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## Original article

### Effect of Life Style Behaviors on Assisted Reproductive Techniques [ART]

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## ABSTRACT

**Background:** Infertility means a couple in their reproductive age not bearing a child after a year's unprotected intercourse. It has a global prevalence of 12% to 15%.

**Aim of the work:** The aim of this study is to evaluate the combined effect of several lifestyle behaviors [Exercise, smoking, alcohol, dietary habits and stress] on assisted reproductive techniques [ART] outcomes.

**Patients and Methods:** This study included 700 patients undergoing intracytoplasmic sperm injection. Patients answered a questionnaire [simple life style questionnaire; SLIQ] and analysis examined the relationship between lifestyle with the intracytoplasmic sperm injection cycles outcomes. Comparison of SLIQ scores as measured by the scoring template with scores obtained by the health professionals' blinded assessment of the questions validated our scoring scheme. We achieved a correlation coefficient of 0.77 [P<0.001] between SLIQ scores and blinded reviewers' scores.

**Results:** The mean number of oocytes was  $6.31 \pm 5.5$ ; and [73%] of oocytes were of good quality; the mean number of embryos was  $3.22 \pm 3.36$  and 69.0% were of good quality. Finally, 399 patients [57%] get pregnant. There was significant relation between life style behaviors and results of ART. There was Positive correlation between [total score and each of quality of oocytes, quality of embryos and pregnancy test.

**Conclusion:** This study has highlighted that lifestyle behaviors can adversely affect general health and reproductive performance.

**Keywords:** Assisted reproductive techniques [ART]; Intra-cytoplasmic sperm injection [ICSI]; Intra uterine insemination [IUI]; Quality of life; Simple life style questionnaire.

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## INTRODUCTION

Infertility refers to a couple in their reproductive age being unable to conceive a child after one year of unprotected intercourse. It has a worldwide prevalence of 12% -15%<sup>[1]</sup>. At present, the latest method to deal with that problem is Assisted Reproductive Techniques [ART] which involves direct manipulation of oocyte and sperm in vitro, which has resulted in dramatic decrease in the rates of infertility. Failure of these techniques could have heavy financial and psychological effect on the family and society<sup>[2]</sup>.

Lifestyle involves efforts to attain thorough physical, psychological and social well-being including weight control, exercise, diet, diseases prevention, avoidance of alcohol and drugs<sup>[3]</sup>. Lifestyle factors have had a dramatic effect on general health and the capacity of reproduction. Smoking and obesity could adversely influence general health and well-being. To clarify more, smoking enhances the risk of cardiovascular disease and adverse outcomes related to obesity include enhanced risk of cardiovascular disease, diabetes mellitus and certain cancers<sup>[4]</sup>.

Lifestyle factors, including age while initiating a family, nutritional status, weight control, exercise, psychological stress, smoking, drug use, consumption of alcohol and caffeine, environmental and occupational exposures, preventative care, and other behaviors are modifiable and might affect fertility<sup>[2]</sup>. Lifestyle is sometimes held to be associated with infertility - smoking, alcohol intake, drug use and even over exercise<sup>[5]</sup>.

## AIM OF THE WORK

The aim of this study was to evaluate the combined effect of several lifestyle behaviors [Exercise, smoking, alcohol, dietary habits and stress] on assisted reproductive techniques [ART] outcomes.

## PATIENTS AND METHODS

This is an observational follow-up study for women attended to International Islamic Center for Population Studies and Research for ART in vitro fertilization [IVF] unit. The patients are eligible in this study after interviews and laboratory tests. Written informed consent was obtained from each

patient before the study. This study included 700 patients undergoing intracytoplasmic sperm injection (ICSI). Patients answered a [simple life style questionnaire; SLIQ] and analysis assessed the relationship between lifestyle with the outcomes of ICSI cycles. Comparison of SLIQ scores as measured via the scoring template with scores attained by the health professionals' blinded evaluation of the questions validated our scoring scheme. We accomplished a correlation coefficient of  $r = 0.77$  between SLIQ scores and blinded scores of reviewers. The SLIQ, as currently tested, is perhaps appropriate for usage in research on individuals who are at least similar to the current study participants<sup>[6]</sup>.

The SLIQ indicates the scoring procedure. It is of five components: diet [three questions], activity [three questions], alcohol intake [three questions], tobacco smoking [three questions], and stress [one question]. For each component, a raw score and a category score could be estimated. To achieve similar weighting for each of the components, the overall score is based on the five category scores. Each component has a category score of 0, 1, or 2 and the overall range of SLIQ scores is 0-10. The greater the score, the healthier lifestyle. Modification was done to the SLIQ to be adapted to our social and community behaviors in the form of cancelling alcohol use in all forms.

## Inclusion criteria

- Age: adult females in the childbearing period from 18 years old [because younger than 18 years are illegible] to 35 year old [due to poor quality oocytes over this age].
- Method of treatment: intra cytoplasmic sperm injection [ICSI].
- Mode of ovum pick up: Transvaginal guided aspiration.
- Mode of transfer embryos: fresh.
- Semen is taken by ejaculate [fresh].
- Agonist protocol either long or flare up agonist.

## Exclusion criteria

- Drugs: taking any drugs for any medical cause.
- Poor responders. According to The European Society of Human Reproduction and Embryology [ESHRE] published the Bologna criteria in 2011

in order to standardize the definition of poor ovarian response [POR] in a simple and reproducible manner.

- Factor related to male infertility as azoospermia.

At least two of the following three criteria had to be present to establish the definition: [1] Advanced maternal age [ $>40$  years] or any other risk factor for POR<sup>[2]</sup>. A previous POR [ $\leq 3$  oocytes with a conventional stimulation protocol]. Conventional ovarian stimulation protocols aimed to maximize the number of oocytes collected to obtain more embryos, thus enabling the selection of the best quality embryos for transfer and the generation of surplus embryos that can be cryopreserved for use in additional, unstimulated cycles that is 450 IU gonadotropins in our practice as a maximum dose for controlled ovarian stimulation<sup>[3]</sup>. An abnormal ovarian reserve test [i.e. antral follicle count [AFC] less than 5–7 follicles or anti-Müllerian hormone [AMH] below 0.5–1.1 ng/ml]

**Outcomes.**

*Quality of oocytes [Total Oocyte Score [TOS]:* Individual oocytes were evaluated based on 6 parameters: Oocyte shape, size, characteristics, structure of the perivitelline space [PVS], zona pellucida [ZP] and polar body [PB] morphology. Each parameter was graded as worst [-1], average [0], or best [1], creating a TOS by adding up individual parameter assessments. The maximal TOS of an oocyte, therefore, could be a +6, the lowest a -6. From 0 to 6 is considered good quality and lower than 0 is considered poor.

*Quality of embryos:* Embryos are graded on an A, B, C and D scale which is based upon the rate of development on that particular day, fragmentation percentage, synchrony of cell division, and evenness of cell division grade A and b is considered good and C and D is considered poor Pregnancy rate.

*Statistical analysis:* Qualitative data were expressed in the frequency and percent distribution, while qualitative continuous data were represented as mean± Standard error (SE) or mean± Standard Deviation (SD). Pearson’s or Spearman’s correlation coefficient [r] was calculated and p value  $< 0.05$  was set as significant levels. All statistical analysis were carried out by statistical package for social science (SPSS) version 18 (SPSS Inc., Chicago, USA).

**RESULTS**

In the present study, the mean age was  $26.8 \pm 0.76$  years, the mean BMI was  $29.0 \pm 0.74$  Kg/m<sup>2</sup> and the mean parity  $0.5 \pm 0.12$  [Table 1].

Table [2] shows the description of number and quality of oocytes in studied patients. The mean of number of oocytes in studied patients was  $6.31 \pm 5.5$  with minimum number of 0 and maximum number of 24 [range 0 – 24]. As regard quality of oocytes 189 oocytes [27%] were poor while 511 oocytes [73%] were good. Table [3] shows the description of number and quality of embryos in studied patients. The mean of number of embryos in studied patients was  $3.22 \pm 3.36$  with minimum number of 0 and maximum number of 15 [range 0 – 15]. As regard quality of embryos 217 embryos [31%] were poor while 483 embryos [69%] were good.

Table [4] shows the description of pregnancy test in studied patients. 301 patients [43%] were negative while 399 patients [57%] were positive.

Table [5] shows that, there was statistically significant positive correlation between [total score and. quality of oocytes], [total score and. quality of embryos] and [total score and pregnancy test]. No statistical significant [p-value  $> 0.05$ ] correlation between [total score and number of oocytes] and [total score and number of embryos].

**Table [1]:** Demographic data of the studied group [mean ± SE].

	Studied patients
Age [years] [mean ± SE; minimum - maximum].	$26.8 \pm 0.76$ ; 21-34
BMI [KG/m <sup>2</sup> ] [mean ± SE; minimum - maximum]	$29.0 \pm 0.74$ ; 22.1-36.7
Parity [mean ± SE; minimum - maximum]	$0.5 \pm 0.12$ ; 0-2

**Table [2]:** Description of number and quality of oocytes in studied patients

Variables		Studied patients [N = 700]
Number of oocytes	Mean ± SD; Minimum – maximum	6.31±5.50; 0- 24
Quality of oocytes	Poor	189 [27%]
	Good	511 [73%]

**Table [3]:** Description of number and quality of embryos in studied patients

Variables		Studied patients[N = 700]
Number of embryos	Mean ± SD	3.22±3.36; 0- 15
Quality of embryos	Poor	217 [31%]
	Good	483 [69%]

**Table [4]:** Description of pregnancy test in studied patients

Variables		Studied patients[N = 700]
Pregnancy test	Negative	301 [43%]
	Positive	399 [57%]

**Table [5]:** Correlation study between Total score and other studied parameters in patients group.

Variables	Total score
	[r]
Number of oocytes	0.08
Quality of oocytes	0.37*
Number of embryos	0.01
Quality of embryos	0.7*
Pregnancy test	0.8*

## DISCUSSION

Several factors are involved in infertility, which include physical, psychological, and social, collectively known as lifestyle. Lifestyle involves attempt of achieving thorough physical, psychological, and social well-being, and includes weight control, exercise, diet, diseases prevention, avoidance of alcohol and drugs, mental health, spiritual health, social health, increased conception age, and prevention of accidents<sup>[7]</sup>.

In the current work, we found that the mean of number of oocytes in studied patients was  $6.31 \pm 5.5$  with minimum number of 0 and maximum number of 24 [range 0–24]. 189 oocytes [27%] were poor while 511 oocytes [73%] were good.

In a cohort study by Ferreira et al.<sup>[8]</sup> that was conducted on 436 patients undergoing their first cycle of ICSI, the mean number of oocytes recovered was  $11.5 \pm 9.0$  and follicles aspirated was  $17.7 \pm 14.2$  which was higher than our results.

In the current study, the mean number of embryos in studied patients was  $3.22 \pm 3.36$  with minimum number of 0 and maximum number of 15 [range 0–15], and 217 embryos [31%] were of poor quality while 483 embryos [69%] were good. Ferreira et al.<sup>[8]</sup> showed that the mean number of embryos was  $2.0 \pm 0.9$  which was lower than our result. In addition, Ferreira et al.<sup>[8]</sup> showed that that the fertilization rate [%], implantation rate [%] and pregnancy rate [%] were  $74.9 \pm 7.5$ ,  $20.9 \pm 17.0$  and 31.4 respectively, which comparable to the present work.

In the current study, there was positive correlation between total score and each of quality of oocytes, quality of embryos and pregnancy rate. On the other side, there was no statistical significant correlation between total score and each of number of oocytes and number of embryos. In agreement with our results, Youness<sup>[9]</sup> found that according to the scores of lifestyle questionnaire, there was a statistical

significant difference between both fertilized and non-fertilized groups regarding physical activity. There was a higher percentage of high physical activity among the fertile group [78%] than the infertile group [52%]. Moreover, obesity was higher among the infertile group [23%] than the fertile group [12%].

Consistent with our results, Ferreira et al. found that the oocytes number recovered was not affected via any variable included in the model. However, obesity negatively affected the normal fertilization rate and positively affected the miscarriage chance. Moreover, physical activity had a positive impact on implantation rate, enhancing the gestation chance in approximately 80% of patients, and reducing the miscarriage chance<sup>[10]</sup>.

As regard psychological stress effect, in a large multicenter study evaluating the depression and anxiety before initiation of the first IVF cycle and once more one a day prior to retrieval of oocyte, no associations between stress degrees and outcomes of IVF were detected<sup>[11]</sup>.

Anderheim et al.<sup>[12]</sup> reported no evidence of the effect of psychological stress on outcomes of IVF, and considered such finding of value for the patients, because it could decrease the stress developed by them during therapy.

Cooper et al.<sup>[13]</sup> demonstrated that couples, who attained ongoing gestations scored greater with measures of a negative view of a child-free lifestyle, require parenthood and total stress than those who did not. Researchers claimed that moderate stress was needed for ideal IVF performance.

Many studies have reported significantly decreased oocyte retrieval in females who were overweight and obese<sup>[14, 15]</sup> which was primarily because of their inadequate ovarian response, and occurred even when PCOS was associated<sup>[16]</sup>

Dokras et al.<sup>[17]</sup> revealed lower numbers of mature oocytes in obese females undergoing IVF. However, while several researchers found an impaired oocyte and embryo quality in obese females<sup>[18]</sup> others did not report such a correlation<sup>[19]</sup>

Similarly, a lower incidence of embryo transfer and a lower mean number of transferred embryos have been detected in a linear correlation to increased BMI in a number of studies<sup>[17]</sup> but not in all<sup>[20]</sup> studies. Therefore, a current lack of consensus exists regarding the proposed impairment of oocyte and embryo in obese females undergoing IVF, and to what degree they are altered.

A number of researchers had hypothesized that high gonadotrophin doses, given as a compensation for relative gonadotrophin resistance related to obesity, might cause impairment of oocyte/embryo quality, failure of implantation and gestational complications<sup>[16]</sup>

Certainly, superovulation in mice prompts several defects including abnormal development of embryo and reduced invasion capacity of blastocysts in vitro, along with reduced implantation rates, delayed implantation, prolonged pregnancy, low birth weight and developmental retardation in vivo<sup>[18]</sup>

In conclusion, this study has highlighted that lifestyle behaviors can adversely affect general health and reproductive performance.

### Conflict of interest

Authors declare that, there was no conflicts of interest.

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