Scientific Foundation SPIROSKI, Skopje, Republic of Macedonia
Open Access Macedonian Journal of Medical Sciences. 2021 Jan 06; 9(B):64-71.
https://doi.org/10.3889/oamjms.2021.5555
eISSN: 1857-9655
Category: *B - Clinical Sciences*
Section: *Psychiatry*

Menopause Anxiety and Depression; How Food Can Help?

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Edited by: Mirko Spiroski
Citation: Fouad S, El Shebini SM, Abdel-Moaty M, Ahmed NH, Hussein AMS, Essa HA, Tapozada ST. Menopause Anxiety and Depression; How Food Can Help? Open Access Maced J Med Sci. 2021 Jan 06; 9(B):64-71. https://doi.org/10.3889/oamjms.2021.5555
Keywords: Anxiety; Depression; Fatty acids; Menopause; Phytoestrogen
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Received: 02-Nov-2020
Revised: 22-Dec-2020
Accepted: 27-Dec-2020

Funding: The practical work was financial supported by the National Research Centre, Egypt.
Competing Interests: The authors have declared that no competing interests exist

Abstract

BACKGROUND: Anxiety and depression are reported as two major frequent and chief complaints among peri-menopausal women in several societies.

AIM: The objective of the study was to study the effect of using two dietary supplements to beat depression and anxiety associated with menopause.

SUBJECTS AND METHODS: Sixty-six volunteers' menopausal women participated on the study for 8 weeks, 35 subjects consumed daily cookies prepared mainly from soya flour and flaxseed, and 31 females consumed daily a blend composed mainly of raw unroasted peanut and raw sesame. Follow-up was performed with menopause rating scale, anxiety score, depression score, and biochemical parameters.

RESULTS: Soya cookies were rich in plant-based protein and total phenols while blend was a good source of unsaturated fatty acid. Blend consumers showed significant percentage reduction in beck anxiety score and beck depression score after intervention, more than cookies consumers group. The anthropometrics parameters were statistical significant changed on both groups, more on the group who consumed the soya cookies. Soya cookies demonstrated an anti-inflammatory effect, while blend had an antioxidant and anti-inflammatory effects as was shown on the serum assay of interleukin-6 and malondialdehyde as an inflammatory marker and an antioxidant marker, respectively.

CONCLUSION: From the results, it can be concluded that the supplementation of products enriched with unsaturated fatty acid was more beneficial to slow down the psychological menopause symptoms than natural estrogen rich product consumption.

Introduction

Every woman has her own experience for cessation of the menstrual cycle (menopause), but the majority of them have symptoms that negatively affect their life [1]. The most common symptoms that bother women are hot flushes, night sweat, cognitive disorders (memory loss, lack of concentration, inability to learn…), and psychological problems (mood swings, anxiety, and depression) [2]. The psychological symptoms have negative drawback on female's personality, friends, family relationship, and work performance [3]. WHO reported that depression is a leading cause of morbidity, mortality, and suicide [4].

The menopausal symptoms occur because estrogen (the main ovarian endogenous hormone that decreases its secretion in female's body during the time of menopause) affects different parts of their body, including theirs emotions and the brain. Females may begin to experience symptoms at early forty's and can last for many years and even decades [5]. Estrogen hormone is a powerful antioxidant, which prevents lipid peroxidation, the deficiency of estrogen in the time of women' menopause could develop a condition of oxidative stress, with the release of reactive oxygen species and/or free radical, which trigger various pathologies development [6].

Depression occurs frequently in postmenopausal women and it puts a negative turn on everything, as rapid feeling of fatigue, sleep problems, disinterest in any activity, and loss of motivation to work. Depression is explained by the loss of estrogenic effect in modulating neuronal excitability and regulation of the synthesis of tryptophan hydroxylase which is the enzyme responsible for serotonin synthesis [7]. Anxiety can be defined as an unpleasant emotional state of nervousness or agitation without clear or realistic cause. This differs from fear which is a coherent response to a real danger [8].

Diets that contain phytoestrogen can be useful during menopause. Natural estrogen sources are found in plants (soy products as soy beans, tofu, whole soybean flour, soy milk; grains as oats, barley, wheat germ; legumes as red beans and black licorice; seeds as flaxseed, sesame seeds, sunflower seeds, fennel, anise; and nuts as peanuts, pistachios, almonds) [9]. Plant estrogens are scientifically known as phytoestrogens, which have similarity to female

sex hormone estrogen and moreover they provide the human body by important micronutrients, fibers, and proteins [9].

Functional foods are healthy prepared foods that provide different nutrients and more, decreasing the risk of disease [10], [11]. They have benefit to modulate body functions to combat some medical diseases by enhancing different physiological phenomena; soya bakery products improve cognitive functions [12]. The use of functional food and nutraceuticals became common and famous to alleviate menopausal symptoms [13].

The study was designed to evaluate the effect of consumption of two prepared supplements; one was prepared mainly from soya flour as a source of plant rich phytoestrogen and the second was rich on fatty acids, to alleviate the most common two psychological symptoms associated with menopause (depression and anxiety).

Materials and Methods

Composition and preparation of the supplements: (Table 1)

First supplement (formula 1) was prepared by mixing these ingredients (soybean flour, whole wheat flour, corn oil, full cream milk, flaxseed, and anise) with the suitable amount of water to be baked as cookies in an electrical oven (Mondial Forni, Model No: 4T 40/60, Italy) at 200°C for about 20 min [14]. Second supplement (formula 2) was prepared by mixing these ingredients together (raw unsalted unroasted crashed peanut, raw sesame seeds, dry coriander, and dry thyme). Ash, crude protein, fat, and crude fiber contents were determined in the cookies and in the blend according to the methods outlined in A.O.A.C [15]. Carbohydrates were calculated: Carbohydrates = 100 – (% protein + % fat + % ash + % crude fiber) [14].

Table 1: Formulae compositions

Formula (1): Cookies		Formula (2): Blend	
Raw materials	(%)	Ingredients	(%)
Soy bean flour	40	Raw peanut	60
Flaxseed	5	Raw sesame	20
Whole wheat flour	35	Dry coriander	15
Full cream milk	10	Dry thyme	5
Anise seeds	5		
Corn oil	5		

Estimation of Fatty acids contents of the supplements

The fatty acids percentage relative areas of the supplements were assessed using Boron trifluoride methanol reagent [16].

Study design

Postmenopausal females with history of menstrual cessation for 1 year and with follicle stimulating hormone (FSH) blood level higher than 30 mIU/mL were included in this study. Eighty-two postmenopausal women suffering from symptoms of menopause participated as volunteers in this study; they were divided into two groups. Exclusion criteria included: Previous history or family history of depression, life alone, divorced or widow females, caring for aging parents, recent losing a loved person, drug abuse, hormonal replacement therapy, antidepressant and/or sedatives drugs, and recent medical illness; written informed consent from each female was taken. Sixty-six women completed the study for two months, 35 subjects on group (A) who consumed cookies (100 g/day), and 31 women participated on group (B), they consumed 90 gram/day of blend. Full medical history and medical examination, detailed history for gynecological, obstetric, psychological history were taken to select our subjects. Full clinical examination and weekly follow-up of the sample of postmenopausal women participants during the study period were done: Relevant anthropometric measurements were reported (minimal waist circumference, waist hip ratio (WHR), body fat percentage, and body muscle mass) [17].

Menopause rating scale (MRS)

The questionnaire has 11 items to check the presence and the severity of the menopausal symptoms which is classified into three subscales. The calculated total score is the sum of the three subscales scores. The three subscales dimensions are psychological, somatic, and urogenital subscales. Psychological symptoms: 0–16 scoring points (depressed, irritable, anxious, and exhausted felling), somatic symptoms: 0–16 points (night sweating, hot flushes, cardiac complaints, sleeping disorders, and joint and muscle complaints), and urogenital symptoms: 0–12 points (sexual problems, urinary complaints, and vaginal dryness) [18].

- Assess the presence of anxiety and its grade by beck anxiety inventory [19]: The total score was calculated by finding the sum of the 21 items. (Score of 0–21 = low anxiety; Score of 22–35 = moderate anxiety; Score ≥36 = severe anxiety)
- Assess the presence of depression and its grade by beck depression inventory (BDI-II): BDI is calculated by finding the sum of the 21 items corresponding to symptom of depression to give a single score. There is a four-point scale for each item ranging from 0 to 3 [20], [21]

Interpretation of the score:

Total Score	Levels of depression
1-10	These ups and downs are considered normal
11-16	Mild mood disturbance
17-20	Borderline clinical depression
21-30	Moderate depression
31-40	Severe depression
Over 40	Extreme depression

- Analysis of prepared food supplements: Micro and macronutrients contents using NutriSurvey program 2007 – University of Indonesia [22].

Blood sampling and biochemical analysis

Blood samples were drawn from the patients and the blood samples were allowed to clot at the room temperature, centrifuged and sera were separated. Biochemical parameters were performed on sera that were stored at −70°C until used. Quantitative determination of estradiol (E2) concentration by E2 ELISA kit supplied by Chemux BioScience Inc, South San Francisco, USA., catalog number 10,009 [23]. Quantitative determination of FSH concentration in participants' sera by FSH ELISA kit supplied by Chemux Bio Science Inc, South San Francisco, USA., catalog number 10001 [24]. Serum high-density lipoprotein cholesterol (HDL-C) was estimated by enzymatic methods using the kit supplied by Erba Lachema s.r.o., Karásek 1d, 621 00 Brno, CZ [25]. Low-density lipoprotein cholesterol (LDL-C) was calculated according to Friedewald equation: {LDL-C (mg/dl) = TC – HDL-C - TG/5} [26]. Serum lipid peroxide malondialdehyde (MDA) as a marker of oxidative stress and antioxidant status was estimated colorimetrically using thiobarbituric acid reaction method [27]. Quantitative determination of interleukin (IL)-6 concentration as a marker of anti-inflammatory was assessed by human IL-6 ELISA kit supplied by Wuhan EIAab Science Co. Ltd, catalog number E0079h [28]. Soluble human IL-6 receptor was assessed in the sera by IL-6 receptor subunit beta ELISA Kit, supplied by EIAab® Catalog No: E0046h [29]. Normal reference range in serum of IL-6 is <5.00 pg/mL [28] and of IL-6 receptor (sIL-6R) is 25–35 ng/ml, pathological changes and various diseases increase sIL-6R concentrations at least by two to threefold [29].

Statistical analysis

All values were expressed as mean value ±SE. Two tailed student t-test was used to compare between data in the same group and between groups. $p < 0.05$ were considered statistically significant. SPSS window software version 17.0 (SPSS Inc. Chicago, IL, USA, 2008) was used. Changes in different data were expressed as % change from baseline.

Results

Sixty-six volunteers' Egyptian menopausal women participated on the study for 8 weeks, 35 subjects on group A (soya cookies) with mean age 50.86 ± 0.77, and 31 females on group B (blend) with mean age 51.26 ± 1.09. All subjects were employees, highly educated, married, and had offspring, with history of menstrual cessation for 1 year, serum FSH was 52.99 ± 11.01 and 48.85 ± 5.01 mIU/mL on group A and B, respectively.

Table 2: Chemical composition of the supplements

Samples	Ash%	Protein%	Fat%	Fiber%	Total carbohydrate%	Total phenols (Tannins) (µg/100 g)
Cookies	2.98	30.76	11.77	7.52	46.97	7986.54
Blend	2.73	23.04	31.18	16.26	26.79	4851.72

Tables 2 and 3 showed the chemical composition and the nutritional ingredients of the two supplements. The soya cookies are good source of protein, carbohydrate, total phenols, Vitamin D, Fe, zinc, calcium, and folic acid; the protein content represents 30.76%, considering this soya cookie a rich plant-based protein source. It was low in sodium content. While the blend analysis demonstrated that fat content was 31.18% and is mainly unsaturated fat, with allowed level of saturated fatty acid. The blend is an excellent source of many vitamins, minerals, and fiber; these include Vitamin A, Vitamin E, Vitamin B6, B12, thiamine, niacin, riboflavin, folate, potassium, calcium, iron, and zinc.

Table 3: The nutritional contents of the supplements

Macronutrient	Cookies/100 g	Blend/100 g
Calories (Kcal)	416.85	479.94
Protein (% cal. supply)	29.52	19.2
Fat (% cal. supply)	25.41	58.47
Carbohydrate (% cal. supply)	45.07	22.33
Micronutrient		
Vitamin B6 (mg)	0.5	1.69
Vitamin B12 (mcg)	0.55	1.71
Riboflavin (mg) (B2)	0.25	1.76
Niacin (mg)	0.7	1.44
Thiamin (mg) (B1)	0.75	1.8
Folate (mg)	144.12	69
Vitamin C (mg)	0.12	0
Vitamin A (µg)	13.63	17.6
Vitamin D (µg)	5.7	3.58
Vitamin E (mg)	5.13	10.44
Sodium (mg)	24.13	59.2
Potassium (mg)	893.1	936.24
Calcium (mg)	149.75	524.84
Iron (mg)	7.38	8.6
Zinc (mg)	2.62	8.71

Analysis of prepared food supplements using NutriSurvey program 2007.

Table 4 showed the relative areas (%) of fatty acids found on soya cookies and the blend. The major fatty acids found in both supplements were oleic, linoleic, palmitic, and linolenic acids (LAs) in decreasing order, but the fatty acids composition in blend were much more. The ratio between the values of the omega 6 to the omega 3 fatty acid (ω-6/ω-3) was approximately 8:1 and 4:1 on group A and B, respectively.

Table 4: Relative area (%) of fatty acids content of the supplements

Fatty acids	Relative area (%)	
	Soya cookies	Blend
Palmitic (16:0)	5.11	7.64
Palmitoleic (16:1)	0.47	1.14
Stearic (18:0)	2.05	2.28
Oleic (18:1)	27. 76	41.16
Linoleic (18:2)	16.54	27.07
Linolenic (18:3)	2.75	6.04

Table 5: Mean of menopausal symptoms scores, relevant anthropometrics measurements, and biochemical parameters before and after supplements consumption

Parameters	Group A: cookies consumption (n = 35)			Group B: blend consumption (n = 31)		
	Mean ± SE		% Change	Mean ± SE		% Change
	Before	After		Before	After	
Age (years)	50.86 ± 0.77			51.26 ± 1.09		
FSH (mIU/mL)	52.99 ± 11.01			48.85 ± 5.01		
MRS	20.66 ± 1.61	14.49 ± 1.32**[a]	−29.86	20.74 ± 1.81	6.94 ± 1.03**[b]	−66.54**[c]
Hot flushes freq/week	7.09 ± 0.16	2.11 ± 0.15**[a]	−70.24	6.69 ± 0.15	3.35 ± 0.11**[b]	−49.93**[c]
Anxiety score	27.20 ± 2.07	20.54 ± 1.78*[a]	−24.49	26.26 ± 2.70	8.29 ± 1.39**[b]	−68.43**[c]
Depression score	19.80 ± 1.52	15.54 ± 1.06*[a]	−21.52	23.26 ± 1.97	8.19 ± 0.74**[b]	−64.79**[c]
Waist circ. (cm)	89.88 ± 1.39	85.15 ± 1.22**[a]	−5.26	93.65 ± 1.13	91.81 ± 1.22*[b]	−1.96**[c]
WHR	0.78 ± 0.01	0.76 ± 0.01**[a]	−2.56	0.83 ± 0.02	0.82 ± 0.02	−1.20**[c]
%body fat	47.72 ± 0.98	46.39 ± 0.67**[a]	−2.79	46.85 ± 0.83	46.02 ± 0.63	−1.77**[c]
Lean body mass	42.88 ± 0.53	43.70 ± 0.95*[a]	+1.91	43.63 ± 0.34	43.09 ± 0.28	−1.24**[c]
Estradiol (pg/mL)	55.79 ± 4.32	78.17 ± 3.1**[a]	+40.11	54.51 ± 2.61	68.98 ± 2.86*[b]	+26.55*[c]
HDL−C (mg/dL)	41.50 ± 1.42	55.50 ± 1.53**[a]	+33.73	35.05 ± 1.19	39.78 ± 1.05**[b]	+13.49**[c]
LDL−C (mg/dL)	148.06 ± 8.27	120.65 ± 8.28**[a]	−18.51	144.03 ± 6.31	130.95 ± 5.63*[b]	−9.08
MDA (nmol/mL)	6.82 ± 0.42	6.20 ± 0.32	−9.09	5.37 ± 1.08	1.51 ± 0.49**[b]	−71.88**[c]
IL-6 (pg/ml)	9.01 ± 0.12	7.89 ± 0.012**[a]	−12.43	8.25 ± 0.13	7.34 ± 0.14**[b]	−11.03**[c]
IL-6 receptor (ng/ml)	126.90 ± 0.29	119.96 ± 2.87*[a]	−5.47	127.16 ± 0.37	100.55 ± 12.6*[b]	−20.93*[c]

MRS: Menopause rating scale; FSH: Follicle stimulating hormone; WHR: Waist hip ratio; HDL-C: High-density lipoprotein cholesterol; LDL-C: Low-density lipoprotein cholesterol; MDA: Malondialdehyde; IL-6: Interleukin-6; a and b: Before versus. After of group A and group B, respectively. c: % changes group A versus group B. Significant at *p < 0.05 **p < 0.01.

Table 5 demonstrated the mean of the evaluated scores; anthropometrics measurements and biochemical parameters before and after supplements consumption among the studied groups. The two groups were similar in terms of mean age, FSH level, MRS score, hot flush severity, calculated anxiety score, and depression evaluation score at the beginning of the study. The depression and anxiety scores were similar in the two groups (p = 0.61) at the first visit, whereas the scores after the last visit, after 8 weeks of dietary intervention, were highly significantly lower in group B than group A (p = 0.001). When the clinical parameters were compared before and after the dietary interventions within groups, there was a significant difference in both groups in terms of total MRS, beck anxiety score, and beck depression score, with more percentage changes and improvements on group B who consumed the blend. Concerning the anthropometrics parameters, the waist circumference, %body fat, and lean muscle mass were statistical significant changed on both groups, more on group A who consumed the soya cookies.

Considering the biochemical parameters, estradiol E2 was significantly increased in both groups, but more in group A at the end of the study; HDL-C and LDL-C were improved on both group but more on group A; MDA as a marker of oxidative stress and antioxidant status was statistically decreased in both groups, but more in group B; IL-6 as a marker of anti-inflammatory and IL-6 receptors were statistically decreased in both groups (Table 5).

Correlation between the beck anxiety score and beck depression score and different parameters at baseline was tested by Pearson test (Table 6); a significant direct correlation was found between anxiety score and hot flushes severity, mean waist circumference, WHR, depression score, FSH, IL-6, IL-6 receptor, and MDA. No significant correlation was found with estradiol level, HDL-C, and LDL-C. A significant direct correlation was found between depression score and hot flushes severity, anxiety score, IL-6, IL-6 receptor, and MDA, and there was negative correlation with HDL-C. No significant correlation was found with minimum waist circumference, WHR, estradiol level, FSH, and LDL-C.

Table 6: Pearson correlation between anxiety score, depression score, and different variables in the two groups at the start of the study

Parameters	Anxiety	Depression
Hot flushes	0.487**	0.890**
Anxiety	-	0.576**
Depression	0.576**	-
Waist circ.	0.639**	0.155
WHR	0.428*	0.257
FSH	0.621**	0.242
Estradiol	−0.279	−0.187
HDL-C	−0.218	−0.540**
LDL-C	0.027	0.009
MDA	0.431*	0.455**
IL-6	0.454*	0.551**
IL-6 receptor	−0.391*	−0.517**

Numbers presented in this table are the value of r =correlation coefficient. *Correlation is significant at the 0.05 level; **Correlation is significant at the 0.01 level. FSH: follicle stimulating hormone; WHR: Waist hip ratio; HDL-C: High-density lipoprotein cholesterol; LDL-C: Low-density lipoprotein cholesterol; MDA: Malondialdehyde; IL-6: Interleukin-6.

Data presented as percentage of psychological subscale of MRS, anxiety score, and depression score at base line and after 2 months of supplements consumption was demonstrated in Table 7, all participants showed significant improvement in psychological symptoms, anxiety score, and depression score after intervention, more in groups B who consumed the blend. Anxiety was often accompanied by a multiplicity of symptoms as awareness of heart beat, shortness of breath, rapid breathing, muscles spasm of the neck and back muscles, headaches, sleep disturbance, dizziness, and digestive problems.

Table 7: Menopause psychological symptoms scores percentages before and after two months of supplements consumption

Menopausal evaluation questionnaires	Score	Percentage basal	Percentage after cookies supplement	Percentage basal	Percentage after blend supplement
		Soya cookies		Blend	
Psychological subscale of MRS	1	8.6	12.77	10.36	68.47
	2	17.83	19.54	16.94	22.72
	3	29.91	38.75	25.86	8.81
	4	43.66	28.94	46.84	-
BAI	1	29.4	64.7	50	85.71
	2	35.3	23.5	7.14	14.29
	3	35.3	11.8	42.86	-
BDI	1	29.4	35.3	21.43	71.43
	2	11.8	17.6	14.28	21.43
	3	5.9	23.5	-	7.14
	4	41.2	23.5	35.71	-
	5	11.8		28.58	-

Psychological subscale of MRS 1=No 2=Mild 3= Moderate 4= sever. Anxiety score 1=low 2= moderate 3= severe, Depression score 1=normal 2= mild mood disturbance 3=borderline clinical depression 4= moderate depression 5= severe depression. MRS: Menopause rating score. BAI: Beck anxiety inventory, BDI: Beck depression inventory.

Discussion

Although vasomotor symptoms as hot flashes and night sweat get a lot more attention at the time of menopause, another common symptom annoying women like feeling of anxiety or depression. Cognitive, psychological, and emotional disorders are common during menopause; females at this phase of life have to deal with changes in bodies' shapes, bony and muscles pains, night sweat, hot flushes, urogenital problems, and other menopausal symptoms at once [30].

This study was designed to assess the efficacy of the two prepared supplements on two common psychological variables occurring during menopause, depression, and anxiety; the first supplement in the forum of cookies was prepared mainly from soybean flour, whole wheat flour and flaxseed; cookies were good sources of protein, carbohydrate, total phenols, Vitamin D, Fe, zinc, calcium, and folic acid. Soy cookies are low in calories and in fat content (11.77%) with ω-6: ω-3 ratio was approximately 8:1. The chemical analysis of the second supplement prepared from raw peanut and raw sesame seeds demonstrated that fat content (31.18%) was mainly mono- and polyunsaturated fat (oleic, linoleic, and LAs), with allowed level of saturated fatty acid and ω-6: ω-3 ratio was approximately 4:1. The blend was rich in vitamins, minerals, and fiber; these include Vitamin A, Vitamin E, Vitamin B6, B12, thiamine, niacin, riboflavin, folate, potassium, calcium, iron, and zinc. The study demonstrated that both supplements had positive effect on menopausal symptoms. Although soya cookies increased serum estradiol level more than the blend, but psychological subscale of menopause rating scale, beck anxiety score, and beck depression score improved more in the blend consumption group, which proved to have more an antioxidant effect in addition to its anti-inflammatory effect, as demonstrated with assay of the serum antioxidant marker MDA and the serum anti-inflammatory marker IL-6. While, cookies had more an anti-inflammatory, hypolipidemic effects, and more positive effect in the anthropometrics parameters with increase in the lean muscle mass. Reduced IL-6 and MDA level following both food supplements consumption were associated with parallel decrease in anxiety and depression severity. The results of the study shed light on the importance of unsaturated healthy fat consumption for alleviating mood changes and psychological symptoms of menopause.

Soy foods and flax seeds have received a lot of attention as phytoestrogen sources, phytoestrogens mimic endogenous estrogen, because their chemical structure is very similar to that of estrogen secreted from the ovaries, when they reach the circulation, the body's estrogen receptors deal with them as if they were estrogen. Epidemiological studies confirm that Asian females practice hot flushes and night sweat less frequently than the Western women [31], [32]. Diet consumed among the Asians anticipated explaining such proven difference. Asians diets are known to be rich in phytoestrogens; previous randomized studies demonstrated a significant decline in the frequency and severity of the vasomotor symptoms [33]. There are few studies that suggest that phytoestrogens may wield some effects on psychological and mental health, resulting in a better quality of life in peri-menopausal females [34], [35], [36]. The effectiveness of soy and herbal medicines (fennel, red clover, and kava) was assessed in improving depression and anxiety in menopausal women [37]. Overall, soy was found to have a minimal effect on these psychological symptoms [36], fennel had a significant positive effect on menopausal women with depression and anxiety disorder [38], and red clover showed varying effects ranging on these two psychological symptoms [39].

Studies demonstrated that eating a diet rich in whole soy foods such as soya beans and bread prepared from soya flour is healthy, soya bread improved the deterioration in the cognitive functions [40]; but women must avoid the highly processed soya foods, as they have different effects than soy that is found in nature [41]. On 2014, two articles evaluated the effects of Isoflavones in Soyabean as an antidepressant, they do not recommended the use of isoflavones for management of depression; they concluded that no relation exist between isoflavones rich foods and individual urinary isoflavone excretion on depression among postmenopausal women [42], [43]. However, Messina and Gleason on 2016, considered the choice of soya foods or isoflavones as a well-tolerated safe antidepressant, they announced that women may be able to improve perimenopausal-related depression, using isoflavones, as estrogens are implicated in the neurotransmitter systems concerned in the pathophysiology of depression, it increases serotonin receptor binding sites and serotonin uptake in postmenopausal women [44].

While phytoestrogen consumption is considered the common manner for alleviating menopausal depression and anxiety, in the current study, we demonstrated the more beneficial effect of fatty acids in alleviating depression and anxiety symptoms. However, the results did not demonstrate the improving effect on these two psychological problems were related either to the type of fatty acids, or the amount of fat consumption or the ratio of omega-6 to omega-3 in the supplement or multifactor's. After reviewing several existing articles on effect of omega-3s consumption in menopause, published data suggested that omega-3 fatty acids may help to reduce menopausal symptoms with or without another intervention [45]. However, other study concluded that the reduction in hot flashes and night sweat frequency with omega-3 fatty acids intake did not differ significantly from that with placebo, but these studies stated that there were several limitations as the heterogeneity of the parameters used in the original studies and in selection criteria, extension of supplementation period may predict significantly decrease the frequency of occurrence of symptoms [46].

The nutritional quality of any dietary products is determined ideally by the presence of high level of unsaturated fatty acids (linoleic acid, LA, and oleic acid) with lower level of saturated fatty acids (palmitic acid, palmitoleic acid, and stearic acid) [47]. Many women totally depredate fat from theirs foods, and wrongly believe that consumption of fat make them obese. Not all fatty acids are bad, unsaturated fats such as linoleic acid, LA, and oleic acid are necessary and crucial for overall good health. LA is an essential omega-3 fatty acid; it is essential for normal cell function. Dietary sources of alpha-LA are nuts, vegetable oils, flaxseed oil, and soybean oil. The fact is fat if taken in the right form, can surely be healthier [48], [49].

In 2017, a study confirmed the efficacy of flaxseed oil in alleviating biochemical changes associated with postpartum depression, which is considered a predisposing factor for menopause related depression [50]. Different mechanisms of action and theories had been proposed for the role of LA to improve depression. One of them, LA can cross the blood brain barrier and interrelate with mood related molecules inside the brain. Another theory, LA has anti-inflammatory actions that may help in relieving depression. Meta-analyses studies suggested that the omega-3 fatty acids were effectives, but reabilities of these researches are controversial, because of variability between doses and ratios of eicosapentaenoic acid to docosahexaenoic acid (EPA to DHA) [51], [52]. Depressed women who are overweight and have elevated inflammatory markers are good candidates for omega-3 FA supplement [53].

Reduced IL-6 level following diet supplement on both group were significantly associated with significant parallel reductions in depression and anxiety severity, results suggested that IL-6 could be a marker in mood disorder. Previous studies demonstrated that systemic inflammatory state has been practically observed to increase in human with age and this is called “inflamm-aging.” This age-related inflammation discovery was explained by up-regulation of the innate immune mechanisms and reduction in adaptive immune system [54]. In addition aging produces a state of low-grade chronic inflammatory response [54]. Moreover, inflammatory mediators and cytokines released in any state of inflammation and inflammatory diseases, promote the release of IL-6R from the surface of liver cells and different leucocytes as neutrophils, lymphocytes, and monocytes [55]. High serum soluble IL-6 receptor level could be used to discriminate efficiency of treatment in cases of treatment resistant cases of major depressive disease [56].

Conclusion

From the results of this study, it can be concluded that consumption of unsaturated fatty acids rich product to menopausal women showed an improvement in the anxiety and depression symptoms associated with the time of menopause, more efficiency than the benefit to slow down the psychological menopause symptoms with phytoestrogen rich product supplementation. However, the results did not demonstrate the improving effects on these two psychological problems, were related to the amount of fat consumption or the ratio of omega-6 to omega-3 in the product. These data support further study of the benefit of supplementation of fatty acids for alleviating the vasomotor symptoms and other menopausal symptoms during the menopausal phase of female’s life.

Authors’ Contributions

Suzanne Fouad designed research and was responsible for clinical examination and weekly follow up; Nihad H. Ahmed was responsible for preparation and analysis of food supplements by Nutrisurvey program; Maha I. A. Moaty and Hend A. Essa had responsibility for biochemical analysis; Maha I. A. Moaty was responsible for statistical analysis of the data; Ahmed Mohamed Saied Hussein was responsible for chemical analysis of the supplements; Suzanne Fouad wrote manuscript; Salwa M. El Shebini, Maha I. A. Moaty revised the manuscript; Salwa M. El Shebini and Salwa T. Tapozada have primary responsibility for final content. All authors read and approved the final manuscript.

Acknowledgement

The authors would like to acknowledge the volunteers females for their participation in this study. We also express our thanks to National Research Centre in Egypt, for project foundation. The project number “11010188” entitled “Dietary therapy and alternative medicine for alleviating the menopausal symptoms”. The research was given ethical approval from Ethical Committee of National Research Centre with (Registration Number 16/110); Signed written informed consents was a must to participate in the research project after they had been given a full explanation of the study.

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