Nutraceutical Effects of Some Egyptian Herbs on Liver Failure Patients

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Abstract: This study was carried on 120 patients with hepatic failure of both sexes, who aged between 30-70 years presented to El Housin hospital, Cairo, Egypt. Patients were divided into control group that administered propeptide, sustagen powder, ensure and ensure plus during coma and then administered post coma homemade diets for one month. The other herbal groups administered homemade diets during coma and administered post coma homemade diets with 5% experimental herbs for one month. The herbal groups were rosemary, turmeric, nettle, chicory, rosemary with turmeric and nettle with chicory groups. The obtained results showed that turmeric has ability to reduce the increasing levels of AST, ALT and bilirubin. Nettle and nettle with chicory groups showed the lower values of urea and creatinine at the end of the experiment. Rosemary with turmeric and nettle with chicory groups had the lower values of cholesterol, LDLc and high values of HDLc with best result of random glucose level. Consumption of the experimental herbs in all groups showed normal values of triglyceride, albumin, sodium, potassium, calcium and phosphorous at the end of the experimental period. From that, consumption of the experimental herbs could improve liver and kidney function, lipid pattern and electrolyte.

Key words: Chicory · Liver disease · Nettle · Patients · Recommended dietary allowance rosemary · Turmeric

INTRODUCTION

Liver failure may be defined as the abrupt loss of liver function, characterized by hepatic encephalopathy and coagulopathy, within 26 weeks of the onset of symptoms (classically jaundice) in a patient without previous liver disease [1]. Medicinal treatment is necessary for a rapid recovery of liver injury however medicines used in the treatment of liver have too many side effects. There is an increasing interest in the use of herbal drugs for therapeutic purposes [2]. Rosemary (Rosmarinus officinalisL.) is used as a culinary herb for flavoring and as an antioxidant in processed foods and cosmetics. Regarding its antioxidant and anti-inflammatory activities, studies have identified phenolic compounds mainly carnosic (phenolic diterpene) and rosmarinic acids (caffeic acid and 3, 4-dihidroxifenilactate ester). Rosemary may provide a possible therapeutic alternative for chronic liver disease [3, 4]. Nettle (*Urtica dioica*), also known as

Stinging Nettle, can be found in temperate climates growing as a weed throughout the world. The plant has many hollow stinging hairs called trichomes on its leaves and stems, which act like hypodermic needles that inject histamine and other chemicals that produce a stinging sensation when contacted by humans and other animals [5]. Stinging nettle is one of the plants with long history as herbal remedy and nutritious addition in diets. Young leaves cooked as a potherb are added to soups and can also be dried for winter use. Nettle is a very nutritious food that is easily digested and is high in minerals (especially iron), vitamin C and pro-vitamin A [6].

Turmeric has been used historically as a component of Indian Ayurvedic medicine since 1900 BC to treat a wide variety of ailments. Curcumin (diferuloylmethane), an active ingredient of turmeric, obtained from the powdered rhizomes of *Curcuma longa* Linn. Turmeric is a powerful scavenger of the superoxide anion, hydroxyl radicals and nitrogen dioxide and protects

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DNA against singlet oxygen-induced strand breaks. Turmeric has hepatoprotective and nephroprotective effects. These beneficial effects have been explained by the induction of antioxidative enzymes [7]. Chicory (*Cichorium intybus*, Asteraceae) is a root vegetable whose green leafy tops are also used in salads or as a coffee supplement. Chicory is one of the most promising novel candidates among the carbohydrates with potential for both food and non-food utilization. It has been implemented in folk medicine from North Africa to South Asia for several 100 year [8].

This study aimed to prepare homemade diet for hepatic patient in coma instead of commercial formula. Also, it aimed to investigate the biological effect of some experimental herbs (Rosemary, Turmeric, Nettle and Chicory) administration in diet in liver failure patient.

MATERIALS AND METHODS

Materials: Propeptide and Ensure were obtained from hospital pharmacy and composed of 40g/l protein, carbohydrates 127.5 g/l (maltodextrine, starch), fat 39.2 g/l, 880 ml/l free water, 500 mg/l sodium and 1252 mg/l potassium. Sustagen were obtained from hospital pharmacy and composed of 80 g total fat, 25g saturated fat, 300 mg cholesterol, 2400 mg sodium, 3500 mg potassium, 375g total carbohydrates, 30g dietary fiber and 65g protein. Rosemary, nettle leaf, turmeric and chicory were purchased from herbs shop in Mansoura city, Egypt.

Diets for Patients During Coma: The American College of Gastroenterology (ACG) recommends patient have weight = 70 kg need meal has total 30-40 calories /kg body weight (2100-2800 calories). The mean value is 2450 calories/ day. This meal consists of 40-60 protein (160-240 calories), 40-50 g fat (360-450 calories) and 300- 400 g carbohydrates (1200-1600 calories) according to Chalasani *et al*. [9]. Two homemade diets were prepared, boiled and mixed in a blender and then were given through Ryle Tube (Nelton Tube). The first diet was composed of 100 g bread, 130 g broccoli, 200 g tomatoes, 120 g beet, 50 g cake, 160 g white honey, 140 g watermelon, 30 g olive oil, 70 g cheese, creamy and 90 g carrot. In addition, 50 g parsley, 200 g apples, 200 ml milk, 110 g oats, 350 g orange juice, 100 g pasta, 50 g green pepper celery, 200 g yoghurt and 140 g banana were added. The second diet was composed of 60 g boiled eggs, 120 g sugar beet, 170 g honey, 200 g tomatoes, 200 g apples, 150 g yoghurt, 45 g brown bread and 90 g wheat boiled. In addition, 95 g boiled rice, 50 g onions, 50 g green pepper, 150 g melon, 100 g carrot, 70 g kiwi, 150 g artichoke, 250 ml milk, 25 g garlic, 50 g celery, 200 ml lemon juice, 100 g cooked zucchini and 54 g olive oil. These diets were computerized to identify the recommends dietary allowance for patients as shown in Tables 1 and 2.

Post coma Diets for Patients Under Experimental Period: These diets were formulated according to caloric requirements, which are 25-30 Kcal/kg/D [10]. Patient have weight = 70 kg need meal contains total calories = 2450. This meal composed of 70 g protein (1 g protein /kg of body weight) contains 70 x 4 = 280 calories, 81.5g fat (30% of meal) contains 735 calories and 333.7g carbohydrates contain 1435 calories. Foods were boiled and mixed in a blender or cooked on steamed and given for patient for one month. The first post coma diet was designed as

Table 1: Analysis of first homemade diet that administered during coma.

Nutrients	Mean Intake	% RDA	Nutrients	Mean intake	% RDA
Water (g)	2143.27	-	Potassium (mg)	513.5	113.8
Calories (kcal)	2450.87	100.03	Zinc (mg)	14.55	103.6
Protein-A (g)	17.34	-	Magnesium (mg)	547.35	156.4
Protein-P (g)	33.39	-	Vitamin-A (mg)	1611.80	161.2
Total protein (g)	50.73	101.46	Vitamin-C (mg)	69.60	127.7
Fat-A (g)	36.30	-	Vitamin-D (mg)	2.73	54.5
Fat-P (g)	8.85	-	Vitamin-E (mg)	10.60	116.0
Total fat (g)	45.15	100.33	Vitamin-B1 (mg)	2.18	145.2
Carbohydrate (g)	460.40	131.42	Vitamin-B2 (mg)	2.74	160.9
Fiber (g)	20.23		Niacin (mg)	10.89	57.3
Calcium (mg)	1312.35	164.0	Vitamin-B6 (mg)	2.92	146.2
Phosphorus (mg)	1383.25	135.4	Vitamin-B12 (mg)	2.47	123.3
Iron-A (mg)	1.43	-	Folate (mg)	548.15	123.3
Iron-P (mg)	15.20	-	Cholesterol (mg)	135.65	-
Total iron (mg)	16.63	106.3	Ash (g)	22.78	-
Sodium (mg)	1132.5	126.5	-	-	-

Age: 30 year Weight: 70 kg Height: 165 cm

Table 2: Analysis of second homemade diet that administered during coma.

Nutrients	Mean Intake	% RDA	Nutrients	Mean intake	% RDA
Water (g)	2374.76	-	Potassium (mg)	421.40	110.1
Calories (kcal)	2427.75	99.09	Zinc (mg)	13.12	97.4
Protein-A (g)	22.75	-	Magnesium (mg)	453.59	129.6
Protein-P (g)	23.83	-	Vitamin-A (mg)	1219.39	141.9
Total protein (g)	46.58	93.16	Vitamin-C (mg)	60.09	110.1
Fat-A (g)	24.56	-	Vitamin-D (mg)	3.07	61.4
Fat-P (g)	16.94	-	Vitamin-E (mg)	11.37	133.7
Total fat (g)	41.50	92.22	VitaminB1(mg)	1.06	70.9
Carbohydrate (g)	466.98	133.42	VitaminB2(mg)	1.61	94.4
Fiber (g)	13.48	-	Niacin (mg)	7.97	41.9
Calcium (mg)	810.44	101.3	VitaminB6(mg)	1.86	93.0
Phosphorus(mg)	1156.78	144.1	VitaminB12(mg)	1.77	88.5
Iron-A (mg)	2.17	-	Folate (mg)	433.03	216.5
Iron-P (mg)	11.98	-	Cholesterol (mg)	305.45	-
Total iron (mg)	14.15	141.5	Ash (g)	16.43	-
Sodium (mg)	1039.59	107.9	-	-	-

Age: 33 year Weight: 70 kg Height: 170 cm

following: Bread, eggs, cheese and orange juice at breakfast, honey, oat and milk between breakfast and lunch, grilled chicken, broccoli, pasta, tomato, onion, garlic, parsley, lettuce and carrot at lunch, fruit salad (banana, orange, pine, apple) between lunch and dinner, dinner as lunch and yogurt and honey before sleep. This first post coma diet was composed of 80 g bread, 60 g eggs, 200 ml orange juice, 210 g pasta, 150 g artichoke, 50 g parsley, 100 g carrot, 100 g pineapple, 150 g yoghurt, 50 g beet, 100 g oats, 50 g grilled chicken and 200 g tomatoes in addition, 100 g onions, 300 g melon, 100 g strawberries, 93 g honey, 30 g olive oil, 50 g creamy cheese, 200 ml milk, 150 g broccoli, 100 g lettuce, 25 g garlic, 100 g banana and 100 g orange. The second post coma diet was designed as following: honey and ground cumin before breakfast, white honey and nuts at breakfast, fruit salad, (kiwi, strawberry, banana, apple and orange) between breakfast and lunch), minced beef, crushed soybeans, beet, artichoke, broccoli, onion garlic, tomatoes, lettuce, cucumber, rice and grapes at lunch), licorice between lunch and dinner, dinner as lunch and yogurt and honey before sleep). This second post coma diet was composed of 30 g whole wheat, 25 g almonds, 100 g banana, 100 g orange juice, 100 g broccoli, 130 g onions, 100 g lettuce, 200 licorice, 17.3 g olive oil and 200 ml milk. In addition, 25 g hazelnuts 100 g. strawberries, 25 g beef, 100 g beet, 25 g garlic, 100 g cucumber, 200 g yoghurt, 150 g grapes, 20 g coconut, 100 g kiwi, 100 g apples, 50 g soya bean, 150 g artichoke, 300 g tomatoes, 110 g boile rice and 120.7 g honey. These diets were computerized to identify the recommends dietary allowance for patients as shown in Tables 3 and 4.

Subjects: The present study conducted on 120 patients with hepatic failure disease of both sexes, who aged between 30-70 years presented at El Housin hospital, Cairo, Egypt. All were fully informed concerning the nature of the disease and the diagnostic procedures involved and medically treated. All patients had neither surgical intervention for gastrointestinal tract or resection anaostmosis. All patients did not suffer from chronic renal failure.

Classification of Subjects: Patients were divided into control and herbal groups as following:

Control Group: This group was included 30 patients were given a high protein diet in intensive care unit, which is industrial made formed from propeptide (250 kcal/260 cc), Sustagen powder (6 teaspoon = 250 kcal), ensure and Ensure plus (6 teaspoons = 250 kcal). The calculated caloric requirement was 25-30 kcal/kg and given through Ryle Tube. The tube was introduced through the nose, pharynx and esophagus to the stomach (about 40 cc) from the tip of the nose as the patients have disturbed level of consciousness. The nutrition was given in 250 cc/4 hours by continuous infusion and 50cc water was given after the meal. After coma (2days), they fed on the homemade post coma diets for one month at hospital.

Herbal Groups: This group was included 90 patients and fed homemade diets that administered during coma. After coma (2 days), they fed on first and second post coma diets with 5% of experimental herbs at hospital for one month. Patients of herbal groups were classified into

Table 3: Analysis of first post coma diet

Nutrients	Mean Intake	% RDA	Nutrients	Mean intake	% RDA
Calories (kcal)	2458.67	100.35	Zinc (mg)	13.74	98.3
Protein-A (g)	40.18	-	Magnesium (mg)	483.11	131.6
Protein-P (g)	32.36	-	Vitamin-A (mg)	1591.50	155.1
Total protein (g)	72.53	103.61	Vitamin-C (mg)	64.87	121.4
Fat-A (g)	44.96	-	Vitamin-D (mg)	3.22	64.4
Fat-P (g)	25.71	-	Vitamin-E (mg)	12.62	146.2
Total fat (g)	70.67	86.71	Vitamin-B1 (mg)	2.72	181.1
Carbohydrate (g)	383.13	114.81	Vitamin-B2 (mg)	2.82	165.6
Fiber (g)	18.95	-	Niacin (mg)	15.93	83.8
Calcium (mg)	1010.65	126.33	Vitamin-B6 (mg)	3.17	158.3
Phosphorus (mg)	1044.18	130.52	Vitamin-B12 (mg)	2.56	128.1
Iron-A (mg)	3.37	-	Folate (mg)	628.58	314.3
Iron-P (mg)	10.75	-	Cholesterol (mg)	406.25	-
Total iron (mg)	14.12	141.2	Ash (g)	17.76	-
Sodium (mg)	1460.30	142.1	-	-	-

Age: 31 year Weight: 70 kg Height: 171 cm

Table 4: Analysis of second post coma diet

Nutrients	Mean intake	% RDA	Nutrients	Mean intake	% RDA
Water (g)	2523.58	-	Potassium (mg)	565.38	126.5
Calories (kcal)	2470.01	100.81	Zinc (mg)	13.82	99.8
Protein-A (g)	29.68	-	Magnesium (mg)	438.21	120.1
Protein-P (g)	41.87	-	Vitamin-A (mg)	1633.99	163.4
Total protein (g)	71.55	102.21	Vitamin-C (mg)	66.94	124.9
Fat-A (g)	39.17	-	Vitamin-D (mg)	4.07	81.5
Fat-P (g)	46.46	-	Vitamin-E (mg)	13.04	153.4
Total fat (g)	85.63	105.06	Vitamin-B1 (mg)	2.49	165.8
Carbohydrate (g)	353.28	105.86	Vitamin-B2 (mg)	2.41	141.9
Fiber (g)	24.80	-	Niacin (mg)	21.27	111.9
Calcium (mg)	1113.26	139.15	Vitamin-B6 (mg)	4.23	211.4
Phosphorus (mg)	1120.80	140.10	Vitamin-B12 (mg)	1.94	97.0
Iron-A (mg)	1.70	-	Folate (mg)	686.53	343.3
Iron-P (mg)	12.75	-	Cholesterol (mg)	103.80	-
Total iron (mg)	14.45	144.5	Ash (g)	21.21	-
Sodium (mg)	1504.44	149.90	-	-	-

Age: 30 year Weight: 70 kg Height: 179 cm

six groups (15 in each) as following: Rosemary group (fed on post coma experimental diets with 5% of rosemary). Turmeric group (fed on post coma experimental diets with 5% of turmeric), Nettle group (fed on post coma experimental diets with 5% of nettle leaf), Chicory group (fed on post coma experimental diets with 5% of chicory), Rosemary with turmeric group (fed on post coma experimental diets with 5% of rosemary and turmeric) and Nettle with chicory group (fed on post coma experimental diets with 5% of nettle and chicory). Each of them was included 15 patients.

Anthropometric Measurements: Each individual's weight and height were measured after relieve from coma [11]. Body mass index (BMI=weight/height^2 inunitsof kg/m^3) was computed [12]. Normal BMI ranges between 18.5 and 24.5 while over weight ranges between 25 and 29.5 but under weight is less than 16. Mid arm muscle (MAC) circumference estimates muscle mass which < 60 percent of standard (25.5 cm in men and 23 cm in women) are considered abnormal somatic or skeletal muscle protein stores [13].

Laboratory Analysis: Blood samples from every patient were taken separately at the beginning and after one month by disposable syringe and collected in two clean sterilized test tubes. One tube with anticoagulant (heparin) was prepared for hemoglobin and random blood glucose estimation by enzymatic colorimetric procedures developed by Diamond kits according to Drabkin [14] and Trinder [15] and the other without anticoagulant which left for coagulation and centrifuged at 3000

rpm/min for 15 minutes to obtain serum. Aspartate and alanine aminotransferase (ASTandALT) were determined according to the method of Reitman and Frankel [16]. Serum bilirubin, urea and creatinine were determined according to Fosseti and Prencipe [17], Patton and Crouch [18] and Bonsens and Taussky [19], respectively. Cholesterol, triglyceride low density lipoprotein cholesterol (LDLc) and high density lipoprotein cholesterol were determined according to according to Trinder and Ann [20], Young and Pestaner [21] and Richmond [22], respectively. Serum sodium, potassium, calcium and phosphorus were estimated according to according to Henry [23].

Statistical Analysis: All obtained data were subjected to analysis of variance and significant difference among the means was calculated using standard deviation. All statistical analyses were done by a statistical software package "SPSS 15.0 for Microsoft Windows, SPSS Inc [24].

RESULTS

The obtained anthropometric results showed a non significant difference in weight, height, BMI and mid arm circumference as illustrated in Table 5. Values of serum ALT and AST were significantly decreased in all subjects groups at the end experimental period compared with the

values at the start of the experiment at P<0.01, 0.05 and0.001. Rosemary with turmeric group showed significant increase in serum ALT and AST at the end experimental period compared with control. Nettle with chicory group showed a significant decrease in serum AST compared with control. There was a significant decrease in serum bilirubin at the end experimental period at P<0.05, 0.01 and 0.001 in all subjects groups compared with the values at the start of the experiment. Rosemary and nettle groups showed significant increase in serum bilirubin compared with control and also with other groups while turmeric, chicory, rosemary with turmeric and nettle with chicory groups showed significant decrease compared with control and other groups as shown in Table 6. Regarding to reference ranges of normal AST is up to 40 (μ/l) and ALT is up to 45 (μ/l), Rosemary, turmeric and nettle groups showed the best values of AST and ALT. Normal value of total bilirubin is ranged 0.3 to 1.9 mg/dl. Turmeric, chicory and rosemary with turmeric showed the lowest values of bilirubin at the end of the experiment. From that, turmeric has ability to reduce the increasing levels of AST, ALT and bilirubin

Regarding to serum urea, there was a significant decrease at P<0.05 and 0.01 in all subjects groups at the end compared with the values at the start of the experiment. Rosemary, turmeric and chicory groups showed a non significant difference in serum urea while nettle, rosemary with turmeric and nettle with chicory

Table 5: Mean ±SD values of weight, height, BMI and MAC in experimental groups.

Variables	Groups			
	Weight(kg)	Height (m)	BMI(kg/m^2)	MAC(cm)
Control	62.26±5.05a	1.71±0.050a	21.27±1.52a	24.56±1.13a
Second	64.20±4.95a	1.70±0.026a	22.17±1.53a	24.60±1.15a

Mean values in each column having different superscript (a, b, c, d) are significant

Table 6: Mean ±SD values of AST, ALT and bilirubin among different groups at the start and at the end of the experiment

Groups	Variables					
	AST (μ/l)		ALT (μ /l)		Bilirubin (mg/dl)	
	At the start	At the end	At the start	At the end	At the start	At the end
Control	129.56±14.11b	119.16±14.87b**	134.80±13.65b	123.53±14.50b**	3.94±0.56ab	3.47±0.47b*
Rosemary	124.13±15.71b	111.66±15.07b**	129.26±15.70 b	115.73±15.04bc**	4.46±0.79 ab	3.82±0.67a**
Turmeric	123.60±25.67b	111.66±21.84b**	129.80±23.58 b	116.86±18.45bc**	3.68±0.20 b	3.12±0.19 c**
Nettle	116.60±18.24bc	108.33±17.38bc**	121.93±17.96bc	113.66±16.39bc**	4.42±0.82 a	3.82±0.75a**
Chicory	125.33±21.19b	117.33±20.77b*	130.73±19.12b	123.73±19.14b*	3.94±0.60 ab	3.28±0.42c**
Rosemary+turmeric	145.73±12.52 a	131.00±11.83a**	150.20±10.48a	135.80±12.10a**	3.92±0.41 ab	3.26±0.27c**
Nettle +chicory	121.60±10.94b	102.00±10.16c***	132.80±10.15b	107.00±10.12c**	4.10±0.74ab	3.39±0.63cd***

Significant with at start value (raw) * P<0.05 ** P<0.01 *** P<0.001

Mean values in each column having different superscript (a, b, c, d) are significant

Table 7: Mean ±SD of urea, creatinine and albumin among different groups at the start and at the end of the experiment.

Groups	Variables					
	Urea (mg/dl)		Creatinine (mg/dl)		Albumin (g/dl)	
	At the start	At the end	At the start	At the end	At the start	At the end
Control	37.16±3.06b	32.13±3.55a*	2.02±0.24a	1.89±0.21ab	3.64±0.35b	3.76±0.31b
Rosemary	36.00±4.84bc	31.28±3.50 ab*	1.98±0.26b	1.84±0.20ab	3.59±0.22c	3.72±0.21 b*
Turmeric	37.46±3.68 b	32.75±2.60a*	2.09±0.19a	1.92±0.15a*	3.69±0.30b	3.81±0.27b*
Nettle	37.02±5.79 b	28.78±2.52c**	1.94±0.13bc	1.69±0.14c*	3.50±0.27bc	3.68±0.18c*
Chicory	39.96±4.55b	31.05±2.83ab*	2.14±0.13a	1.82±0.16bc*	3.78±0.23a	3.96±0.17 ab*
Rosemary+ turmeric	38.85±3.51b	30.26±3.64b**	2.06±0.27a	1.78±0.21c*	3.55±0.25b	3.74±0.19b*
Nettle+ chicory	36.18±4.32bc	28.78±2.52 c**	1.97±0.18b	1.69±0.14c*	3.79±0.20a	4.00±0.15a**

Significant with at start value (raw) * P<0.05 ** P<0.01 *** P<0.001

Mean values in each column having different superscript (a, b, c, d) are significant

groups showed significant decrease compared with control group. On the other side, turmeric, nettle, chicory, rosemary with turmeric and nettle with chicory groups showed significant decrease in serum creatinine at the end compared with the values at the start of the experiment. There was a non significant difference in serum creatinine in rosemary, turmeric and chicory but significant decrease in nettle, rosemary with turmeric and nettle with chicory compared with control group. Consumption of experimental herbs showed significant increase in serum albumin at P<0.05 in patient groups at the end compared with the values at the start of the experiment. Rosemary, turmeric, chicory and rosemary with turmeric groups showed a non significant difference in serum albumin while nettle group showed significant decrease but nettle with chicory groups showed significant increase in albumin compared with control group as shown in Table 7. Regarding to reference normal value of urea was 10 to 20 mg/dl, while normal value of creatinine was 2 mg/dl but normal value of albumin was 3.4 - 5.4 g/dl. Nettle and nettle with chicory groups showed the lower values and gave the most desirable values of urea and creatinine at the end of the experimental period. Consumption of the experimental herbs to patients could improve the albumin values and appeared with reference normal values.

The value of cholesterol was significantly decreased at P<0.05, 0.01and0.001 in all experimental groups at the end except control group compared with the value at the start of the experiment. Rosemary with turmeric and nettle with chicory groups showed significant decrease in cholesterol value compared with control group at the end of the experiment. Triglyceride is the most common type of fat in the body. Many people who have heart disease or diabetes have high triglyceride levels. High triglyceride level combined withlow HDL

cholesterol or high LDL cholesterol seems to speed up atherosclerosis. Regarding to triglyceride value, all experimental groups showed significant increase at the end compared with the value at the start of the experiment. Nettle with chicory group showed significant increase in triglyceride compared with control group at the end of the experiment but others showed a non significant difference. On the other side, the value of HDLc was significantly increased at P<0.05 in all experimental groups at the end compared with the value at the start of the experiment. Chicory, rosemary with turmeric and nettle with chicory groups showed significant increase in HDLc value compared with control and also rosemary, turmeric and nettle group at the end of the experiment. The value of LDLc was significantly decreased at P<0.01 in all experimental groups at the end compared with the value at the start of the experiment. There was insignificant difference among experimental groups compared with control except nettle with chicory group that showed significant decrease in LDLc value at the end of the experiment as shown in Table 8.

Reference normal value of cholesterol level shows that less than 200 mg/dl had desirable level with lower risk for coronary heart disease but a cholesterol level of 200 mg/dl or higher can raise coronary heart disease. The level of 200 to 239 mg/dl has borderline high the risk of coronary heart disease. Experimental herbs groups had somewhat desirable level of cholesterol. Rosemary with turmeric and nettle with chicory groups had the best value of cholesterol at the end of the experiment. Reference normal value of triglyceride level is less than 150 mg/dl and the optimal level is less than 100 mg/dl. All experimental herbs groups were within normal values of triglyceride at the end of the experimental period. Higher levels of HDLc are better. Low HDLc (less than 40 mg/dl for men, less than 50 mg/dl

Table 8: Mean ±SD of cholesterol, triglycerides, HDLc and LDLc among groups at the start and at the end of the experiment.

	Variables							
	Cholesterol (mg/dl)		Triglycerides (mg/dl)		HDLc (mg/dl)		LDLc (mg/dl)	
Groups	At the start	At the end	At the start	At the end	At the start	At the end	At the start	At the end
Control	214.96± 8.24ª	203.56±7.37 ª	115.26±7.91ᵃᵇ	133.36±8.37 ᵇ*	26.90±3.28ª	34.34±3.75ᵇ*	165.00±6.98 ª	142.54± 6.45ª**
Rosemary	215.86± 4.47ª	203.73±5.56 ª*	116.20±3.72 ª	133.80±4.03ᵇ*	25.58±1.92 ª	34.18±3.19ᵃᵇ*	167.04±4.12 ª	142.78± 4.47ª**
Turmeric	215.13± 9.67 ª	201.93±8.11ᵃᵇ*	115.26±9.66 a	131.60±7.88ᵇ*	25.12±2.51 ª	33.40±2.78ᵇ*	166.96±6.63 ª	142.21± 6.90ª**
Nettle	215.60± 9.03ª	202.80±6.71ᵃᵇ*	115.60±9.03 ª	133.26±8.26ᵃᵇ*	26.12±3.60 ª	34.88±4.63ᵇ*	166.36±5.72 ª	141.26± 4.25ª**
Chicory	216.53± 2.53 ª	202.00±1.55ᵃᵇ*	116.53±2.53 ª	134.80±4.61ᵃᵇ*	26.38±3.72ª	35.37±5.03ª*	166.84±4.85 ª	139.66±.16ᵃᵇ**
Rosemary+turmeric	216.80± 7.13ª	200.93±5.43ᵇ**	116.80±7.13 a	136.93±5.52ᵃᵇ*	25.37±1.13 ª	35.05±1.90ª*	168.06±5.15 ª	138.49±.18ᵃᵇ**
Nettle+ chicory	214.80± 9.57ª	197.00±3.56ᶜ***	114.80±9.57ᵃᵇ	143.60±4.83ª**	26.85±1.25 ª	36.24±1.60ª*	164.98±7.15 ª	132.04± 3.90ᶜ**

Significant with at start value (raw) * P<0.05 ** P<0.01 *** P<0.001
Mean values in each column having different superscript (a, b, c, d) are significant.

Table 9: Mean ±SD of hemoglobin and glucose among groups at the start and at the end of the experiment.

	Variables			
	Hemoglobin (g/dl)		Glucose (mg/dl)	
Groups	At the start	At the end	At the start	At the end
Control	10.75±0.40ª	10.80±0.37ª	201.96±8.21ª	198.50±8.24 ª*
Rosemary	10.97±0.26 ª	11.06±0.26ᵇ*	202.0±3.6ª	197.6±3.2 ᵃᵇ*
Turmeric	10.75±0.30 ª	10.81±0.23ᵃᵇ	205.0±8.6ª	200.0±8.6 ª*
Nettle	10.71±0.13 ª	10.81±0.13 ᵃᵇ	199.7±4.4ᵇ	194.7±4.4 ᵇ*
Chicory	10.58±0.48 ª	10.74±0.46 ᵃᵇ*	202.6±9.3ª	197.2±9.11 ᵃᵇ*
Rosemary + turmeric	10.74±0.55 ª	10.92±0.43 ᵃᵇ*	197.0±10.11ᵇ	189.6±11.10ᵇᶜ*
Nettle + chicory	10.78±0.51 ª	10.99±0.41 ᵃᵇ*	201.6±6.6ª	193.3±7.5 ᵇ*

Significant with at start value (raw) * P<0.05 ** P<0.01 *** P<0.001
Mean values in each column having different superscript (a, b, c, d) are significant.

for women) increase risk for heart disease. An HDL cholesterol of 60 mg/dl or higher gives some protection against heart disease. The obtained results showed that all experimental herbs groups had less than 40 mg/dl of HDLc indicate high risk of heart disease. Rosemary with turmeric and nettle with chicory groups showed high values of HDLc at the end of the experimental period. On the other side, the lower LDL cholesterol can lower the risk of heart attack and stroke. Near or above optimal of LDLc is at 100 to 129 mg/dl but borderline high is at 130 to 159 mg/dl High risk of heart attack appears at level 160 to 189 mg/dl. All experimental herbs groups had LDLc values ranged from132.04±3.90 to142.78± 4.47 mg/dl. The good prognosis appeared in nettle with chicory group at the end period of the experiment.

The value of hemoglobin was significantly increased at P<0.05 in rosemary, chicory, rosemary with turmeric and nettle with chicory groups at the end compared to the value at the start of the experiment. Rosemary group showed a significant increase in hemoglobin at the end while other groups showed insignificant difference compared to control group. All herbs consumed groups

showed significant decrease in glucose at the end at P<0.05 compared to the value at the start of the experiment. Nettle, rosemary with turmeric and nettle with chicory showed significant decrease in glucose compared to control group as shown in Table 9. Normal hemoglobin level in adult male is 14-18 gm/dl and in adult females is around 12-16 gm/dl. So, the obtained values of hemoglobin in our study were in somewhat less than normal values. Rosemary group showed the best value of hemoglobin at the end of the experimental period. The reference values for a normal random glucose test in an average adult are 79-110mg/dl, between 140-200mg/dlis considered pre-diabetes and > 200mg/dlis considered diabetes. Rosemary with turmeric and nettle with chicory had the best result of random glucose level at the end of the experimental period.

The value of sodium was significantly increased at P<0.05 in all experimental groups at the end except control group compared with the value at the start of the experiment. All herbs consumed groups showed significant increase in sodium at the end compared with control group. The value of potassium was significantly

Table 10: Mean ±SD of sodium, potassium, calcium and phosphorus among different groups at the start and at the end of the experiment.

	Variables							
	Na (meq/l)		K (meq/l)		Ca (mg/dl)	P (mg/dl)	Ca (mg/dl)	P (mg/dl)
Groups	At the start	At the end	At the start	At the end	At the end	At the end	At the start	At the end
Control	134.16±2.52[a]	138.70±2.50[b]	3.91±0.08 [a]	4.02±0.07 [a*]	9.66±0.10[ab]	8.67±0.10[b*]	3.85±0.08[a]	3.63±0.08[ab*]
Rosemary	135.40±1.956 [a]	139.40±1.91[a*]	3.90±0.07[ab]	4.01±0.08[ab]	9.70±0.13[a]	8.71±0.13[b*]	3.85±0.11 [a]	3.65±0.11[a*]
Turmeric	135.33±2.257 [a]	139.33±2.257 [a*]	3.94±0.07[a]	4.02±0.07[a*]	9.69±0.07[ab]	8.65±0.13[b]	3.86±0.07 [a]	3.65±0.08[a*]
Nettle	135.86±2.325 [a]	139.86±2.325 [a*]	3.88±0.07[bc]	3.98±0.06[bc]	9.67±0.10[ab]	8.69±0.10[b*]	3.86±0.06 [a]	3.63±0.08[ab*]
Chicory	134.13±2.133 [a]	139.60±1.594 [a*]	3.96±0.07[a]	4.06±0.06[a]	9.73±0.10[a]	9.12±0.55[a]	3.85±0.08 [a]	3.55±0.17[b*]
Rosemary +turmeric	134.93±2.631 [a]	139.86±2.587 [a*]	3.85±0.06[bc]	4.01±0.06[ab]	9.66±0.10[ab]	8.91±0.47[ab]	3.84±0.07 [a]	3.55±0.14[b*]
Nettle + chicory	136.66±2.439 [a]	141.53±1.846 [a*]	3.88±0.08[bc]	4.03±0.06[a*]	9.69±0.12[ab]	8.59±0.13[b*]	3.86±0.07 [a]	3.57±0.11[b*]

Significant with at start value (raw) * $P<0.05$ ** $P<0.01$ *** $P<0.001$

Mean values in each column having different superscript (a, b, c, d) are significant.

increased at $P<0.05$ in control, turmeric and nettle with chicory groups at the end compared with the value at the start of the experiment. Nettle group showed significant decrease in potassium at the end compared with control but other herbs consumed groups showed a non significant difference in potassium at the end compared with control group. On the other hand, the value of calcium was significantly decreased at $P<0.05$ in control, rosemary, nettle and nettle with chicory at the end compared with the value at the start of the experiment. All herbs consumed groups showed a non significant difference in calcium at the end compared with control group except chicory group that showed significant increase. The value of phosphorous was significantly decreased at $P<0.05$ in control and all herbs consumed groups at the end compared with the value at the start of the experiment. There was a non significant difference in phosphorous at the end in all herbs consumed groups compared with control group as shown in Table 10. Reference normal serum sodium level is between approximately 135 and 145 meq/l, while the normal range of potassium is 3.7 to 5.2 meq/l. The Normal values of calcium range from 8.5 to 10.2 mg/dl but normal values range phosphorous from 2.4-4.1 mg/dl. The obtained results in this study showed that all herbs experimental patients groups had normal values of sodium, potassium, calcium and phosphorous at the end of the experimental period.

DISSCUSION

The obtained results of body mass index and mid arm circumference of subjects were within normal values according to Fidanza *et al.* [12] and McCarthy [13]. The improvement of liver and kidney function in our study revealed to hepatoprotective herbal drugs contain a variety of chemical constituents like phenols, coumarins, lignans, essential oil, monoterpenes, carotinoids, glycosides, flavonoids, organic acids, lipids, alkaloids and xanthines. The antioxidant and hepatoprotective properties of polyphenolics, flavonoids and phenyl propanoids are well explored [7]. Turmeric contains monoterpenes, sesquiterpenes and sesquiterpene alcohol zingiberol, gingerol and shagoals. Gingerols have cardio tonic analgesic, anti-inflammatory; antipyretic [25]. 5-Hydroxy-7, 4-dimethoxyflavone (also called 4-methoxytectochrysin) isolated from rosemary that has antioxidative activity [26, 27]. Regarding to the obtained results of ASTandALT enzymes, albumin and total bilirubin, Rosemary possesses antioxidant activity and hepatoprotective effects. Over the course of the development of cirrhosis, the increased enzymatic activities of gamma-glutamyl transpeptidase and ALT and the rise in bilirubin levels caused by CCl_4 administration were prevented by Rosmarinus officinalis co-administration. These benefits on experimental cirrhosis suggest a potential therapeutic use for R. officinalis as an alternative for liver cirrhosis [28]. There was a significant increase in serumliver biochemical parameters (AST, ALT and alkaline phosphatase), accompanied by a significant decrease in the level of total protein and albumin in the streptozin-induced diabetic in rats when compared with that of the normal group. The high-dose treatment of rosemary extracts group (200 mg/kg body wt) significantly restored the elevated liver function enzymes near to normal. Rosemary extracts exerted a hepatoprotective effect and exhibits the protective effect on tissues and prove its potentials as an antidiabetic agent [29]. The increased levels of serum enzymes (ASTandALT) and bilirubin observed in rats treated with carbon tetrachloride were very much reduced in the animals treated with natural cichorium root

and root callus extracts and carbon tetrachloride induced hepatic damage [30]. Turmeric was shown to be a potent scavenger of a variety of reactive oxygen species including superoxide anion radicals, hydroxyl radicals and nitrogen dioxide radicals. It was also shown to inhibit lipid peroxidation in different animal models [31]. Fermented turmeric powder is effective and safe in the treatment of subjects with elevated ALT levels over a 12 weeks period and serum AST levels were significantly reduced [32].

Previous studies showed that nettle leaves are a good source of essential amino acids, ascorbic acid, available and unavailable carbohydrates, fatty acids and carotenoids and several mineral elements. The root of the plant contains chemicals such as scopoletin, sterols, fatty acids, polysaccharides and isolectins [5, 6]. Fresh chicory typically contains 68% inulin, 14% sucrose, 5% cellulose, 6% protein, 4% ash and 3% other compounds, while dried chicory contains approximately 98% inulin and 2% other compounds. Inulin is soluble in water and not hydrolyzed by human digestive enzymes; it is expected to behave like a soluble fiber and to have a hypolipidemic effect. This might treat jaundice, hepatitis and hepatic congestion, also by stimulating the flow of bile, chicory is considered to treat gallstones, biliary insufficiency, gastritis and splenomegaly [33, 34]. A mechanism of action of oligofructose was associated with the modulation of cholesterol synthesis by short-chain fatty acids produced by the gut microflora during the fermentation process. Chicory has a potent hepatoprotective, antioxidant, hypoglycemic, diuretic, anti-testicular toxicity and immunomodulatory effects [35, 36]. Phenolic compounds from rosemary protect against hypercholesterolemia induced oxidative stress, increasing the activities of antioxidant enzymes and reducing the amount of thiobarbituric acid reactive substances. The aqueous extract was also able to improve the serum lipid profile, contributing to cardiovascular disease reduction [37].

Severe fluid and electrolyte abnormalities always accompany acute liver failure. Free water retention occurs early, resulting in dilutional hyponatremia, which can contribute to cerebral edema, mandating immediate correction. In general, the degree of hyponatremia is proportional to the severity of liver failure. Hypokalemia accompanies hyponatremia, due to gastrointestinal losses, diuretics and alkalosis. Hypophosphatemia also occurs commonly and results from a shift of phosphate from the extracellular to the intracellular compartment in response to glucose infusions and possibly due to use in ATP synthesis by regenerating hepatocytes. In the

presence of oliguric renal failure, however, hyperkalemia and hyperphosphatemia usually develop. Finally, hypocalcemia can complicate the transfusion of large amounts of citrated blood products. Concomitant hypokalemia should be corrected, as hypokalemia increases renal ammonia production and may promote conversion of ammonium into ammonia, which can cross the blood-brain barrier [38, 39]. The obtained results were agreed with the previous studies that polyherbal formulations, which contain mixtures of several herbal extracts, are widely promoted for liver diseases and are available in the market in the form of solid and liquid formulations.

It is concluded that administration of herbs (rosemary, chicory, nettle and turmeric) could improve liver and kidney function and also improve lipid pattern in hepatic failure patients.

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