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Research Article

Assessment of Obesity and Eating Disorder in Infertile Women - a

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ABSTRACT

Objective: The relation between obesity and infertility is reported in several scientific studies but there are a few studies on eating disorders and the risk of infertility. The aim of this study was to investigate and compare the prevalence of obesity and eating disorders in infertile and fertile women.

Materials and Methods: This was a descriptive cross-sectional study. The statistical population was all women aged 20-45 years referred (140 infertile patients and 140 healthy control groups). Data was collected from a questionnaire that consisted of two parts: demographic information, height, weight and Body Mass Index (BMI) and the EAT-26 Nutrition Questionnaire. All data was analyzed using SPSS software.

Results: The results showed that BMI in the case and control groups were 26.68 ± 4.03 and 24.80 ± 3.45 years, respectively, and there was a statistically significant difference between the two groups. ($p < 0.001$). 37% of the case group and 63% of the control group had normal BMI, which was significantly higher in the control group than the case group ($p < 0.001$). Analysis of the eating disorders questionnaire (EAT-26) in case and control groups showed a statistically significant difference between the two groups ($p < 0.001$) and the mean of nutritional disorders score was significantly higher in the infertile woman in comparison with fertile cases.

Conclusion: Totally, the results showed that obesity and nutritional disorders affect the reproductive health of women, so it is necessary for gynecologists and reproductive health staff to inform women in reproductive age about the obesity risks of infertility.

Keywords: Obesity; Eating disorders; Women; Infertility

INTRODUCTION

Infertility is defined as the absence of pregnancy following sexual intercourse for 12 months or more if both partners have not used any method of contraception [1]. Infertility, with about 80 million infertile patients around the world, is considered by the World Health Organization as one of the most important public health problems [2,3]. Almasi-Hashiani A, et al. [4] reported 72.4 million infertile women (minimum 40.2 million and maximum 120.6 million) aged between 20-44 years (10.98 million in developed countries and 4.4 61 million cases in developing countries) suffering from infertility.

Obesity is one of the important problems related to health all over the world, which in recent years has emerged as a new epidemic that leads to many problems such as cardiovascular problems, diabetes, asthma, arthritis, chronic pain and Alzheimer's [5]. The prevalence of obesity in the United States was estimated to be over 35% in 2019 [6]. Also, in Iran, Heidari-Beni M, et al. [7] reported the prevalence of obesity is nearly 20%.

Eating Disorders (EDs) are defined as the conditions that are described by several disorders in eating, including all psychological eating disorders (anorexia nervosa, bulimia nervosa), binge eating disorder and avoidance restrictive food intake disorder [8]. EDs are an important factor that affects all sides of human life, such as increased systematic disease, negative effects on fertility potential, cardiovascular and psychological health [9]. Also, ED during pregnancy is harmful for both mother and infant [10]. Freizinger M, et al. [11] reported the prevalence of ED in their study population (infertile woman) was 20.7%, which was 5 times higher than the normal range in the United States.

Numerous scientific studies have reported a positive correlation between obesity and women's infertility, but based on our knowledge, little documents have existed on the relationship between ED and female infertility. The novelty of this study is that to date and based on our knowledge, no scientific study has been published to report the prevalence of ED in Iranian infertile women. Consequently, the aim of this study was to evaluate the prevalence of obesity and ED in infertile women and compare it with fertile control cases.

MATERIAL AND METHODS

Case selection

All Iranian women aged between 20-45 who referred to the Kerman Afzalipur Infertility Centre and Gynecology Clinic during 2019 participated in this descriptive case-control study.

Inclusion criteria for the infertile group were women with identified infertility (infertility due to ovulation dysfunction, endocrine disorders, anatomical defects, genetic and immunologic effects), and for control group history of at least one live birth and no history of infertility. Women with male partner infertility, a history of systematic diseases such as diabetes, cardiovascular and thyroid diseases, postpartum infection, psychological disorders, cancer and on eating diet cases are excluded from the study. Finally, 280 women (140 infertile and 140 fertile controls) participated in the study. Informed consent was obtained from all study cases. Approval for this study was granted by the Research committee of Kerman University of medical sciences, Kerman, Iran under code IR.KMU. AH.REC 1400.29.

Estimating sample size methods

To determine the sample size according to the prevalence of obesity in other studies in fertile and infertile women [12], which was 35 and 53%, respectively, and using the formula of the difference between two ratios and the assumption of $\alpha = 0.05$ and the power of 0.9. The number of samples for each group was estimated to be 139 cases. Estimated sample size for two-sample comparison of mean Analysis: A priori: Compute required sample size.

Input:	Tail(s)	=	One
	Proportion p1	=	0.35
	Proportion p2	=	0.53
	α err prob	=	0.05
	Power (1-β err prob)	=	0.90
	Allocation ratio N2/N1	=	1
Output:	Sample size group 1	=	139
	Sample size group 2	=	139
	Total sample size	=	278

Data collection

The data was collected through two questionnaires (1- Demographic information including age, place of residence,

education, income, anthropometric information of the participants including height, weight and calculating Body Mass Index (BMI). 2- EAT-26 nutritional questionnaire).

The EAT-26 questionnaire was first designed by Garner and Garfinkel [13]. This questionnaire has 26 questions and 3 components: food diets, bulimia or desire to eat and oral control. This questionnaire helps to identify the risk of eating disorders. Questionnaire scoring is as follows: Assigned points for questions 1-25 are scored on a 4- score scale with always (3 points), usually (2 points), often (1 point), and sometimes, rarely, and never (0 points). Item 26 is reverse scored, and a final score is calculated by summing items from 1-26.

In this study, the weight of the study population was measured using a standardized Seka digital scale (Brooklyn, USA). The height was measured using a tape measure while standing next to the wall without shoes. The BMI was also calculated by dividing weight (in kilograms) by the square of the height (in meters).

Statistical analysis

After data collection, all documents were entered into the computer system and analysed by SPSS software version 20 (version 20, SPSS Inc., Chicago, IL) and the *p* value less than 0.05 was considered statistically significant. Qualitative variables presented as frequency and percentage and quantitative variables were described using mean and standard deviation, and chi-square, the independent T test, and ANOVA tests were used for analytical statistics.

RESULTS

The results showed the age of the study population in the case and control groups were 33.53 ± 6.54 and 29.81 ± 5.91 years, respectively, so there was no statistically significant difference between the two groups ($p = 0.339$). The height of the cases in both cases and control groups showed no statistically significant difference ($p = 0.394$). The weight in the case and control groups was significantly higher than the control group ($p = 0.002$) (Table 1).

The BMI of the study population in the case and control groups were 26.68 ± 4.03 and 24.80 ± 3.45, respectively. There was a statistically significant difference between the two groups ($p < 0.001$) and the BMI was significantly higher in the group of women with infertility. The comparison of ED between two groups based on questionnaire score (EAT-26) showed significantly higher levels of ED in infertile women than control ($p < 0.001$) (Table 2).

Table 1: Demographic parameters in both case and control groups.

Parameters	Infertile Patients	Control Non-Infertile	*p* - value
	n = 140	*n* = 140	
Age (year) M ± SD	33.53 ± 6.54	29.81 ± 5.91	0.33
Weight (kg) M ± SD	79.58 ± 13.16	74.94 ± 12.53	0.002
Height (m) M ± SD	1.72 ± 0.09	1.73 ± 0.10	0.39
Spouse Job N (%)			0.55
Employed	96 (68.6)	97 (69.3)	
Homemaker/ Unemployed	44 (31.4)	43 (30.7)	
Education status N (%)			0.44
Literate	96 (68.6)	98 (70)	
Uneducated	44 (31.4)	42 (30)	
Income. Million Tomans. N (%)			0.27
< 3	9 (6.4)	14 (10)	
03-Jul	126 (90)	117 (83.6)	
>7	5 (3.6)	9 (4.6)	

The student t test was used to data analysis. Data for quantitative variables presented by Mean ± SD and percentage for qualitative variables. *P* - values ≤ 0.05 were considered statistically significant.

Table 2: comparison of BMI and eating disorder questionnaire between fertile and infertile women.

	Infertile Patients	Control Non-Infertile	*p*-value
	n = 140	*n* = 140	
BMI mean ± SD	26.68 ± 4.03	24.80 ± 3.43	0.001
< 18.5 N (%)	1 (0.7)	0 (0)	
18.8-24.9 N (%)	50 (37)	85 (63)	
25-30 N (%)	88 (62.9)	55 (93.3)	
> 30 N (%)	1 (0.7)	0 (0)	
EAT-26 score	27.60 ± 7.20	23.8 ± 7.84	0.001

The student t test was used to data analysis. Data for quantitative variables presented by Mean ± SD and percentage for qualitative variables. *p*-values ≤ 0.05 were considered statistically significant. Note: BMI: Body Mass Index.

DISCUSSION

Several studies reported BMI in infertile women is higher than fertile cases [14,15]. So BMI is a main parameter of fertility potential. In the present study, BMI in the infertility group was significantly higher than the control group and was similar to scientific reports. In obese people, the level of leptin hormone (production in white fat tissue, responsible for satiety) was elevated [16]. High levels of leptin hormone also directly and significantly have negative effects on the menstrual cycle and ovulation in women [17]. So, in the relationship between obesity and female infertility, maybe leptin hormone is responsible for fertility disorders.

The results of various research have shown that EDs are a main risk factor in human health [18,19]. About 90% of EDs occur before the age of 25 in women [20]. One of the important consequences of EDs is the effect on fertility potential [21], which was evaluated in the present study. Based on our knowledge, the present study was the first study in Iran that investigated the prevalence of EDs in infertile women.

The results of the present study showed that the risk of EDs based on self-report were significantly higher in infertile women than in the fertile control group. Since the BMI is higher in the infertile group, the relationship between obesity and eating disorder in this study can potentially predict the probability of infertility risk in cases with EDs and high BMI. High BMI has been proposed to be a risk factor for continuous EDs [18]. In high BMI cases with EDs, bulimia nervosa is a main symptom [22]. Psychiatric defects and stress are the main common problems in infertile patients [23]. Stress and bulimia nervosa are in direct relationship [24], so in infertile patients maybe stress is responsible for EDs.

Some reports showed EDs were related to infertility risk factors, including defects in ovulation [25] (an-ovulatory cycles, Poly-Cystic Ovary Syndrome (PCOS) and Premature Ovarian Failure (POF)),

irregular menstrual cycle [26] (amenorrhea, oligomenorrhea), hormonal defects [27] (LH deficiency, hyperprolactinemia, GNRH deficiency).

Similar to our study, Freizinger M, et al. [11] reported the prevalence of ED in their study population (infertile women) was 20.7%, which was 5 times upper than normal range in the United States. Earlier in 1990, Donna and his colleagues assessed eating disorders in infertile cases. They reported 16.7% of infertile patients suffering from EDs. They also showed women with irregular menstrual cycles were at higher risk of EDs. Hormonal dysfunction such as a low level of LH was responsible for irregular menstrual cycle in EDs cases [28].

Algars M, et al. [29] reported EDs have negative effects on the menstrual cycle in reproductive age women. They concluded the dysfunction in gonadotropin and gonadal hormone secretion are the cause of menstrual disorders. In another study, Winston AP, et al. [30] showed the main reproductive hormonal axis (hypothalamic–pituitary–gonadal axis) can be affected by defects in nutrition program. They also discussed that defects in this axis can negatively affect fertility potential. Based on reports [31,32] we think maybe endocrine defects can effect negatively on fertility in patients with EDs.

In contrast to our founding, Rodino IS, et al. [33] assessed the EDs in infertile patients and reported EDs in infertile women who referred for infertility treatment were not significantly higher than fertile cases. In another study, Assens and colleagues reported in their national cohort study on Danish infertile women, the prevalence of EDs was similar to other populations [34]. Maybe differences in the methodological or study population selection were responsible for the difference between those studies.

PCOS is a fertility problem for women. Insulin-resistance in these patients is a risk factor for other disorders including diabetes and non-alcoholic fatty liver. In PCOS women, nutrition disorders and EDs are the main problems and about 25% of PCOS patients suffer from EDs [35]. Zain and colleagues in 2008 reported the relationship between obesity and female infertility. They showed EDs is in direct relation with Poly-Cystic Ovary Syndrome (PCOS). They concluded changes in hormonal profile occurred in infertile cases with obesity and nutrition disorders. Maybe defects in oestrogen and progesterone secretion lead to an increase in high secretion of testosterone in women with EDs and high levels of free testosterone are responsible for defects in ovulation and menstrual cycle in infertile women with EDs [36].

CONCLUSION

The scientific papers that assess the EDs in infertile patients are limited. In this study, we assessed the prevalence of EDs in infertile women and compared them to fertile cases. Also, we investigated BMI in infertile and fertile cases. We hypothesized that obesity and EDs will be positively associated with female infertility. Our results confirmed the hypothesis and showed in infertile patients, obesity and EDs were significantly higher than fertile cases. The most EDs occur in young women who are of reproductive age. At this age, women need more attention to reproductive health and more care from obstetrics and gynecologists. So obstetrics and gynecologists must pay more attention to EDs and must categorize their patients into EDs subgroups. So, it is important to detect infertility risk factors based on nutrition and life style to manage EDs and decrease the chance of infertility in EDs cases.

LIMITATIONS

In this study, the type of infertility, the cause of infertility, infertility duration and outcome of treatment were not investigated. Also, the analysis of the EAT-26 questionnaire was not analysed based on three sub-categories.

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