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**Original Research Article**

# Effect of supplementation of Purslane-*Portulaca oleracea* in hypercholesterolemic subjects

**S. Tarkergari[1], K. Waghray[2]*, S. Gulla[3]**

[1]BHEL General Hospital, Ramachandrapuram, Hyderabad, Telangana, India
[2]School of Food Technology and Nutrition, Loyola Academy, Alwal, Secunderabad, Telangana, India
[3]Department of Food Technology, College of Technology, Osmania University, Hyderabad, Telangana, India

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***Correspondence:**
K. Waghray,
E-mail: kavitagl@rediffmail.com



## ABSTRACT

**Background:** *Portulaca oleracea* (Purslane) is a medicinal plant containing diverse phyto constituents grown all over the world. Several studies have reported its pharmacological effects like, antihypertensive, anti-inflammatory antioxidant, hypoglycemic, hypocholesterolemic, hypotriglyceridemia neuroprotective effects.
**Methods:** Dried Portulaca oleraca leaves were incorporated into spice powder/ karampodi a south India food adjunct which was used for supplementation studies for 90 days (3 months) among hyper cholesterolemic subjects after obtaining a written informed consent. Biochemical parameters like lipid profile, i.e., total cholesterol, low density lipoprotein cholesterol, triglycerides, high density lipoprotein cholesterol, very low-density lipoprotein cholesterol, kidney function test, Liver function test were assessed. Baseline information, their medical history and 24hr dietary recall was elicited from the subjects through a pretested schedule.
**Results:** The results have shown that the total cholesterol levels and its fractions along with triglycerides were significantly decreased, HDL-C increased significantly in the test groups from pre- supplementation to during-supplementation and were stable at post-supplementation period.
**Conclusions:** Our results indicated that the spice powder was rich in polyunsaturated fatty acid had a strong hypo cholesterolemic and hypotriglyceridemic effect.

**Keywords**: Medicinal, Food adjunct, Hypercholesterolemic, Supplementation, Cholesterol and its fractions

## INTRODUCTION

Cardiovascular diseases (CVDs) are the leading cause of death globally. An estimated 17.9 million people died from CVDs in 2019, representing 32% of all global deaths. Of these deaths, 85% were due to heart attack and stroke. Over three quarters of CVD deaths take place in low and middle-income groups. Out of the 17 million premature deaths (under the age of 70) due to non-communicable diseases in 2019, 38% were caused by CVDs. Most cardiovascular diseases can be prevented by addressing behavioral risk factors such as tobacco use, unhealthy diet and obesity, physical inactivity and harmful use of alcohol. It is important to detect cardiovascular disease as early as possible so that management with counseling medicines and diet can begin.[1] Purslane (*Portulacaoleracea*) is an annual plant belonging to Portulacaceae and is commonly called "Pigweed" or "Little hogweed' in English, Gangapaayala/Peddapaayala/Peddapaavilaaakukoora" in Telugu, "Khursa/Naunia/Chotalunia" in Hindi, "Parippukeerai" in Tamil and "Bruhalloani" in Sanskrit. It can be frequently seen in places such as vegetable gardens and empty spaces as well as any roadside. In the Western style, it can be mainly used with lettuce for salads.[2] Also, it can be dried and used as a material for various dishes as well as tea or soup.[3,4] In Korea, people used to blanch a

tender shoot of the plant in summer to preserve them for eating throughout the winter.[5] Purslane shows higher amounts of certain biological components, than many other plants including oleic acid, linoleic acid and γ-linolenic acid, and has been reported to suppress cancer or be effective in decreasing the occurrence rate of heart diseases.[6,7] Also, Purslane contains great amounts of nutrients such as tocopherol and ascorbic acid.[8] Moreover, purslane extract shows an antioxidant activity based on phenolic compounds, including flavonoids.[5,9,10] which are known to lower cholesterol or triglyceride levels in hyperlipidemic rats.[11,12] However, there are few studies related to the prevention of hyperlipidemia by purslane.[13-15] To verify the biological effect of purslane on hyperlipidemia, this study focuses on the effect of supplementation of dehydrated purslane spice powder on the change of the lipid components and diabetics in human subjects.

## METHODS

About 60 individuals who were on lipid- lowering interventions, between 40 and 60 years of age and had previously recorded total cholesterol (Total-C) values between the above 250 mg/dl to 270 mg/dl, low density lipoproteins LDL-C values were between 80 to 160 mg/dl for age and sex, as outlined by the Lipid Research Clinics and who underwent a recent cholesterol screening at, family practice clinics for diabetic screenings in the BHEL General Hospital, Ramachandrapuram, Hyderabad were selected. Subjects were further evaluated using two additional complete fasting lipid profiles that included Total-C, LDL-C, HDL-C, and triglycérides. Those whose total cholesterol for age and sex (Lipid Research Clinics 1980) based on the mean of the baseline measurements were invited to participate in the study. The resulting sample (n=60) was grouped for this analysis into test group and apparently normal group sub groups as displayed in (Table 2). Subjects gave written informed consent for this study. Subjects were supplemented with 15g a day spice powder of dehydrated purslane for a period of three months. Biochemical parameters like lipid profile, i.e., Total cholesterol, LDL-C, Triglycerides, HDL, VLDL were assessed. The kidney functioning capacity was assessed by measuring the levels of serum creatinine, urea and uric acid.[17-22] Liver function test were assessed by serum bilirubin, alkaline phosphatase, alkaline amino transferase (SGPT/ALAT) using standard kits with help of Roche/Hitachi 904/911 automatic enzyme analyzer. Baseline information, their medical history and 24hr dietary recall was elicited from the subjects through a pretested schedule.[23-25]

### *Selection criteria*

The subjects who consented were included on the criteria that they were screened previously and were recorded with total cholesterol (TOTAL-C) values between the 50th and 95th percentile for age and sex, as outlined by the Lipid research clinics.

### *Period of study*

During the study period of 9 months first 3 months from September 2017 to November 2017 a base line study was conducted, between December 2017 and February 2018 supplementation of the developed product was given and between March 2018 and may 2018 a follow up study was taken up. A written consent was obtained from the subjects for their willingness to participate in the study for the said period. The covariance of the variables under study was measured to statistical analysis of the results was measured and compared.

## RESULTS

The data pertaining to sex mean age BMI income medical history of the subjects is displayed in (Table 1-2). Daily nutrient intake of pulses, green leafy vegetables, other vegetables, and milk and milk products was greater in test group than that of apparently normal group for all nutrients studied except for cereals and oils and fats and meat and meat products (Table 3). Cereals intake averaged 375.3±51.66 g/day, (apparently normal group) and 365.7±40.1 g/day (test group) for all subjects, 42.6±18 g/day of pulses for apparently normal group and 51.23± 13.4 g/day of pulses for test group was recorded as daily intake and oils and fats (67.2±40.1 g/day in apparently normal group and 61.4±37.33 g/day in test group), meat and meat products (75.6±11.42 g/day in apparently normal group and 70.4±9.31 g/day in test group) were consumed more than the recommended daily allowances Table-8. Subgroup analyses revealed that green leafy vegetables, other vegetables, milk and milk products were consumed less than the RDA. Health professionals have recommended decrease of intake of dietary fat and cholesterol to reduce the risk of CVD.

### *Total cholesterol*

The changes of effect of supplementation of the 15 g a day spice powder of *Portulaca oleracea* on total cholesterol in hypercholesterolemic subjects in pre supplementation, during supplementation and post supplementation is shown in (Table 4). The total cholesterol decreased significantly in the hypercholesterolemic group in comparison with the apparently normal group who were not on supplementation but were on statins. The total cholesterol prior to the supplementation in the first three months was seen to range from 269.2±17.1 mg/dl to 269.9±17.1 mg/dl were on statins 5 to 10 mg per day and was seen to be significantly reduced on supplementation from 208.5±21.2 mg/dl (first month) to 178.1±15.7 mg/dl (second month) to further 158.4±12.6 mg/dl (third month) indicating 39% reduction, further post supplementation consecutive three months analysis levels increased from 160 mg/dl to 167 mg/dl. The other lipid parameters like LDL, HDL, VLDL and Triglycerides which are shown in (Table 5).

**Table 1: General information of the selected hypercholesterolemic human subjects.**

| Parameters | Apparently normal (N=30) | P value | Test group (N=30) | P value |
|---|---|---|---|---|
| **Gender, N (%)** | | | | |
| Males | 14 (46.66) | 0.3059 | 17 (56.66) | 0.4422 |
| Females | 16 (53.33) | | 13 (43.33) | |
| **Mean age (years)** | | | | |
| Males | 50.0±4.5 | 0.8090 | 48.0±6.2 | 1.000 |
| Females | 48.0±4.4 | | 48.0±3.93 | |
| **Mean height (cm)** | | | | |
| Males | 169.12±5.94 | - | 169.9±3.56 | - |
| Females | 153.0±3.45 | | 148.8±2.98 | |
| **Mean weight (kg)** | | | | |
| Males | 71.5±6.83 | - | 75.0 | - |
| Females | 63.1±5.58 | | 65.0±4.46 | |
| **Mean BMI (weight/height²)** | | | | |
| Males | 25.0±2.35 | 0.0015 | 26.1±1.58 | - |
| Females | 27.0±2.3 | | 29.4±2.28 | |
| **Categories of BMI, N (%)** | | | | |
| Normal weight | 7 (23.33) | - | 8 (26.66) | 0.955 |
| Over weight | 21 (70) | | 20 (66.6) | |
| Obese | 2 (6.66) | | 2 (6.66) | |
| **Social status, N (%)** | | | | |
| Middle income | 7 (23.33) | - | 8 (26.66) | 0.875 |
| Upper middle income | 16 (3.33) | | 14 (46.66) | |
| Higher income | 7 (23.33) | | 8 (26.66) | |

**Table 2: Medical history of the selected patients.**

| Parameters | Apparently normal (N=30) | Test group (N=30) | P value |
|---|---|---|---|
| **Mean blood pressure (mmHg)** | | | |
| Systole | 139.88 | 135.21 | 0.3148 |
| Diastole | 85.22 | 83.0 | 0.2822 |
| **Mean duration of disease (years)** | 3.26 | 3.14 | 0.7867 |
| **Oral drugs** | Statins (5mg/10mg) | | |
| **Family history, Positive history** | | | |
| Mother | 2 (6.66) | 2 (6.66) | 0.985 |
| Father | 9 (30) | 9 (30) | |
| Brother | 1 (3.33) | 2 (6.66) | |
| Both parents | - | - | |
| Grand parents | 1 (3.33) | 1 (3.33) | |
| Negative history | 17 (56.66) | 16 (53.33) | |
| **Personal habits** | | | 0.194 |
| Smoking | 3 (10) | - | |
| Alcohol | 2 (6.66) | 3 (10) | |
| None | 25 (83.33) | 27 (90) | |

The mean triglyceride levels ranged from 151.67±5.9 mg/dl to 153.33±5.9 mg/dl in the hypercholesterolemic subjects and 153.47±8.2 mg/dl to 156.60±7.96 mg/dl in the apparently normal group for the first three months prior to the supplementation of the spice powder made with *Portulaca oleracea*. Mean TG levels of hyper-cholesterolemic subjects during supplementation of three months was seen to decrease from 141.87±7.66 mg/dl to 131.10±5.65 mg/dl vs. apparently normal group who had a triglyceride level range of 158.0±7.52 mg/dl to 159.77±6.21 mg/dl. The mean TG value post supplementation for the consecutive next three months ranged between 128.83±5.55 mg/dl to 134.37±4.86 mg/dl in the hyper-cholesterolemic subjects and 160.80 mg/dl to 161.67 mg/dl in the apparently normal group subjects respectively The subjects had an average LDL-C level of 150.61±19 mg/dl (range 149.43±16.22, 152.83±18.48 mg/dl) during the consecutive three month period prior to supplementation which reduced to 108±9.26 mg/dl, 97.33±5.97mg/dl, and 88.13±8.8 mg/dl in the consecutive three month period of supplementation.

**Table 3: Mean food intake of hypercholesterolemia subjects by 24 hr dietary recall method.**

| Food groups (g) | Apparently normal (N=30) (mean) | Test group (N=30) (mean) | RDA |
|---|---|---|---|
| **Cereals** | 375.3 | 365.7 | 350 |
| **Pulses** | 42.6 | 51.23 | 30 |
| **Green leafy vegetables** | 46.6 | 52.3 | 200 |
| **Other Vegetables** | 103.3 | 106.33 | 200 |
| **Milk and milk products** | 108.8 | 110.2 | 150 |
| **Oils & fats** | 67.2 | 61.4 | 20 |
| **Meat & meat products** | 75.6 | 70.4 | 40 |

There was an increase in the values after the three months period of post supplementation from 120.7±10.89 mg/dl to 134.53±9.56 mg/dl. The apparently normal group group had a mean of 152.87±18.83 mg/dl (range 149.97±16.22, 158.40±9.1 mg/dl) for the entire 9-months period (Table 6). The mean VLDL values were 30.51±1.22 mg/dl for subjects with hyper cholesterolemia during the 3 month period of pre-supplementation of spice powder, and 27.22±1.12 mg/dl during the period of supplementation and 26.3±1.16 mg/dl during theconsecutive 3 months of post supplementation whereas apparently normal group had a mean VLDL of 30.25±1.67 mg/dl (range 29.73±1.67, 31.33±1.27 mg/dl) vs. the normal range of 5-40 mg/dl, so both the subjects and apparently normal group were within the normal range and significantly different. ($p<0.05$). The HDL cholesterol was 31.87±3.2 mg/dl, 33.3±2.93mg/dl, and 34.20±2.9 mg/dl for the first three months of the study prior to the supplementation of *Portulaca oleracea* (purslane) spice powder which showed a great increase to 47.50±3.0, 51.53±3.46, and 53.77±2.32 mg/dl during the 3-month period of supplementation in the hypercholesterolemic subjects.

**Table 4: Effect of *Portulaca oleracea* spice powder supplementation on the cholesterol levels of selected hyper cholesterolemic subjects (n=60).**

| Period of supplementation (months) | Cholesterol levels (mg/dl) | % reduction |
|---|---|---|
| **Pre- supplementation** | | |
| 1 | 269.9±17.1 (270.1±14.9) | - |
| 2 | 269.5±12.1 (272.3±13.7) | - |
| 3 | 261.2±17.3 (274.9±13.5) | - |
| **During supplementation** | | |
| 1 | 208.5±21.2* (275.1±13.6) | 22.7 |
| 2 | 178.1±15.7* (277.3±25) | 34.0 |
| 3 | 158.4±12.6* (278.7±11.3) | 39.38 |
| **Post supplementation** | | |
| 1 | 160.0±13.4* (278.3±9.6) | - |
| 2 | 162.0±16* (279.3±9.3) | - |
| 3 | 167.4±9.1* (280.0±10.6) | - |

*Significant at 0.05% level ($p<0.05$).

Weaning away from the purslane spice powder in the consequent 3 months post supplementation showed a slight decrease of HDL cholesterol to 44±3.58,42.13±3.32 and 40.97±2.69 mg/dl on the other hand, HDL-C remained almost the same in the 9-month period in apparently normal group as shown in (Table 5). Overall both ratios Total cholesterol/HDL cholesterol and LDL/HDL cholesterol significantly decreased but there was no significant difference observed when compared to males and females. The kidney function tests like Blood urea, serum creatinine, and serum uric acid levels were assessed in all the subjects controls and hypercholesterolemic subjects. The serum uric acid (normal range 2.3-8.2 mg/dl), serum creatinine (normal ranges 0.5-0.8 mg/dl) levels for both the groups prior to supplementation, during supplementation post supplementation were within the normal range (Table 6). Blood urea ranged from 29.13±4.9 mg/dl, 32.70±5.55 mg/dl (apparently normal group 38.93±5.56 mg/dl, 37.53±3.65 mg/dl) prior to the supplementation of the spice powder and 24.90±3.57, 24.20±3.26 mg/dl (apparently normal group 38.96±3.76, 38.23±3.18 mg/dl) which was significant at $p<0.05$ while supplementing and 23.97±2.55-24.13±2.75 (apparently normal groups, 37.27±3.58-37±4.36 mg/dl) post supplementation in the hypercholesteraemic spice powder fed subjects which were non-significant

***Liver function tests in hypercholesterolemia***

Liver function tests were also conducted and presented in (Table 7). Serum bilirubin was found to be nearly the same in both the subjects and was within the normal range in the ensuant three months period prior to the supplementation, during and post supplementation (normal values 0-1.2 mg/dl).

**Table 5: Effect of Portulaca *oleracea* spice powder supplementation on the lipid profile levels in hypercholesterolemic subjects.**

| Period supplementation in months | LDL-C (mg/dl) | HDL-C (mg/dl) | VLDL-C (mg/dl) | Triglycerides (mg/dl) |
|---|---|---|---|---|
| **Pre supplementation** | | | | |
| 1 | 152.83±18.48 (150.73±9.49) | 31.87±3.2 (34.50±5.40) | 30.33±1.09 (31.33±1.68) | 151.67±5.91 (153.60±8.20) |
| 2 | 149.43±16.22 (152.57±9.04) | 33.3±2.93 (29.53±5.0) | 30.63±1.22 (30.62±1.67) | 152.33±5.99 (154.47±8.1) |
| 3 | 149.57±14.78 (154.40±9.10) | 34.20±2.9 (28.10±4.15) | 30.57±0.97 (30.73±1.57) | 153.43±4.4 (156.10±7.96) |
| **During supplementation** | | | | |
| 1 | 108.20±9.26* (155.33±6.72) | 47.50±3.0* (28.87±2.6) | 28.33±1.49* (30.10±1.47) | 141.87±7.66* (158.0±7.52) |
| 2 | 97.33±5.97* (156.73±6.82) | 51.53±3.46* (30.83±2.06) | 27.10±1.12* (29.90±1.68) | 135.67±5.60* (159.47±8.43) |
| 3 | 88.13±8.8* (158.30±6.67) | 53.77±2.32* (30.50±3.62) | 26.23±1.16* (30.03±1.09) | 131.10±5.65* (159.77±6.21) |
| **Post supplementation** | | | | |
| 1 | 120.7±10.89* (159.97±6.58) | 44.0±3.58* (30.03±3.16) | 25.77±1.13* (29.73±1.38) | 128.83±5.55* (160.80±6.75) |
| 2 | 131.47±9.65* (161.0±6.65) | 42.13±3.32* (30.83±2.67) | 26.33±0.92* (29.77±1.27) | 131.93±5.05* (160.77±6.53) |
| 3 | 134.53±9.56* (162.8±5.44) | 40.97±2.69* (30.83±3.0) | 26.80±0.99* (30.07±1.20) | 134.37±4.86* (161.67±5.43) |

*Significant at 0.05% level ($p<0.05$).

**Table 6: Effect of *Portulaca oleracea* (purslane) spice powder supplementation on blood urea, S. creatinine and S. uric acid levels in hypercholesterolemic subjects.**

| Period supplementation in months | Blood Urea (mg/dl) | S. creatinine (mg/dl) | S. Uric acid (mg/dl) |
|---|---|---|---|
| **Pre supplementation** | | | |
| 1 | 29.13±4.92 (38.93±5.56) | 0.70±0.10 (0.76±0.12) | 4.83±0.67 (5.47±0.53) |
| 2 | 32.33±5.55 (38.71±4.86) | 0.69±0.12 (0.76±0.11) | 4.71±0.63 (5.48±0.53) |
| 3 | 30.5±5.40 (37.53±3.65) | 0.69±0.11 (0.77±0.11) | 4.64±0.62 (5.53±0.45) |
| **During supplementation** | | | |
| 1 | 24.90±3.57* (38.96±3.76) | 0.65±0.08* (0.78±0.08) | 4.31±0.58* (5.49±0.46) |
| 2 | 24.93±4.06* (37.34±3.23) | 0.64±0.077* (0.79±0.093) | 4.20±0.53* (5.49±0.45) |
| 3 | 24.20±3.26* (38.23±3.18) | 0.64±0.073* (0.79±0.076) | 4.09±0.50* (5.48±0.56) |
| **Post supplementation** | | | |
| 1 | 23.97±2.55 (28±3.58) | 0.64±0.977* (0.81±0.09) | 4.15±0.50* (5.51±0.51) |
| 2 | 24.13±2.59* (38.18±4.07) | 0.65±0.072* (0.82±0.09) | 4.14±0.51* (5.53±0.54) |
| 3 | 24.07±2.75* (37.32±4.36) | 0.67±0.085* (0.82±0.082) | 4.12±0.48* (5.54±0.53) |

*Significant at 0.05% level ($p<0.05$).

Alanine transaminase (ALT) or SGPT were within the normal levels for both the test group subjects and apparently normal group. (normal=0-37 U/l) There was a slight reduction of ALT from 22.44±1.9 U/l to 19.90±0.9 U/l when the spice powder of *Portulaca oleracea* was supplemented.

## DISCUSSION

Lifestyle modification is the cornerstone of population-based strategies for prevention of coronary heart disease and is the first line of therapy in patients with hypercholesterolemia. Ample evidence suggests that polyunsaturated fatty acids and monounsaturated fatty acids have a similar cholesterol-lowering effect when substituted for saturated fatty acids.[26-28] Most studies of fatty acids and blood lipids have been done with fats and oils, hence it is desirable to know the effects of specific foods on risk factors for coronary heart disease. Portulaca oleracea which was rich in omega- 3 fatty acids, also has high levels of γ-linolenic acid, fiber and polyphenols. as seen earlier and studied by several investigators, it was further chosen for this study. It was observed that there was 22.7 to 39.38% reduction in serum cholesterol levels of hypercholesterolemic subjects after supplementation of Portulaca oleracea spice powder in the test group.

**Table 7: Effect of *Portulaca oleracea* spice powder supplementation on LFT levels in hypercholesterolemic subjects.**

| Period supplementation in months | S. bilirubin (mg/dl) | S. alkaline phosphatase (IU/l) | SGPT (U/l) |
|---|---|---|---|
| **Pre supplementation** | | | |
| 1 | 0.80±0.13 (0.75±0.15) | 8.40±1.22 (8.57 ±015) | 22.93±2.02 (26.13±4.05) |
| 2 | 0.8±0.37 (0.77±0.155) | 8.17±0.155 (8.88 ±1.21) | 22.23±1.90 (26.20±4.04) |
| 3 | 0.75±0.097 (0.78±0.152) | 8.13±1.0 (8.89±0.93) | 22.17±1.85 (26.63±3.50) |
| **During supplementation** | | | |
| 1 | 0.69±0.088 ns (0.79±0.104) | 7.63±0.71 ns (8.90±0.69) | 20.37±1.35* (26.87±3.06) |
| 2 | 0.7±0.09 ns (0.79±0.095) | 7.60±0.72 ns (8.92±.66) | 19.67±0.994* (26.93±4.33) |
| 3 | 0.7±0.08 ns (0.85±0.09) | 7.67±0.54 ns (8.93±0.64) | 19.67±0.994* (26.93±4.33) |
| **Post supplementation** | | | |
| 1 | 0.733±0.084 ns (0.87±0.14) | 7.77±0.72 ns (9.17±0.59) | 20.33±1.155* (26.95±2.79) |
| 2 | 0.74±0.10 ns (0.88±0.10) | 7.73±0.64 ns (9.23±0.679) | 20.60±1.276* (26.95±2.41) |
| 3 | 0.75±0.08 ns (0.89±0.098) | 7.63±0.556 ns (9.10±0.548) | 20.37±1.15* (26.97±2.66) |

*Significant at 0.05% level ($p<0.05$).

The total cholesterol analysis of a consecutive three-month period after Post supplementation of the Portulaca oleracea spice powder were maintained between 160 mg/dl to 167 mg/dl. Similar obsevations were made by Torsdittor et al, Park et al, Kwon, et al and Lee et al.[5,15,28-30] Lee et al also having studied the effects of Portulaca oleracea powder on the lipid levels of rats found a similar decrease of total cholesterol by 26.2%) Lachhiramka and reported reduction in cholesterol levels with garlic supplementation.[5,31] Their results showed the significantly decrease of 13% ($p<0.001$) from mean baseline of 269.30 mg/dl to 233.93 mg/dl at 90th day in serum cholesterol levels among the male patients. In female patients, the decrease was 10% ($p<0.001$) from mean baseline of 26 0.30mg/dL to 233.90 at 90th day. Hoyos et al showed that increases in total cholesterol and LDL-C induced by a high fat diet was reduced significantly by melatonin administration.[32] The melatonin concentration in Portulaca oleracea (purslane) was found to exceed that reported in a number of other fruits and vegetables.[33]

Melatonin has a variety of important functions including direct free radical scavenging and antiinflammatory properties.[34] Hoyos et al showed that increases in total cholesterol and LDL-C induced by a high fat diet was reduced significantly by melatonin administration.[32] *Portulaca oleracea* (purslane) has a positive effect on HDL cholesterol and the potential effect of Portulaca oleracea (purslane) on HDL cholesterol may be attributed to polyunsaturated fatty acids content in Portulaca oleracea (purslane). Results are agreed with Feoli et al who stated that the increase in HDL-C or HTR ratio is one of the most important criteria of anti-hypercholesterolemic agent.[35] The decrease of plasma cholesterol by administration of spice powder was ascribed to the decrease of both free and esterified cholesterol. The triglycerides of hypercholesterolemic subjects during supplementation of three months was seen to decline vs control though there was again a slow rise in the LDL values after the three month period of post supplementation which could be attributed to melatonin administration found in Portulaca oleracea (Purslane) which was supported by Simopouloes et al, Rodriguez et al and Hoyos et al.[32-35] All the kidney function parameters blood urea, serum creatinine and serum uric acid levels decreased but were within the normal range in both test and normal subjects. Similar observations were made for liver function tests.

***Limitations***

Limitations of were; the study subjects who were screened for hyper cholesterolemia also suffered other co morbidities and were consuming oral medications. The impact and interference of the oral medications on the supplementation of the spice powder was not taken into consideration.

## CONCLUSION

The present study concludes that *Portulaca oleracea* (Purslane) is a helpful plant in prevention of development of hyperlipidemia, fatty liver, etc. through preventing oxidative stress and chronic inflammation, improvement of fat metabolism, decreasing triglycerides, LDL, and total cholesterol, regulating the levels of liver enzymes (transaminases). The study results indicated that the spice powder was rich in polyunsaturated fatty acids had a strong hypolipidemic, hypotriglyceridemic and hypo-cholesterolemic effects with a reduction of plasma total cholesterol, LDL-C levels and an increase in HDL-C levels in hyper lipidemic subjects.

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