



**BIOLOGICAL EVALUATION OF FORTIFIED MILK PROTEINS WITH  
PSYLLIUM HUSK AND ZIZYPHUS SPINA-CHRISTII L ON SOME BIOMARKERS  
IN RATS**

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**ABSTRACT**

The present study was carried out to investigate the effect of the fortified casein (Cas) and whey protein hydrolysate (WPH) with herbal medicine, namely Psyllium husk (Ps) and Napek (Nap) on hyperlipidemia and liver enzymes in male albino rats. Eighty rats were divided into ten groups, group 1 was given standard diet as a normal control group, group 2 was given the fatty diet (cholesterol 1%) as a positive control, groups (3, 4, 5, 6, 7, and 8) were fed on fatty diet upon the treatment of casein, whey protein hydrolysate, Ps husk, casein plus Ps, whey protein plus PS, Nap, casein plus Nap and whey plus Nap. This study indicated that incorporation of casein and whey proteins with each Ps husk and Nap caused an improvement in the lipid profile, namely, total cholesterol, HDL, LDL and triglyceride. The fortification caused a significant increase in HDL level, while a significant decrease in LDL-C levels was noticed. Also, a significant decrease in Tri G level was shown upon the fortification of milk proteins under study with Ps husk and Nap respectively. On the other hand, the fortified casein and whey protein with each Ps husk and Nap had no harmful effect on liver functions (ALT, AST, and ALP), bilirubin (total and indirect) and albumin. Moreover, a significant decrease in serum MDA was observed. The foregoing results proved that the fortification of milk proteins with herbal medicine is effective in protection against oxidative stress of body cells.

**Keywords:** Milk protein, herbal medicine, Lipid profile, Liver function

## 1. INTRODUCTION

Fast food and high-fat diet one of the big healthy problems nowadays that contributes to several diseases such as: obesity, nonalcoholic fatty liver disease, hypertensive and heart diseases. Thus, many studies have been conducted to utilizing the nature ingredients alone or complications together to enhance the bioavailability or improve their functionality. Natural products have been a source of medicinal ingredients play a role against health hazards in under developed and developing countries has been used. It is well known that the oxidation of lipid may cause cardiovascular disease if not stopped at earlier steps. Numerous studies suggest that dietary fiber may lower lipid profile by inhibiting cholesterol synthesis within absorption of products of fermentation or by alternation of the bile acid pool. On the other hand, many studies have shown that phenolic compounds play an important prophylactic role against oxidative stress as a result of their capacity to scavenge free radicals [1]. In recent years, several study come to the viewpoint that milk proteins (MPs) besides they provide all body needs of the essential amino acids, they have many types of functional and biological activates, such as antioxidant, immunomodulatory, antimicrobial and anticancer [2,3,4]. Additionally, MPs and their hydrolyzed

products have been suggested to affect lipid metabolism and they have anti-obesity effects [5]. In addition to, the whey protein hydrolysate (WPH) is more digestible that release high level of bioactive peptides and absorbable nitrogen source than the WPC [6]. Thus, it can be effectively used in health promoting foods as a bio-functional ingredient and high antioxidant that may have positive effect on several diseases [7]. Otherwise, numerous studies have been interested to isolate the bioactive polysaccharides from natural sources due to their various functional, beneficial pharmacological effects and biological activities for these compounds. Among several types, *Plantagoovata* husk (psyllium husk) and *Ziziphusspina-christi* (Nabeq) are known as an excellent source of many active constituents such as bioactive polysaccharides, phenolics, flavonoids, alkaloids, cyclopeptide, and steroids, which all of them play important role including immunomodulatory, antioxidant, antitumor, hypocholesterolemia and hepatoprotective activity [8, 9, 10]. Also, psyllium husk is particularly rich in alimentary fibers, which consists of 85% water-soluble fiber. This dietary fiber was reported to exhibit a hypolipidemic effect in both animal and human studies, which the lowering of lipid profile by inhibiting cholesterol absorption in intestine is the main mechanism of

action [11]. Concerning, Nabeq is a multipurpose tree distributed along the entire. The utilization of juice, fruits and leaves as a source of different bio active compounds such as tannins, betulinic acid, triterpenoidsaponin, glycosides and vitamin C. [12, 13] that have received much consideration since they play an important prophylactic role against oxidative stress as a result of their capacity to scavenge free radicals [14, 15]. Furthermore, these components have a wide range of health benefits against several disease such as improving cardiovascular system, enhancing immune system, gastrointestinal, antianemic and anticancer [16, 17]. The herein study was conducted to impact the fortified casein and whey proteins with psylliumhusk (PS) mucilage and Ziziphusspina (Napek) mucilage on hyperlipidemia in male albino rats.

## 2. MATERIALS AND METHODS

### 2.1 Materials:

Casein were purchased from the herd of Faculty of Agriculture, Dairy Science Department, and Cairo University. The whey protein hydrolesate (WPH) was purchased from the Egyptian company for dairy products and food additives "Egy Dairy", 10th of Ramadan city, Egypt. psyllium husk and the ripening fruit of Ziziphusspina-christi (Nabeq) obtained from local market, Giza, Egypt Psylliumhusk, Napek.

**Chemicals:** All the used chemicals were analytical grade, Enzymatic Kits: commercial kits of the company Randox laboratories (San Francisco, CA, USA) were used to determine serum liver levels of ALT, AST, ALP, and Albumin, total and direct bilirubinkits were purchased from Biomerieux, laboratory of reagents and products (Marcy Letoile, France). Commercial kits of the company Diamond Diagnostics, Egypt were used to determine serum lipid levels cholesterol, triglycerides, HDL-cholesterol, LDL-cholesterol was calculated according to [18], MDA was obtained from Eagle Diagnostics (Dallas, TX, USA)

**Animals:** Adult male albino rats weighting about  $150 \pm 15$  g were used, all animal procedures were performed according to the guidelines for the care and use of experimental animals from the animal house of National organization for drug control and Research (NODCAR), Giza, Egypt, Animals were kept under normal laboratory conditions for one week before the start of the experiment rats were allowed to feed and water on uniformity diet.

**2.2 Preparation of Psyllium husk and Nabeq mucilage:** The mucilage of psyllium husk has been prepared by dissolving 1.2 g per 100 mL distilled water. The resulting soft gel has been stored in refrigerator (4-5 °C) until used. The Nabeq

mucilage, the fruits were thoroughly washed with water to remove dirt and debris. The fresh peel and pulp were separated from seed and mixed with distilled water at a ratio of 1:10 (w/v) and stored overnight under cooling (4-5 °C). The mixtures were blended using the laboratory blender (Toshiba Mixie, Japan) and were centrifuged (2,000 rpm for 30 min, 7 °C). The resulted viscous soluble mucilage (NabM) was filtrated through cheese cloth and stored under cooling (4-5 °C) until used. Milk protein was mixed with the mucilages of Pysllium husk and Nabeq according to [19]

**2.3 Experimental design:** After an acclimatization period of one week, ten equal group of eighty adult male albino rats (8 rats each) Group 1 kept as control feeding on standard diet, group 2 was given the fatty diet cholesterol 1%( 1g/ Kg diet) as described by [20], group 3 treated with casein and group 4 treated with whey protein hydrolesate according to FDA recommendation for daily protein intake 100 mg protein / ml ,group 5 treated with ps husk according to FDA recommendation for daily carbohydrates intake 500mg carb / ml, group 6 received a combination casein and Ps husk , also group 7 treated with mixture of whey proteins and Ps husk, group 8 treated with Napek according to FDA recommendation for daily carbohydrates intake 500mg carb / ml,

group 9 treated with mixture of casein and Napek , group 10 treated with mixture of whey protein and Napek .

**2.4. Collection of blood samples:** Blood samples were withdrawn from the retro-orbital vein of each animal, under light anesthesia by diethyl ether, according to the method described by [21]. Blood was allowed to coagulate and then centrifuged at 3000 rpm for 15 min. The obtained serum was used to estimate the activities of liver function enzymes and lipid profile.

**2.5 Preparation of liver samples:** Immediately after blood sampling, animals were sacrificed by cervical dislocation and the liver tissues were rapidly removed, washed in ice-cooled saline, plotted dray and weighed. A weighed part of each liver was homogenized, using a homogenizer (Medical instruments, MPW-120, Poland), with ice-cooled saline (0.9%NaCl) to prepare 20% w/v homogenate. The homogenate was then centrifuged at 4000 rpm for 5 min.

#### 2.6 Statistical analysis

All experiments were performed in triplicate and the results are presented as the mean  $\pm$  standard deviation. Statistical analysis was performed using SPSS 11.5 (SPSS, Inc., Chicago, IL, USA). Duncan's multiple range test by one-way analysis of variance (ANOVA) was carried out to determine the significant differences among the samples with and without additive

### 3. RESULTS AND DISCUSSION

#### 3.1 Effect of feeding fortified casein with Psyllium husk and Napek on lipid profile in mal albino rats

Data in Table (1) show the impact of fortified casein for each PS husk and Nab on lipid profile in male albino rats. After 30 days, data revealed that all groups showed a decrease in lipid profile namely, Tri. Glyceride (Tri. Gly), T. cholesterol (T. Cho), HDL and LDL level in comparison with the positive control (group2) rats fed on fatty diets during the course of experiment. Concerning, Tri. Gly significant decrease in all groups in this parameter from 120.67 to 89.75, 94.33 and 94.33 mg/dl in the manipulated groups with fatty diet, casein, casein plus PS and casein plus Nap respectively. Similar trend of results was observed for T.Ch level, a significant decrease by 164.24, 151.33, 157 mg/dl for the tested group upon casein, casein plus PS husk and casein plus Nap respectively in comparison with the positive control group upon fatty diet.

As for HDL, the results revealed that a significant increase in HDL, the results revealed that a significant increase in HDL value from 31.33 to 51.52, 43, 44.3 mg/dl for rats fed on fatty diet, casein plus PS husk and casein plus Nap. On the other hand, the obtained data showed that a significant decrease in LDL values from 153.2 to 94.77, 89.46 and 93.8 mg/dl in

manipulated groups with fatty diet, casein, casein plus Ps husk and casein plus Nap respectively. In respect of the biological evaluation of each Ps husk and Nab separately on lowering lipid profile as similar finding of results was shown. Used PS and Nap a decrease in Tri Gly by 87 and 75.66 respectively in comparison with +ve control fed on fatty diet. Also, a significant decrease in T.ch by 178.6 and 173 mg/dl for PS and Nap respectively at the end of treatment compared with positive control. Concerning HDL a significant increase by 42.66, 54 mg/dl for Ps husk and Nab, while a decrease in LDL by 91 and 109.53 mg/dl compared with the rats fed on fatty diet. It can be seen from the illustrated data that the fortification of casein with each Ps husk and Nap separately was more effective in lowering lipid profile on the tested group.

#### 3.2 Effect of feeding fortified whey protein hydrolysate with Psyllium husk and Napek on lipid profile in mal albino rats

Data in Table (1) show the Tri .Gly values of rats feeding on fortified whey protein against the oxidative stress of fatty diet. After 30 days data revealed that a significant decrease in Tri. Gly values by 96, 99, 77 mg/dl respectively for whey, whey plus Ps husk and whey plus Nap against 120.67 mg/dl for positive control. As for T.ch, markedly decrease was noticed by 157.6, 173.66 and 155 mg/dl for whey

protein, whey protein plus PS husk and whey plus Nab respectively against positive control by 208.22 mg/dl. Concerning, HDL values a significant increase from 31.33 mg/dl to 47.67, 47.46 and 46.6 mg/dl for +ve control group, whey protein, whey plus Ps husk and whey plus Nap respectively after 30 days. For LDL values a significant decrease from 153.2 to 91, 117.2 and 93.6 mg/dl for the manipulated groups with whey, whey plus Ps husk and whey plus Nap respectively in comparison with +ve control group (2). It can be concluded from table (1) that the PS effect on lowering Tri. Gly was more active by 87 mg/dl against 96, 99 mg/dl the whey plus PS. As for T.ch the PS was less effective than fortified whey by 178.6 mg/dl for PS against 157.6 and 173.66 mg/dl for whey and whey plus PS. Concerning, HDL values the fortified whey with PS husk was more effective by 42.66 mg/dl for PS against 47.67 and 47.46 mg/dl for whey and whey plus PS husk respectively. For, LDL values the fortified whey protein was more effective than PS husk separately in lowering LDL values. In respect with the biological effect of Nap on lipid profile compared with the incorporation with whey proteins, the result revealed that incorporation of whey protein was more effective than Nab separately by 91 and 93.6 mg/dl for whey and fortified whey against Nap.

### **3.3 Effect of feeding fortified casein and whey protein hydrolysate with Psyllium husk and Napek on liver enzymes**

Concerning, the influence of fortified casein and whey proteins hydrolysate with Psyllium husk and Napek on liver enzymes, Table (2) show that alanine aminotransferase (ALT) values was significant increase from 21 U/L to 49 U/L for manipulated groups with St. diet (Group1) and fatty diet group (2) respectively after 1 month of treatment. As for aspartate aminotransferase (AST) U/L upon the same condition, a markedly increase was noticed from 18 U/L to 57.67 U/L for group one and two respectively. The same trend of results was noticed for ALP U/L values by 122.53 and 206.44 in groups 1 and group 2 at the end of experiments. Finally, the same finding was observed for Bilirubin total and indirect, Table (2) show an increase from 1.0 mg / dl and 0.18 mg / dl to 1.59 mg / dl and 0.6 mg / dl respectively as mentioned before. In respect of Albumin gm. / ml a mild decrease from 4.33 gm / dl to 3.06 mg / dl to in comparison to normal control (St. Diet) group. The manipulated groups 3 and 4 with casein and whey proteins a significant decrease by 23.19 and 31.9 U/L was observed in comparison with group (2) by 49 U/L. Also, a significant decrease in AST from 57.67 to 19.51 and 18.33 U/L in comparison with group (2) positive control

positive group (fatty diet). On the other hand a similar trend of results in alkaline phosphatase (ALP) values, a decrease from 206.44 to 173.98 and 180.51 U/L in group 3 and group (4) corresponding to positive control group (2). However, the same trend of results was noticed for total bilirubin and Albumin, the results of groups upon casein and whey protein was within normal in composition with the normal control (St. Diet).

Used PS husk in rat feeding on fatty diet during the course of experiment caused a significant decrease in ALT, ALP, AST by 27.33, 15.21 and 173.59 U/L in comparison with positive control group (fatty diet) at the end of treatment. The results of bilirubin total and indirect and Albumin values were approximately within the control values. Concerning the influence of the incorporation of casein with PS group (6), the mean values of ALT, AST, ALP level were 49, 57.67, 206.44 U/L in group (2) reduced to 26, 25.33 and 122.46 U/L after 30 days. Also, similar decrease in bilirubin values in comparison with the control group (2), while the albumin value was similar to normal control. Also the obtained data in table (2) revealed that a significant decrease in liver enzymes in comparison with positive control by 26, 24.51 and 161.23 in the manipulated values. Concerning the influence of the incorporation of casein

with PS group (6), the mean values of ALT, AST, ALP level were 49, 57.67, 206.44 U/L in group (2) reduced to 26, 25.33 and 122.46 U/L after 30 days. Also, similar decrease in bilirubin values in comparison with the control group (2), while the albumin value was similar to normal control. Also the obtained data in table (2) revealed that a significant decrease in liver enzymes in comparison with positive control by 26, 24.51 and 161.23 in the manipulated group (7) with whey protein plus Ps husk against 49, 57.67 and 206.44 U/L in positive control group (2), while the bilirubin and Albumin values were similar to normal control. The utilization of Nap group (8) caused a significant decrease in ALT, AST, and ALP values from 49, 57.67, 206.44 to 22.66, 21.07 and 126.42 at the end of treatment. On the other hand a significant decrease in T. bilirubin and the albumin values were within normal values in normal control one. In respect of the manipulated group (9) with the fortified casein with Nap the obtained data revealed that a significant decrease in ALT, AST and ALP values by 23.34, 18.54 and 121.9 U/L in comparison with positive control. Also, similar trend of results in bilirubin and Albumin by 0.43, 1.17 mg / dl and 4.93 gm/ ml respectively compared with positive control but within normal control. As for the effect of the fortified whey protein with Nap on these

parameters significant decrease in ALT, AST and ALP by 20.66, 19.09 and 125.165 U/L. Respectively group (10) compared with positive control. Also the same trend of results was noticed for bilirubin and albumin by 0.39 mg /dl, 1. 17 mg/dl and 4.76 gm/ml.

### 3.4 Effect of feeding fortified casein and whey protein hydrolesate with Psyllium husk and Napek on MDA

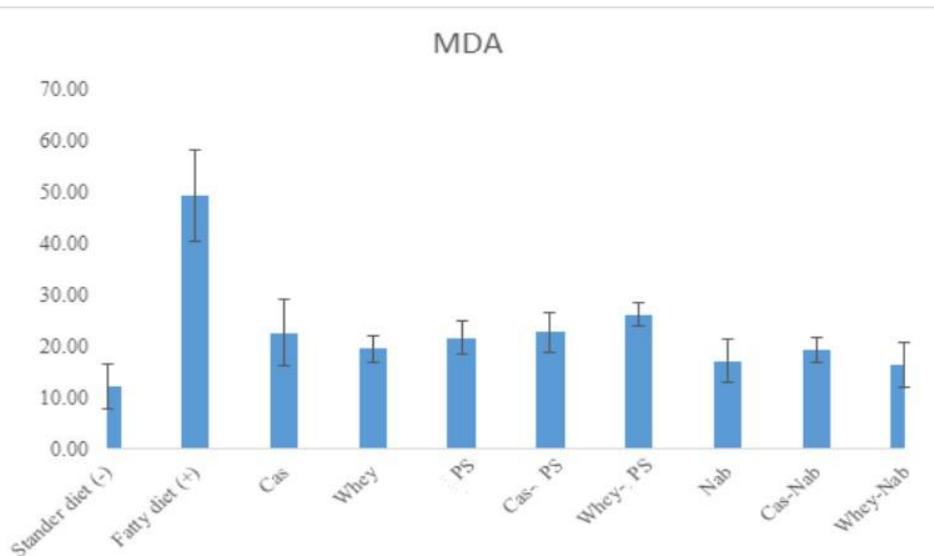
In respect to MDA parameter it can be seen from the Fig (1) that markedly increase in the MDA level in Positive control group fed on fatty diet after 30 days of test owing to the increase of free radicals in the cell. On the other hand it be concluded that the incorporation of casein and whey protein with each of PS and lowered the MDA level in the tested groups compared with positive group as mentioned before.

Table (1) Effect of fortified Casein and whey protein with Psyllium husk and Napek on lipid profile

Samples	Tri-Gly	T.cho	HDL mg/dL	LDL mg/dL
Standerd diet	87.6 ± 18.65bcd	167 ± 18.73bcd	51.73 ± 6ab	97.73 ± 15.03cd
Fatty diet (+)	120.67 ± 3.78a	208.22 ± 11.59a	31.33 ± 3.5c	153.2 ± 14.22a
Casein	89.75 ± 2.87bcd	164.24 ± 2.2bcd	51.52 ± 2.64ab	94.77 ± 5.94d
WPH	96 ± 10.5b	157.6 ± 4.5cd	47.67 ± 9.29ab	91 ± 14.72d
Ps husk	87 ± 12.288bcd	178.6 ± 3.05b	42.66 ± 2.08b	122.93 ± 3.26b
Cas+ Ps	94.33 ± 8.32bc	151.33 ± 13.05d	43 ± 5.56b	89.46 ± 8.01d
WPH+ Ps	99 ± 18.52b	173.66 ± 3.60bc	47.46 ± 1ab	117.2 ± 11.87bc
Nab	75.66 ± 2.08d	173 ± 14b	54 ± 3.6a	109.53 ± 13.83bcd
Cas +Nab	94.33 ± 3.06bc	157 ± 8.71cd	44.33 ± 10.11b	93.8 ± 2.69d
WPH+ Nab	77 ± 5.56cd	155 ± 22.33cd	46 ± 3.6ab	93.6 ± 19.0d
LSD	18.59	20.68	9.43	21.82

Table (2) Effect of fortified Casein and whey protein with Psyllium husk and Napek on liver enzymes

Samples	ALT U/L	AST U/L	ALP U/L	indirect bilirubin mg/dL	T-bilirubin mg/dL	Albumin gm/mL
St. diet	21 ± 3 <sup>b</sup>	18.00 ± 4.58 <sup>bc</sup>	122.53 ± 5.75 <sup>d</sup>	0.18 ± 0.05 <sup>b</sup>	1 ± 0.03 <sup>b</sup>	4.33 ± 0.47 <sup>bcd</sup>
Fatty diet	49 ± 18.33 <sup>a</sup>	57.67 ± 12.78 <sup>a</sup>	206.44 ± 12.17 <sup>a</sup>	0.6 ± 0.14 <sup>a</sup>	1.59 ± 0.45 <sup>a</sup>	3.06 ± 0.1 <sup>c</sup>
Casein	23.19 ± 3.12 <sup>b</sup>	19.51 ± 3.04 <sup>bc</sup>	173.98 ± 14.05 <sup>bc</sup>	0.36 ± 0.05 <sup>ab</sup>	1.09 ± 0.08 <sup>b</sup>	4.32 ± 0.12 <sup>bcd1</sup>
WPH	31.6 ± 7.57 <sup>b</sup>	18.33 ± 4.5 <sup>bc</sup>	180.51 ± 7.72 <sup>b</sup>	0.37 ± 0.17 <sup>ab</sup>	1.15 ± 0.13 <sup>b</sup>	4.97 ± 0.25 <sup>a</sup>
Ps husk	27.33 ± 5.68 <sup>b</sup>	15.21 ± 2.64 <sup>c</sup>	173.59 ± 15.35 <sup>bc</sup>	0.38 ± 0.3 <sup>ab</sup>	0.95 ± 0.108 <sup>b</sup>	4.87 ± 0.25 <sup>a</sup>
Cas+Ps	26 ± 7 <sup>b</sup>	25.33 ± 7.02 <sup>b</sup>	122.46 ± 0.7 <sup>d</sup>	0.38 ± 0.14 <sup>ab</sup>	0.99 ± 0.058 <sup>b</sup>	3.9 ± 0.26 <sup>d</sup>
WPH+ Ps	26 ± 5.29 <sup>b</sup>	24.51 ± 3.51 <sup>bc</sup>	161.23 ± 15.35 <sup>c</sup>	0.5 ± 0.14 <sup>a</sup>	1.12 ± 0.251 <sup>b</sup>	4.5 ± 0.3 <sup>abc</sup>
Nab	22.66 ± 2.88 <sup>b</sup>	21.07 ± 1.52 <sup>bc</sup>	126.42 ± 11.52 <sup>d</sup>	0.49 ± 0.23 <sup>a</sup>	1.08 ± 0.12 <sup>b</sup>	4.23 ± 0.33 <sup>cd</sup>
Cas+Nab	23.34 ± 4.93 <sup>b</sup>	18.54 ± 2.51 <sup>bc</sup>	121.9 ± 2.95 <sup>d</sup>	0.43 ± 0.2 <sup>ab</sup>	1.17 ± 0.204 <sup>b</sup>	4.93 ± 0.35 <sup>a</sup>
WPH+Nab	20.66 ± 3.78 <sup>b</sup>	19.09 ± 5.32 <sup>bc</sup>	125.165 ± 6.28 <sup>d</sup>	0.39 ± 0.16 <sup>ab</sup>	1.17 ± 0.376 <sup>b</sup>	4.76 ± 0.33 <sup>ab</sup>
LSD	12.896	9.477	16.061	0.301	0.383	0.514



**Fig (1): Effect of fortified casein and whey protein hydrolesate with Psyllium husk and Napek on MDA**

We investigated the impact of each PS Husk and Nap. Incorporated with casein and whey protein hydrolesate at 500 mg / ml Daily dose level for 30 days on liver enzymes and lipid profile in male albino rats. All clinical assessments of liver enzymes and albumin indicates that the administration of PS husk and Nap separately did not cause any change in liver functions. Also, similar trend of results was shown upon the fortification of whey proteins and casein with each PS and Nap. Our study corroborates previous data showing that PS Husk fiber significantly lowered serum total cholesterol, triglycerides and LDL, Also administration of PS Husk caused a significantly increase in HDL – cholesterol. Some studies suggest that dietary fiber may be reduced the digestibility and absorption of lipids and resulted in low concentration of blood lipids the results are agreement with the observation of [22, 23]. Dietary fat and

cholesterol may escape intestinal absorption due to the increased viscosity of soluble fiber Also, soluble fiber may bind bile acids or cholesterol in the intestine, preventing their reabsorption into the body. In addition the liver responds by taking up more LDL. C. from the blood stream thereby lowering the concentration of LDL-C. In the blood and T.G in compared with the basal diet [24]. A major catabolic route involves conversion of cholesterol into bile acids, Transformation mediated by liver enzymes [25]. Other studies have shown that consumption of psyllium fiber reduced serum total cholesterol and LDL-C.in hypercholesterolemic diet [26]. In addition the previous results much with the study of [27]. Who suggested that the mixing of dietary fiber (i.e. ocimum canum seeds and psyllum seeds) might be beneficial to control of the cholesterol level in high fat diet. Also [27]. Mentioned that, it is safe to take the psyllum husk during the period

of nursing, owing to its benefits for improving the digestive tract health and cholesterol levels. It can be concluded from our study that the utilization of Napek did not cause any changes in liver functions and reduce the lipid profile. This finding is in agreement with that obtained with [28]. It can be seen from our study that psyllium and Napek yielded lower total lipids and higher HDL and also administration of PS Husk caused a significant increase in HDL – cholesterol. Some studies suggest that dietary fiber may reduce the digestibility and absorption of lipids and resulted in low concentration of blood lipids; the results are in agreement with the observation of [22, 23]. Dietary fat and cholesterol may escape intestinal absorption due to the increased viscosity of soluble fiber. Also, soluble fiber may bind bile acids or cholesterol in the intestine, preventing their reabsorption into the body. In addition, the liver responds by taking up more LDL-C from the blood stream, thereby lowering the concentration of LDL-C in the blood and T.G in comparison with the basal diet [24]. A major catabolic route involves conversion of cholesterol into bile acids, a transformation mediated by liver enzymes [25]. Other studies have shown that consumption of psyllium fiber reduced serum total cholesterol and LDL-C in a hypercholesterolemic diet [26]. In addition, the previous results are in agreement with the study of

[27]. Who suggested that the mixing of dietary fiber (i.e. ocimum canum seeds and psyllium seeds) might be beneficial to control of the cholesterol level in a high fat diet. Also [27]. Mentioned that, it is safe to take the psyllium husk during the period of nursing, owing to its benefits for improving the digestive tract health and cholesterol levels. It can be concluded from our study that the utilization of Napek did not cause any changes in liver functions and reduce the lipid profile. This finding is in agreement with that obtained with [28]. It can be seen from our study that psyllium and Napek yielded lower total lipids and higher HDL than observed in normal controls. On the other hand, it caused a reduction in T. Glycerids values compared with the positive control group. Also, our study proved that the fortification of casein and whey proteins causes an improvement in LDL-Chol. Concentration. In addition, the incorporation of each PS and Napek to the dairy products under study play a role in the stability or the modulatory of the antioxidants of milk protein fraction and improved their prophylactic effect against the oxidative stress occurred by feeding on a fatty diet.

#### **4. CONCLUSION**

The supplementation of each PS or Napek to a healthy diet such as dairy products may be effective in improving human lipid profile. The obtained findings in this study,

it is practical to achieve a significant increase in dietary fiber or Napek are included in the daily foods. Also, it is practical to achieve a significant increase in daily intake of bioactive components as herbal medicine, and they are more useful than synthetic medicine for its therapeutic properties and a sustainable protection against oxidative stress of body cells

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