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Effects of Dietary Probiotic (*Lactobacillus acidophilus*) on Hematology, Blood Biochemistry and Lipid Profile of Carbon Tetrachloride-Induced Toxicity in Rats

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Abstract: ***Exposure to carbon tetrachloride induces acute and chronic hepatic injuries as well as renal injuries in rats. Therefore, the current study aimed to evaluate the effect of probiotic (Lactobacillus acidophilus)onhematology, blood biochemistry and lipid profile of healthy rat, also the protective roleagainst carbon tetrachloride -induced toxicity in albino rat.Four groups with ten rats each group were used for this purpose; these groups included the control vehicle group that received saline daily for 30 days,probiotic group (0.009x10^{6}CFU/ gram of rat body weightorally)daily for 30 days;carbon tetrachloride group (2.5ml/kg intraperitoneally twice per week for three week;the probiotic –carbon tetrachloride group. The results revealed thatcarbon tetrachloride significantly increased serum levels of alanine aminotransferase, aspartate aminotransferase, alkaline phosphatase, total bilirubin, cholesterol, triglyceride, urea and creatinine. In addition, there were substantial increase in lipidperoxidation (malondialdehyde),white blood cell, packed cell volume and level of glucose with significant decreases in albumin, total protein, creatinine kinase,hemoglobin and red blood cells.Carbon tetrachloride also caused histological changes in liver, kidney and spleen tissues. However, administration of probiotic ameliorated the carbon tetrachloride induced liver and kidney damage with improved hematological, lipid profile and glucose level.***

1. Introduction

Carbon tetrachloride is a toxic substance and commonly used as a chemical intermediate, degreasing agent and dry cleaning fluid.It has been proven to have a highly hepatotoxic effect, as well as inducing nephrotoxicity. Carbon tetrachloride can lead to acute tubular necrosis in the kidney and damage to the liver, which leads to cirrhosis [1]. Its harmful effect on the liver and kidney occurs due to the carbon tetrachloridemetabolites, toxic trichloromethyl, and trichloromethylperoxy radicals inherent in the cytochrome P450 system [2].CCL4 induced hepatocellular damage as fatty degeneration, fibrosis and impairment of liver function causing leakage of aspartate aminotransferase and alanine aminotransferase into circulation and released into the blood stream[3] also rise level of alkaline phosphatase [4].High in the level of total bilirubin than normal must have been due to liver damage and fibrosis[5].Carbon tetrachloride treatment significantly decreased serum total protein, albumin and globulin level compared to control and these may result in decreased hepatic ability to synthesize protein. Albumin significantly decreased that associated with active cirrhosis and biliary liver damages [5].

The term "probiotics" is used to describe the kind of non-pathogenic microorganisms that are good bacteria that are either the same as or very similar to the bacteria that are already in your body. Probiotic is a live microbial feed supplement which beneficially affects the host animal by improving its intestinal microbial balance[6]. Probiotics containing food has the ability to influence body functions in order to reduce the risk of many diseases [7].Some strains of *Lactobacillus acidophilus* may be considered to have probiotic characteristics [8]. *Lactobacillus acidophilus* is species of gram positivebacteria in the genus Lactobacillus [9]. Probiotic are used medicinally as *Lactobacillus acidophilus* [10-11]. *Lactobacillus acidophilus* selected as a probiotic bacteria because criteria that suitable and are originate from human and other mammals.The dietary supplement with *Lactobacillus acidophilus* modulates immunity, release antioxidants and improve gastrointestinal functions [12].*Lactobacillus acidophillus* on hepatocellular, preventing hepatocellular damage in experimentally induced colitis[13]. The supplementation of *Lactobacillus acidophilus* is found to be beneficial in altering the levels of lipid profile in hypercholesterolemic subjects [14]. Administration *Lactobacillus acidophilus* increase immunity as increase total white cells blood and thrombocytes in mice [15].

2. Materials and Methods

2.1 Chemicals

Probioticis available as capsules, each capsule contains over 100 million active *Lactobacillus acidophilus* (including the naturally occurring metabolic product produced by lactobacilli) at the time of manufacture and it marked by Puritan's Pride as Probiotic Acidophilus®. In the present study probiotic group was treated with oral dose 0.009x10^6 per gram of rat body weight [16]which equivalent to 37.50 mg/kgb.wt[17] in drinking water. Carbon tetrachloride obtained from the laboratory of toxicology faculty of veterinary, medicine Benha University, Pharmaceuticals industries (Cairo, Egypt).Total bilirubin, serum transaminases activities (AST and ALT), alkaline

phosphatase (ALP), total protein, albumin, blood creatinine, blood urea, creatinine kinase, blood cholesterol, blood triglyceride, L-malondialdehyde (MDA) , blood glucose erythrocytic count, total leucocytic count, haemoglobin concentration and packed cell volume were kits were purchased from Diamond Company (Cairo, Egypt).

2.2 Animals and experimental design

40 male Wister albino rats weighting 200-280 g (age of rat 50~60 days) were obtained from animal house of Faculty of Veterinary Medicine, Benha University ,Egypt .The animals were housed in 49x35 cm stainless steel wire mesh cages with bedding of ground wood chips at 21 c. They were fed fresh-pelleted food and their water as placed in glass bottles of 500 ml. Rats were kept at a constant environmental and nutritional condition throughout the period of experiment. The animals were left for 15 days for acclimatization before the beginning of the experiment.The rats were randomly divided into main 6 groups.**Group (1):** Ten rats were administrated saline only 0.2ml daily for 30 days.**Group (2):** Ten rats were administrated probiotic (*Lactobacillus acidophilus*) orally at dose $0.009x10^6$CFU/ gram of rat body weightfor 30daysdaily**Group (3):** Ten rats were administrated carbon tetrachloride 25%(dissolved in olive oil) intraperitoneally injection 2.5ml/kg b.wt twice per week for three week to induce hepatic and renal toxicity.**Group (4):**Ten rats were administrated probiotic (*Lactobacillus acidophilus*) as group 2 followed by carbon tetrachloride intraperitoneally injection 2.5 ml/kg b.wt twice per week for three week to induce hepatic and renal toxicity.

2.3 Blood collection

Blood samples were taken at first, seventh and fourteenth day post-treatment in all groups after the end of administration .Two blood samples were taken from each rat in the group for both biochemical and hematological studies from median canthus of the eye.**The first blood sample** was collected without anticoagulant for separation of clear serum for biochemical analysis. **The second sample** of blood was collected in the test tube mixed with sodium Citrate 3.8% as anticoagulant, the sample was shake several times to ensure mixing of blood with anticoagulant. These blood samples were used for hematological studies to determine erythrocytic count and hemoglobin concentration.

2.4 Serum biochemical analyses

The collected sera were used for biochemical analysis to determine serum total bilirubin, serum transaminases activities (AST and ALT), alkaline phosphatase (ALP), total protein, albumin, blood creatinine, blood urea, creatinine kinase, blood cholesterol, blood triglyceride, L-malondialdehyde (MDA) and blood glucose

2.5 Evaluation of oxidative stress markers

Lipid peroxidation was measured by determination of MDA content in liver and kidney homogenates.

2.6 Histopathology

The treated rats were sacrificed at first day, seventh day and fourteenth day. Specimens were collected from liver, kidney and spleen from each sacrificed tested rats and fixed directly in formalin 10% for at least 24hour, then the sample were washed under running tap water followed by immersion in serial dilutions of ethyl alcohol. Specimens were cleared in xylene and embedded in paraffin at 56 degree in hot air oven for twenty four hour. Paraffin bees wax tissue block were prepared for sectioning at 4 microns thickness by slidge microtome. The obtained tissue sections were collected on glass slides, deparaffinized and stained by hematoxylin and eosin stain for routine examination through the light microscope [18].

2.7 Statistical analysis

Statistical analysis was conducted with the Statistical Package for Social Science [19]to determine if variables differed between groups, according to [20].The Shapiro-Willk test was used to test the normal distribution of the data before statistical analysis was performed. Compare between means were conducted by one-way ANOVA and subsequent Duncan's multiple range test [21].Probability values of less than 5% ($P < 0.05$) were considered significant.

3. Results

Effect of probiotic ($0.009x10^6$CFU/ gram of rat body weight) orally for 30 days and carbon tetrachloride 25% (2.5ml/kg body weight twice per week) intraperitoneally for three week on serum total bilirubin,aspartate aminotransferase level (AST), alanineaminotransferase level (ALT) alkaline phosphatase (ALP), total protein, albumin, globulin, blood creatinine, blood urea, creatinine kinase, blood cholesterol, blood triglyceride, L-malondialdehyde (MDA) ,blood glucose, erythrocytic count(RBCs), haemoglobin (Hb), total leukocytic (WBCs) and packed cell volume.

Values with different litters within different row differed significantly at ($P \leq 0.05$).

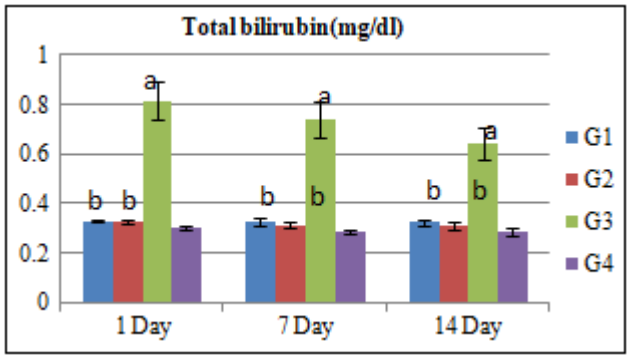


Figure 1: G (1): Control**, G (2):** Probiotic, **G(3):** CCL_4**G(4):**Prbiotic+CCL_4

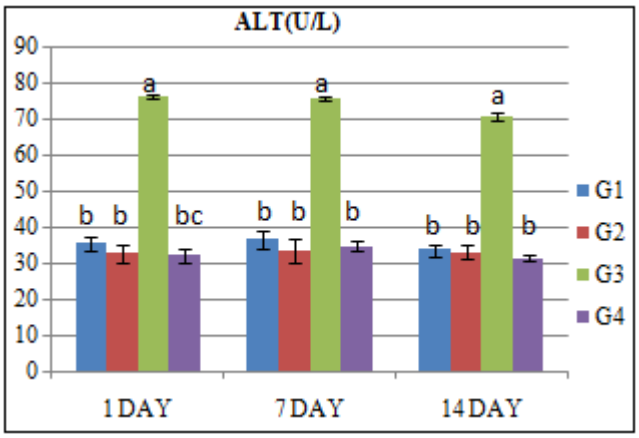


Figure 2: G (1): Control **G (2):** Probiotic **G (3):** CCL_4 **G (4):** Prbiotic+CCL_4

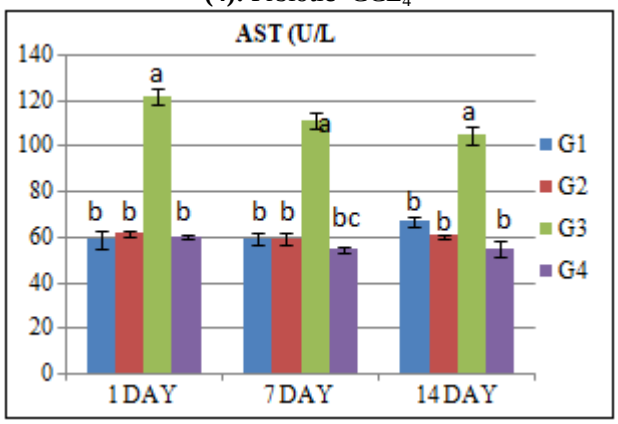


Figure 3: G (1): Control **G (2):** Probiotic **G (3):** CCL_4 **G (4):** Prbiotic+CCL_4

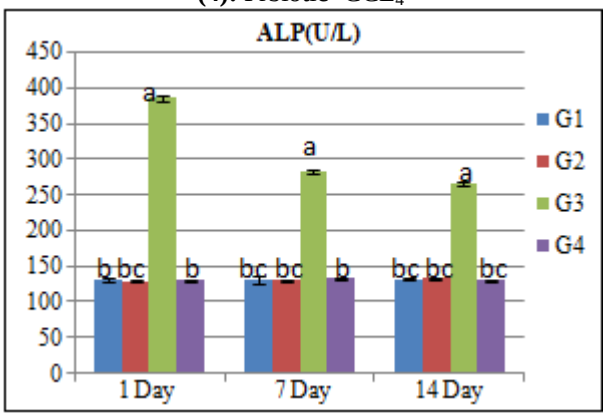


Figure 4: G (1): Control **G (2):** Probiotic **G (3):** CCL_4 **G (4):** Prbiotic+CCL_4

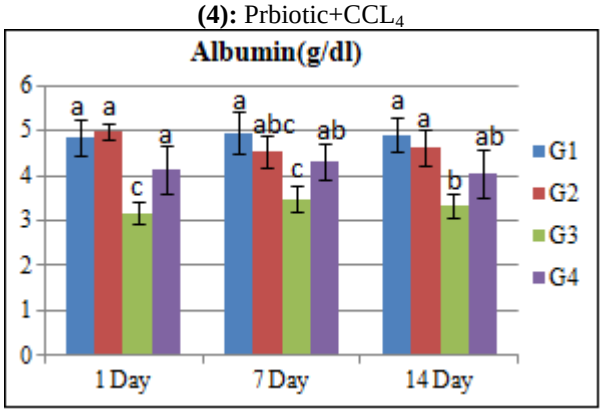


Figure 5: G (1): Control **G (2):** Probiotic **G (3):** CCL_4 **G (4):** Prbiotic+CCL_4

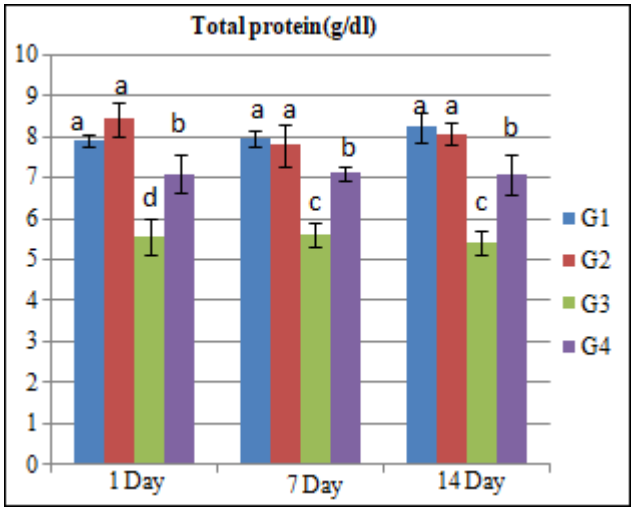


Figure 6: G (1): Control **G (2):** Probiotic **G (3):** CCL_4 **G (4):** Prbiotic+CCL_4

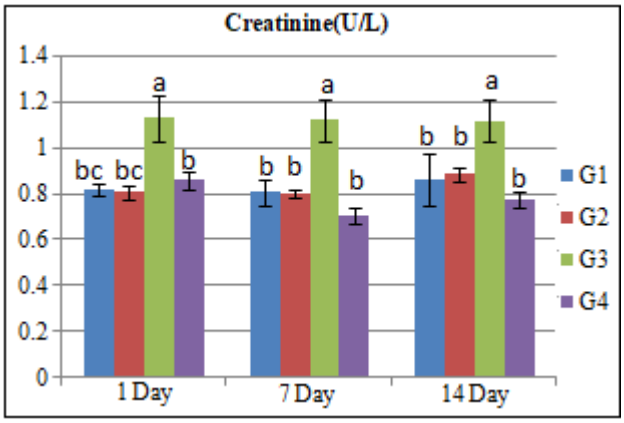


Figure 7: G (1): Control **G (2):** Probiotic **G (3):** CCL_4 **G (4):** Prbiotic+CCL_4

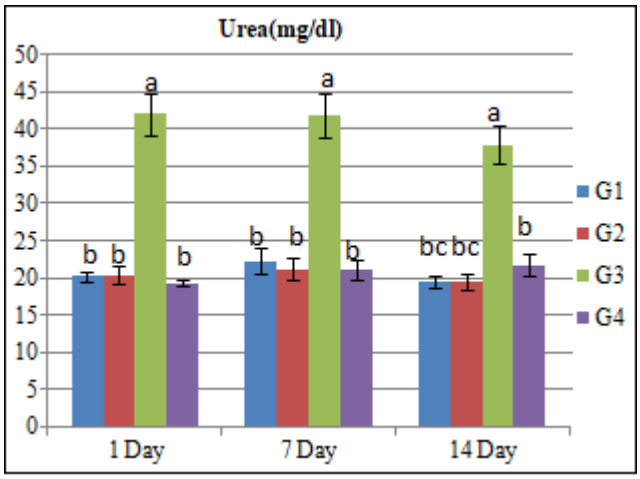


Figure 8: G (1): Control **G(2):** Probiotic **G (3):** CCL_4 **G (4):** Prbiotic+CCL_4

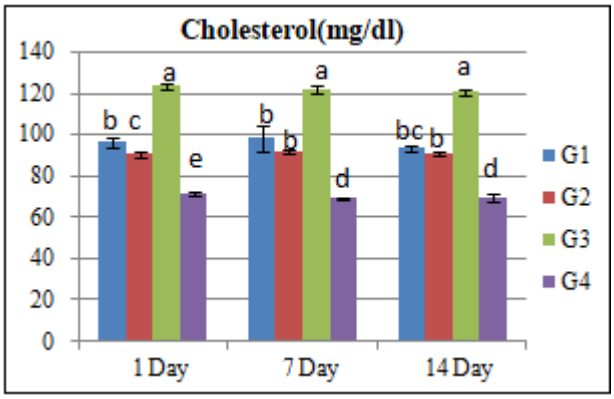


Figure 9: G (1): Control **G(2):** Probiotic **G(3):** CCL_4 **G(4):**Prbiotic+CCL_4

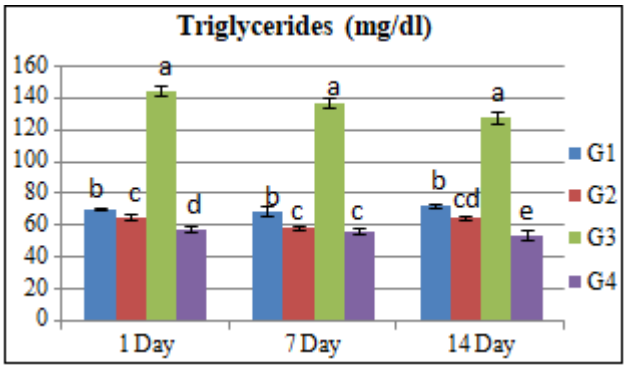


Figure 10: G (1): Control **G (2):** Probiotic **G(3):** CCL_4 **G(4):**Prbiotic+CCL_4

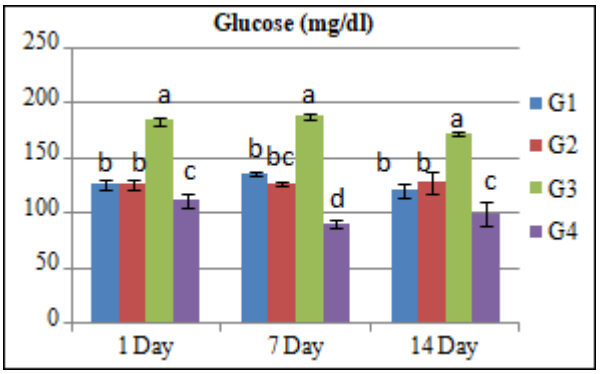


Figure 11: G (1): Control **G (2):** Probiotic **G (3):** CCL_4 **G (4):** Prbiotic+CCL_4

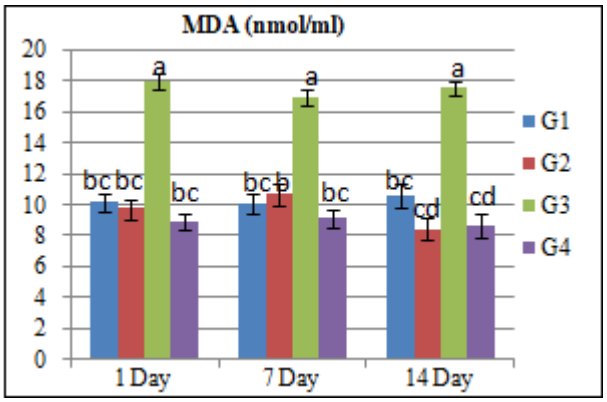


Figure 12: G (1): Control **G (2):** Probiotic **G (3):** CCL_4 **G (4):** Prbiotic+CCL_4

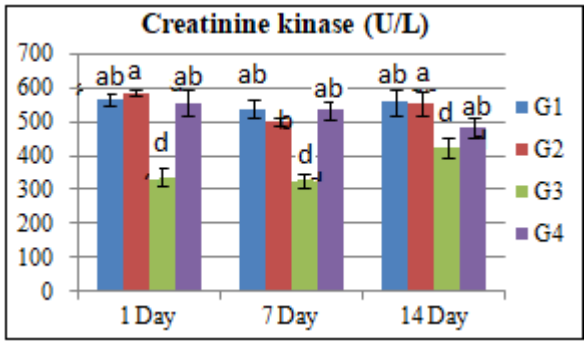


Figure 13: G (1): Control **G (2):** Probiotic **G (3):** CCL_4 **G(4):**Prbiotic+CCL_4

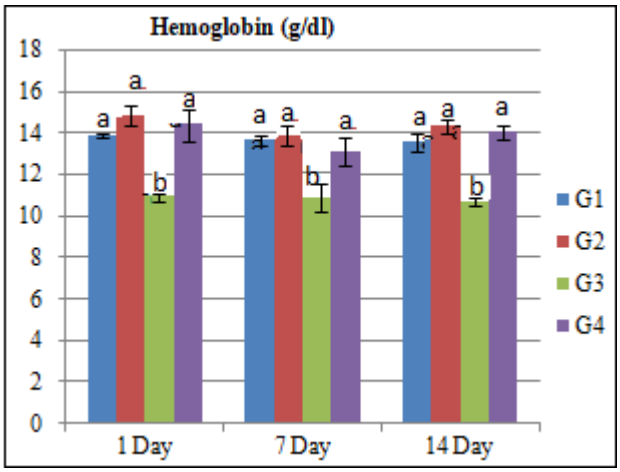


Figure 14: G (1): Control **G (2):** Probiotic **G (3):** CCL_4 **G(4):**Prbiotic+CCL_4

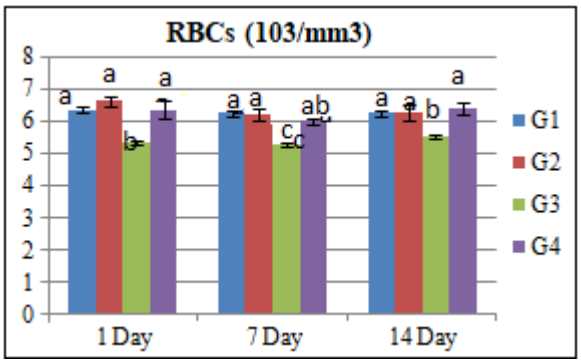


Figure 15: G (1): Control **G (2):**Probiotic **G (3):** CCL_4 **G(4):**Prbiotic+CCL_4

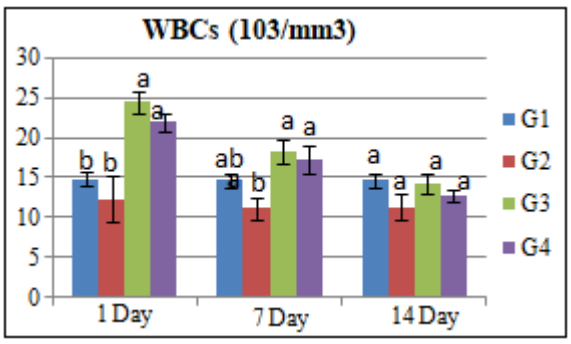


Figure 16: G (1): Control **G (2):** Probiotic **G (3):** CCL_4 **G(4):**Prbiotic+CCL_4

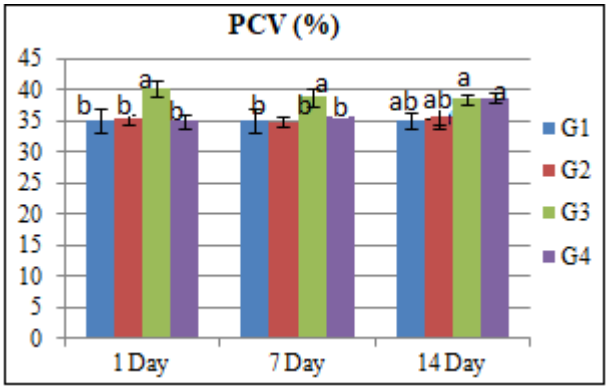
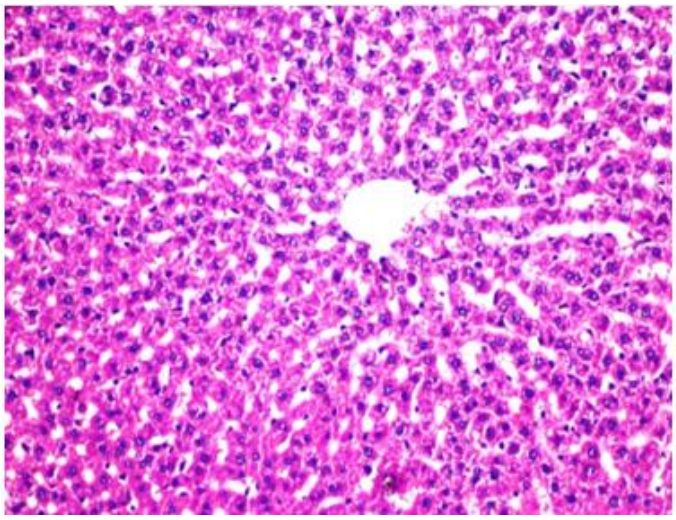
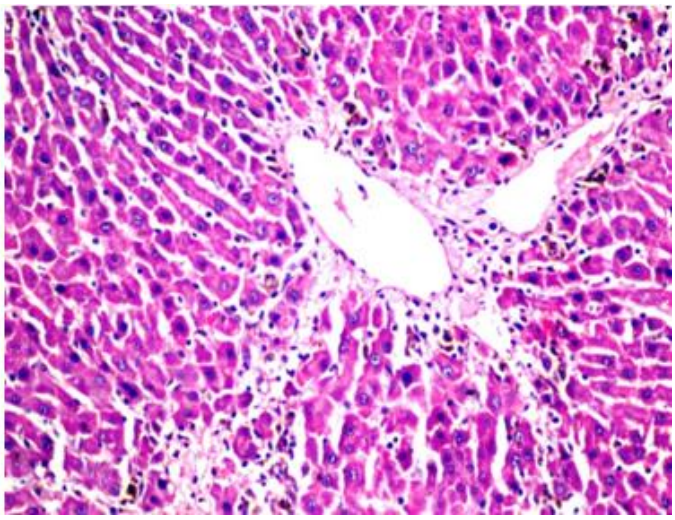


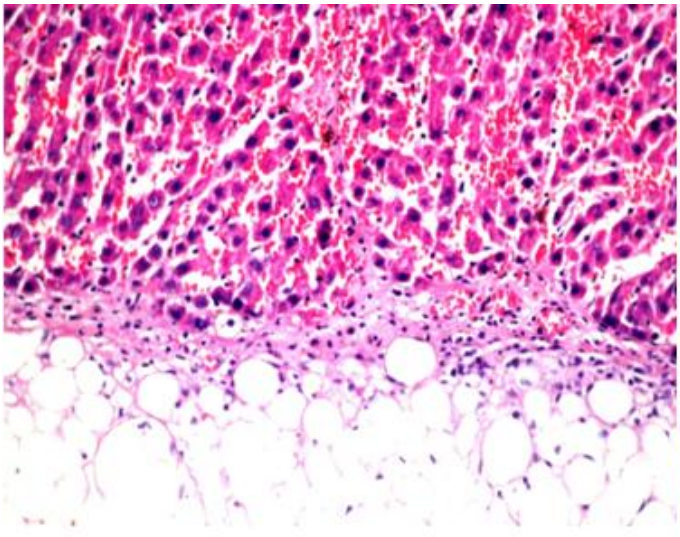
Figure 17: G (1): Control **G (2):** Probiotic **G (3):** CCL_4 **G(4):** Prbiotic+CCL_4



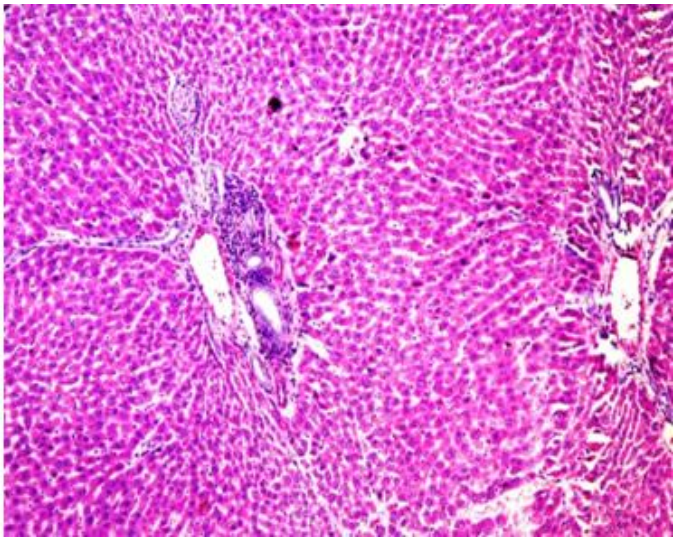
(A)



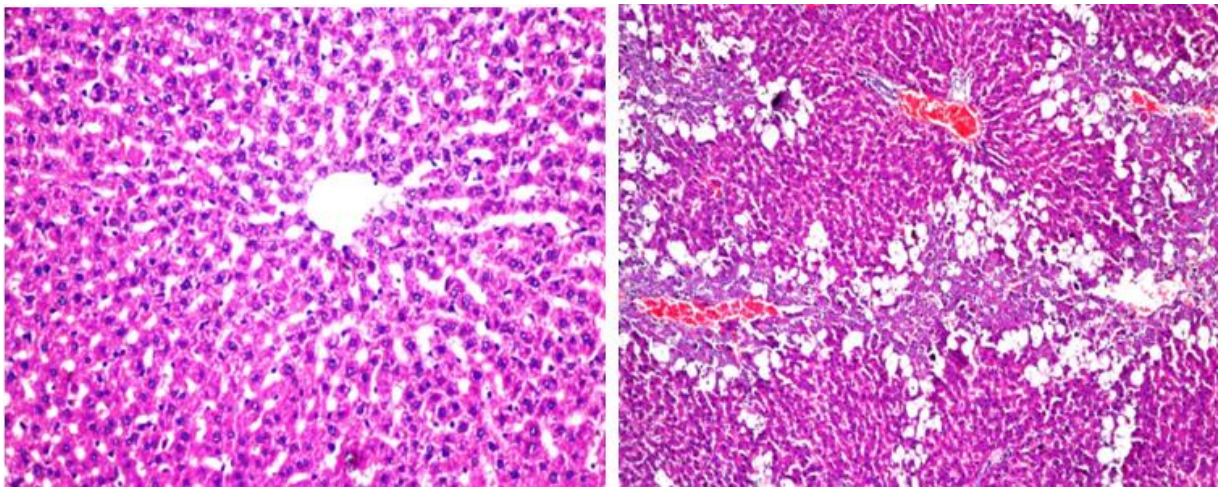
(B)



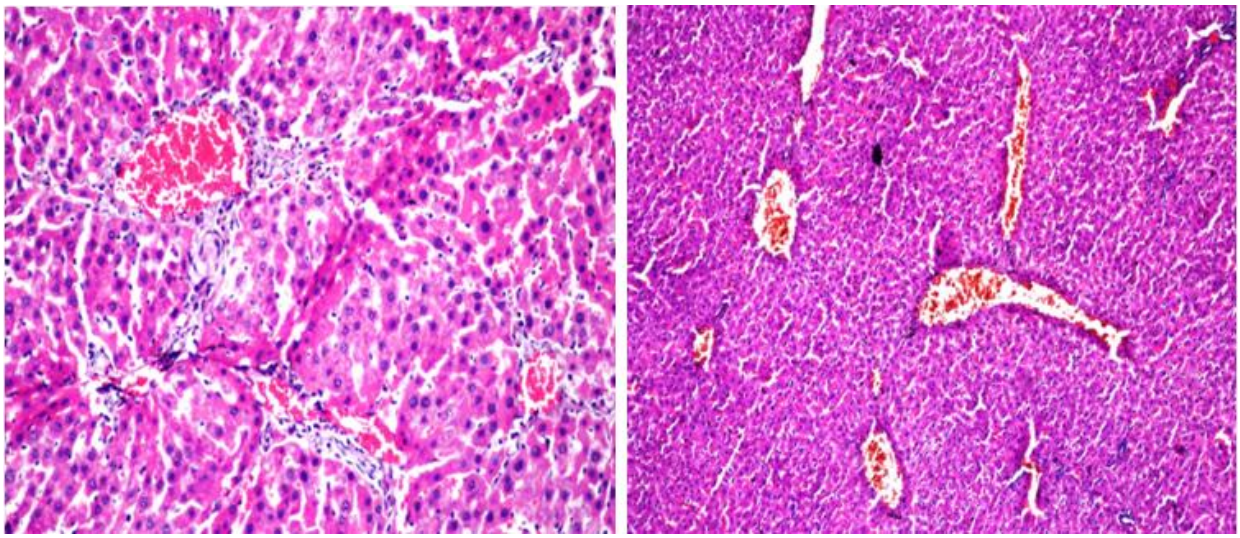
(C)



(D)

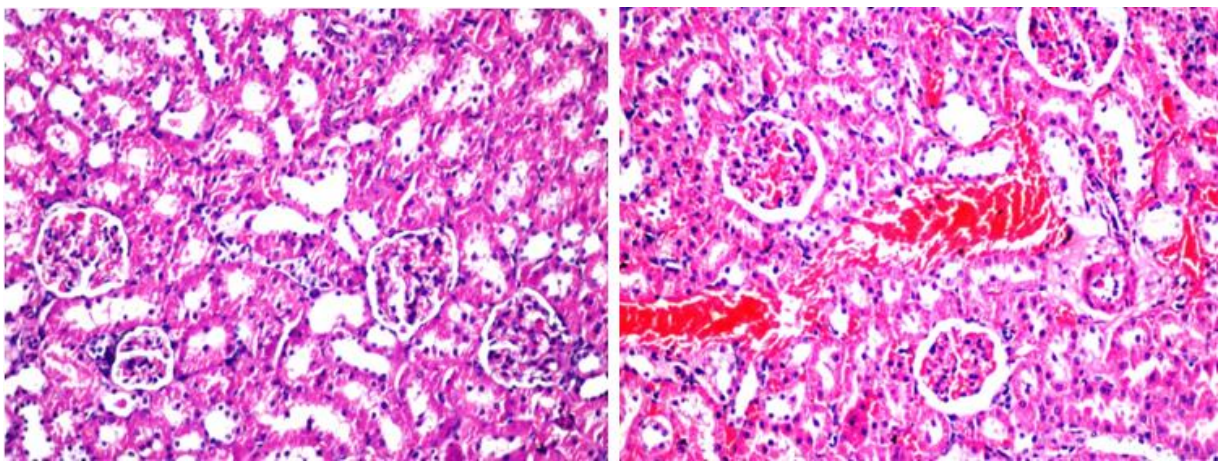


(E) (F)



(G) (H)

Figure 18: Histopathological changes in liver sections of control normal ,carbon tetrachloride, probiotic and probiotic with carbon tetrachlorideA: Liver sections from a control rat shownnormal histological structure of central vein and surrounding hepatocytes in the parenchyma .**B,:** CCL4 rat showssteatosiswith inflammatory cells infiltration in in the hepatic capsule at first day. **C:**CCL4 rat showssteatosis with inflammatory cells infiltration in hepatic capsule with congestion in sinusoids of underlying parenchymaat seventh day. **D:** CCL4 rat showsmassive inflammatory cells infiltration in the portal area with dilatation in portal veinat fourteenth day. **E:**probioticshownormal histological structure of central vein and surrounding hepatocytes in the parenchyma**F:**probiotic-CCL4 rat showscentrilobular hepatic vacuolization and necrosis in the hepatocytes associated with congestion in the portal veins at first day**G:**probiotic-CCL4 rat showsfine fibrosis with inflammatory cells infiltration dividing the parenchyma into lobules associated with congestion in the portal vein at seventh day.**H:**probiotic–CCL4rat showscongestion in the central and portal veins at fourteenth day.



(A) (B)

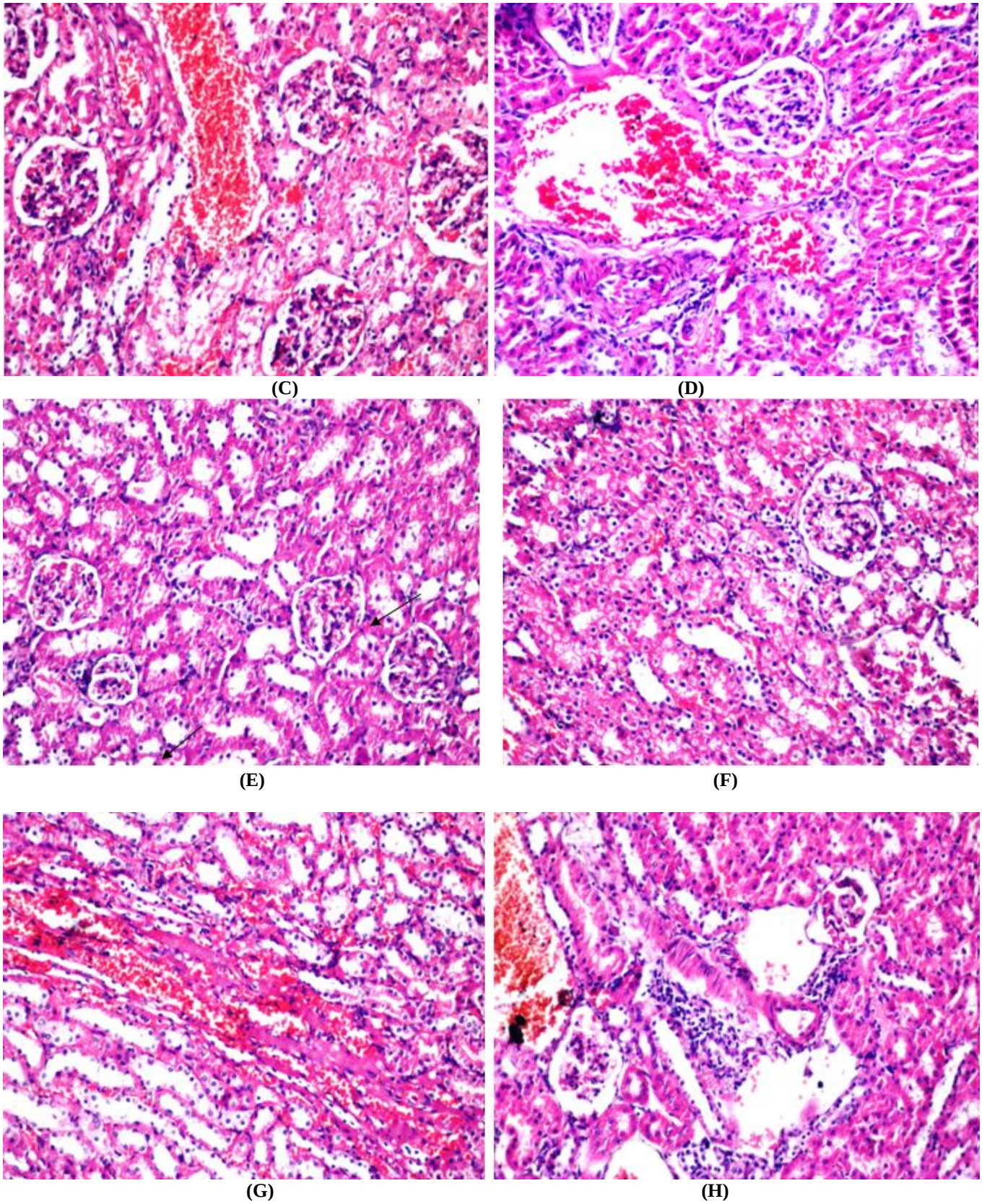
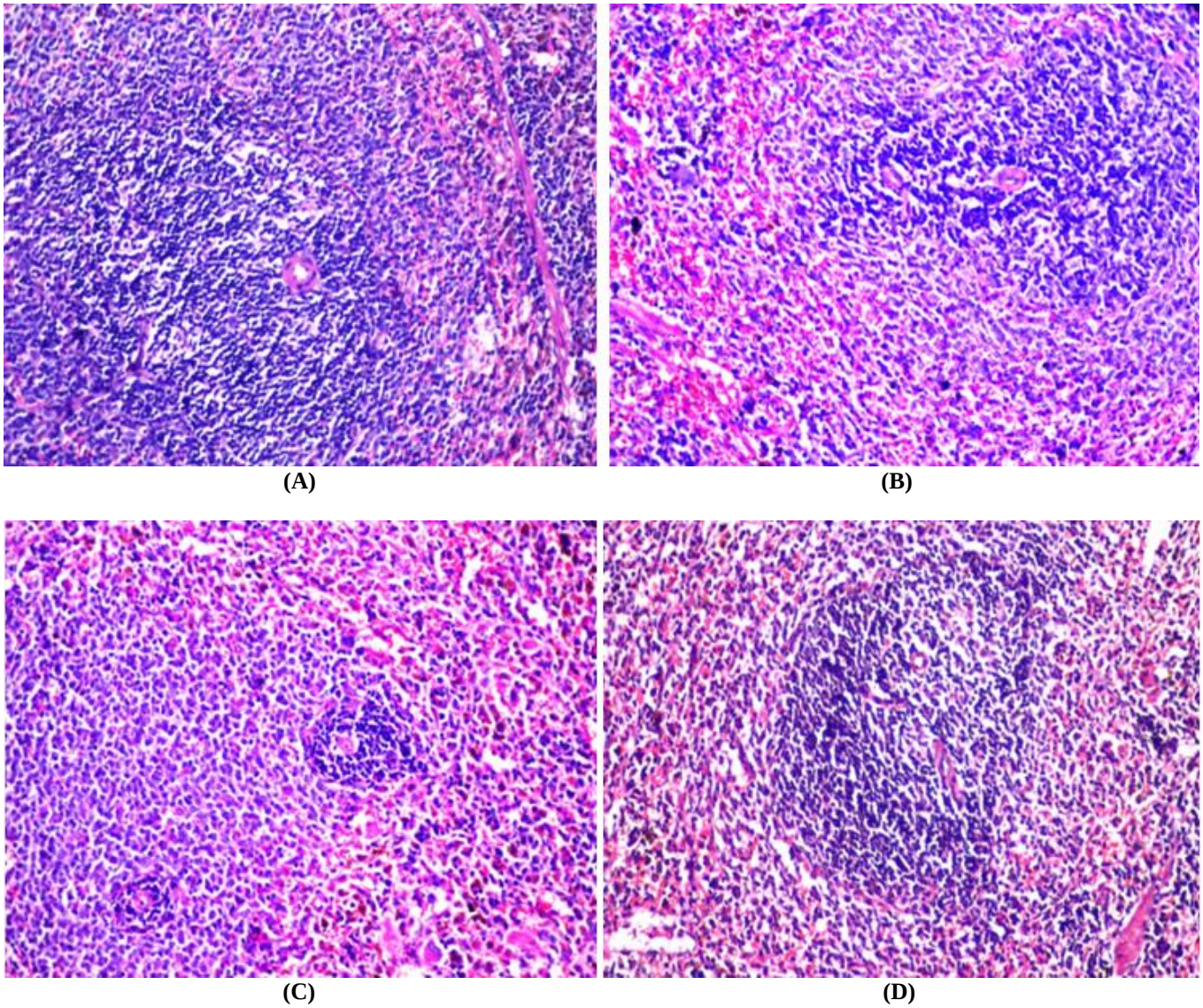


Figure 19: Histopathological changes in kidney sections of control, carbon tetrachloride, probiotic and probiotic with carbon tetrachloride A: Kidney sections from a control rat shownormal histological structure of of glomeruli and tubules.**B:** CCL4 rat showscongestion in cortical blood vessels at first day. **C:**CCL4 rat focal haemorrhagic in between the tubules at cortex at seventh day. **D:** CCL4 rat showsfocal haemorrhagic in between the tubules at cortex.at fourteenth day. **E:**probiotic normal histological structure of of glomeruli and tubules**F:**probiotic-CCL4 rat showsswelling and degeneration in the tubular lining epithelium of the cortex at first day. **G:** probiotic–CCL4rat showsfocal haemorrhage between the tubules at the corticomedullaryat seventh day**H:**probiotic –CCL4rat showsfocal inflammatory cells infiltration in between the tubules with congestion in the blood vessels at the cortexat fourteenth day.



(A) **(B)**

(C) **(D)**

Figure 20: Histopathological changes in spleen sections of control, carbon tetrachloride, probiotic and probiotic with carbon tetrachloride A: spleen sections from a control and probiotic rat show normal histological structure of the white and red pulps with surrounding sinusoids at first, seventh and fourteenth day.**B:** CCL4 rat shows lymphoid depletion in white pulps at first and seventh day.**C:** CCL4 rat showssever depletion in lymphoid cells with pulps at fourteenth day **D:**probiotic-CCL4 rat showslymphoid depletion in the white at first seventh and fourteenth day.

4. Results

4.1 Serum biochemical analysis

As shown in Figures (1-8)

These data suggested that when probiotic compared with control have insignificant change onAST, ALT, ALP, total bilirubin, urea and creatinine.CCL4 induced hepatotoxicity and nephrotoxicity as demonstrated by the elevation of serum liver and kidney biomarker. The AST, ALT, ALP, total bilirubin, urea and creatinine levels were substantially increased ($p< 0.05$) in response to CCL4 treatment. CCL4 caused significant decrease total protein, albumin and creatinine kinase (Fig 13) compared to those of control rats. In contrast, these parameters were significantly reduced ($p< 0.05$) when CCL4 treated-rats were administrated probiotic compared to the CCL4 group.

4.2. Lipid profile

As shown in Figures (9-10)

There was a significance decrease of probiotic group on serum cholesterol at first day but no remarkable change at seventh day and fourteenth day compared to control group (1). Probiotic followed by carbon tetrachloride group (7) had a significant decrease on serum cholesterol at first, seventh and fourteenth day compared to carbon tetrachloride toxicity. Probiotic caused remarkable decrease on serum triglyceride at first, seventh and fourteenthday compared to control group. There was a significant decrease of probiotic group followed by carbon tetrachloride on serum triglyceride at (1,7and14) day compared tocarbon tetrachloride.

4.3 Hepatic oxidative damage parameter

Carbon tetrachloride intoxication and treatment with probiotic, on lipid peroxidation and liver oxidative parametersare shown in Figure 12. Carbon tetrachloride intoxicated rats showed significant increases (P≤0.05) in MDA compared to those of control rats.However, the toxic effects of carbon tetrachloride on hepatic MDA were significantly (P≤0.05) reduced by administration of probiotic.

4.4. Glucose level

As shown in Figure(11)carbon tetrachloride caused significant increase in glucose level ,while probiotic reduced the elevation compared toCarbon tetrachloride.

4.5. Some hematological aspects (Hb, RBCs, WBCs and PCV)

As shown in Figures (14-17).The effects of carbon tetrachloride intoxication and treatment with probiotic, onhemoglobin concentration, RBCsWBCs and PCV are shown in Figure (14-17). Carbon tetrachlorideintoxicated rats showed significant decreases (P≤0.05) in hemoglobin concentration and RBCsbut there was increase in PCVcompared to those of control rats.However, the toxic effects of CCL4 on Hbconcentration, RBCsand PCV were significantly improved (P≤0.05) by administration of probiotic

4.6. Histopathological findings

As shown in Fig (18) Liver sections of control saline-treated rats had uniform polyhedral hepatocytes with normal sinusoids and central veins. In contrast, we observed portal vein congestion, severe hydropic degeneration, necrosis, nuclear condensation, and lymphocytic infiltration around the portal vein in CCL4-treated rats at first, seventh and fourteenth day after end of administration. Probiotic restored the normal hepatic architecture.

As shown in Fig. (19) Control rats had normal glomeruli and renal tubular epithelia. In contrast, CCL4-intoxicated rats showed a severe loss of the brush border, tubular necrosis, and tubular vacuolization. In addition, CCL4-treated rats exhibited moderate tubular dilatation and inflammatory cell infiltration at first,seventh and fourteenth day. Treatment probiotic caused a notable recovery of the histopathological appearance after CCL4-induced renal injury.

As shown in Fig. (20) Spleen showed no histopathological alterations on control and probiotic group. Spleen of carbon tetrachloride showedseverdepletion in lymphoid cells with pulps while probiotic followed carbon tetrachloridereduced lymphoid depletion in the white pulps.

5. Discussion

5.1 Effect on liver function:

Carbon tetrachlorideinduced hepato cellular damage as fatty degeneration, fibrosis and impairment of liver function [22-23-24 -25] and liver examination proved that histopathological findings showed steatosis with inflammatory cells infiltration. The obtained results came in agreement with [26] proved that histopathological examination of livers reduced fatty degeneration, cytoplasmic vacuolization and necrosis in carbon tetrachloride treated rats.Carbon tetrachloride causedevaluation of liver tissues and diffuse hepatosteatosis in rats [27]. Histopathological injuries were recorded in liver of rat with carbon tetrachloride treatment[28].

Probiotic (*Lactobacillus acidophilus*) had no adverse effect compared to normal control rats.*Lactobacillus acidophilus*occurs naturally in the human and animal gastrointestinal tract and mouth [29-30]and histological examination proved that data [31] stated that no histopathological abnormalities or changes were observed in liver of both male and female rats of probiotic group, while probiotic and carbon tetrachloride induced marked reduction in liver function enzymes compared to hepatotoxicity of carbon tetrachloride.Our results came consistent with[32]evaluated that probiotics simultaneously with cadmium chloride restored the altered values of alanine aminotransferase and aspartate aminotransferase to the normal levelin rat male Wistar rats *Rattusnorvegicus*.[13] revealed that colitis caused significant ($p<0.05$) decrease in liver function enzymes, While Lactobacillus acidophilus recipient succeededin keeping alkaline phosphatase and plasma total protein values within normal, but decreased alanine aminotransferase and aspartate aminotransferase in coparasim with control group. The *lactobacillus plantarum* CCFM8246 recovered the alanine aminotransferase and aspartate aminotransferase in serumagainst copper intoxication in mice[33]. [34]stated the probiotic *Clostridium butyricum* decrease the carbon tetrachloride induced levels of alanine aminotransferase and aspartate aminotransferase in the serum of these mice and liver examination showed significant improvement hepatocellular damage of probiotic and carbon tetrachloride . The obtained results came in agreement with [35] evaluated the efficiency of *Lactobacillus acidophilus* to protect liver from the toxicity of zearalenone in vital systems of albino white rats.The protective effects of probiotic consumed simultaneously with cadmium attenuated histomorphological changes in the liver[36].Probiotics improved the histological feature of hepatocytes reduced apoptosis and stimulated proliferation on thioacetamide induced hepatotoxicity rats[37].

5.2 Effect on kidney function

Carbon tetrachloride caused nephrotoxicity which manifested by a significant increase serum level of creatinine and urea. Renal damage was represented by significant increase in serum urea and creatinine as recorded by[38]. Creatinine on the other hand is mostly derived from endogenous source by tissue creatinine breakdown. Altitude of urea and creatinine levels in the blood was taken as the index of nephrotoxicity[39].Our findings are in accordance with[40-41-42-43-44-45]andkidney examination proved that histological findings of kidney showed renal degeneration, necrosis congestion in cortical blood vessels and focal haemorrhagic in between the tubules at cortex[46-41]

Probioticdid not have effect on serum level of creatinine and urea compared to control. This results came agreement with [47] suggested that the probiotic on blood urea nitrogen and creatinine concentrations no significance difference in large felids. Also [48]stated that Lactobacillus plantarum AD3 had no significant visible changes in respect to control rat, while probioticand carbon tetrachloride induceda significantdecreased on serum level of creatinine and urea compared to carbon tetrachloride. There is a direct correlation between the structure of microflora in gastrointestinal tract and uremic condition. Restructuring the gastrointestinal microbial community may be beneficial reducing uremic load in the gut and its escape in system circulation. Modification of intestinal flora to refrain generation of toxins by probiotic [49]. Probiotic evaluate the impact on solute concentration in plasma or on their fecal or urinary excretion [50]. It has been shown to have very potent antioxidant effects in preventing endothelial apoptosis caused by oxidants [51]. Our findings are in accordance with [52] investigated that probiotic strains supplemented to aflatoxins treated group revealed a significantly depletion in serum creatinine and urea levels. *Lactobacillus* played a protective role against the progression of chronic kidney disease[39].*Lactobacillus plantarum* AD3 as an effective probiotic strain for acetaminophen induced uremic patient the level of plasma urea and creatinine in tested rats were significantly lower in comparison to uremic control [48] and kidney examination of probiotic and carbon tetrachlorideshowed good improvement of the histological picture. There were focal degenerative changes in proximal tubules without vacuoles and apoptosis, while glomeruli were not affected. These findings are in agreement with [39] investigated the protective effect of probiotic supplementation against cadmium-induced toxicity in rat male Wistar rats *Rattusnorvegicus* by histopathological changes in kidneys.

5.3 Effect on lipid profile

Carbon tetrachloride induced a significant increase on lipid profile(cholesterol and triglyceride) compared to control. Rise in serum total cholesterol might be attributed to its reduced catabolic rate and/or reduced activity of hepatic cholesterol-7-alpha-hydroxylase, the rate limiting enzyme in bile acid synthesis from cholesterol [53-54-55-56].

Probiotic caused a significant decrease on lipid profile (cholesterol and triglyceride) compared to control. The obtained results came in agreement with that obtained by[57-58]showed that the hypocholesterolemic effect of local Lactobacillus strains was attributed to its ability to lower serum and liver total cholesterol levels. *Lactobacillus acidophilus* significantly reduced in cholesterol and triglycerides in rats[59-60-61-62].

Probiotic and carbon tetrachloride induced a significant decrease on serum level of cholesterol and triglyceride compared to carbon tetrachloride rats. The obtained results came consistent with that obtained by[63]concluded that *Lactobacillus acidophilus* supplementation exert hypotriglyceridemicin diabetic rats. *Lactobacillus acidophilus La5* and *Bifidobacteriumlactis* improved total cholesterol and low density lipoprotein cholesterol concentrations in type 2 diabetic people[64].*Lactobacillus casei 01* improved the total cholesterol, low-density lipoprotein-cholesterol, high-density lipoprotein-cholesterol and triacylglycerides of the hypertensive overweighed women[65].

5.4 Effect on serum glucose level:

Carbon tetrachloride showed a significant increase in serum glucose level compared to control rats [66-67].Probiotichad insignificantdifference on glucose level compared to control .The obtained results came consistent with [68]found that probiotic treatment had no effect on blood glucose levels in healthy rats and[69]said that *Lactobacillus casei*did not cause a significant change in blood gluose levels in control mice receiving the probiotic.

The effect of probioticand carbon tetrachloride restored the increase of glucose of carbon tetrachloride. The obtained results came in agreement with that attained by[70]stated that munghurt*Lactobacillus acidophilus* had the effect of the decreasing blood glucose levels and in alloxan-induced diabetic rats.[71]suggested that probiotic consumption improved the glycemic control in Type 2 diabetes.

5.5 Effect on serum L-malondialdehyde (MDA) level:

Carbon tetrachloride caused a significant increase in serum L-malondialdehyde in rats compared to control[43-72-73]. Probiotic showed insignificant change on malondialdehyde level .The obtained results came in agreement with [74]said that *Lactobacillus rhamnosus* feeding to mice (10^7, 10^9, 10^{11} and 10^{13} cfu/animal/d) repetitively for 28 days revealed no adverse effects on malondialdehyde in rat.Probioticand carbon tetrachloriderestored the increase malondialdehyde level induced by carbon tetrachloride .The obtained results came in agreement with that attained by[63]concluded that *Lactobacillus acidophilus*significantly decrease the elevated malondialdehydein diabetic rats. *Lactobacillus plantarum CCFM8661* offered a significant protective effect against lead toxicity by preventing alterations in the levels of malondialdehyde caused by lead exposure[75].Inconsistent with[76]evaluatedtheeffect of probiotics indicated a non-significant declining trend in the level of malondialdehyde.

5.6 Effect on serum creatinine kinase level:

Carbon tetrachloride induced a significant decrease on creatinine kinase level compared to control [77-78].Probiotic and carbon tetrachloride caused significant increase on creatinine kinase level compared to carbon tetrachloride group.The findings agreement with [79]revealed that *Lactobacillus plantarum*TWK10 (LP10) supplementation increase creatine kinase of exercise performance, physical fatigue, and gut microbial profile mice .Long-term supplementation with probiotic may increase muscle mass, enhance energy harvesting, and have health-promotion, performance-improvement, and anti-fatigue effects.

5.7 Effect on hematological picture:

Carbon tetrachloride induced hematological toxicity in rat which manifested by significant increase on white blood

cells and packed cell volume but significantly decreased in red blood cell and hemoglobin.This results were similar to that obtained by [80]illustrated that carbon tetrachloride caused significant reduction in hemoglobin content and haematocrit percentage accompanied by leukocytosis, granulocytosis, monocytosis and lymphocytopenia. Probiotic had no remarkable change on hemoglobin, red blood cell, white blood cell packed cell volume compared to normal control and the results were consistent with [81] stated that *Lactobacillus plantarum*or *Lactobacillus casei*or their mixed culture improved health performance of rats in terms of hematologica and these increases were only of statistical significance without any clinical relevance as most of these parameters were within the normal physiological values for rats.Inconsistent with[82]investigated that the effect of oral administration of different doses of probiotic, Lactobacillus plantarum. There was a significant increase in hemoglobin and red blood cell when compared with the control in rat

Probioticand carbon tetrachloride induced improvement on level of hemoglobin, and red blood cell count but there was no effect on white blood cells and packed cell volume compared to carbon tetrachloride. The results were agreement with [35] evaluated that *Lactobacillus acidophilus* had the ability to raise hemoglobin treating rats with zearalenone.

6. Conclusion

Available evidence indicates that probiotics (*Lactobacillus acidophilus)* supplements is not toxic and have benefit effect on lipid profile(cholesterol and triglyceride) of healthy rat.Probiotics (*Lactobacillus acidophilus)*may play a vital role in management toxicity of carbon tetrachloride byalleviating the carbon tetrachloride toxicity-induced on liver and kidney damage with improvement on hematological, lipid profile and glucose level.

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