OBESITY AS ENVIRONMENTAL RISK FACTOR FOR REPEATED PREGNANCY LOSS IN PATIENTS WITH ANTIPHOSPHOLIPID SYNDROME

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El-Bokary, M. S.[(1)]; Salah El-Din, S. M.[(2)] and Hathhout, Azza, M.
1) Institute of Environmental Studies and Research, Ain Shams University
2) Obstetrics and Gynecology department, Obstetrics, and Gynecology department, Faculty of medicine, MenofieyaUniversity

ABSTRACT

Introduction: Antiphospholidsyndrome (APS) is an autoimmune hypercoagulablestate caused by antiphospholid antibodies. Primary antiphospholipidsyndrome occurs in absence of any other related disease. Secondary antiphospholipid syndrome occurs with other autoimmune disease as systemic lupus erythrematosis. The clinical features of the APS are various, but the most common clinical presentation is pregnancy loss, DVT. Pulmonary thromboembolism, the cardiac manifestations of APS include myocardial infarction, pericardial effusion, myocardiopathy, and coronary artery thrombosis, but the most common manifestation is valvular abnormalities.

Aim: to investigate the influence of obesity in women diagnosed as an antiphospholipid cases according to Sydney's criteria on pregnancy morbidities, vascular events, pulmonary thromboemboism and laboratory criteria.

Methods: A case control study was conducted that include women attending obstetric outpatient clinic. These women were previously diagnosed as antiphospholipid cases according to (Sydney's criteria).A total of 60 women have been equally divided into two groups: First group corresponds to control group which includes 30 women with normal body mass index (BMI) i.e. < 30 Kg/m2 and, second group include 30 obese women with (BMI > 30Kg/m2).

Results: Obesity is independent predictor for preterm birth intrauterine fetal death and pulmonary thromboembolism.

Conclusion: Obesity is associated with worth pregnancy outcomes in patients with primary antiphospholipid syndrome.
Keywords: Antiphospholipid syndrome, Obesity, Pregnancy morbidities, Vascular events, Pulmonary thromboembolism, Antiphospholipid antibodies.

INTRODUCTION

The antiphospholipid syndrome (APS) is an autoimmune disease characterize by arterial and venous thrombosis due to antiphospholipid antibodies. The disorder is referred to as primary when it occurs in the absence of another autoimmune disease. Secondary APS occurs in the context of an autoimmune disorder such as systemic lupus erythematosus. The catastrophic APS (CAPS) is a rare life-threatening form of APS in which widespread intravascular thrombosis results in multiorgan ischemia and failure (Cervera *et al*., 2009 ;Nayer and Ortega, 2014).

The other major clinical manifestations of the antiphospholipid syndrome are obstetrical. They include the unexplained death of one or

more morphologically normal fetuses at or beyond the 10th week of gestation, the premature birth of one or more morphologically normal fetuses before the 34th week of gestation because of either eclampsia or severe preeclampsia, and three or more unexplained, consecutive spontaneous abortion before the10thweek of gestation (Lochshin *et al*.,2006; Giannakopoulos and Krilis,2013).

These Cases with poor obstetric outcome are known to have obstetric antiphospholipid syndrome (OAPS) (Alijotas-Reig *et al*., 2012; Alijotas-Reig *et al*.,2014).

The clinical features of the APS are various, but the most common

clinical presentation is pregnancy loss, deep venous thrombosis (DVT) (Cervera et al., 2002; Ye *et al*., 2005). Pulmonary thromboembolism, the cardiac manifestations of APS included (myocardial infarction, pericardial effusion, myocardiopathy, and coronary artery thrombosis, but the most common manifestation is valvular abnormalities) (Espisonsa *et al.,* 2002; Ye *et al.*,2005).

AIM OF THE WORK

The aim of the current study is to investigate the influence of obesity in women diagnosed as having antiphospholipid syndrome (according to Sydney's criteria) on pregnancy morbidities, vascular events, and pulmonarythromboemboism and laboratory criteria.

PATIENTS AND METHODS

A case control study was conducted that include women attending obstetric outpatient clinic. These women were previously diagnosed as antiphospholipid cases according to (Sydney's criteria).

Due to scarcity of antiphosphoipid cases, women participating in this current study were collected from outpatient clinic of three hospitals, Boulak El Dakror General Hospital, Embaba General Hospital and Om Elmasrein GeneralHospital.

The period of the study was about 24 months from august 2015 till August 2017.

Thrombotic events both venous and arterial of every patient were analyzed, pregnancy morbidities included in Sydney's classification were evaluated also laboratory investigations included in Sydney's criteria were

examined and then among 200 patient with antiphospholipid syndrome attending the outpatient clinics of the three hospitals, 60 patients were selected to participate in this study.

A written consent to take part in the study was obtained. Refusal to participate in the study was an obvious exclusion criteria.

Inclusion Criteria: Women who were previously diagnosed as having antiphospholipid syndrome as described by Sydney's criteria.

According to Sydeny's criteria; APS is diagnosed when at least one of the following clinical criteria and one of the following laboratory criteria are met.

Laboratory Criteria:

1) Lupus anticoagulant (LA) present in plasma, on two or more occasions at least 12 weeks apart, detected according to the guidelines of the International Society on Thrombosis and Haemostasis.
2) Anticardiolipin (aCL) antibody of IgG and/or IgMisotype in serum or plasma, present in medium or high titer, on two or more occasions, at least 12 weeks apart, measured by standardized ELISA.
3) Anti 2glycoprotein-1 antibody of IgG and/or IgMisotype in serum or plasma (in titer >99th percentile), present on two or more occasions, at least 12 weeks apart, measured by standardized ELISA (Marchetti *et al*.,2013).

Clinical Criteria:

1) 1 unexplained fetal deaths ≥10 weeks of gestation with normal anatomy by prenatal ultrasound examination or direct postnatalexamination.
2) ≥1 preterm deliveries of a morphologically normal infant before 34 weeks of gestation due to severe preeclampsia, eclampsia, or features consistent with placentalinsufficiency.
3) ≥3 unexplained, consecutive, spontaneous pregnancy losses <10 weeks of gestation, after exclusion of maternal anatomic and hormonal abnormalities and paternal and maternal chromosomal abnormalities (Charles & Michael, 2017).

Exclusion Criteria:

- Women who didn't have obstetric morbidities or have obstetric morbidities but were not as described in Sydney's criteria.
- Women with pregnancy losses explained by infectious, metabolic, anatomical or hormonal factors or maternal and paternal chromosomaldiseases.
- Women with history of hepatitis B virus, hepatitis C virus or human immunodeficiency virus infection as well as those with non-organ systemic autoimmunedisease.
- Women with negative laboratory criteria as described in Sydney'scriteria.

A total of 60 women have been equally divided into two groups: First group corresponds to control group which includes 30 women with normal BMI i.e. < 30 Kg/m2 and are not smokers, second group include 30 obese women with (BMI > 30 Kg/m2).

All eligible patients were submitted to the following:

1) Careful historytaking:

- Age and duration ofdisease.
- Number of full termpregnancy. 3- Number of earlymiscarriage.
- Number of midtrimestericabortions.
- Number of preterm deliveries of morphologically normal infantbefore 34 weeks of gestation due to severe preeclampsia, elcampsia or features consistent with placental insufficiency.
- Unexplained fetal death or stillbirth
- Unexplained second or third trimester fetaldeath.
- Full data about any previous thrombotic event either venous orarterial

2) Clinicalexamination

- General and abdominal examination: to exclude any medicalproblem.
- Gynecological examination; to exclude any gynecological cause of pregnancymorbidities.
- Laboratory investigations: laboratory assay foranti-
- phospholipid antibodies (apL) in two occasions at least 12 weeks apart.
- The resultant data was tabulated and statistical analysis wasdone.

STATISTICAL METHODS

Data were analyzed using SPSS© Statistics version 23 (IBM© Corp., Armonk, NY, USA).

Categorical variables were presented as number and percentage and between-group differences were compared using Fisher's exact test.

Normality of numerical data distribution was examined using the Shapiro-Wilk test. Normally distributed numerical variables were presented as mean ± SD and inter-group differences were compared using one-way analysis of variance (ANOVA) with application of the Tukey-Kramer test for multiple Pairwise comparisons if there was a statistically significant difference among thegroups.

Multivariable binary logistic regression analysis was used to examine the relation between obesity and individual disease manifestations or outcomes as adjusted for other confoundingfactors.

Two-sided p-value <0.05 was considered statistically significant.

RESULTS

Table (1): Relation between obesity and manifestations ofdisease

Variable	Non-obese (n=30)	Obese (n=30)	p-value*
Age (years)	28.5 ± 7.4	27.5 ± 7.9	0.530
Duration of disease (months)	57.0 ± 39.0	89.2 ± 68.6	0.022
Recurrent early miscarriage(REM)	28 (46.7%)	16 (53.3%)	0.656
Premature birth (PMB)	21 (35.0%)	15 (50.0%)	0.181
Intrauterine fetal death (IUFD)	24 (40.0%)	17 (56.7%)	0.179
Pulmonary thromboembolism(PTE)	17 (28.3%)	13 (43.3%)	0.165
Vascular events	18 (30.0%)	9 (30.0%)	1.000
+ve Lupus anticoagulant (LAC)	52 (86.7%)	16 (53.3%)	0.001
+veAnticardiolipin (aCL) IgG	39 (65.0%)	15 (50.0%)	0.181
+veAnticardiolipin (aCL) IgM	36(60.0%)	19 (63.3%)	0.821
Anti β2 glycoprotein-1 IgG and/or IgM	43(71.7%)	22 (73.3%)	1.000

Data are mean ± SD or number (%).
*Unpaired t-test (for continuous data) or Fisher's exact test for categorical data.

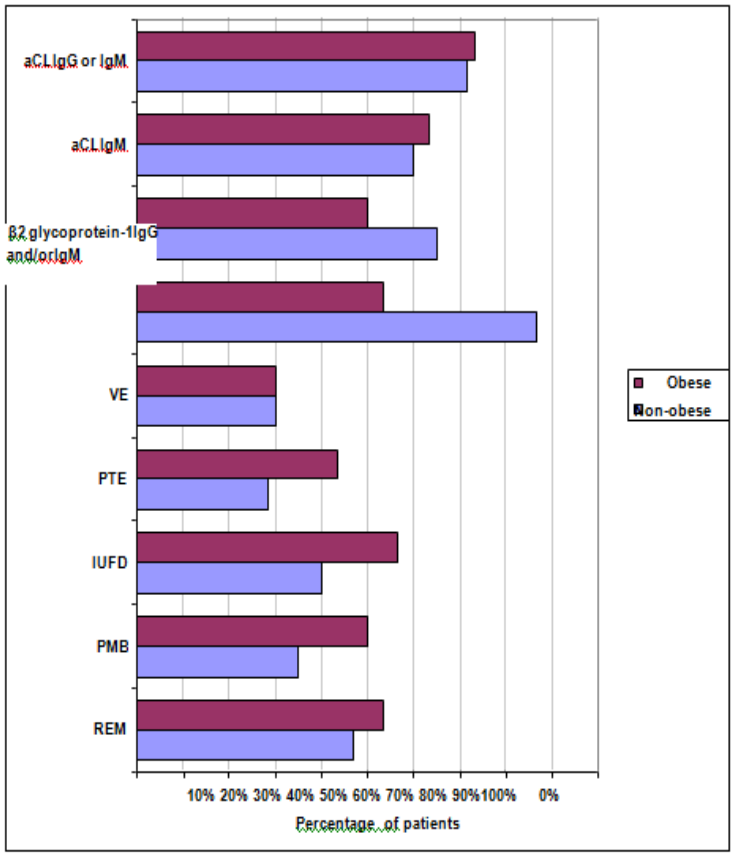

Figure (1): Prevalence of the various disease features in obese and non-obese patients.

LAC : Lupus Anti Coagulant
VE: Vascular Event
PTE : Pulmonary thromboembolism
IUFD: Intrauterine fetal death
PMB: Premature birth
REM: Recurrent Early Miscarriage

Table (2): Multivariable binary logistic regression analysis for the relation between obesity and recurrent early miscarriage as adjusted for other confoundingfactors

Variable	B	SE	Wald	p-value	Odds ratio	95% CI
Age (years)	-0.072	0.042	2.965	0.085	0.930	0.857 to1.010
Disease duration (months)	0.003	0.006	0.169	0.681	1.003	0.990 to1.015
Obesity	0.942	0.657	2.054	0.152	2.566	0.707 to9.306
Constant	0.952					

B = regression coefficient, SE = standard error, Wald = Wald statistic, 95% CI = 95% confidence interval.

After adjustment for other variables, obesity was not an independent predictor for REM.

Table (3): Multivariable binary logistic regression analysis for the relation between obesity and premature birth as adjusted for other confoundingfactors

	B	SE	Wald	p-value	Odds ratio	95% CI
Age (years)	-0.145	0.053	7.629	0.006	0.865	0.780 to0.959
Disease duration (months)	-0.007	0.008	0.667	0.414	0.993	0.977 to1.010
Obesity	1.791	0.763	5.514	0.019	5.998	1.345 to26.752
Constant	2.766					

B = regression coefficient, SE = standard error, Wald = Wald statistic, 95% CI = 95% confidence interval.

After adjustment for other variables, younger age (odds ratio = 0.865, 95% CI = 0.780 to 0.959, p-value = 0.006), obesity (odds ratio = 5.998, 95% CI = 1.345 to 26.752, p-value = 0.019) was independent predictors for PMB.

Table (4): Multivariable binary logistic regression analysis for the relation between obesity and intrauterine fetal death as adjusted for other confoundingfactors

Variable	B	SE	Wald	p-value	Odds ratio	95% CI
Age(years)	0.128	0.054	5.603	0.018	1.137	1.022 to1.264
Disease duration (months)	-0.001	0.007	0.034	0.854	0.999	0.984 to1.013
Obesity	2.311	0.905	6.522	0.011	10.087	1.712 to59.448
Constant	-5.376					

B = regression coefficient, SE = standard error, Wald = Wald statistic, 95% CI = 95% confidence interval.

After adjustment for other variables, older age (odds ratio = 1.137, 95% CI = 1.022 to 1.264, p-value = 0.018), obesity (odds ratio = 10.087, 95% CI = 1.712 to 59.448, p-value = 0.011) was independent predictors for IUFD.

Table (5): Multivariable binary logistic regression analysis for the relation between obesity and pulmonary thromboembolism as adjusted for other confoundingfactors

Variable	B	SE	Wald	p-value	Odds ratio	95% CI
Age (years)	0.249	0.075	10.965	0.001	1.283	1.107 to1.487
Disease duration (months)	-0.007	0.009	0.665	0.415	0.993	0.976 to1.010
Obesity	3.706	1.321	7.873	0.005	40.690	3.057 to 541.690
Constant	-10.255					

B = regression coefficient, SE = standard error, Wald = Wald statistic, 95% CI = 95% confidence interval.

After adjustment for other variables, older age (odds ratio = 1.283, 95% CI = 1.107 to 1.487, p-value = 0.001), obesity (odds ratio = 40.690, 95% CI = 3.057 to 541.690, p-value = 0.005 was independent predictors for PTE.

Table (6): Multivariable binary logistic regression analysis for the relation between obesity and vascular events as adjusted for other confoundingfactors

Variable	B	SE	Wald	p-value	Odds ratio	95% CI
Age (years)	0.006	0.042	0.022	0.882	1.006	0.927 to1.092
Disease duration (months)	0.003	0.006	0.294	0.588	1.003	0.991 to1.016
Obesity	-0.008	0.702	0.000	0.991	0.992	0.251 to3.930
Constant	-1.329					

B = regression coefficient, SE = standard error, Wald = Wald statistic, 95% CI = 95% confidence interval.

After adjustment for other variables, obesity was not an independent predictor for vascular events (all p-values >0.05).

Table (7): Multivariable binary logistic regression analysis for the relation between obesity and positive lupus anticoagulant test as adjusted for other confoundingfactors

Variable	B	SE	Wald	p-value	Odds ratio	95% CI
Age (years)	0.060	0.052	1.313	0.252	1.062	0.959 to1.176
Disease duration (months)	-0.014	0.008	3.188	0.074	0.986	0.970 to1.001
Obesity	-0.706	0.736	0.920	0.338	0.494	0.117 to2.090
Constant	0.476					

B = regression coefficient, SE = standard error, Wald = Wald statistic, 95% CI = 95% confidence interval.

After adjustment for other variables, obesity was not an independent predictor for a positive LAC test (all p-values >0.05).

Table (8): Multivariable binary logistic regression analysis for the relation between obesity and positive anticardiolipinIgG test as adjusted for other confoundingfactors

Variable	B	SE	Wald	p-value	Odds ratio	95% CI
Age (years)	-0.002	0.039	0.002	0.962	0.998	0.925 to1.077
Disease duration (months)	0.001	0.006	0.012	0.913	1.001	0.989 to1.013
Obesity	-0.583	0.636	0.841	0.359	0.558	0.161 to1.942
Constant	0.576					

B = regression coefficient, SE = standard error, Wald = Wald statistic, 95% CI = 95% confidence interval.

After adjustment for other variables, obesity was not an independent predictor for a positive aCLIgG test (all p-values >0.05).

Table (9): Multivariable binary logistic regression analysis for the relation between obesity and positive anticardiolipinIgMtest as adjusted for other confoundingfactors

Variable	B	SE	Wald	p-value	Odds ratio	95% CI
Age (years)	-0.005	0.040	0.016	0.899	0.995	0.920 to1.076
Disease duration (months)	0.011	0.007	2.381	0.123	1.011	0.997 to1.025
Obesity	-0.346	0.649	0.284	0.594	0.708	0.199 to2.523
Constant	0.134					

B = regression coefficient, SE = standard error, Wald = Wald statistic, 95% CI = 95% confidence interval.

After adjustment for other variables, obesity was not an independent predictor for a positive aCLIgM test (all p-values >0.05).

Table (10): Multivariable binary logistic regression analysis for the relation between obesity and positive anti-β2 glycoprotein-1 IgG and /or IgM test as adjusted for other confounding factors

Variable	B	SE	Wald	p-value	Odds ratio	95% CI
Age (years)	-0.003	0.041	0.005	0.945	0.997	0.920 to1.0813
Disease duration (months)	0.000	0.007	0.004	0.950	1.000	0.987 to1.013
Obesity	0.334	0.688	0.235	0.628	1.396	0.362 to5.383
Constant	0.793					

B = regression coefficient, SE = standard error, Wald = Wald statistic, 95% CI = 95% confidence interval.

After adjustment for other variables, obesity was not an independent predictor for a positive anti B2glycoprotien – 1, IgG and/or IgM (all p- values >0.05).

DISCUSSION

A major cause of morbidity and mortality of the antiphospholipid syndrome (APS) is the occurrence of thrombotic events (Felipe *et al.,* 2014).

Obesity is an established risk factor for thrombosis; it is related with adverse pregnancy outcome. Coexistence of obesity with antiphospholipid syndrome (APS) raises the risk of developing thrombosis. (Cedergren, 2004).

This current study evaluate the impact of obesity as a risk factor of

(APS) by comparing incidence of pregnancy morbidities (REM, PMB-IUFD), PTE, vascular events and presence of:

- Anti-cardiolipinIgG and/or IgM measured by standardized non cofactor dependent ELISA on 2 or more occasions, not less than 12 weeks a part: medium or high titre (i.e> the 99thpercentile).
- Lupus anticoagulant detected on 2 occasions not less than12 weeks a part

according to the guidelines of international society of thrombosis andhemostasis.

Anti-B2 glycoprotein-1 IgG and/or IgMisotype in serum or plasma in titre> the 9th percentile) present on two occasions at least twelve weeks apart measured by a standardized ELISA.

In two groups of women who were previously diagnosed as (APS) cases according to Sydney's criteria.

- First group consists of 30 patients who have normal(BMI) <30. This group is considered as control group (reference group).
- Second group consists of 30 patients who have (BMI) > 30Kg/m2.

Table 1 describes the relation between obesity and presentation of the disease. The table shows that there is no statistically significant difference in age between obese group and no obese group (P value 0.53) (the obese group).

But there is significant difference in duration of disease between the previous two groups p value 0.022. This result disagree with Caldas *et al*. (2010) who reported that there is no significant difference in age and duration of the disease between obese and non obese group P value is 0.78 and 0.78.

Table 1 also shows that there is no significant difference in obstetric event between obese and non obese group (P value in case of REM is 0.656, in case of PMB is 0.181 and in IUFD is 0.179. this result disagree with Caldas et al. (2010) who reported that obese group had a higher frequency of obstetric event 53.3% than non obese group 22.8% p value 0.04.

This table also shows that there is no significant difference in the incidence PTE between obese and non obese group 43.3% and 28.3% respectively P value is 0.165. This result disagree with Caldas *et al.* (2010) who reported that there is significant difference in the incidence of PTE between obese and non obese group 96.6% and 14.2% respectively p value is 0.022.

In case of vascular event table (1) show that there is no significant difference between obese and non obese group 30% in both groups p value.

This agree with Caldas *et al*. (2010) show reported that there is no significant difference in vascular event between obese and non obesegroup.

The result of laboratory characteristics of (APS) patients obese and non obese show that LAC was more frequent in non obese (APS) patients than obese are 86.7% in non obese group and 53.3% in obese group Pvalue

0.001. On other hand there is no significant difference between obese and non obese group in other laboratory criteria. This result agree with Caldas *et al*. (2010) who reported that the incidence of LAC in non obese group (94.2%) is higher than obese group (53.340) P value is 0.01 and there is no significant difference between obese group and non obese group in other laboratory criteria (Caldas *et al.* (2010) explained this finding by comparing with some data from previous literature that show a lower prevalence of antinuclear antibodies in women with overweight or obesity (Conzalez *et al.*, 2008), being speculated the role of leptin resistance in obese individuals, could impair antinuclear antibodies production by B lymphocytes (Brito *et al*.,2006).

A multivariable binary logistic regression analysis for relation between obesity and criteria of the disease was done and showed the following data:

Table 2: as regard REM: Obesity was not an independent predictor factor for REM.

Table 3: as regard PMB.: Obesity was an independent predictor for PTB (odd ratio 5.998, (95% CI= 1.395 – 26.752) p value 0.019. This agree with Cnattingius et al. (2013) who reported that as compared with normal weight women rates (%)

and adjusted odd ratios (Ors, (95% CI) of extremely preterm delivery were as follow BMI 25 to less than 30 (0.21%, OR 1.26, 95% (CI 1.15-1.37).

BMI 30 to less than 35 (0.27%, OR 1.58 95% (CI, 1.39-1.79) BMI 35 to less than 40 (0.35% OR, 2, 2.01, 95% (CI 1.6-2.45) and BMI of 40 or greater

(0.52%, OR 2.99 95% (CI 2.28-3.92).

On the other hand age was independent predictor for PTB odd ratio = 0.65, 95%, CI= 0.780 to 0.959 p value 0.006. This agree with Hediger et al. (1997) who reported that after adjusting for all risk factors young adolescent overall had a nearly 75% increased risk of PMB (adjusted odds ratio – 1.74) (95C3 1.07-2.84).

Table 4: as regard IUFD.: Obesity was independent predictors for IUFD odds ratio=10.087, (95% CI= 1.712 to 59.448). p value 0.011. this agree with Tennant et al. (2011) who reported that obese women were at significantly increased risk of fetal death (adjusted odd ratio = 2.32 (95% CI 1.64-3.28) P < 0.001.

On the other hand older age was independent predictor for IUFD odds ratio-1.137, 95% CI 1.02-1.264) P value 0.018. this agree with Bateman (2006) who reported that the odds ratio for stillbirth 1.28 (95% CI, 1.24-1.32) in women aged 35-39 years and 1.72 (95% CI 1.6-1.81) in women aged 40 years or older compared with 20-34 years oldwomen.

Table 5 as regard PTE: Obesity was also independent predictor for PTE odd ratios 40.690, 95% (CI 3.057-541.690) p value 0.005. This agrees with Friend and Kakker (1970) who demonstrated that the risk of pregnancy associated pulmonary embolism (PAPE) is increase with obesity (BMI ≥ 30 kg/m2) but disagree with Min *et al*. (2014) who reported that in analysis of BMI at delivery women with BMI of 25 to 29 showed higher prevalence than women with BMI greater than 30 (7 vs 5 cases).

Older age was independent predictor for PTE odd ratio = 1.2833 95% (CI= 1.107-1.487) P value 0.001 this agree with Min et al. (2014) who reported that the prevalence of pregnancy associated pulmonary embolism (PAPE) was high in advanced maternal age(46.2%).

Table 6 as regard vascular event: This study showed that obesity was not an independent predictor for vascular events (p value > 0.05). This disagrees with Klovaite et al. (2015) who reported that risk of DVT increased with increasing BMI (P Trend < 0.001).

Table 7, 8, 9, 10 laboratory criteria: Obesity was not an independent predictor for a positive LAC test (table 7), positive acLIgG test (table 8), positive acLIgG test (table 9), or anti-β2 glycoprotein-1 IgG and IgM(table 10), (all p- value>0.05).

This disagrees with Caldas et al. (2010) who reported that LAC was more frequent in non-obese primary antiphospholipid patients (PAPs) patient than obese ones P value <0.01.

RECOMMENDATIONS

Patient with APS need to take all possible measures to lower the risk of developing blood clots. This includes: maintaining a healthy body weight, no smoking and remaining physically active.

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السمنة المفرطة كعامل للخطورة البيئية للفقد المتكرر للحمل في مرضى متلازمة مضادات الدهون الفوسفاتية

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محمود سري البخاري[١]– شريف محمد صلاح الدين[٢]– عزة مصطفي حتحوت

١) معهد الدراسات والبحوث البيئية، جامعة عين شمس ٢) قسم أمراض النساء والتوليد، كلية الطب، جامعة المنوفية

المستخلص

مقدمة: تعتبر متلازمة مضادات الدهون الفوسفاتية أحد الأمراض المناعية التي تتصف بتجلطات وريدية وشريانية نتيجة وجود مضادات الدهون الفوسفاتية.وتعد متلازمة مضادات الدهون الفوسفاتية أولية إذا حدثت بدون وجود أمراض مناعية أخرى. وتعد المتلازمة ثانوية إذا حدثت مصاحبة لأحد الأمراض المناعية.ونتيجة لحدوث التجلطات في الأوردة والشرايين فهناك مشكلات كثيرة تحدث أثناء الحمل مثل الإجهاض المتكرر والولادة المبكرة وموت الجنين داخل الرحم. ويعتمد تشخيص متلازم مضادات الدهون الثلاثية على وجود واحدة من المشكلات المصاحبة للحمل أو حدوث جلطة أحد الشرايين أو الأوردة وذلك في وجود واحد أو أكثر من مضادات الدهون الثلاثية في الدم (مرتين أو أكثر المدة بين كل تحليل وآخر ١٢ أسبوع على الأقل).ويعد زيادة الوزن من أهم العوامل التي تؤثر بالسلب على نتائج الحمل.

الهدف من الدراسة: دراسة تأثير زيادة الوزن على نتائج الحمل والصفات الإكلينيكية وكذلك نتائج التحاليل لمضادات الدهون الثلاثية في السيدات اللاتي سبق تشخيصهن كمرضى متلازمة الدهون الثلاثية.

ونظراً لندرة ذلك المرض فقد تم جمع الحالات من ثلاثة مستشفيات وهم مستشفي بولاق الدكرور العام ومستشفي أم المصريين العام ومستشفي إمبابة العام.

خطوات العمل: قد تم عمل هذه الدراسة على ستون سيدة ممن سبق تشخيصهن كمرضى متلازمة الدهون الفوسفاتية وقد تم تقسيم الستون سيدة على مجموعتين وقد تم التقسيم على أساس الوزن، وقد تمت دراسة مدى تأثير زيادة الوزن على نتائج الحمل ونسبة وجود الجلطات بالشرايين والأوردة كذلك على نسبة تواجد مضادات الدهون الفوسفاية بالدم.

الاستنتاج: بعد عمل التحاليل الإحصائية تبين أن للسمنة تأثير مستقل على حالات الولادة المبكرة وموت الجنين داخل الرحم.