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Effect of life style modification on premenopausal uterine fibroids: a randomized controlled trial

Wpływ modyfikacji stylu życia na mięśniaki macicy pojawiające się w okresie przedmenopauzalnym: randomizowane badanie kontrolowane

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Abstract

Purpose. This study was designed to investigate the effect of life style modification on premenopausal uterine fibroids. Materials and methods. Forty pre-menopausal women diagnosed as uterine fibroids shared in this study. They were selected randomly from the Out-patient clinic of gynecology department in Damanhour Medical National Institute in Damanhour. Their ages were ranged from 36-47 years old. Their body mass index (BMI) didn't exceed 35 kg/m2. They were diagnosed as subserosal and intramural uterine fibroids. Pregnant women, patients with malignant disease, cardiac pacemakers, myomectomy, psychological problems, postmenopausal patients or hormonal replacement therapy are excluded from study. The design of study was pre-test post-test experimental design. They were divided into two equal groups: Group A (Control group) consisted of 20 patients who received moderate restricted Mediterranean diet for six months. Group B (Study group) consisted of 20 patients who treated by lifestyle intervention program in the form of moderate restricted Mediterranean diet and aerobic exercises (5 times /week) for six months. Each patient in both groups was asked to take 3-4 teabag of Lipton green tea per day. Body mass index (BMI) was assessed by using standard weight-height scale, waist circumference (WC) was assessed by tape measurement; severity of symptoms was assessed by symptoms severity scale questionnaire (SSS) for all patients in both groups A and B before and after treatment. Serum Estradiol (E2), total cholesterol (TC) and triglyceride (TG) were assessed for all patients in both groups A and B before and after treatment. Results. pretreatment, there was no statistical significant difference between both groups A and B in the mean values of BMI, waist circumference, symptoms severity subscale (SSS), serum estradiol (E2), total cholesterol (TC) and triglyceride level (TG). While post treatment, there was statistical significant difference between both groups A and B in the mean values of BMI, waist circumference, symptoms severity subscale (SSS), serum estradiol (E2), total cholesterol (TC) and triglyceride level (TG) (more decrease in group B). Conclusion. Life style modification through aerobic exercise and Mediterranean diet is effective in reducing severity of symptoms and improve quality of life in premenopausal uterine fibroids patients.

Key words:

life style, premenopausal, uterine fibroid, exercise

Streszczenie

Cel. Niniejsze badanie zostało zaprojektowane w celu zbadania wpływu modyfikacji stylu życia na mięśniaki macicy pojawiające się w okresie przedmenopauzalnym. Materiały i metody. W badaniu wzięło udział czterdzieści kobiet w okresie przedmenopauzalnym, u których zdiagnozowano mięśniaki macicy. Zostały one wybrane losowo z Poradni Oddziału Ginekologii w Damanhour Medical National Institute w Damanhour. Ich wiek wahał się od 36-47 lat. Ich wskaźnik masy ciała (BMI) nie przekraczał 35 kg/m2. U kobiet zdiagnozowano podsurowicówkowe i śródścienne mięśniaki macicy. Z badania wykluczono kobiety w ciąży, chore na nowotwory złośliwe, z rozrusznikami serca, po miomektomii, z problemami psychologicznymi, pacjentki po menopauzie lub stosujące hormonalną terapię zastępczą. Projekt obejmował porównanie wyników przed rozpoczęciem i po zakończeniu badaniu. Uczestniczki zostały podzielone na dwie równe grupy: Grupa A (grupa kontrolna) składała się z 20 pacjentek, które prowadziły umiarkowanie restrykcyjną dietę śródziemnomorską przez sześć miesięcy. Grupa B (Grupa badana) składała się z 20 pacjentek, które objęto programem zmiany stylu życia w postaci umiarkowanej restrykcyjnej diety śródziemnomorskiej i wykonywania ćwiczeń aerobowych (5 razy w tygodniu) przez 6 miesięcy. Każda pacjentka została poproszona o wypijanie 3-4 filiżanek zielonej herbaty Lipton dziennie. Wskaźnik masy ciała (BMI) oceniano za pomocą standardowej skali wagowo-wzrostowej, obwód talii (WC) zmierzono metrem; Nasilenie objawów oceniano za pomocą kwestionariusza skali nasilenia objawów (SSS) dla wszystkich pacjentek w obu grupach A i B przed i po leczeniu. Estradiol (E2) w surowicy, cholesterol całkowity (TC) i trójglicerydy (TG) były oceniane u wszystkich pacjentek w obu grupach A i B przed i po leczeniu. Wyniki. Przed leczeniem nie stwierdzono istotnej statystycznie różnicy między obiema grupami A i B w średnich wartościach BMI, obwodu talii, podskali nasilenia objawów (SSS), estradiolu w surowicy (E2), cholesterolu całkowitego (TC) i trójglicerydów (TG). W okresie po leczeniu zaobserwowano statystycznie istotną różnicę między obiema grupami A i B w średnich wartościach BMI, obwodu talii, podskali nasilenia objawów (SSS), estradiolu w surowicy (E2), cholesterolu całkowitego (TC) i poziomu trójglicerydów (TG) (większy spadek w grupie B). Wniosek. Modyfikacja stylu życia poprzez wykonywanie ćwiczeń aerobowych i prowadzenie diety śródziemnomorskiej skutecznie zmniejszają nasilenie objawów i poprawia jakość życia pacjentek z mięśniakami macicy w okresie przedmenopauzalnym.

Słowa kluczowe

styl życia, okres przedmenopauzalny, mięśniak macicy, ćwiczenia

Introduction

Uterine fibroids (UF) are one of the most popular gynecological disorders among premenopausal patients causing morbidity and decrease quality of life due to excessive menstrual bleeding, pelvic pain, and other symptoms. Problems with fertility and pregnancy can also occur. The prevalence of uterine fibroids is higher in black patients than white patients [1]. Uterine leiomyomas (UL) (also called myomas and fibroids) are benign tumors of uterine myometrial tissue that composed of smooth muscle, vascular smooth-muscle, fibroblasts and extracellular matrix (ECM) [2].

Uterine leiomyomas is an estrogen-dependent tumor like to other gynecological disorders tumors. UL has never been reported before age of menarche; and, it may increase in size during pregnancy but decrease after ovariectomy, treatment with gonadotropin-releasing hormone agonist, or postmenopausal, which also suggests that the disease depends on estrogen levels [3]. Estrogen levels in women have an effect on the development of UFs tumors and dietary habits can also have an effect on the stimulation of estrogen metabolism in premenopausal patient hence, high fiber, low fat diet protocol and physical exercise may be an assistant factor in decreasing serum estrogen since women who exercised at least 4 hours per week had lower circulating sex hormones (estrogen), and insulin levels were found to have a slower onset of UFs growth [4].

In premenopausal patient, obesity is associated with menstrual irregularities, early menarche and delayed menopause resulting in increased lifetime exposure to unopposed estrogens and decreased exposure to progesterone. Hence, physical activity could directly influence these pathways by decreasing total body fat levels which reduce the total and bioavailable estrogen levels [5]. A positive correlation was found between uterine myoma volume and BMI ≥ 30.00 kg/m2 due in part to increased levels of free circulating estrogens in these women [6].

Many of causal pathways have been suggested linking obesity to hormonal dependent disease, including estrogen synthesis in adipose tissue, the chronic inflammation resulted from obesity and hyperinsulinemia [7].

Unhealthy lifestyles related to obesity; including physical inactivity and poor diet habits in fruits and vegetables, may increase prevalence of UFs [8].

Anthropometric measure and lifestyle factors influence tumor risks. Overweight and obesity increase the risk of many tumors, including hormone-related disease in women [9]. Obesity has many adverse effects on general health-related quality of life, and advocate obesity management do as a preventative measure against premenopausal hormonal related disease [10]. Body mass index (BMI) changes influence the prevalence of UFs. UFs are found to be three times more prevalent in obese female, specially the one's with central obesity and in those with BMI > 35. This is because peripheral fat conversion and production of circulating estrogen called estrone [11]. Lifestyle modifications such as regular physical activity, preventing the intake of junk food, promoting healthy eating habits and maintaining optimal BMI help to improve general women health. Also improvement of health prevents future problems such as heavy menstrual bleeding, dysmenorrhea, hyperlipidemia, obesity, and infertility [12]. Exercise has positive effects on general women's health, exercise training has established benefits for dyslipidemia, bone health, and preservation of lean mass [13], and decrease the risk for estrogen-dependent tumor and reduction of premenstrual distress [14].

The Mediterranean style dietary pattern is a dietary protocol followed by populations living around the Mediterranean Sea. The dietary pattern is based on the consumption of unrefined carbohydrate, fresh fruit and vegetables, olive products and supplemented very little red meat intake and a strong propensity for fish and seafood [15]. Green tea is a powerful antioxidant. The mechanism of Green tea action appears to be blockage of tumorgenesis by modulating signaling pathways involved in cell proliferation, transformation, inflammation, and oxidative stress [16].

So, this study was conducted to determine the effect of life style modification on premenopausal uterine fibroids.

Material and Methods

Design of the study

The design of study was pre-test post-test experimental design. The study was performed between January 2019 to August 2020.

Participants

Forty pre-menopausal women diagnosed as uterine fibroids shared in this study. They were selected randomly from the Out-patient clinic of gynecology department in Damanhour Medical National Institute in Damanhour, Egypt participated in this study. The patients confirmed their participation in the study by signing a consent form after clarifying the nature, and benefits of the study and their right to drop out from the study at any time. Ethical approval was gained from the institutional review board at Faculty of Physical Therapy, Cairo University before initiating the study [No: P.T.REC/012/003101].

Eligibility criteria

To be included in the study: The patients were diagnosed as subserosal and intramural uterine fibroids by ultrasonography with their ages were ranged from 36-47 years old and their body mass index (BMI) didn't exceed 35 kg/m2. They were irregular menstrual flow length. Participants were excluded from the study if they were pregnant, patients with malignant disease, cardiac pacemakers, myomectomy, psychological problems, postmenopausal patients or hormonal replacement therapy.

Randomization

The patients were assigned randomly into two groups (study group (A) and control group (B) by a blinded and an independent research assistant who opened stamped envelopes that had a randomization card generated by a computer. No subjects withdrew of the study after randomization.

Interventions

The patients were randomly divided into two groups: Group A: (Control group): was composed of 20 patients who received moderate restricted Mediterranean diet for six months. Group B: (Study group): was composed of 20 patients who treated by

lifestyle intervention program in the form of moderate restricted Mediterranean diet and aerobic exercises (5 times /week) for six months.

Mediterranean diet

Moderate restricted Mediterranean diet was used for treatment of patients in both groups. Mediterranean diet with excluded the alcohol component, with high-fiber intake (14 g/1000 kcal each day). Calculating Basal Metabolic Rate (BMR) by the following equation [17].

$$\text{BMR (age 31 to 60)} = \frac{36.4 \times \text{weight [kg]} - 104.6 \times \text{height [m]} + 3619}{4.184}$$

Estimating Total Daily Energy Expenditure (TDEE) was calculated from the table 1. of Activity Multiplier as the following [18].

We gradually decreased 500 kcal/day from the TDEE to lose one pound of (0.5 kg / week) body weight each week.

A meal plan was consisting of protein (15-20% of daily energy requirement), carbohydrate (50-55% of daily energy requirement) and (20- 25%) fat (saturated fatty acids less than 7% of total calories and 1% trans fatty acids). Diet protocol of well balanced, low glycemic load with personalized recommendations to increase intakes of unrefined cereals, vegetables, fruits, olive oil and fish also reduce intake of high-glycemic index foods and saturated fats [19].

Table 1. Activity Multiplier

Sedentary life style	TDEE = BMR x 1.2
Light physical activity	TDEE = BMR x 1.375
Moderate physical activity	TDEE = BMR x 1.55
Heavy physical activity	TDEE = BMR x 1.725
Very strenuous physical activity	TDEE = BMR x 1.9

Aerobic exercises

It was performed by all patients in group B only. Aerobic exercises program started with walking on electrical treadmill for 3-5 times /week, for six months (Fig. 1).

Each session was taken 50 minutes as the following:

- 10 min warming up exercise by walking on electrical treadmill by low speed.
- 10 min cooling down at low speed as in warming up.
- 30 min walking at moderate intensity (65–70% of maximum heart rate for 1–4 weeks and 70–80% of max HR for remainder of study) [20]. The max HR was calculated by subtracting the age from 220 [21].

Advice

Each patient in both groups A and B was asked to take 3-4 teabag of Lipton green tea per day. All patients in both groups were re-evaluated biweekly through follow up visits to note their improvement in body weight.

Outcome Measures

All the assessment procedures were done pre and post treatment:

Body mass index (BMI)

Body mass index was calculated by measuring weight and height by using stander weight-height scale for all patients in both groups A and B before and after treatment according to the following equation:

BMI = weight/height² (Kg/m²) [22].

Waist circumference measurement

A non-stretchable tape measurement was used to measure waist circumference before and after treatment for all women in both groups A& B; mid-way between upper border of the lateral iliac crest and the lower border of the lowest rib at the end of gentle expiration with arm relaxed at body sides and wore light clothes.

Blood sample analysis

Blood samples were obtained for assessment of total cholesterol, triglyceride and follicular phase plasma estradiol levels for both groups before and after treatment.

Blood samples were obtained once and after an overnight fasting.

Symptoms severity subscale questionnaire

It was used to assess symptom severity before and after treatment for both groups. It assessed severity of fibroid-related symptoms (including items that reflect bleeding characteristics, pressure, urinary frequency, and fatigue). The higher the score on the severity subscale of the questionnaire, the greater the severity of symptoms [23].

$$\text{Transformed Score} = \frac{\text{Actual possible score} - \text{actual raw score}}{\text{Possible raw score range}} \times 100$$

Eight questions; these questions use a 5-point Likert-type scale ranging from 1 (not at all) to 5 (a very great deal). The data obtained from this scale are at the ordinal level. The patients received points based upon their response as indicated: 1 point for not at all, 2 points for a little bit, 3 points for somewhat, 4 points for a great deal and 5 points for a very great deal. This section has eight questions total; therefore, scores for this section ranged from 8 to 40 (with scores closer to 40 reflecting greater perceived symptom severity) [24].

Statistical analysis

Results are expressed as mean ± standard deviation. Test of normality, Shapiro Wilk test, was used to measure the distribution of data measured. Accordingly, comparison between variables in the two groups was performed using unpaired t test. Comparison between pre- and post-treatment data in the same group was performed using paired t test. Statistical Package for Social Sciences (SPSS) computer program (version 19 windows) was used for data analysis. P value ≤ 0.05 was considered significant.

Results

The unpaired t test revealed that there was no statistical significant difference in age and height between both group A &B (Table. 2).

Table 2. General characteristics of the two studied groupss

	Group A	Group B	t value	P value	S
Age [yrs.]	27.3 ± 8.36	171.47 ± 8.55	26.15 ± 7.91	171.27 ± 7.41	0.65^{NS}
Height [m]	75.57 ± 12.91	25.54 ± 2.70	76.57 ± 10.76	26.35 ± 5.13	0.746^{NS}

Data are expressed as mean ± SD or number (%). NS = p > 0.05 = not significant

BMI, Waist circumference, Severity symptoms scale questionnaire, Serum Estradiol, Total Cholesterol and Triglyceride level

Within groups

There was a statistically significant decrease in the mean value of BMI, waist circumference, symptoms severity subscale (SSS), total cholesterol (TC) and triglyceride level (TG) post treatment when compared with its corresponding pretreatment value measured in both groups A and B ($p < 0.001$). Serum estradiol (E_2) decreased non-significantly in group A and decreased significantly in group B (Table. 3).

Between groups

Pretreatment, there was no statistical significant difference between both groups A and B in the mean values of BMI, waist circumference, symptoms severity subscale (SSS), serum estradiol (E_2), total cholesterol (TC) and triglyceride level (TG) (Table. 3). Post treatment, there was statistical significant difference between both groups A and B in the mean values of BMI, waist circumference, symptoms severity subscale (SSS), serum estradiol (E_2), total cholesterol (TC) and triglyceride level (TG) (more decrease in group B) (Table. 3).

Table 2. Descriptive and Inferential Statistics of the Dependent Variables in the Experimental and Control Groups Pre and Post the Eight-Week Study Period

Dependent Variables		Pretreatment Mean ± SD	Posttreatment Mean ± SD	Mean Difference	% of change	Within group P-value**
BMI	Group A	33.81 ± 2.37	31.55 ± 2.54	2.26	6.68% ↓↓	0.001 (S)
	Group B	32.99 ± 2.15	28.83 ± 2.34	4.16	12.61% ↓↓	0.001 (S)
	p- value*	0.262 (NS)	0.001 (S)			
WC	Group A	113.15 ± 8.29	103.80 ± 7.74	9.35	8.26% ↓↓	0.001 (S)
	Group B	111.05 ± 8.01	98.88 ± 6.90	12.17	10.96% ↓↓	0.001 (S)
	p- value*	0.421 (NS)	0.001 (S)			
Questionnaire	Group A	56.88 ± 17.70	50.78 ± 16.99	6.10	10.72% ↓↓	
	Group B	50.78 ± 15.24	38.34 ± 15.56	12.44	24.50% ↓↓	0.001 (S)
	p- value*	0.227 (NS)	0.020 (S)			0.001 (S)
Serum E2	Group A	56.39 ± 22.40	50.74 ± 22.49	5.65	10.02% ↓↓	0.247 (NS)
	Group B	55.10 ± 21.28	37.22 ± 19.57	17.88	32.45% ↓↓	0.005 (S)
	p- value*	0.853 (NS)	0.041 (S)			
Total cholesterol	Group A	192.90 ± 41.80	169.9 ± 27.67	23.0	11.92% ↓↓	0.012 (S)
	Group B	207.35 ± 39.56	155.70 ± 31.85	51.65	24.91% ↓↓	0.001 (S)
	p- value*	0.269 (NS)	0.006 (S)			
						0.032 (S)
Triglyceride	Group A	136.50 ± 43.96	126.20 ± 39.36	10.3	7.55% ↓↓	0.001 (S)
	Group B	161.55 ± 43.17	118.40 ± 33.65	43.15	26.71% ↓↓	
	p- value*	0.077 (NS)	0.001 (S)			

Data are expressed as mean ± SD. NS = p > 0.05 = not significant, S = p≤ 0.05 = significant

Discussion

This study was establishes to detect the effect of life style modification through aerobic exercise and Mediterranean diet in reducing severity of symptoms and improve quality of life in premenopausal uterine fibroids patients.

The study's results reported that there was a statistically significant decrease in the mean value of BMI, waist circumference, symptoms severity subscale (SSS), total cholesterol (TC) and triglyceride level (TG) post treatment when compared with its corresponding pretreatment value measured in both groups A and B ($p < 0.001$). Serum estradiol (E_2) decreased none significantly in group A and decreased significantly in group B.

Between groups, pretreatment, there was no statistical significant difference between both groups A and B in the mean values of BMI, waist circumference, symptoms severity subscale (SSS), serum estradiol (E_2), total cholesterol (TC) and triglyceride level (TG).

While post treatment, there was statistical significant difference between both groups A and B in the mean values of BMI, waist circumference, symptoms severity subscale (SSS), serum estradiol (E_2), total cholesterol (TC) and triglyceride level (TG) (more decrease in group B).

Lifestyle modification can reduce the recurrence rate and increase the chance of survival in hormonally mediated disease [25].

He et al. [26] who reported that there was decrease in risk of UFs associated with the intake of green vegetables and regular physical exercise. Hence; the protective effect of intake of vegetables and fruits could be related to excess dietary fibers. Fiber can influence sex hormone and bile acid metabolism though partially interrupting enterohepatic circulation, altering intestinal metabolism and increasing the fecal excretion of these compounds.

Physical activities and exercise are likely to affect the level of estrogen metabolism and body immunity that influences the Portability to uterine fibroid [27]. This study was designed to investigate the effect of life style modification on premenopausal uterine fibroids.

Dietary habits may change the inflammatory response or interact with hormones, stress, aging, and other factors to influence risk of UFs [28].

The results of this study supported by those of Hirko et al. [29], who found that whole grains, vegetables, and other foods rich in fiber may influence estrogen metabolism and have been associated with a decrease plasma estrogen levels in premenopausal women by increasing fecal excretion.

The results of this study also supported by those of Harris et al. [30], who found that decreased prevalence of UFs in women who higher dietary intake of Omega-3PUFA and increased risk of UFs who higher dietary intake trans fatty acid concentrations. Dietary fat habit has estrogenic effects that increase prevalence of UFs.

The results of this study also supported by those of Mancini et al. [31], who found that Mediterranean dietary protocol (MD) resulted in greater weight loss than the low-fat diet. MD was found to improve dyslipidemia up to 50% and reduced risk of developing the metabolic syndrome and increase in levels of healthy biomarkers.

The results of this study also supported by those of Carruba et al. [32], who found that Mediterranean diet for six months reduce (over 40%) of total estrogen levels. MD more effectively reduces estrogens levels hence; provide a basis to create dietary protective pattern for hormonal dependent disease. As estrogen stimulates increase size of UFs.

The results of this study come in consistence with those of Forman [33], who found that low-fat and high-fiber dietary habits have been associated with decline about 7% in E2 level in premenopausal UFs women.

The results of this study also come in consistence with those of Wang and Xu [34], who found that Mediterranean diet has positive effect on reduction of TG; after lifestyle modification and reduce sugar intake.

The results of this study also disagreed with those of Nagata et al. [35], who found no significant associations between UFs and low-fat, high fiber dietary protocols in premenopausal women.

The results of this study also disagreed with those of Bosetti et al. [36], who found that Mediterranean diet as high carbohydrates dietary habit have been suggested to play an important role in the development of UFs. Hence; refined carbohydrates and whole grain cereals influence glycemic index and glycemic load as these variables measure the absorption rate of blood glucose then increase insulin demand.

Roshdy et al. [37], who proved the efficacy of green tea on significant reduction of UFs size and symptoms severity. Inhibitory effects of green tea on catechol-O-methyltransferase (COMT), an enzyme that have recently linked to the pathogenesis of UFs. Green tea is known to be capable of inhibiting (COMT) as it allow the oxidative estrogen metabolism to catechol estrogens that has been postulated to be a factor tumorgenesis.

The results agreed with those of Chen et al. [38], who found that green tea extract for 12 weeks was found to reduce body weight, decreases in BMI, triglyceride levels and decreased total cholesterol. Green tea has been attributed to increase body thermogenesis and fat oxidation.

The results disagreed with those of Hsu et al. [39], who examined the effect of green tea extract on obese women (16–60 years) after 12 weeks. There was no statistical difference in body weight, BMI and WC.

The results of this study agreed with those of Jacoby et al. [40], who found a significant improvement in symptoms severity in premenopausal UFs by complementary and alternative treatments (exercise and diet). Improvement in symptoms severity related to decrease of UFs size.

The results of this study also agreed with those of Kossman et al. [41], who applied aerobic exercise training to high risk of hormonally related tumors premenopausal women and recorded that total estrogen exposure declined by 18.9%. Exercise may offer high-risk women a way to reduce hormone levels and would reducing body weight, BMI and making them physically and psychologically fit.

The results of this study also agreed with those of Williams et al. [42], who found that healthy lifestyle modification (moderate caloric restriction and moderate intensity aerobic exercise) in premenopausal women would produce significant reduction in serum estradiol by 15%.

The results of this study also agreed with those Westerlind and Williams [43], who conducted moderate-intensity exercise pulse moderate calorie restriction and recorded a changes in estrogen metabolism, particularly when a state of negative energy balance is obtained.
The results of this study supported by those of Cho et al. [44], who revealed that, reduced E2 levels, BMI and WC post exercise training. Exercise reduced E2 levels and these changes are secondary to gonadotropin abnormality.
The results of this study also supported by those of Baird et al. [45] reported that premenopausal women receiving regular exercise at least 4 hours per week had lower estrogen and insulin levels and recorded slower onset of UFs development. This explains the nature of exercise as protective against uterine fibroid, breast cancer and other hormonal mediated tumors.
The results of this study come in consistence with those of Ennour-Idrissi et al. [46], who found that exercise training decreases circulating sex hormones. Effect of exercise on estradiol is mediated by weight loss and sequestration of estradiol by increasing levels of binding proteins, as was observed with SHBG levels.
The results of this study also come in consistence with those of Schmitz et al. [47], who found that exercise training decrease follicular phase estrogen. Regular aerobic exercise for five menstrual periods among pre-menopausal patient would result in positive changes in physiologic parameters that have been associated with decrease risk of hormonally related tumor.
The results of this study also come in consistence with those of Huang et al. [48], who found that exercise training after high-intensity focused ultrasound significantly improved the absorption of UFs, reduced recurrence rate and increased the rate of pregnancy in UFs women after 1 year. Also exercise training lead to a more significant reduction in dysmenorrhea score.
The results of this study also come in consistence with Flake et al. [49], who found that dietary habits that are high fiber and low fat may be a contributing factor in decrease serum estrogen in premenopausal women.
The results of this study also come in consistence with those of Galani and Schneider [50], who found significantly reduction in WC, TG and TC as result of lifestyle modification(dietary counseling and physical exercise). Lifestyle modification programs are multi-factorial interventions that are designed for each women or group therapy according to their risk factor status and the needs of the patient.
The results of this study also come in consistence with those of Wong et al. [51], who conducted 12-weeks aerobic exercises training over 30 minutes and noticed a significant reduction in BMI, TG levels, and body weight.
The results of this study also come in consistence with those of Elmahgoub et al. [52], who studied the effect of combined exercise training on physical fitness and lipid profiles. Results indicated that exercises significant decrease in body weight, BMI, waist circumference, TG, and cholesterol.
The results of this study also come in consistence with those of Scott, et al. [53], who found that combined exercise training program and hypocaloric health dietary habits resulted a significant decrease of body weight, WC and positively impact upon health outcomes that influencing long-term prognosis in overweight hormonal dependent disease women.
The results of this study disagreed with those of Tworoger et al. [54], who observed that physical activity and inactivity have limited associations with premenopausal sex hormone (estrogens, and SHBG) and growth factor levels. Anovulation may be only mechanism through which physical activity decrease risk of premenopausal hormonally related conditions.
The results of this study also disagreed with those of Campbell et al. [55], who investigated the association between exercise training program for premenopausal patient and estrogen metabolites. Results indicated that no statistically significant differences between average and highly fit patients in estrogen metabolites either the follicular or luteal phase.
The results of this study also disagreed with those of Pasagian-Macaulay et al. [56], who found that no difference in estrogen metabolism after lifestyle modification (increased physical activity and reduced dietary fat intake)in premenopausal women.

Conclusion

It can be concluded that life style modification through aerobic exercise and Mediterranean diet is effective in reducing severity of symptoms and improve quality of life in premenopausal uterine fibroids patients.

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