INCREASED BODY MASS INDEX NEGATIVELY IMPACTS BLASTOCYST FORMATION RATE IN JAPANESE WOMEN UNDERGOING IN VITRO FERTILIZATION

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AIM or OBJECTIVE

The aim of this study is to investigate the effect of maternal BMI on blastocyst formation rate and IVF outcomes following frozen-thawed embryo transfer (FET).

INTRODUCTION

Now a day, obesity has become a worldwide epidemic. According to recent survey, as of November 2018, approximately 19.6 % female adults in Japan aged 20 years and older were overweight (BMI≥25.0) (Statista 2021). The deleterious effects of being overweight or obese on general health are well studied. However, there is a lack of information on effect of the increased BMI on reproductive consequences of varying age group females. Previously, it has been reported that overweight and obese (BMI ≥30) women are three times more likely to have anovulatory infertility than normal-weight women (Rich-Edwards et al., 1994). In order to overcome infertility issues due to obesity, *In vitro* fertilization (IVF) chosen as an advanced treatment option. It is observed that obesity has negative impact on fertility treatments including IVF. In IVF cycles, obesity has detrimental effect on higher amount of gonadotropins, reduced number of oocytes retrieved and mature oocytes (Wittemer et al., 2000; Spandorfer et al., 2004; Maheshwari et al., 2007), and decreased fertilization rate (Carrell et al., 2001). However, results of previous studies has demonstrated that women with elevated BMI has decreased clinical pregnancy rates, higher miscarriage rates and decreased live birth rates as compared to normal (Maheshwari et al., 2007; Wang et al., 2000; Fedoresak et al., 2004).

The purpose of present study was to investigate the effect of increasing female BMI on blastocyst formation rate in Japanese population undergoing IVF treatment at our clinic. Also, we have assessed the impact of maternal BMI on IVF outcomes like clinical pregnancy rate, miscarriage rate and live birth rate in frozen-thawed embryo transfer (FET) cycles.

METHODS

This is retrospective cohort analysis of total 180 patients (306 cycles) of 25-45 years of age with a diagnosis of infertility subjected to IVF/ICSI at Kinoshita Ladies Clinic, Otsu, Japan between June 2017 and December 2018. All patients included in this study were classified into underweight (≤18.5 kg/m²), normal range (18.5-22.9 kg/m²), overweight at risk (23-24.9 kg/m²), and Obese (≥25 kg/m²) based on their BMI status (WPRO, 2000). The blastocyst formation rate was calculated. Cleavage stage embryos or blastocysts were cryopreserved and utilized for FET. Clinical pregnancy, miscarriage and live birth rate were calculated.

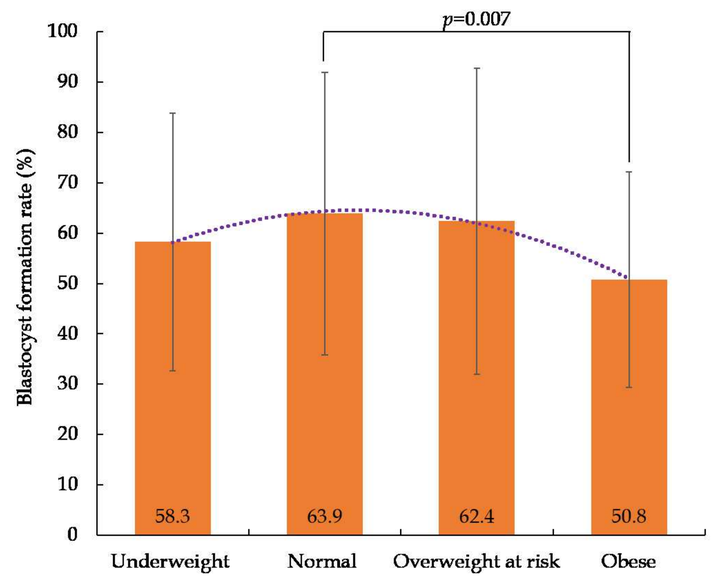
RESULTS

Table-1. Demographics and patient characteristics

Characteristics	Underweight (<18.5 kg/m²)	Normal (18.5-22.9 kg/m²)	Overweight (23-24.9 kg/m²)	Obese (≥25 kg/m²)	*p* value
No. of cycles; n	161	47	38	31	-
No. of patients; n	110	26	28	26	-
Age (yr.)	32.5±4.6	36.4±4.7	36.1±4.4	37.3±4.9	<0.001
AMH (ng/mL)	3.4±3.8	2.1±2.0	3.0±3.7	2.0±1.8	0.029
BMI (Kg/m2)	17.7±0.6	20.6±1.2	23.9±0.7	28.1±2.9	<0.001
Basal FSH	8.2±2.9	7.6±2.3	7.2±2.5	7.4±1.8	0.512
Basal LH	7.9±3.1	7.1±3.0	6.8±3.1	7.1±3.4	0.223
Infertility diagnosis; n (%)					
Endometriosis	2 (0.9)	17 (7.8)	6 (2.8)	7 (3.2)	<0.001
PCOS	2 (0.9)	5 (2.3)	1 (0.5)	1 (0.5)	0.046
Antisperm antibody	0 (0)	0 (0)	0 (0)	2 (0.9)	-
Male factor	1 (0.5)	8 (3.7)	6 (2.8)	3 (1.4)	<0.001
Tubal factor	3 (1.4)	4 (1.8)	3 (1.4)	1 (0.5)	0.019
Unexplained	21 (9.7)	82 (37.8)	17 (7.8)	19 (8.7)	<0.001
No data	0 (0)	4 (1.8)	0 (0)	2 (0.9)	-

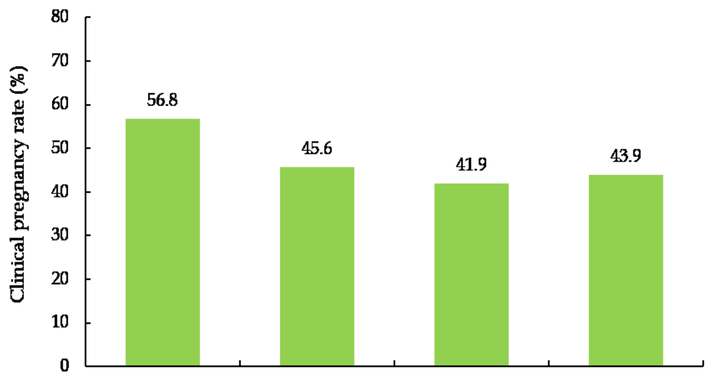
*Baseline characters between the BMI groups were compared using Kruskal-Wallis test.

Graph 1. Effect of maternal BMI on blastocyst formation rate in IVF



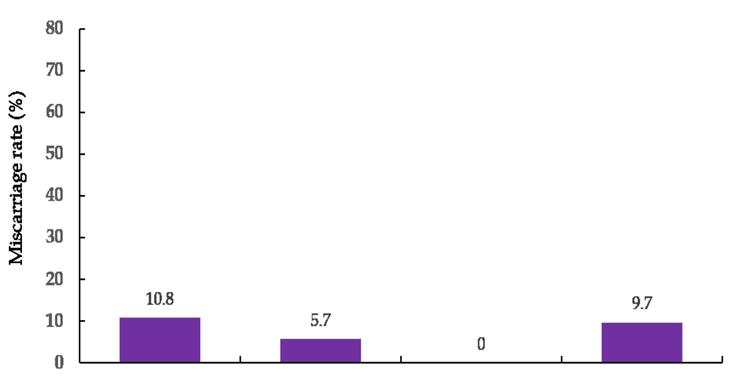
*Outcome measures between the BMI groups were compared using Kruskal-Wallis test.

Graph 2. Effect of maternal BMI on clinical pregnancy rates in women undergoing IVF treatment



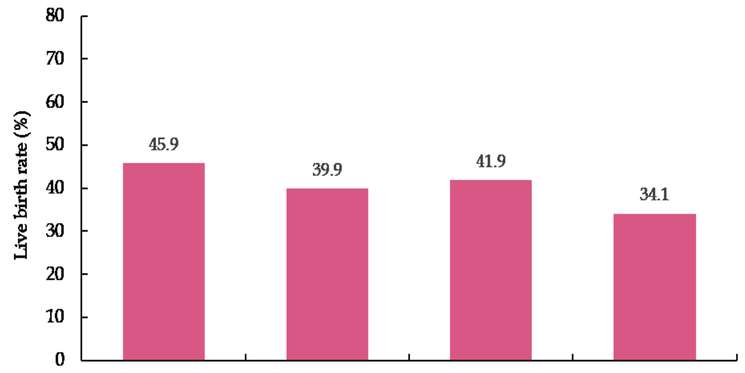
Underweight	Normal	Overweight at risk	Obese	
21/37	72/158	13/31	18/41	*p*= N.S.
(56.8 %)	(45.6 %)	(41.9 %)	(43.9 %)	

Graph 3. Effect of maternal BMI on miscarriage rate in Japanese women undergoing IVF following FET



Underweight	Normal	Overweight at risk	Obese	
4/37	9/158	0/31	4/41	*p*= N.S.
(10.8 %)	(5.7 %)	(0.0 %)	(9.7 %)	

Graph 4. Effect of maternal BMI on live birth rate after IVF treatment and FET



Underweight	Normal	Overweight at risk	Obese	
17/37	63/158	13/31	14/41	*p*= N.S.
(45.9 %)	(39.9 %)	(41.9 %)	(34.1 %)	

*Graph 2~4: Outcome measures between the BMI groups were compared using Fisher's Exact test. *p*-=N.S.

CONCLUSION

During IVF, the maternal BMI has significant impact on embryo quality as measured by blastocyst formation and it was adversely affected in obese-infertile women. As like blastocyst formation, BMI does not show direct influence on IVF outcomes upon FET. Although the results presented in our study shows nonsignificant differences in clinical pregnancy, miscarriage and live birth rate among all BMI groups, there is a downward trend for these parameters in obese patients.

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Contact

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