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Changes in lipd profile and some biochemical parameters in perimenopausal women treated with turmeric

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ABSTRACT

Background: Turmeric is a perennial plant of ginger family serving as an effective nutritional supplement that has major benefits for the body and brain. The major benefits stretch from anti-inflammatory, antioxidant, anticancer, anti-arthritic, anti-aging to improving brain functions as well as its possible property of lowering sugar, lipids and increasing calcium. Due to fluctuation in estrogen, perimenopausal women are at high risk of heart disease, diabetes and osteoporosis.
Materials and Method: This study investigates the effect of turmeric on lipid profile and some biochemical parameters in perimenopausal women. Sixty apparently healthy women of perimenopausal age were selected and treated for three months with turmeric. Blood sample were collected at baseline, first, second and third month of treatments. Serum was evaluated for lipid profile, fasting blood sugar and calcium. Measurements of their anthropometric parameters were taken at every level.
Result: The mean anthropometric parameters showed that weight p=0.045, WC p=0.043 was significantly lower after three months of treatment while SBP p=0.000, DBP p=0.009 was significantly increased after three months of treatment. Calcium concentration increased though not significant but FBS significantly decreased to 4.83±0.41 (p=0.004) after three months of treatment. HDL increased significantly to 1.30 ± 0.11 (p=0.0001) after three months of treatment.
Conclusion: This study showed that turmeric increases calcium and HDL-c concentration, reduces weight, waist circumference, FBS, TC, TG, LDL, VLDL and moderates systolic and diastolic blood pressure. Thus, it serves as an alternative remedy in management of menopausal symptoms.

1. Introduction

Menopause is a natural process that marks the end of a woman's menstrual cycle.[1] It is preceded by changes in endocrinological, biological and clinical features.[2–4] The period when these changes occur is known as menopause transition (perimenopause) and is characterized by uneven rise and fall of the main female reproductive hormone estrogen. Perimenopause is known to last for an average of four years and varies from one woman to another.[5] Randolph et al. reported in a cohort study of SWAN that out of 3,257 participants 75.1% were perimenopaused.[6] Proir, reported that women enter perimenopause on the average age of 47.5 years. Over the years' treatment of perimenopausal symptoms are based on drug therapy.[5] These treatments include the use of hormone like estrogen, antidepressants like SSRIs and gabapentin.

Turmeric is perennial plant of Zingiberaceae family (ginger family) known as Curcuma longa. Its flavor is peppery, warm and bitter while its fragrance is mild yet slightly reminiscent of orange and ginger.[7] Turmeric is widely used as an alternative to the far more expensive saffron spice.[8] It has been used in treatment for a variety of internal disorders such as pain, indigestion, throat infections

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and common cold or liver ailments as well as topically to cleanse wounds or treat skin sores.[8]

Turmeric is an effective nutritional supplement in existence which has major benefits for the body and brain. It contains bioactive compounds (curcumin) with powerful medicinal properties[9] Curcumin is strongly anti-inflammatory in that it matches the effectiveness of some anti-inflammatory drugs without the side effects.[10] NF-kB is believed to play a major role in many chronic diseases[11] Curcumin can increase brain levels of BDNF[12] and thereby improve memory.[13]

In a study in people with rheumatoid arthritis curcumin was shown to be more effective than an anti-inflammatory drug[14] Oxidation and inflammation are believed to play a role in aging curcumin in this action has become very popular as an anti-aging supplement.[15]

In menopause transition, women experience an increase in joint pain and general wear and tear on their musculoskeletal system. Turmeric has been clinically proven to reduce joint pain by 86.2% within 21 days of use and reduce cartilage degeneration, joint tenderness and inflammation. Maurilio et al. reported that curcumin supplementation decreased intestinal adiposity accumulation, serum cholesterol alterations and oxidative stress in ovariectimized rats.[16]

Anthropometric parameters (WT, WC, SBP, DBP), changes in lipid profile (TC, TG, HDL-c, LDL-c, VLDL-c) and some biochemical parameters (Ca, FBS) in perimenopausal women treated with turmeric is investigated in this study to determine its effect and thus suggest the possible use in natural medicine as a choice for general women's health.

2. Materials and Method

2.1. Supplement

Turmeric was purchased from market in Jos North LGA, Plateau State, Nigeria.

2.2. Preparation

Turmeric rhizomes were collected and washed in cool running water. It was boiled, sliced into pieces and air dried and then baked in oven at 170-200^{o}F for 2hours. The dried turmeric was put in a food processor and ground into powder and then put in a container and stored in a dark and dry place away from direct light. 6g was weighed out, dissolved in a glass of warm water and administered orally to the participants.

3. Experimental design

A cohort longitudinal-interventional study lasting for 3 months. Sixty apparently healthy women of perimenopausal age were selected and treated with turmeric.

3.1. Sample collection

10mls of blood sample was collected into plain bottle from each participant at zero level and at one month intervals for the three months. Each sample at every time was spun at 3,000 rpm for 5 minutes to achieve complete separation. The serum sample was then separated and stored in the refrigerator at -4^{0}C.

3.2. Determination of calcium

Serum calcium was determined using the method described by[17] and[18] Calcium OCPC procedure is based on the reaction of Calcium ions (Ca^{2+}) with O-cresolphthalein complex in an alkaline solution to form an intense violet coloured complex which shows maximum absorbance at 578nm.

3.3. Glucose estimation

Serum fasting blood sugar was determined using the method described by.[19] Glucose is determined after enzymatic oxidation in the presence of glucose oxidase. The hydrogen peroxide formed reacts under catalysis of peroxidase, with phenol and 4-amino-phenazone to form a red-violet quinoneimine dye as indicator.

3.4. Lipid estimation

Lipid profile was determined using enzymatic colorimetric methods. The method for Total Cholesterol was described by.[20] and[21] Serum triglyceride was determined by using the method described by.[22] High density lipoprotein was determined using the method described by.[23]and[24] LDL-C and VLDL-c was estimated by calculation according to the formular of Friedewald et al.[24]

3.5. Statistical analysis

The data generated was analyzed using SPSS to compare the changes in lipid profile, anthropometric and biochemical parameters. T-test and ANOVA was used for analysis of variance. p-value <0.05 was considered statistically significant. Data are presented as mean ± standard error of mean in the result.

4. Result

Anthropometric parameters at baseline showed that weight, waist circumference, systolic and diastolic blood pressure were 76.26 ± 12.15kg, 40.93±3.21cm, 118.00± 12.15mmHg and 76.00± 7.23mmHg respectively. After treatment the mean body weight significantly reduced to 75.46±11.78 (p=0.009) and 74.80±11.86 (p=0.045) after two and three months of treatments respectively. Waist circumference measurement reduced significantly to 39.26±3.10 (p= 0.043) after three months of treatment.

Table 1: Effect of turmeric on some anthropometric parameters of perimenopausal women.

Parameters	Baseline	One month	Two months	Three months	F-value	P-value
WT	76.26±12.15	75.86±12.06^{a}	75.46±11.78^{a}	74.80±11.86^{a,b,c}	3.240	0.027
WC	40.93±3.21	40.86±2.99	39.56±3.19^{a}	39.26±3.10^{a,b}	2.528	0.043
SBP	118.00±6.39	119.00±4.95^{a}	120.00±2.96^{a,b}	120.00±3.51^{a,b}	7.558	0.000
DPB	76.00±7.23	78.00±4.14^{a}	78.00±4.14^{a}	80.00±4.57^{a,b,c}	4.260	0.009

Values represent the mean ± SD for n=60.
a= P<0.05 compared with baseline
b =P<0.05 compare with one month
c =P<0.05 compared with two months

Table 2: Effect of turmeric on some biochemical parameters of perimenopausal women.

Parameters	Baseline	One month	Two months	Three months	F-value	P-value
Calcium	2.43±0.26	2.43±0.15	2.44±0.14	2.45±0.11^{a,b}	1.074	0.076
FBS	5.13±0.29	4.87±0.37^{a}	4.86±0.40^{a,b}	4.83±0.41^{a}	5.252	0.004

Values represent the mean ± SD for n=60.
a= P<0.05 compared with baseline
b =P<0.05 compare with one month
c =P<0.05 compared with two months

Table 3: Effect of turmeric on lipid profile of perimenopausal women.

Parameters	Baseline	One month	Two months	Three months	f-value	P-value
TC	6.66±1.09	4.46±0.96^{a}	4.25±0.067^{a,b}	4.18±0.68^{a,b,c}	2.756	0.0543
TG	1.54±0.80	1.27±0.50^{a}	1.22±0.39^{a,b}	1.17±0.29^{a,b,c}	3.082	0.0344
HDL-c	0.88±0.34	1.28±0.16^{a}	1.29±0.12^{a}	1.30±0.11^{a,b}	11.63	0.0001
LDL-c	2.59±0.67	2.54±0.71	2.32±0.72^{a,b}	2.22±0.65^{a,c}	0.974	0.0411
VLDL-c	0.70±0.35	0.60±0.22^{a}	0.56±0.17^{a,b}	0.54±0.12^{a,b}	2.760	0.0526

Values represent the mean ± SD for n=60.
a= P<0.05 compared with baseline
b =P<0.05 compare with one month
c =P<0.05 compared with two months

Systolic and diastolic blood pressure were significantly increased to 120.00 ± 3.51 (p=0.000) and 80.00 ± 4.57 (p=0.009) after three months of treatment.

Calcium (Ca) and fasting blood sugar (FBS) measurements at baseline were 2.43± 0.26 and 5.13 ± 0.29 respectively. There was increase in calcium concentration, though not significant but FBS significantly decreased to 4.83±0.41 (p=0.004) after three months of treatment.

Lipid profile at baseline was total cholesterol (6.66± 1.09), triglyceride (1.54±0.80), HDL (0.88±0.34), LDL (2.59 ±0.69) and VLDC (0.70 ± 0.35). Gradual decreases were noticed in TC, TG, LDL-C and VLDL-C while HDL-C had a gradual increase. After three months of treatment TC decreased to 4.18±0.68 (p=0.0545) while HDL increased significantly to 1.30±0.11 (p=0.0001). When the levels of treatment were compared TC and HDL were significant at zero versus one month, zero versus three months and one versus three months.

5. Discussion

Perimenopause also known as menopause transition is characterized by uneven rise and fall of the main female reproductive hormone estrogen[5] causing some anthropometric and biochemical changes. These changes are noticed in weight, waist circumference, blood pressure, calcium (Ca), fasting blood sugar (FBS) and lipids (TC, TG, HDL-c, LDL-c, VLDL-c). In this study, it was found that administration of turmeric decreased the mean body weight and waist circumference of perimenopausal women. The decrease may be due to antioxidant and anti-inflammatory property possessed by curcumin that suppresses inflammatory markers that play a role in obesity[25], [26] ,[27] and thus reduce weight.

Turmeric administered to perimenopausal women moderated systolic and diastolic blood pressure. The moderation may be as a result of anti-inflammatory and antioxidant capacity of curcumin which moderates excess platelet aggregation that occurs in sticky, clot forming blood[28] Calcium — a chemical messenger that tells the muscle to contract is supplied in moderation thereby keeping the arteries in good shape.

Calcium is a vital mineral the body uses to build strong bones and teeth. Its loss in menopause transition causes a serious health challenge-osteoporosis. Menopausal osteoporosis occurs after cessation of estrogen production by the ovaries.[29] The loss of the protective effect of estrogen has direct impact on the maintenance of bone health[30] The report of Wright et al.[31] on ovariectomimized rats found out that turmeric has bone protective effect.

Blood sugar level is one biochemical parameter affected by perimenopause. At this time, estrogen and progesterone level drop and this combination affects blood sugar regulation and puts women at risk for insulin resistance which can promote the development of diabetes[32]

In this study, the fasting blood sugar of perimenopausal women treated with turmeric showed some decreases similar to the report of Homa et al. that supplementation with curcumin (turmeric) in type 2 diabetes causes significant change in fasting blood sugar.[33]

The growing health benefits of turmeric from study shows that the major compounds found in the plant help to reduce some of the symptoms of menopause, diabetes and risks of CVDs[34] The use of turmeric in this study resulted in reduction of TG, TC and LDL-C. Additionally the supplement was found to improve HDL-C. The analysis also showed that prolonged treatment (>2 months) was associated with greater efficacy. This study is in agreement with that of Maithili et al.[34] and Schepker that reported that adding turmeric to drug regimen or food could markedly improve lipid metabolism and fasting glucose levels.[35]

6. Conclusion

This study showed that administration of turmeric for a period of three months greatly regulated some of the biological and clinical changes (biochemical) in perimenopausal women by reducing weight, waist circumference, FBS, TC, TG, LDL VLDL and increasing calcium and HDL while moderating systolic and diastolic blood pressure. Based on the above turmeric has a positive metabolic effect on perimenopausal women.

7. Recommendation

This study suggests that turmeric be used daily as supplement by women of perimenopausal age to help alleviate their menopausal health challenges. Further studies should be carried out to ascertain its possible effect on males undergoing andropause (with metabolic syndrome).

8. Source of Funding

None.

9. Conflict of Interest

None.

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