# Effect of aerobic exercises on blood coagulationin obese pre and post menopausal women.

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## Abstract

**Background:**Coagulation is a complex process by which blood forms clots.Disorders of coagulation can lead to an increased risk of bleeding (hemorrhage) or clotting (thrombosis).**Purpose:**The aim of this study is to determine the effect of aerobic exercises on blood coagulation in obese pre and post menopausal women.**Materials and Methods:**Forty (pre and post menopausal) women were selected randomly from physical therapy department in El Mahala El Kobara General Hospital.They were divided into: groups (A) and group (B).Their ages ranged from (group A 30-40years) (group B 50-60years). Their body mass indices (BMI) were ranged from 30-40 kg/m$^2$. Both groups (A&B) performed aerobic exercises program on treadmill 3 times /week for 12 weeks. Each session took 30 minutes as follow: 5 min warming up exercise by walking on treadmill at low speed, 20 min walking at sub maximal intensity (60-70 % of maximal heart rate) and 5 min cooling down by walking on treadmill at low speed as in warming up.Blood coagulation that included (Platelet aggregation and fibrinogen) were evaluated in the two groups (A&B) before and after the end of the twelve week.**Result:** The results showed that aerobic exercises have a great effect in reducing blood coagulation in obese pre and post menopausal women. **Conclusion:** It seems that aerobic exercises can be used as a method of reducing risk factors for cardiovascular diseases of inactive obese women.

**Key words:** Aerobic exercises, Blood coagulation, Menopausal women.

## Introduction

Menopause is diagnosed after 12 months of amenorrhea resulting from the permanent cessation of ovarian function at mean age of about 51 years. The pre menopause, a time of changing ovarian function and precedes the final menses by several years **(Marcus et al., 2008).** Menopausal symptoms affect about 70% of women approaching menopause. Common menopausal symptoms are menstrual irregularities that periods may come more frequently, shorten or lengthen, and become light or heavy **(Hopkins and Johan, 1996).**

In early postmenopausal women the amount of the intra-abdominal fat strongly influences insulin sensitivity and plasma triglyceride levels. Accordingly, from a metabolic standpoint it seems most essential to reduce intra-abdominal fat in postmenopausal women **(Rendell et al., 2001).** The prevalence of obesity is increasing world wide and is reaching epidemic proportions. Majority of adults are becoming increasingly overweight and one of the subpopulations in which this prevalence is growing most rapidly is postmenopausal women. 8.3 million population is forecasted to be obese in age of 50 years or older in 2010 **(Wang et al., 2007).** Obesity has been defined as "an increase in body weight resulting from an excessive increase in body fat" **(Loscalzo et al., 2008).**

Obesity is pervasive, affecting people of all ages and at all socioeconomic levels. It is a global problem, affecting an estimated 300 million people worldwide. Its prevalence is increasing in both developed and developing countries throughout the world. It is estimated that in excess of 65% of adults are classified as overweight (with body mass index >25.0 $kg/m^2$), with >30% of adults classified as obese (with body mass index >30 $kg/m^2$) **(World Health Organization, 2002 and Flegal et al., 2002).**

Obesity increases the likelihood of various diseases, particularly heart disease, type 2 diabetes, obstructive sleep apnea, certain types of cancer and osteoarthritis**(Haslam and James, 2005).** Coagulation (clotting) is the process by which blood changes from a liquid to a gel. It potentially results in hemostasis, the cessation of blood loss from a damaged vessel, followed by repair. The mechanism of coagulation involves activation, adhesion, and aggregation of platelets along with deposition and maturation of fibrin. Disorders of coagulation are disease states which can result in bleeding (hemorrhage or bruising) or obstructive clotting (thrombosis) **(David et al., 2009).**

Abnormalities in coagulation and haemostasis represent a well-known link between obesity and thrombosis (both arterial and venous). Several studies have shown that obese patients have higher plasma concentrations of all pro-thrombotic factors (fibrinogen, vonWillebrand factor (vWF), and factor VII) as compared to non-obese controls, with a positive association with central fat **(De Pergola and Pannacciulli, 2002).**

Fibrinolytic activity on postmenopausal women could be improved by a 3-week regular submaximal training program. These changes on the hemostatic factors suggest that short-term aerobic training may prevent the decline in fibrinolytic function observed in sedentary postmenopausal women (**Maturitas, 2009).**

Exercises using muscles consume energy derived from both fat and glycogen. Due to the large size of leg muscles, walking, running and cycling are the most effective means of exercise to reduce body fat. Exercise affects macronutrient balance. During exercise, there is a shift to greater use of fat as a fuel **(Shaw et al., 2006).**

Shear-induced platelet aggregation (SIPA) is important in arterial thrombosis, which is a major contributing factor for atherothromboticocculasion of blood vessels which can be inhibited by exercise training **(Piepoli et al., 2004).** Exercise is extremely important through a women's lifetime and particularly as she gets older. Regular exercise benefits the heart and bones, regulate weight contribute to a sense of overall well-being and improve mood. If a woman is physically inactive, she is far more prone to coronary heart disease, obesity, high blood pressure, diabetes and osteoporosis**l(Jeannette, 2001).**

## Subject, materias and methods

**Subjects:**

Forty (pre and post menopausal) women were selected randomly from physical therapy department in El Mahala El Kobara General Hospital.They were divided into two equal groups; group A (pre menopausal women) and group B (post menopausal women).Their ages were ranged from (group A 30-40years) (group B 50-60years). Their body mass indices (BMI) were ranged from 30-40 $kg/m^2$. Patients who have hepatic diseases, chest diseases, cardiac diseases, smoking, pregnancy, endocrinal disorders, use medication to lose weight and hypertension are excluded from this study.

The study was conducted from March 2016 to Decemder 2016.

**Procedures:**

All women were given a full explanation of the protocol of the study and consent form signed for each women before participating in the study.

**A-Evaluative procedure:**

1- Weight and height measurements.
2- Blood sample.

**Treatment procedure:**

All women in both groups (A&B) performed aerobic exercises program on treadmill 3 times /week for 12 weeks. Each session took 30 minutes as follow: 5 min warming up exercise by walking on treadmill at low speed, 20 min walking at sub maximal intensity (60-70% of maximum heart rate) and 5 min cooling down by walking on treadmill at low speed as warming up.

## Results

**I-General characteristics of patients:**

Results are expressed as mean ± standard deviation (SD). There was no statistical significant difference between mean values ofheight, weight and BMI of group A and those of group B (table 1).

**Table (1): Physical characteristics of patients in both groups (A&B).**

| Items | Group A | | Group B | | Comparison | | S |
|---|---|---|---|---|---|---|---|
| | Mean | ±SD | Mean | ±SD | t-value | P-value | |
| Weight (Kg) | 91.56 | ±10.93 | 92.78 | ±12.24 | -0.33 | 0.741 | NS |
| Height (cm) | 161.65 | ±5.33 | 160.7 | ±7.66 | 0.455 | 0.652 | NS |
| BMI ($Kg/m^2$) | 34.92 | ±3.64 | 35.64 | ±3.35 | -0.648 | 0.521 | NS |

**II-Blood coagulation:**

**(1): Platelet aggregation:**

**a. Ristocetin:**

**1-Within groups:**

As presented in table (2) and illustrated in figure (1), within group's comparison the mean ± SD values ofristocetinein the "pre" and "post" tests were 69.45±3.01 and 73.95±3.67 respectively in the group A. Paired t test revealed that there was highly significant increase of ristocetine at post treatment in compare to pre treatmentwhere their t and P-values were ( t= -7.44, p=0.0001*).

Additionally, the mean ± SD values ofristocetinein the "pre" and "post" tests were 71.05±2.11 and 72.35±1.75 respectively in the group B. Paired t test revealed that there was significant increase of ristocetine at post treatment in compare to pre treatmentwhere their t and P-values were ( t= -4.1, p=0.001*).

**2- Between groups:**

Considering the effect of the tested group (first independent variable) on ristocetin, unpaired t test revealed that the mean values of the "pre" treatment between both groups showed no significant differences where their t and P-values were ( t= -1.942, p=0.06). While, unpaired t test revealed that there was no significant difference of the mean values of the "post" treatment between both groups where their t and P-values were ( t= 1.756, p=0.087).

**Table (2): Mean ±SD and p values of ristocetine pre and post test at both groups.**

| Ristocetin | Pre test | Post test | MD | % of change | t-value | p- value |
|---|---|---|---|---|---|---|
| | Mean± SD | Mean± SD | | | | |
| Group A | 69.45±3.01 | 73.95±3.67 | -4.5 | 6.47 | -7.44 | 0.0001* |
| Group B | 71.05±2.11 | 72.35±1.75 | -1.3 | 1.82 | -4.1 | 0.001* |
| MD | -1.6 | 1.6 | | | | |
| t-value | -1.942 | 1.756 | | | | |
| p- value | 0.06 | 0.087 | | | | |

***Significant level is set at alpha level <0.05 SD: standard deviation**
**MD: Mean difference p-value: probability value**

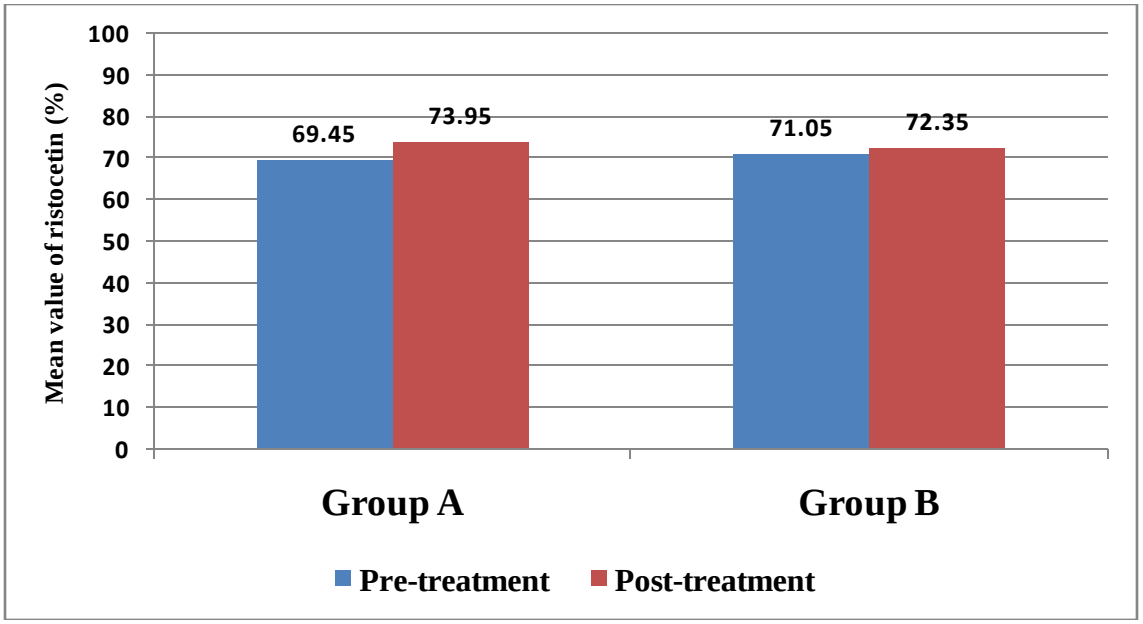


**Figure (1): Mean values of ristocetine pre and post-treatment at both groups**

**b. ADP:**

**1-Within groups:**

As presented in table (3) and illustrated in figure (2), within group's comparison the mean ± SD values of ADP in the "pre" and "post" tests were 58.25±8.21 and 68.95±5.05 respectively in the group A. Paired t test revealed that there was significant increase of ADP at post treatment in compare to pre treatmentwhere their t and P-values were (t= -5.754, p=0.0001*).

Additionally, the mean ± SD values of ADP in the "pre" and "post" tests were 59.55±4.94 and 61.35±5.56 respectively in the group B. Paired t test revealed that there was significant increase of ADP at post treatment in compare to pre treatmentwhere their t and P-values were ( t= -2.764, p=0.012*).

**2- Between groups:**

Considering the effect of the tested group (first independent variable) on ADP, unpaired t test revealed that the mean values of the "pre" treatment between both groups showed no significant differences where their t and P-values were ( t= -0.606, p=0.548). While, unpaired t test revealed that there was significant difference of the mean values of the "post" treatment between both groups where their t and P-values were (t= 4.522, p=0.0001*) and this significant increase in favor of group A than group B.

**Table (3): Mean ±SD and p values of ADP pre and post test at both groups.**

| ADP | Pre test | Post test | MD | % of change | t-value | p- value |
|---|---|---|---|---|---|---|
| | Mean± SD | Mean± SD | | | | |
| Group A | 58.25±8.21 | 68.95±5.05 | -10.7 | 18.36 | -5.754 | 0.0001* |
| Group B | 59.55±4.94 | 61.35±5.56 | -1.8 | 3.02 | -2.764 | 0.012* |
| MD | -1.3 | 7.6 | | | | |
| t-value | -0.606 | 4.522 | | | | |
| p- value | 0.548 | 0.0001* | | | | |

*Significant level is set at alpha level <0.05 SD: standard deviation

MD: Mean difference, p-value: probability value

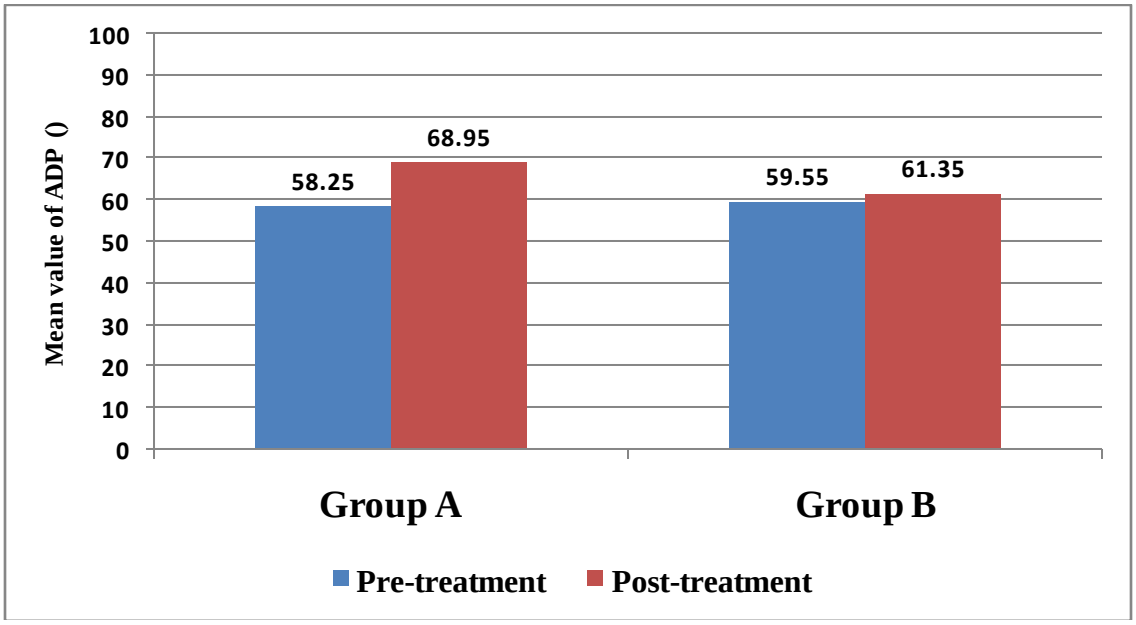


**Figure (3): Mean values of ADP pre and post-treatment at both groups**

**c. Collagen:**

**1-Within groups:**

As presented in table (4) and illustrated in figure (3), within group's comparison the mean ± SD values of collagen in the "pre" and "post" tests were 61.35±14.9 and 69.5±7.55 respectively in the group A. Paired t test revealed that there was highly

significant increase of collagen at post treatment in compare to pre treatmentwhere their t and P-values were (t= -3.669, p=0.002*).

Additionally, the mean ± SD values of collagen in the "pre" and "post" tests were 56.45±18.45 and 61.6±15.11respectively in the group B. Paired t test revealed that there was significant increase of collagen at post treatment in compare to pre treatmentwhere their t and P-values were ( t= -3.305, p=0.004*).

**2- Between groups:**

Considering the effect of the tested group (first independent variable) on collagen, unpaired t test revealed that the mean values of the "pre" treatment between both groups showed no significant differences where their t and P-values were ( t= 0.924, p=0.361). While, unpaired t test revealed that there was significant difference of the mean values of the "post" treatment between both groups where their t and P-values were (t= 2.090, p=0.043*) and this significant increase in favor of group A than group B.

**Table (4): Mean ±SD and p values of collagen pre and post test at both groups.**

| Collagen | Pre test | Post test | MD | % of change | t-value | p- value |
|---|---|---|---|---|---|---|
| | Mean± SD | Mean± SD | | | | |
| Group A | 61.35±14.9 | 69.5±7.55 | -8.15 | 13.28 | -3.669 | 0.002* |
| Group B | 56.45±18.45 | 61.6±15.11 | -5.15 | 9.12 | -3.305 | 0.004* |
| MD | 4.9 | 7.9 | | | | |
| t-value | 0.924 | 2.090 | | | | |
| p- value | 0.361 | 0.043* | | | | |

***Significant level is set at alpha level <0.05 SD: standard deviation**

**MD: Mean difference, p-value: probability value**

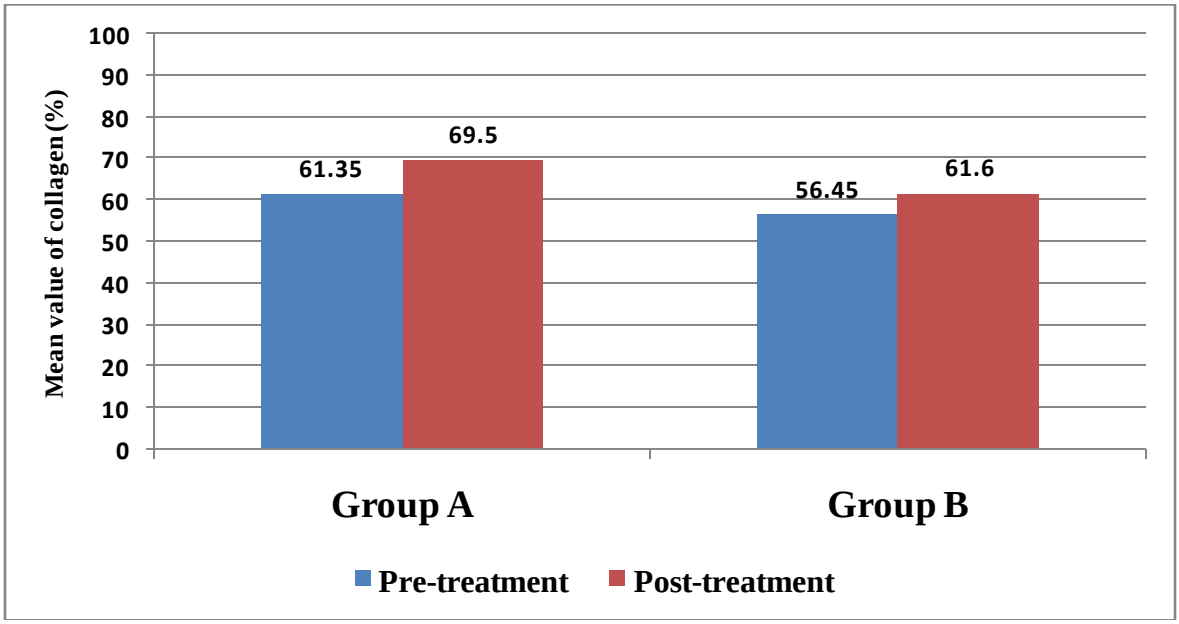

Figure (4): Mean values of collagen pre and post-treatment at both groups

**(2): Fibrinogen:**

**1-Within groups:**

As presented in table (5) and illustrated in figure (4), within group's comparison the mean ± SD values of fibrinogen in the "pre" and "post" tests were 301.85±63.05 and 237.75±34.17 respectively in the group A. Paired t test revealed that there was highly significant reduction of fibrinogen at post treatment in compare to pre treatmentwhere their t and P-values were (t= 6.596, p=0.0001*).

Additionally, the mean ± SD values of fibrinogen in the "pre" and "post" tests were 292.9±68.97 and 264.1±4.91 respectively in the group B. Paired t test revealed that there was significant reduction of fibrinogen at post treatment in compare to pre treatmentwhere their t and P-values were ( t= 3.529, p=0.002*).

**2- Between groups:**

Considering the effect of the tested group (first independent variable) on fibrinogen, unpaired t test revealed that the mean values of the "pre" treatment between both groups showed no significant differences where their t and P-values were ( t= 0.428, p=0.671). While, unpaired t test revealed that there was significant difference of the mean values of the "post" treatment between both groups where their t and P-values were (t= -2.179, p=0.036*) and this significant reduction in favor of group A than group B.

**Table (5): Mean ±SD and p values of fibrinogen pre and post test at both groups.**

| Fibrinogen | Pre test | Post test | MD | % of change | t-value | p- value |
|---|---|---|---|---|---|---|
| | Mean± SD | Mean± SD | | | | |
| Group A | 301.85±63.05 | 237.75±34.17 | 64.1 | 21.23 | 6.596 | 0.0001* |
| Group B | 292.9±68.97 | 264.1±4.91 | 28.8 | 9.83 | 3.529 | 0.002* |
| MD | 8.95 | -26.35 | | | | |
| t-value | 0.428 | -2.179 | | | | |
| p- value | 0.671 | 0.036* | | | | |

***Significant level is set at alpha level <0.05 SD: standard deviation**

**MD: Mean difference, p-value: probability value**

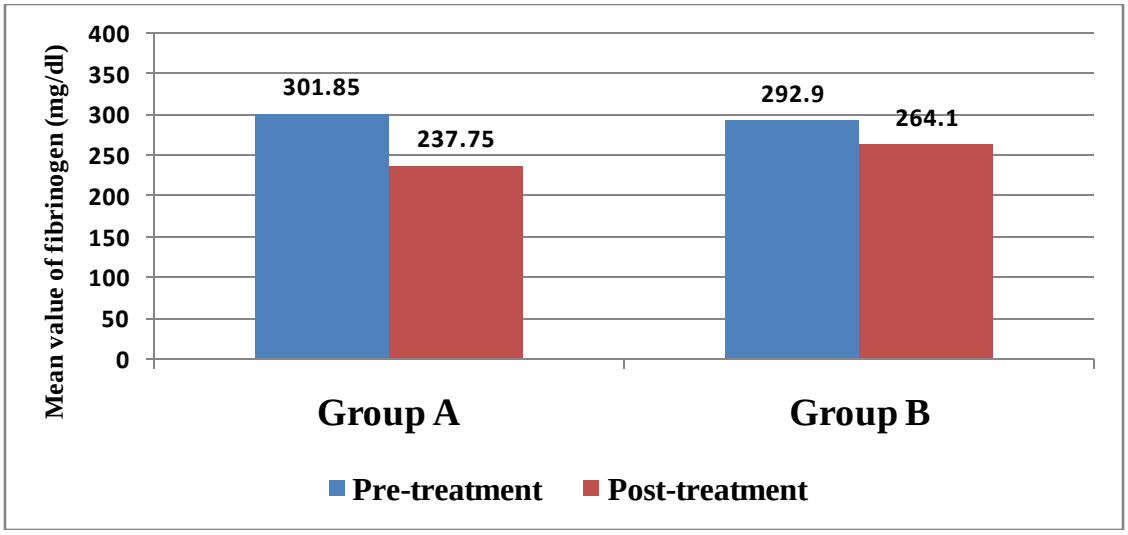


**Figure (5): Mean values of fibrinogen pre and post-treatment at both groups.**

## Discussion

Blood coagulation plays a critical role not only in homeostasis but also in many physiological and pathological conditions. Blood coagulation potential in humans as well as other mammals reaches a young adult level around the time of weaning, followed by a gradual increase during young adulthood and an almost 2-fold increase by old age. This advancing age associated increase in coagulation potential takes place in healthy centenarians indicating that the increase is a normal age associated phenomenon. However, it is conceivable that in the general human population, such increases in blood coagulation potential may substantially contribute to the development and progression of age associated cardiovascular and thrombotic disorders. This increase in blood coagulation potential is apparently due to the collective effects of increases in the plasma level of procoagulant factors, combined with only marginal increases or even decreases in the plasma levels of anticoagulation factors (such as antithrombin III and protein C) or of factors involved in fibrinolysis **(Lowe et al., 2007)**.

Advancing age is associated with an increased risk of CVD in general and atherosclerotic vascular disease in particular. In women, the incidence of both CVD and thrombosis increases after the onset of menopause. It has been suggested that age-related changes in coagulation and fibrinolytic factors contribute to the increased risk of atherothrombotic events in postmenopausal women by accelerating the atherosclerotic process and promoting thrombus formation. Indeed, higher plasma concentrations of fibrinogen and fibrin D-dimer, both markers of thrombogenic risk, and reduced endogenous fibrinolytic activity have been reported in healthy postmenopausal compared with premenopausal women **(Gensini et al., 2006)**.

Plasma fibrinogen is an important component of the coagulation cascade, as well as a major determinant of blood viscosity and blood flow. Increasing evidence from epidemiological studies suggests that elevated plasma fibrinogen levels are associated with an increased risk of cardiovascular disorders, including ischaemic heart disease (IHD), stroke and other thromboembolism. This increase in plasma fibrinogen levels may promote a prothrombotic or hypercoagulable state, and may in part explain the risk of stroke and thromboembolism in conditions such as atrial fibrillation (AF).

Plasma concentrations of fibrinogen generally increase with age. This age-related increase in plasma fibrinogen may be due to a slower rate of disposal of fibrinogen, rather than an increased production rate **(Fu and Sreekumaran, 2008)**.
The present study was conducted to determine the effect of aerobic exercises on blood coagulation in pre and post menopause in obese women.

Forty (pre and post menopausal) women were selected randomly from physical therapy department in El Mahala El Kobara general hospital shared in this study. They were divided into two equal groups A (pre menopausal women), B (post menopausal women). Their ages ranged from (group A 30-40years) (group B 50-60years). Their body mass indices (BMI) were ranged from 30-40 $kg/m^2$. Both groups (A&B) performed aerobic exercises program, in the form of treadmill 3 times /week for 12 weeks. Each session took 30 minutes as follow: 5 min warming up exercise by walking on treadmill at low speed, 20 min walking at sub maximal intensity (60-70 % of maximal heart rate) and 5 min cooling down by walking on treadmill at low speed as in warming up.

Blood coagulation that included (Platelet aggregation and fibrinogen) were evaluated in the two groups at two intervals, the starting of the study and at the end of the twelve week (post exercises program).

The results of this study showed that there was a significant increase in platelet aggregation (Ristocetin, ADP and Collagen ) in both groups (A&B) after aerobic exercises, and there was a significant decrease in fibrinogen in both groups(A&B) after aerobic exercises. Result showed also there was no significant difference between both groups (A&B) before aerobic exercises in platelet aggregation and fibrinogen, but showed there was a significant difference between both groups (A&B) after aerobic exercise in fibrinogen and collagen in favor of group A.

Thus the results found that there was a significant reduction in blood coagulation in obese women pre and post menopause.

The results of the study agreed with **(Wolfgang, 2000)** who showed that inhibition of the coagulation system is accompanied by an increase in the fibrinolytic capacity in healthy subjects. However, patients with ischemic heart disease, who cannot increase their fibrinolyticpotential may be at considerable risk for ischemic events if they are exposed to unaccustomed strenuous physical exertion. It is concluded that physical activity has profound effects on thrombogenic factors and that these mechanisms could contribute to its beneficial cardiovascular effects.
Also the results of this study agreed with **(Smith, 2003)** who approved that both the coagulation and fibrinolytic cascades are stimulated by strenuous exercise.
The results of this study also supported by **(Faxon et al., 2004)** who examined 60 obese subject men and women for 3 month with moderate aerobic exercise. They approved that platelet aggregation improved significantly after exercise with the use of ADP and collagen as inducing agent. Normal volunteers showed significanty greater inhibition of plasma aggregation when compared with hypertensives and patients with coronary artery disease with use of both ADP and collagen.
The results of this study agreed with those of**(Dill and Costill, 2004)** who said thatexercise induced hyperfibrinogenolysiswas suggested as a plausible mechanism mediating fibrinogen reduction after the exercise. It is known that prolonged exercise is usually associated with an expansion of plasma volume.
The results of this study also agree with **(National Institute of health$_B$, 2005)** approved that regular moderate intensity physical exercise improve platelet

aggregability as a consequence of increasing level of tissue plasmiogen activator and reducing level of plasminogen activator inhibitor -1. In addition, the exercise association improvement in the lipid profile and reduction in fat mass may decrease blood coagulation, as well as increase fibrinolysis. Thus, it can be hypothesized that physical exercise training has apowerfull beneficial impact on blood coagulation and fibrinolysis.

The results of **(Pitsavos et al., 2005)** matches with present study result. A randomized trial was done to study the associations between physical activity, inflammation and coagulation markers in people with metabolic syndrome. They approved that the adoption of aphysically active lifestyle is independenty associated with lower level of the investigated blood coagulation in individuals with the metabolic syndrome. The latter may suggest a pathway for reducing cardiovascular events, even in high-risk people .

The results of study supported by **(Desouza et al., 2007)** whoapproved that increased fibrin deposition caused by increasing activity of Tissue–Type plasminogen activator (t-PA) antigen, have a major role in occurrence of atherosclerosis and thrombosis diseases. Activation of t-PA in women during postmenopausal period that had regular physical activity decreased in comparison with sedentary individuals, as a result, deposition of fibrin decrease in their vascular walls. Also increased (fibrin D-Dimer) level is a special product of the enzymatic activity of plasmin on fibrin that is deposition formation factor of fibrin and atherosclerosis occurrence. This factor also increased by aging. Also, Regular exercises reduce fibrin D-dimer and thus have impact on formation of fibrin. However, plasma fibrinogen may be reduced by increasing blood plasma (reduction in viscosity) that help reduce the risk of atherosclerosis, that seems to be the effect of regular exercises.

The results of the study agreed with those of**(Kestin et al., 1993 and Lekakis et al., 2008)** who said that aerobic exercise reduces pro-inflammatory cytokines and induces the expression of antioxidant and anti-inflammatory mediators in vascular wall. These changes directly inhibit the progression of atherosclerosis. In fact it is well known that pro-inflammatory cytokines, such as transforming growth factor and interferon produced in early atherosclerotic lesion by activated immune cells are involved in the progression of atherosclerosis. Moreover to confirm the role of exercise in the modulation of cytokines production recent finding have demonstrated that skeletal muscle is an endocrine organ able by exercising to stimulate the production and the release of cytokines which in turn can influence and modify cytokine production in other tissues and organs. By that physical exercise decreasing blood coagulation, plasma fibrinogen levels and platelet activation stimulation.Fibrinolytic enzymes and increasing tissue plasminogen activator prevent atherosclerosis, unstable coronary syndromes and acute myocardial infarction.

The results also agreed with **(Shahla and Mohammad, 2013)** in randomized trail 23 healthy and enable to do physical activity old women of Shahrekord (Chaharmahalvabakhtiary province, Iran) retirement home. Subjects were randomly divided to two groups including study (n=14 individuals) and control (n=11individuals). First, for assessment of fibrinogen level, 5cc blood samples were obtained after 8 hours nightly fasting from anterior vein in resting condition. Study group was participated in 8 week (three times a week) low impact aerobic exercise (LIA) training program (15 min in first day with 40% of maximum heart rate until 40 min in last day with 65% of maximum heart rate). All measurements repeated at the end of 8 week training. The obtained results showed that 8 week LIA program has significant effect on reduction of old women plasma fibrinogen level (P=0.02). It

seems that use of 8 week LIA training has positive effects on improvement of cardiovascular health and prevention of inflammatory disease related to plasma fibrinogen level in Iranian old women.

In agreement with present study a randomized, controlled trial was done by **(Ali et al., 2014)**to investigate the effect of 8 weeks aerobic training on CRP and fibrinogen levels in inactive middle-aged women. 40 female volunteers aged 50-60 years were randomly divided into two groups: aerobic training (n=20) and controls (n=20) groups. The subjects participated in progressive aerobic training on treadmill three times a week (15) minutes per session (50 % maximum heart rate) to 40 minutes (60 % maximum heart rate). Study variables before and after intervention in both groups were measured. Data analysis was performed using paired and independent t tests. Research findings showed significant decrease in CRP (p=0.011) and fibrinogen (p=0.044) in post test compared to pretest. Also research findings showed that CRP (p=0.019) levels between the two groups. It seems that aerobic exercise can be used as a method of reducing risk factors for cardiovascular diseases of inactive middle aged women. The findings showed that fibrinogen levels in the aerobic training decreased significantly compared to the pretest and posttest, but after 8 weeks, a significant difference in fibrinogen levels between the two groups. possibly adaptation of this loss is regular exercise, directly or indirectly, through control of inflammatory cytokine production in the liver.

In contrary to our result **(Pediatr et al., 2002)** determined the relation of hemostatic markers to cardiovascular fitness and adiposity and the effect of physical training on these markers. Obese females were randomly assigned to group of lifestyle education and group of lifestyle education plus moderate intensity physical training. They concluded that unfavorable levels of fitness and adiposity were associated with higher level of hemostatic markers putting individuals with this profile at greater risk for future cardiovascular disease. No evidence was provided that physical training had a direct influence on these marker in obese females.

On other hand **(Moosavi and Habibian, 2012)** found that aerobic exercise increase the fibrinogen level in comparison with resistive training. This study was done on trained volunteer women the subject were randomly divided into two groups of aerobic and resistance training. Following 12 to 14 hours of nightly fasting, venous blood samples were collected pre, immediately after exercise and after 60 min of recovery and analyzed for fibrinogen content. In both the aerobic and resistance training group fibrinogen levels increased immediately after exercise and remained higher than baseline levels during recovery. This changes were significant only in aerobic group. This difference in result from our study may be due to short period of this study as our study took 3 month but this study took 6 week.

## conclusion

On the basis of the results obtained in the present study, it can be concluded that aerobic exercise have a great effect in reducing blood coagulation in obese women pre and post menopause. It seems that aerobic exercise can be used as a method of reducing risk factors for cardiovascular diseases of inactive obese women.

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# تأثير التمرينات الهوائية على تجلط الدم لدي السيدات البدينات قبل وبعد إنقطاع الطمث.

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## المستخلص

**الخلفية:**تجلط الدم عملية معقدة وعن طريقها يتم تحويل الدم إلي جلطات والخلل في عملية تجلط الدم قد يؤدي إلي زيادة خطر حدوث نزيف دموي أو تجلط للدم غير مرغوب فيه. الغرض من هذه الدراسة تحديد تأثير التمرينات الهوائية علي تجلط الدم لدي السيدات البدينات قبل وبعد إنقطاع الطمث. اختيرت أربعون سيدة (قبا وبعد إنقطاع الطمث) بطريقة عشوائية من مستشفي المحلة العام. تم تقسيمهن إلي مجموعتين متساويتين مجموعة (أ) قبل إنقطاع الطمث ومجموعة (ب) بعد إنقطاع الطمث. تراوحت أعمارهن بين (المجموعة أ من 30-40 عام) ، (المجموعة ب من 50-60 عام). ومؤشر كتله أجسامهن تراوحت بين 30-40 كجم/م$^2$ .كلتا المجموعتين (أ ، ب) مارست برنامج التمرينات الهوائية علي المشاية الكهربائية بسرعة بطيئة ، 20 دقيقة مشي علي المشاية الكهربائية علي شدة تحت القصوي ( 60-70% من أقصي عدد لنبضات القلب) ، 5 دقائق تهدئة عن طريق المشي علي المشاية الكهربائية بسرعة بطيئة مثل فترة الإحماء. تم تقيم تجلط الدم ال ذي يشتمل علي (تراكم الصفائح الدموية و الفيبرينوجين) في المجموعتين في فترتين : في بداية الدراسة وفي نهاية 12أسبوع (بعد برنامج التمرينات). **النتيجة:** أظهرت نتائج هذه الدراسة أن هناك زيادة ذات دلالة إحصائية في تراكم الصفائح الدموية في المجموعتين (أ، ب) بعد التمرينات الهوائية ، وأن هناك نقصان ذات دلالة إحصائية في الفيبرينوجين في المجموعتين (أ ، ب) بعد التمرينات الهوائية.أوضحت النتائج أيضا عدم وجود إختلاف ذات دلالة إحصائية بين المجموعتين (أ ، ب) قبل التمرينات الهوائية في تراكم الصفائح الدموية والفيبرينوجين ، ولكن هناك أختلاف ذات دلالة إحصائية بين المجموعتين (أ ، ب) بعد التمرينات الهوائية في الفيبرينوجين والكولاجين لصالح المجموعة أ.

**الملخص:** أوضحت نتائج هذه الدراسة وجود نقصان ذات دلالة إحصائية في تجلط الدم في السيدات البدينات قبل وبعد انقطاع الطمث.وبالتالي يمكن أستخدام التمرينات الهوائية كوسيلة من وسائل الحد من عوامل الخطر لأمراض القلب والأوعية الدموية لدي السيدات البدينات.أوضحت نتائج هذه الدراسة وجود نقصان ذات دلالة إحصائية في تجلط الدم في السيدات البدينات قبل وبعد انقطاع الطمث.

**الكلمات الدالة:** التمرينات الهوائية، تجلط الدم، السيدات بعد إنقطاع الطمث .