oxy}-1,4,5-trihydroxycyclohexanecarboxylic acid

Table.6 Effects of Polyphenolic extracts on serum lipid profile and Atherogenic index levels

Animal groups	n	Cholesterol mg/dL Mean ± S.D	T.G mg/dL Mean ± S.D	HDL mg/dL Mean ± S.D	LDL mg/dL Mean ± S.D	VLDL mg/dL Mean ± S.D	Atherogenic Index Mean ± S.D
A	6	101.21 ± 2.49^{b}	42.41 ± 2.02^{c}	35.86 ± 1.58^{a}	56.86 ± 2.80^{b}	8.48 ± 0.40^{c}	1.59 ± 0.12^{b}
B	6	138.89 ± 3.86^{a}	61.06 ± 1.29^{a}	30.58 ± 1.34^{b}	96.09 ± 3.99^{a}	12.21 ± 0.26^{a}	3.14 ± 0.22^{a}
C	6	103.46 ± 2.24^{b}	43.08 ± 1.38^{bc}	36.03 ± 1.79^{a}	58.81 ± 2.99^{b}	8.62 ± 0.27^{cb}	1.64 ± 0.14^{b}
D	6	105.52 ± 3.19^{b}	45.33 ± 1.13^{b}	35.93 ± 1.54^{a}	60.53 ± 3.02^{b}	9.06 ± 0.23^{b}	1.69 ± 0.12^{b}
LSD		4.95	2.45	2.57	5.31	0.49	0.25

Note: Each value represents (mean ± SD) values with non identical superscript (a, b or c …etc.) were considered significantly different ($P \leq 0.01$). n=no. of animals.

Figure.1 Absorption spectrum of PRY extract by (UV- SCAN) in water

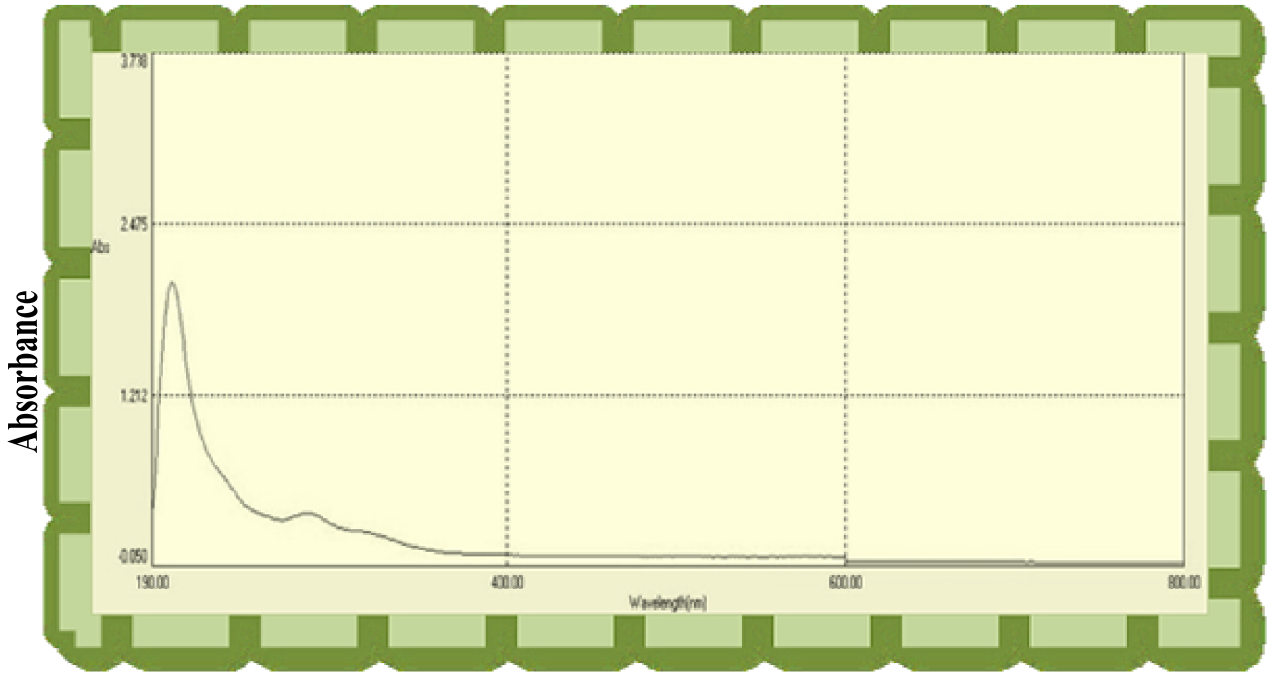


Figure.2 Absorption spectrum of PDY extract by (UV- SCAN) in water

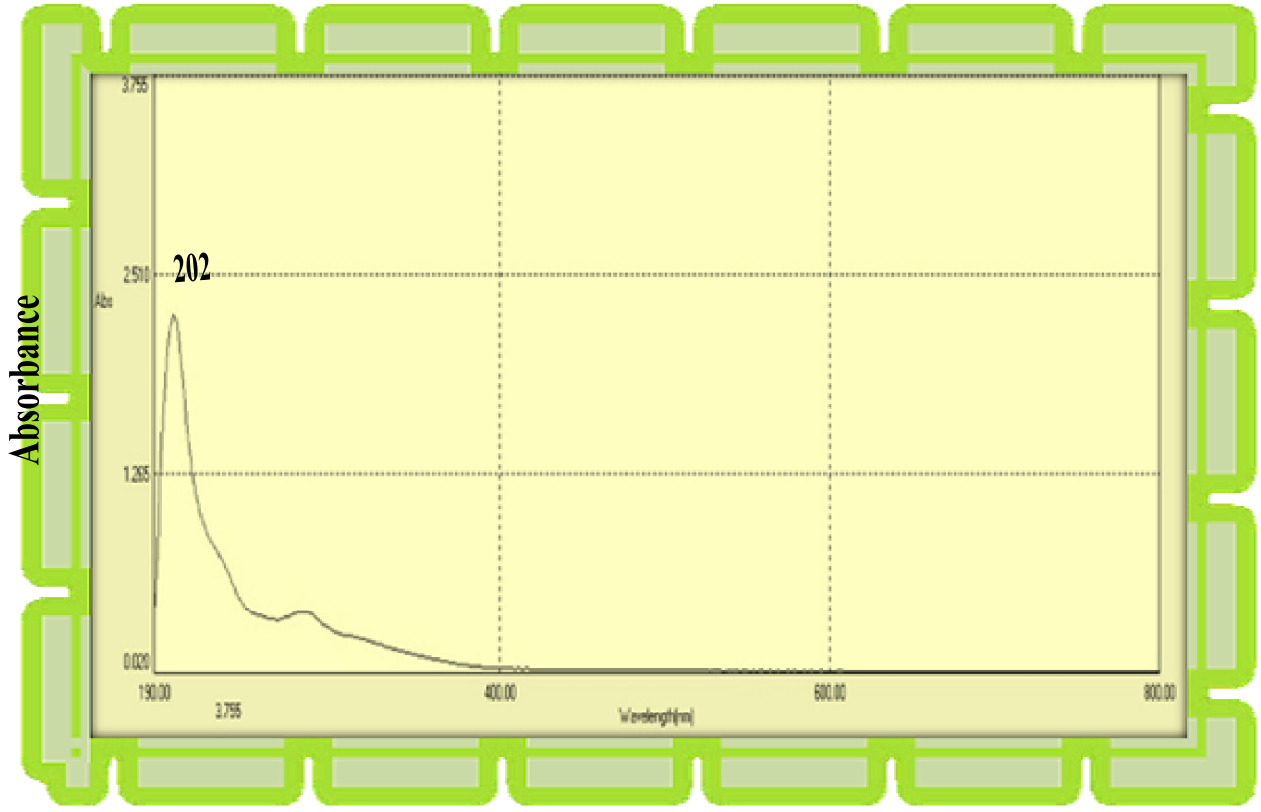


Figure.3 HPLC chromatogram of standard polyphenolic compounds

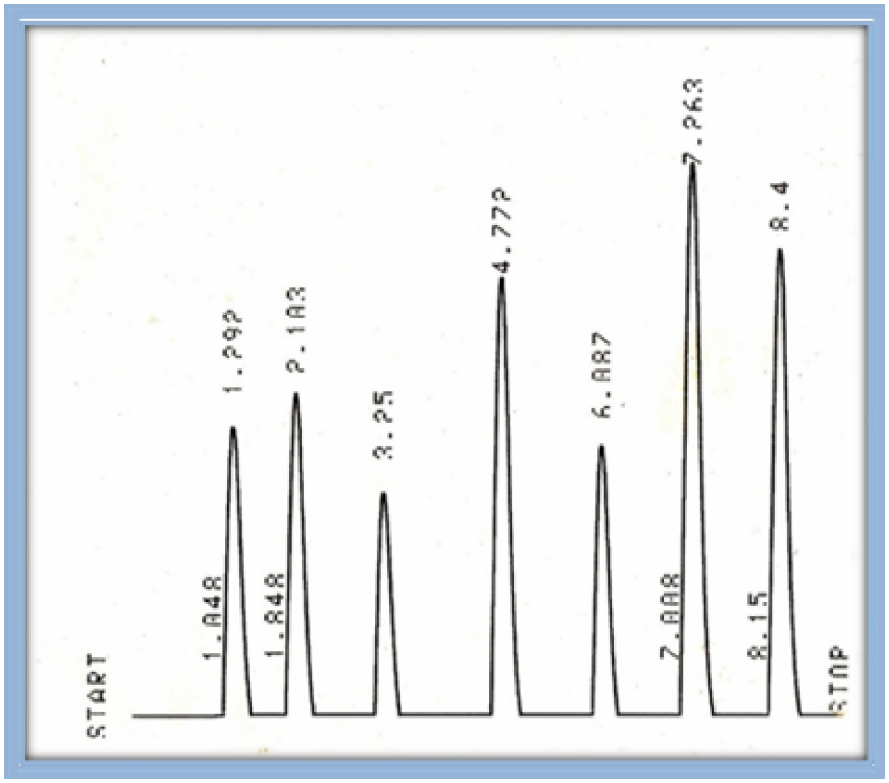


Figure.4 HPLC chromatogram of PDR extract

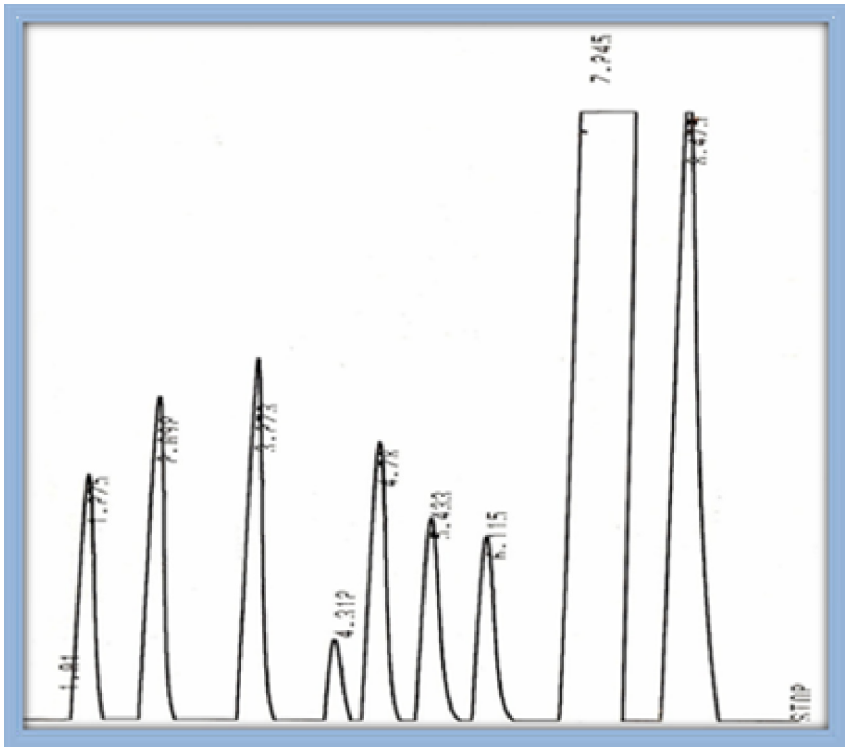


Figure.5 HPLC chromatogram of PDR extract

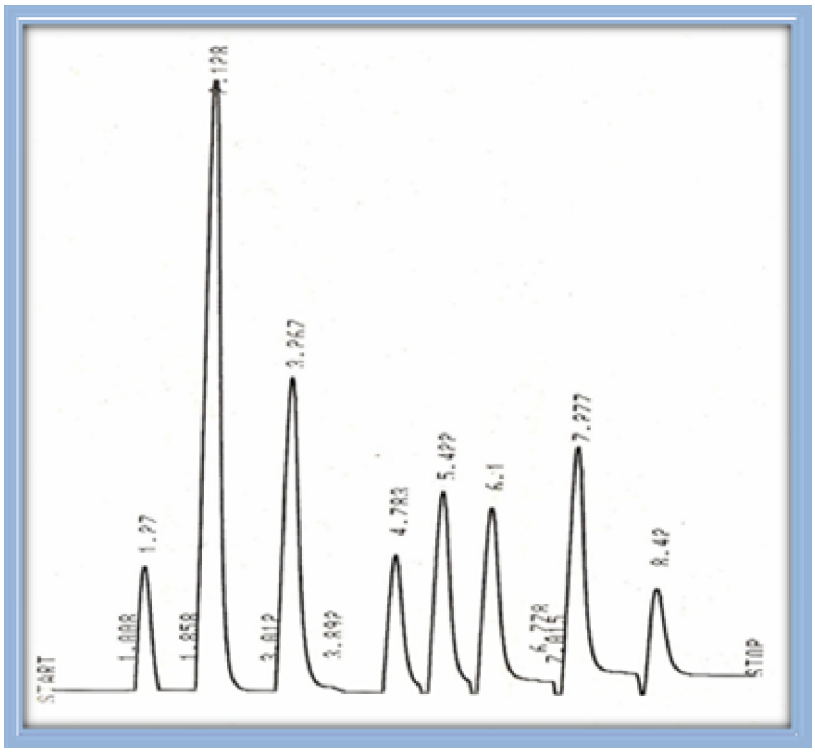


Figure.6 Changes in the concentration of serum TC of (A), (B),(C) and (D) groups

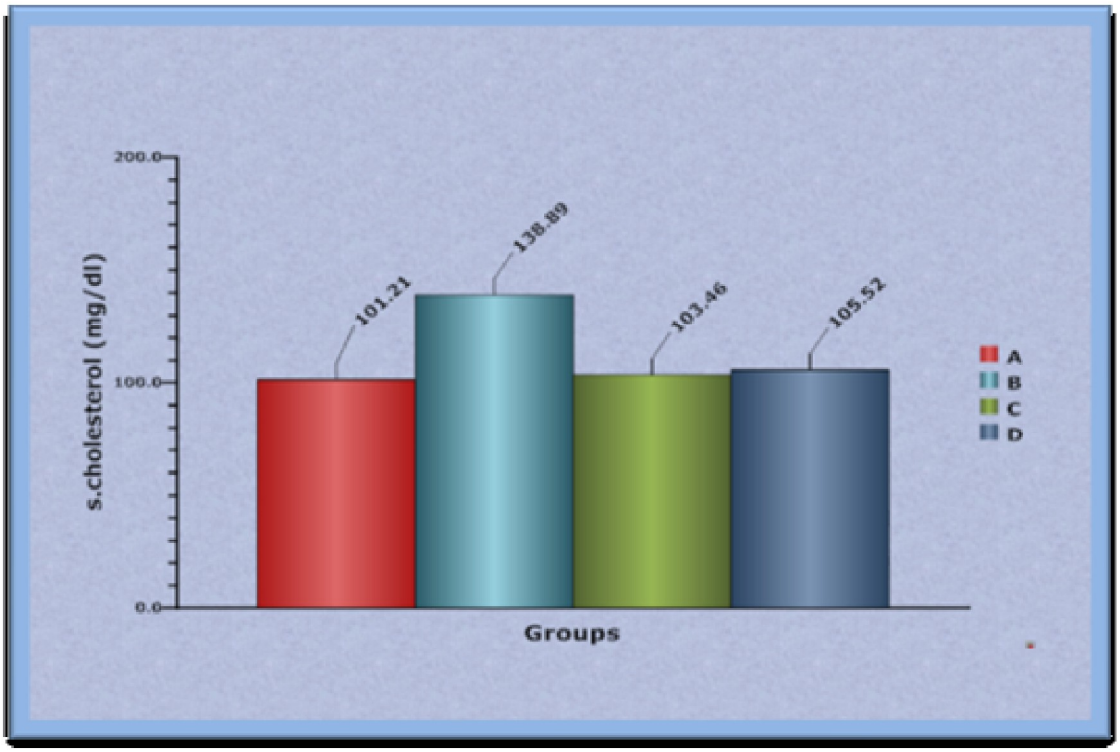


Figure.3-7 Changes in the concentration of serum TG of (A), (B),(C) and (D) groups

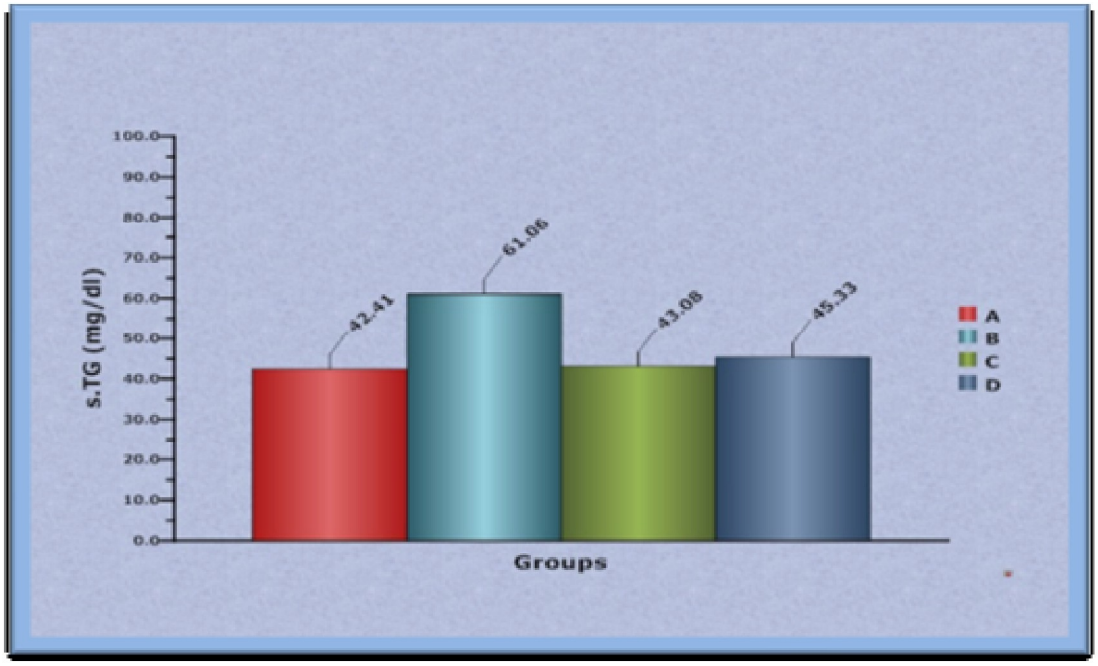


Figure.3-8 Changes in the concentration of serum HDL of (A), (B),(C) and (D) groups

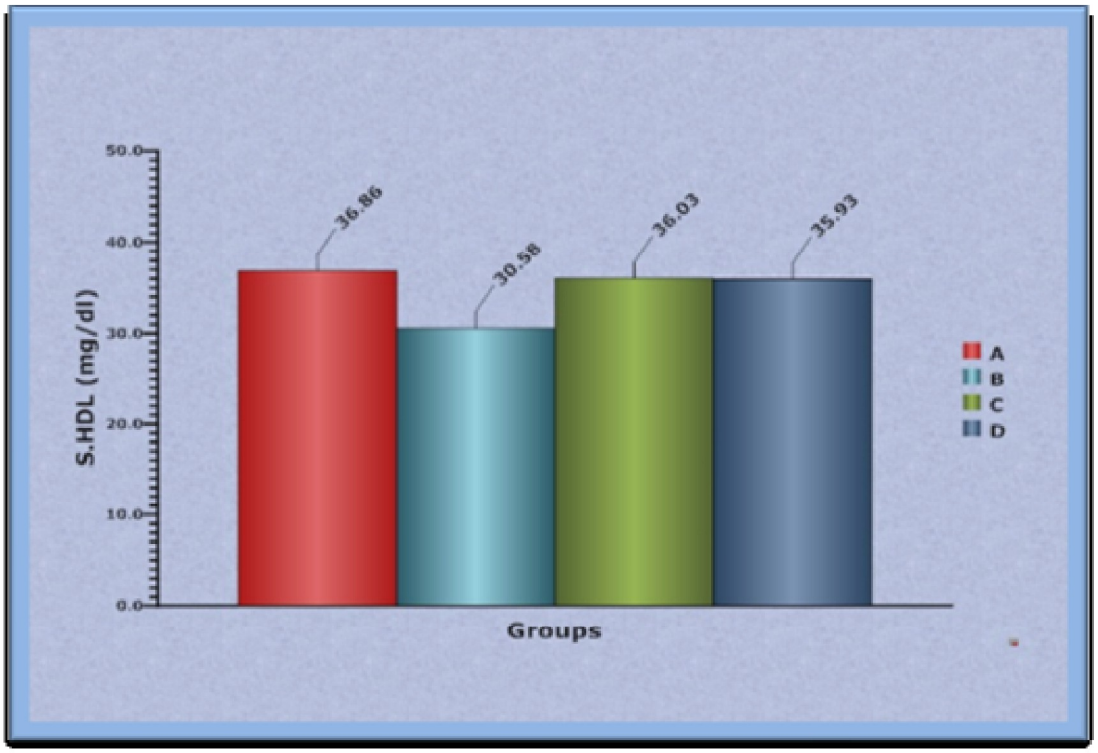


Figure.9 Changes in the concentration of serum LDL of (A), (B),(C) and (D) groups

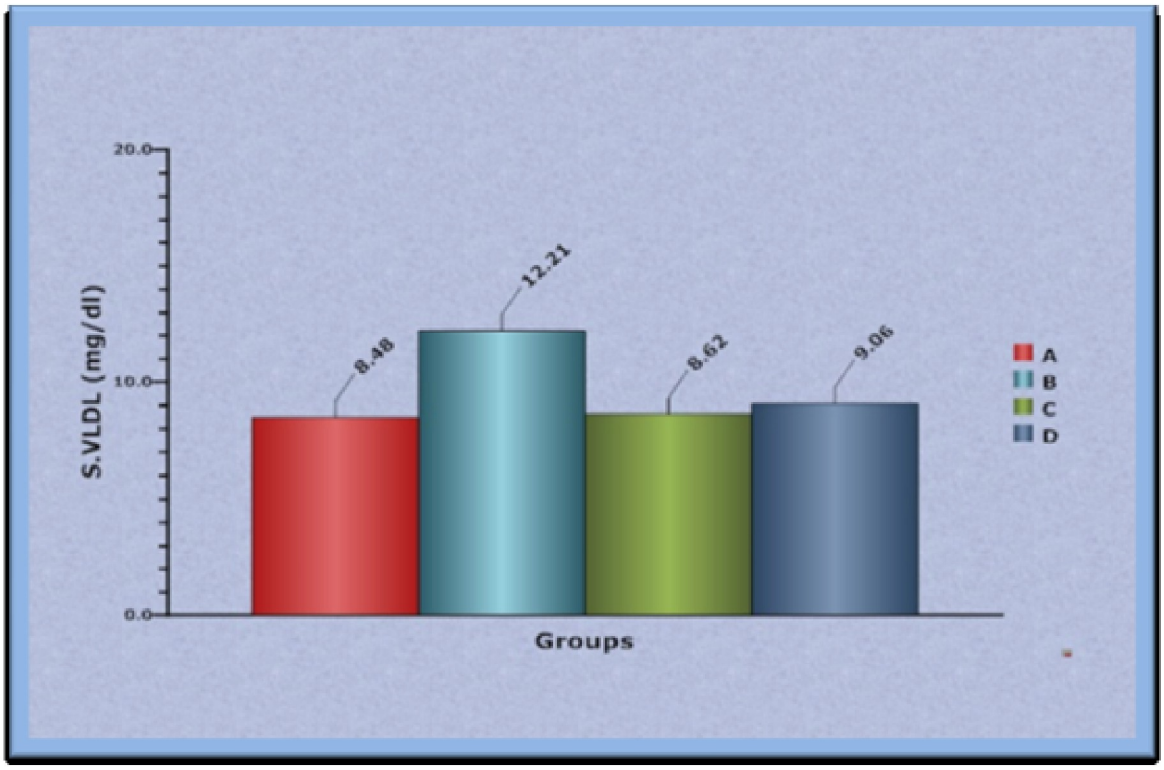


Figure.10 Changes in the concentration of serum VLDL of (A), (B),(C) and (D) groups

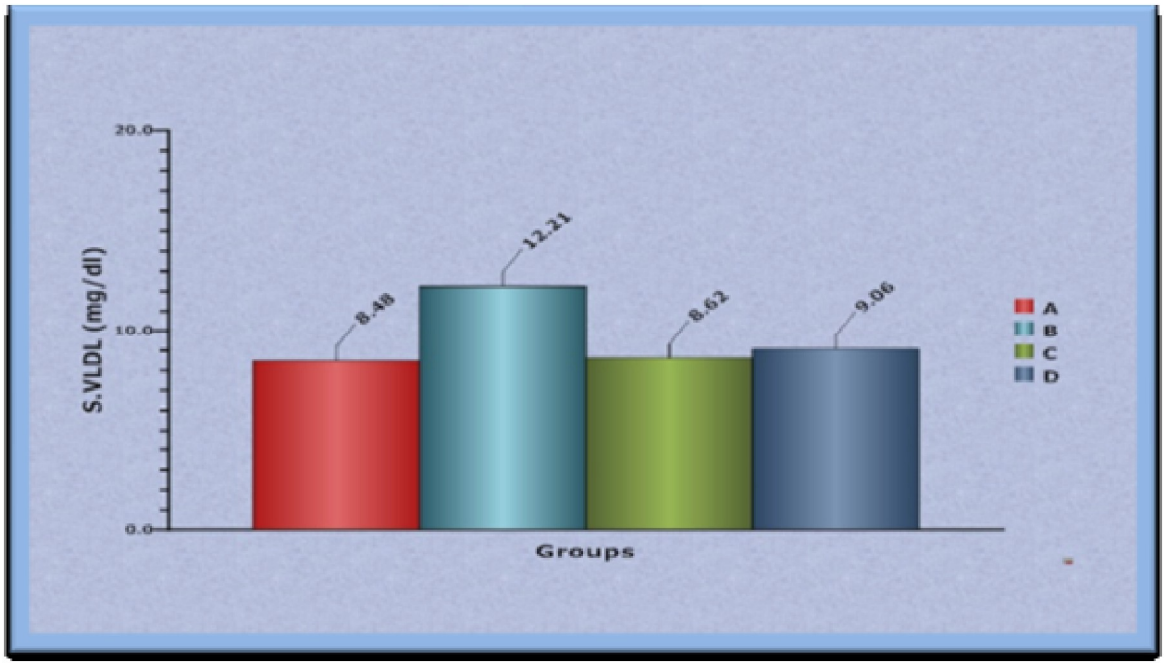
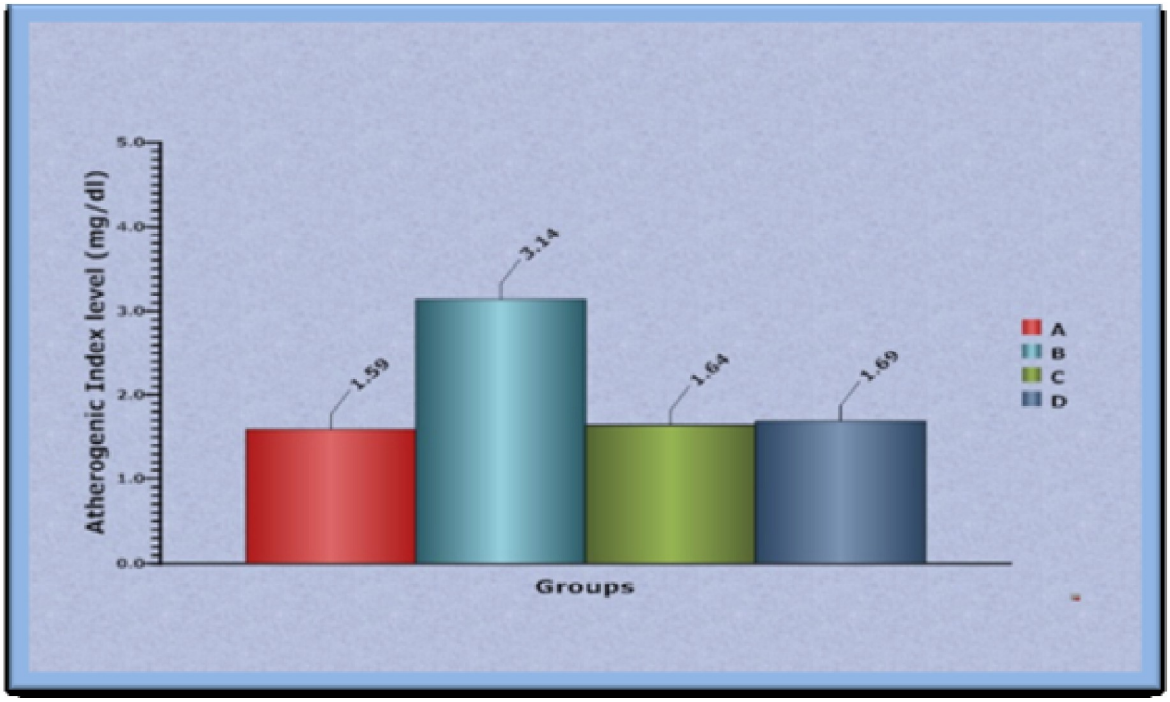


Figure.3-11 Changes in the concentration of serum Atherogenic index levels of (A), (B),(C) and (D) groups



0.01). Groups (C and D) showed significant increase in the serum HDL concentration as compared with group (B) ($p < 0.01$) , with greater increment in HDL concentration in PDR extract treated group (C) as compared with PDY extract treated group(D) ($p < 0.01$).On the other hand, no significant differences ($P<0.01$) can be observed between(C and D) groups as compared to control group (A) after having been treated for (30) days with (25 mg /kg B.W) of PDR and PDR extracts respectively. This result is similar to the result of Nishi *et al.,* (2013). Various studies have reported that the Polyphenols can also increase plasma HDL cholesterol concentration (Abe *et al.,* 2011; Murphy *et al.,* 2003).

And may be the reason for this rise to the phenolic compounds, especially flavonoids work to activate Lecithin Acyl Transferase (LCAT), which works to integrate cholesterol free with high-density lipoproteins (HDL) and thus lead to raise the level of HDL in the blood (Ghule *et al.,* 2006), was due also to the phenolic compounds may increase the effectiveness and caused activate Lipoprotein lipase enzyme and this enzyme involved in the metabolism of proteins, high-density lipoproteins (Hemlä, 1992).

Serum LDL concentration was changed as shown in table (6) and figure (9), at 30 day there was significant increase in the serum concentration of LDL in group (B) as compared with normal control group(A) ($P < 0.01$) . At these times, there was significant reduction in the serum concentration of LDL in groups (C and D) as compared with group (B) ($P < 0.01$), with greater decrement in LDL concentration in PDR extract treated group (C) as compared with PDY extract treated

group(D) ($p<0.01$). On the other hand, no significant differences can be observed between(C and D) groups as compared to control group (A), after having been treated for (30) days with (25 mg /kg B.W) of PDR and PDR extracts respectively. The decrease of LDL levels as reported in this study was compatible with finding of Nishi *et al.,* (2013)**.** On the other hand, numerous studies have confirmed the predominant phenolic compounds in prunes also inhibited LDL oxidation the strong antioxidant activity of chlorogenic acid toward LDL (Rice-Evans *et al.,* 1996; Nardini *et al.,* 1995).

Changes in the Atherogenic index levels is shown in table (6) and figure (11), within time there was significant increase in the Atherogenic index levels in group (B) as compared with the normal control group (A) ($p < 0.01$). On the other hand, show results a significant decrease ($P < 0.01$) in Atherogenic index levels in groups (C and D) after having been treated for (30) days with (25 mg /kg B.W) of PDR and PDR extracts respectively when compared to group (B), with greater decrement in Atherogenic index levels in PDR extract treated group as compared with PDY extract treated group. At these times, no significant differences can be observed between(C and D) groups as compared to control group (A). The decrease of Atherogenic index levels levels as reported in this study was compatible with finding of Nishi *et al.,* (2013)**.** The polyphenolic in red wine have been shown to have antiatherogenic properties (Vinson *et al.,* 2001; Fremont, 2000).

Poly-phenolic extract isolated from *prunus domestica* red (PDR) and *prunus domestica* yellow(PDY) wall nuts in this study giving the immediately yields compound that are exist in each extract identified by using UV-Visible spectrum, also appearance of several peaks indicating to the existing of phenolic acidsCompounds are determined through using HPLC technique, where in poly-phenolic extract six phenolic acids and one glycosides (Tannic acid, Gallic acid, Caffeic acid, Vanillic acid, Ferulic acid, amygdalin, Chlorogenic acid) have been isolated from PDR and PDY wall nuts.PDR extract has greater effect on reduce serum lipid profile and atherogenic index levels approximately to normal values than PDY extract.

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