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Original Research Article

Effect of Female Body Weight Indices in Assisted Reproductive Technique Outcome

Ban Jabir Edan[1*] Hind Abdlkadhim[2] Huda Jabir Edan[3]
[1]College of Medicine, University of Babylon, Hilla, IRAQ
[2]College of Medicine, University of Kufa, Kufa, Najaf, IRAQ
[3]Ministry of Health-Babylon Government, IRAQ

[*]E-mail: banjabir@yahoo.com

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Abstract

Many factors effect on reproduction , one of them is weight . Increase body weight may affect negatively on reproduction. It may effect on ovulation by alteration of hormones level, sex hormone binding globulin and interaction between hormones and affecter receptors like insulin resistant. Increase body weight may be linked with decreased likelihood of achieving pregnancy in women undergo assisted reproductive technique(ART).The aim of this study isexamining the association of pregnancy outcome with body weight indices in subfertile women undergo intracytoplasmic sperm injection.

A total of 60 subfertile women was participated in this study. The study carried out between, March 2013 and September 2013 Fertility Center, at AL-Sadder teaching hospital.

All patients underwent full history and physical examination (including BMI , waist , hip , waist/hip ratio) on day 2 of menstrual cycle and the treatment doses (FSH and LH analogue) were calculated till time of oocyte pickup.Then embryos were classified according to their morphology and percentage of fragmentation.

Of the studied women, 28.3% were overweight, 33.3% were obese and 38.4% were normal weight. The positive pregnancy rate among the whole studied women was 20% (12 of 60). According to BMI, the pregnancy rate is 26%, 23%, and 25% in normal, overweight, and obese women, respectively.There were insignificant differences among BMI groups concerning age of patients, duration of subfertility and subfertility cause. While there was significant differences among different BMIgroups regarding waist and waist-hip ratio ($p<0.05$).

The odds ratio of positive pregnancy is found to be negatively but insignificantly related with increase weight.

Regarding complication ,all patients with OHSS are overweight and obese ($P<0.05$).

Increase weight may affect negatively on pregnancy outcome in women undergoing ART, including complication with ovarian hyperstimulation syndrome.

Key Words: Body weight indices, controlled ovarian hyperstimulation, pregnancy and ICSI.

تأثير مؤشر وزن الإناث في نتائج التقنيات المساعدة على الإنجاب

الخلاصة

هناك العديد من العوامل التي تؤثر على الإنجاب، احدها الوزن. زيادة وزن الجسم قد تؤثر سلبا على الانجاب .. اما عن طريق التأثير على الإباضة او عن طريق تغيير مستوى الهرمونات، او التأثير على التفاعل بين الهرمونات و مستقبلات الهرمونات كمقاومة الأنسولين.. زيادة وزن الجسم قد تكون مرتبطة مع احتمال انخفاض نجاح الحمل في النساء الخاضعات للتقنيات المساعدة على الانجاب . الهدف من هذه الدراسة هو دراسة العلاقة بين نتيجة الحمل مع مؤشرات وزن الجسم لدى النساء قليلات الخصوبة واللاتي خضعن لحقن الحيوانات المنوية بالبويضة.

وقد شاركت 60 امرأة قليلة الخصوبة في هذه الدراسة .حيث جرت هذه الدراسة بين مارس 2013 و سبتمبر 2013 في مركز الخصوبة / مستشفى الصدر لتعليمي

في يوم 2 من الدورة الشهرية, خضع جميع المرضى للسؤال عن التاريخ الطبي الكامل والفحص البدني (بما في ذلك مؤشر كتلة الجسم، والخصر، والورك والخصر / نسبة الورك) وجرعات العلاج الهرموني حتى وقت سحب البويضات والأجنة الناتجة قد تم تصنيفها وفقا إلى التشكل والنسبة المئوية للتجزئة.

28.3٪من النساء يعانون من زيادة الوزن، 33.3٪ كانوا يعانون من السمنة المفرطة، وكانت 38.4٪ لديهن الوزن الطبيعي. وكان معدل الحمل الإيجابي بين النساء 20٪ (12 من 60). وفقا لمؤشر كتلة الجسم، معدل الحمل هو 26٪، 23٪، و 25٪ في النساء ذوات الوزن الطبيعي، زيادة الوزن، والسمنة، على التوالي. كانت هناك اختلافات ضئيلة بين المجموعات مؤشر كتلة الجسم فيما يتعلق بعمر المرضى، ومدة ضعف الخصوبة وسبب ضعف الخصوبة. في حين كانت هناك اختلافات كبيرة بين المجموعات مؤشر كتلة الجسم المختلفة فيما يتعلق الخصر ونسبة الخصر إلى الورك (P<0.05).

علاقة نسبة احتمالات الحمل إيجابي سلبيا ولكن غير معنوي مع زيادة الوزن.

وفيما يتعلق بالمضاعفات، جميع المرضى الذين يعانون متلازمة فرط المبيض يعانون من زيادة الوزن والسمنة (P<0.05).

زيادة الوزن قد تؤثر سلبا على نتيجة الحمل في النساء اللواتي يخضعن **للتقنيات المساعدة على الإنجاب**، بما في ذلك مضاعفات متلازمة فرط المبيض.

الكلمات المفتاحية: مؤشرات وزن الجسم، متلازمة فرط المبيض،الحمل ،الحقن المجهري.

Introduction

Many factors effect on reproduction, one of them is weight . Increase body weight may affect negatively on reproduction. It may effect on ovulation by alteration of hormones level, sex hormone binding globulin and interaction between hormones and affecter receptors like insulin resistant . Increase body weight may be linked with decreased likelihood to get pregnancy in women undergo assisted reproductive technique. There is no confirmation that weight can affect the embryo grading and therefore the pregnancy rate. Altered uterine receptiveness after embryos transfer, perhaps because of disturbed endometrial function may effect on ICSI results by other mechanism [1].

The occurrence of increasing weight in subfertile women is elevated, and there is increasing data that it is a negative associated with result of ART. Many recent and previous research have connected between increase weight and poor ICSI results[2].

The current study aimed to examine the association between weight and ICSI results and to assess the likelihoodof the effect of ageon ART result in relation with weight insubfertile women undergo ICSI.

Materials and Methods

In the present study, a total of 60 subfertile women were participated in this study. The study carried out between , March 2013 and September 2013 in Fertility Center at AL-Sadder teaching hospital.

BMI was calculated according to the following equation

$$BMI = weigt(Kg) \div Hightsequare(m2)$$

In which 18.5-25 kg/m^2 considered (normal weight), 25−29.9 kg/m^2 considered over weight and ≥ 30kg/m^2 considered obese. The waist is measured at the minimum boundary of the ordinary waist, and the hip circumference is measured at its widest part of the hip[3].The participants were divided in to three groups, group A:normal weight, group B: overweight and group C: obese women.

All patients underwent full history and physical examination on day 2 of menstrual cycle and the treatment doses (FSH and LH analogue) were calculated till time of oocyte pickup .Then embryos were classified according to their

morphology and percentage of fragmentation, when Cells are of equal size; no fragmentation seen, Grade I ;Cells are of equal size; minor fragmentation only(1–20%) Grade II; Cells are of unequal size; no fragmentation to moderate fragmentation(21 - 50%)Grade III and finally when cells are of equal or unequal size; fragmentation is moderate to heavy(over 50%)Grade IV[4].Assessment of pregnancy were done after 14 days of embryo transfer by measuring s.HCG level. The pregnancy rate was calculated by the number of pregnant women dividing on the total number of subfertile women involved in this study.

SPSS; Version 17 program was used to perform statistical analysis of this study.
For continuous data, ANOVA test was used while for discrete data, Chi esquire test was used to get the significance among groups. Results are expressed as mean ±SD for continuous data and sometime percentage or median for discrete data . P value less than 0.05, was considered significant[5].

Results

Of the studied women, 28.3% were overweight and 33.3% were obese.

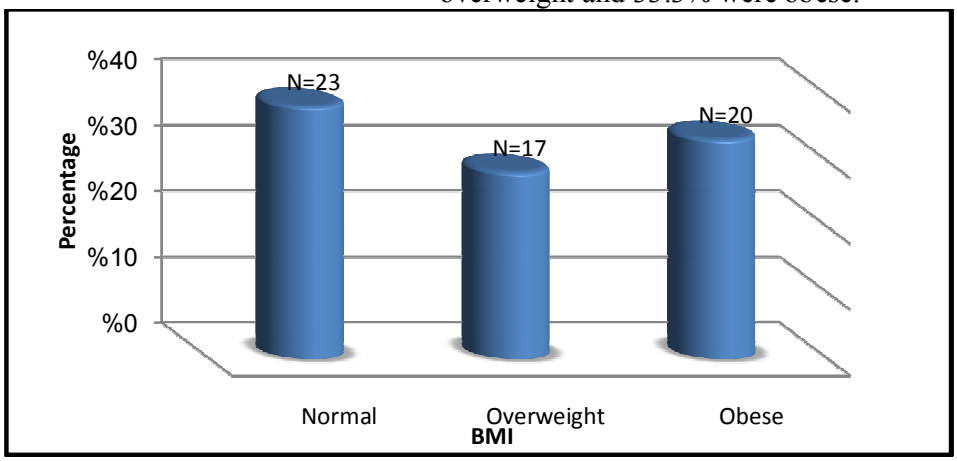

Figure 1: Patient groups according to BMI

By history and physical examination of subfertile women, There were insignificant differences regarding age, subfertility duration and subfertility cause in different three groups (normal, overweight and obese women). While, there was a significant differences were observed concerning waist and waist-hip ratio($p<0.05$).

Table 1: Clinical characteristics of normal, overweight and obese women

	Group A	GroupB	GroupC	P- Value
BMI(KG/M2)	22.58±2.06	26.83±1.47	32.79±3.18	P<0.01**
waist	81.13±7.98	93.71±6.80	106.78±15.28	P<0.01**
hip	100.83±20.54	105.73±21.04	114.17±8.29	P>0.05
West/hip ratio	0.81±0.08	0.96±0.31	0.89±0.18	P<0.05*
Age (years)	29.36±5.47	32.76±5.71	33.10±5.20	P>0.05
Duration of infertility	8.14±4.23	9.37±4.32	8.26±4.53	P>0.05
Endometrial thickness	5.32±2.88	4.41±2.40	5.97±2.59	P>0.05
FSH	3.72±1.77	4.78±2.28	4.38±2.50	P>0.05
LH	1.87±1.07	2.12±1.67	2.30±1.41	P>0.05
Prolactin	20.44±11.39	18.05±9.46	45.60±77.01	P>0.05

Estrogen		25.07±17.9	45.24±26.86	50.88±41.97	P>0.05
infertility	Primary	16	13	15	P>0.05
	Secondary	7	4	5	
Cause of infertility	Male	12	7	7	P>0.05
	Tubal	2	1	0	
	Anovulatory	5	4	8	
	unexplained	2	2	3	
	Combined	2	3	2	

*p value < 0.05 is significant

Table 2 Characteristics of controlled ovarian hyperstimulation program according to BMI. There were insignificant increase in FLH and LH dose in normal, overweight and obese group respectively (P>0.05) .

Table 2: Characteristics of controlled ovarian hyperstimulation program according to BMI

	Group A BMI 19-24.9 Kg/m^2	**Group B BMI 25-29.9 Kg/m^2**	**Group C BMI>30 Kg/m^2**	**P- value**
Duration (days)	13.47±2.60	13.12±2.09	13.72±3.08	P>0.05
Total FSH (1U)	1477.5±549.00	1646.25±783.0	2006.25±1105.5	P>0.05
Total LH dose	370.50±457.5	482.25±477.5	577.5±546.00	P>0.05
E2 at HCG day	2141.19±804.1	2231.38±1000.28	3056.70±676.92	P>0.05

Table 3 shows correlation between Weight indices and ICSI parameters,there was insignificant negative correlation between Weight indices and mature oocyte (MII), Fertilization rate, cleavage rate and good grade embryos, (p>0.05).

Table 3: Correlation between Weight indices and ICSI parameters

ICSI Parameters		BMI	Waist	HIP	W/H	Thigh	Arm
Total follicles	r	0.079	-0.021	-0.047	0.018	-0.235	-0.018
	p	0.579	0.890	0.747	0.903	0.108	0.903
Oocyte retrieval	r	-0.129	-0.106	-0.072	-0.030	-0.182	0.033
	p	0.381	0.493	0.636	0.842	0.253	0.838
Endometrial thickness	r	0.121	0.001	-0.116	0.008	0.042	0.065
	p	0.391	0.992	0.421	0.957	0.773	0.655
MII	r	-0.084	0.100	0.206	-0.075	-0.027	0.033
	p	0.523	0.465	0.128	0.580	0.851	0.815
FR	r	-0.155	-0.029	-0.019	-0.096	-0.091	-0.025
	p	0.237	0.832	0.888	0.479	0.522	0.860
CR	r	-0.015	0.001	0.037	-0.027	0.115	0.165
	p	0.907	0.997	0.785	0.840	0.416	0.242
GI	r	-0.016	0.050	0.040	-0.039	0.001	0.213
	p	0.905	0.714	0.770	0.771	0.995	0.129
GII	r	-0.125	0.232	0.211	0.001	0.166	0.051
	p	0.343	0.088	0.119	0.999	0.238	0.721
GIII	r	0.176	-0.145	0.104	-0.172	-0.315*	-0.146
	p	0.178	0.290	0.445	0.200	0.023	0.301
GIV	r	0.091	-0.043	0.089	-0.086	-0.072	-0.159
	p	0.488	0.757	0.514	0.527	0.611	0.260

*p value < 0.05 is significant, r correlation coefficient

MII, mature oocyte; FR fertilization rate ; CR cleavage rate; G I ,II, III and IV grad I,II, III and IV. The positive pregnancy rate among the whole studied women was 25% (15of 60).

The positive pregnancy rate was about26%, 23%, and 25% in normal, overweight, and obese women, respectively.

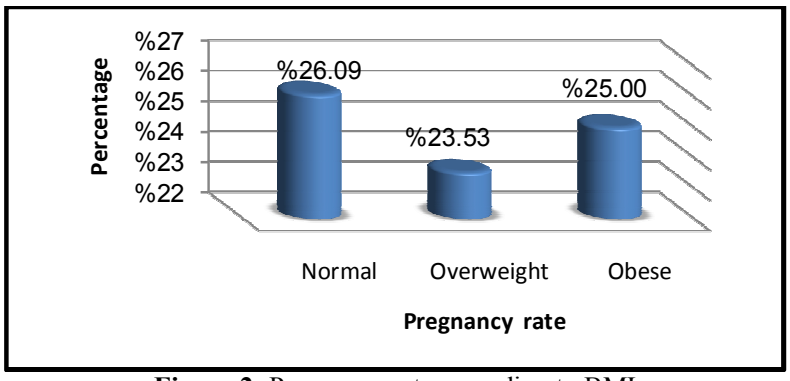

Figure 2: Pregnancy rate according to BMI

The odds ratio of positive pregnancy is found to be affected negatively but insignificantly with overweight and obesity in subfertile women undergo ART program as shown in Table 4.

Table 4: Association of positive pregnancy outcome with age in different BMI groups

		Odds Ratio	P value	95% Confidence Interval	
				Lower Bound	Upper Bound
Pregnant	Overweight	0.854	0.872	0.203	3.742
	Obese	0.935	0.944	0.239	3.735
	Normal weight	.	.	.	.
Pregnant Aged >35 years	Overweight	1.000	1.000	.091	11.028
	Obese	0.277	0.250	.021	3.041
	Normal weight	.	.	.	.

The reference category is non pregnant
This parameter is set to zero because it is redundant

Figure (3) shows the percentage of complication (OHSS) in normal , overweight and obese groups, 5 patients had OHSS, all patients with OHSS are overweight (N=3) and obese (N=2) ($P<0.05$)

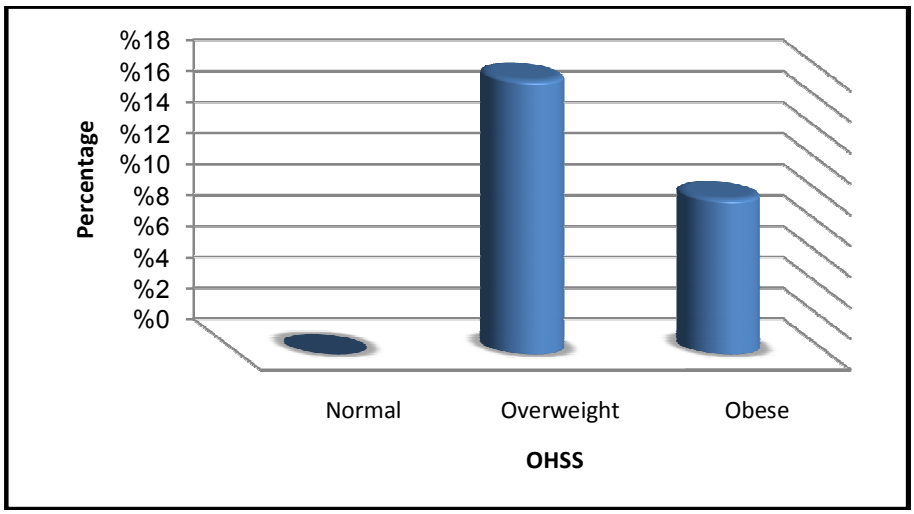

Figure 3 : OHSS and BMI

Discussion

This study shows that overweight or obese subfertile women who have attended ICSI treatment have insignificantly lower clinical pregnancy compared with normal weight women following controlled overian stimulation.This results agreed with that obtained by Pinborg *et al*. who found that increase weight in subfertile women associated with decrease pregnancy rate compared with women with normal weight women[6].Kasim and Roshdy, found a significant reduction in pregnancy rate among subfertile overweight and obese women [1].Obesity can modify the biochemical and endocrine functions which can effect on ovaries and uterus [7].Furthermore, increased weight is connected with metabolic modification of fat and carbohydrate with insulin resistance.Anovulation may be a cause of subfertility that may occur due to increase usage of carbohydrate[8].

Table 2 Characteristics of controlled ovarian hyperstimulation program according to BMl. There were insignificant increase in FLH and LH dose in normal, overweight and obese group respectively (P>0.05). A large cohort study done by Li et al.found that increase weight associated with increase requirement of gonadotrophin ampoules.There was insignificant negative correlation between Weight indices and number of mature oocytes fertilization rate, cleavage rate and good grade embryos this results agreed with Beydounet al. results.Beydoun et al. found that increase weight was associated negatively with the number of oocytes collected [9].Another study recommended that oocyte quality was unaffected by BMI[10].Matalliotakis *et al.* compared normal weight women with obese women on various IVF/ICSI outcomes. They found that obese women had decrease number of oocytes after stimulation, an increase FSH and LH dose used and decrease number of oocytes retrieved. Nevertheless, weight did not affect pregnancy rate, abortion or delivery rates [11].

Another research has shown that increase weight have lower fertilization rates (FR) , lower cleavage rate (CR)andlower good quality embryos [12]. In the same way, Beydoun et al. found that there was insignificant effect of weight on the odds ratio of pregnancy, abortion and rate of live birth. Additionally, weight didn't affect ART success. Weight seems to have a significant effects on early stages of ART treatment[9].Normal weight women when compared with obese one had a higher rate of pregnancy [odds ratio = 1.40 (95% CI: 1.22, 1.60)][13].Another research found that obese women had lower good quality embryo in compares with women under 35 years of age [10].

Ovulation induction and result of ART can affected negatively by increasing weight [14].Bellver et al. recommended that increase weight cause decreaseuterine receptivity and number of retrieved ovum [15]. Obese patients had increase leptin level which cause central leptin resistance with decrease gonadal response, Both mechanism could explain the hormonal alteration anduterine receptivity in overweight and obese women undergo ART[16].

Conclusion

Increase weight and weight indices specially waist/hip ratio may affect negatively on ART results, including complication as ovarian hyper-stimulation syndrome.

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