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Original Research Article

## Examining the rate of pregnancy with assisted reproductive technology and the outcome of pregnancy in women referring to the infertility center of Ardabil city

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### ABSTRACT

**Background:** Assisted reproductive technology (ART), including in vitro fertilization (IVF) and microinjection or intracytoplasmic sperm injection (ICSI) and intrauterine sperm injection (IUI) has been widely used to solve the problem of human infertility and has brought many benefits to millions of women and men. The husband is dealing with infertility disorders. The aim of this study was to determine the rate of pregnancy with ART and the outcome of pregnancy in women.

**Methods:** In this descriptive-cross-sectional retrospective study 380 women who visited the infertility center of Ardabil city Alavi hospital from the beginning of October 2017 to the end of September 2019 to get pregnant with assisted reproductive methods. Data were collected by a checklist and then were analyzed by statistical methods in statistical package for the social sciences (SPSS) version 24.

**Results:** The most important cause of infertility was attributed to ovarian causes with 36.5% and then male causes with 27.8%. In total, 82 people (22.6%) got pregnant out of 380 people referred for infertility treatment. Among these 82 people, 51.2% of healthy and full-term babies and 22.0% of healthy and pre-term babies were born. Also, 26.8% had no birth due to various reasons.

**Conclusions:** The results showed that the results of treatment with pregnancy methods in Ardabil are acceptable. The IUI method had the highest success rate in terms of pregnancy and the IVF method had the highest success rate in terms of the birth of a healthy baby.

**Keywords:** IVF, ICSI, IUI, Pregnancy

### INTRODUCTION

Infertility is a disease of the reproductive system that characterized by the absence of pregnancy after 12 months or more of regular unprotected intercourse.<sup>1</sup> The World Health Organization estimates that 1 in 6 couples experience some delay in pregnancy, and an increasing number require assisted reproductive treatment.<sup>2</sup> About 9% of couples around the world face the problem of infertility at some point in their life.<sup>3</sup> In developed

countries, 5% of children are born in laboratory conditions.<sup>4</sup> It is estimated that the rate of pregnancy caused by assisted reproductive technology (ART) is 0.2%-3.9% of births in Europe.<sup>5</sup>

Assisted reproductive methods are the usual selected treatment for many infertile couples, that the causes of which are male or female or idiopathic.<sup>6</sup> ART cycles are classified in the form of fresh (or using a newly fertilized embryo), frozen/thawed (using an embryo that was

previously fertilized and frozen and then thawed) and autologous (the woman's own oocyte) or donor (donor egg).<sup>7</sup> During the ART process, several drugs are used to induce ovulation. Gametes are selected, embryos are cultured in the laboratory and then frozen and thawed, and large doses of progesterone are used to support the luteal phase. ART, including in vitro fertilization (IVF) and microinjection or intracytoplasmic sperm injection (ICSI) and intra uterine insemination (IUI), has been widely used to solve the problem of human infertility and has brought many benefits to millions of couples involved with infertility disorders. In addition, with ICSI, an ovum can be fertilized directly by injecting a sperm into the cytoplasm, which is more invasive than IVF.<sup>8</sup>

After the first child born from an IVF pregnancy in 1978, there has been a steady growth in the use of ART, and more than 4 million babies have been born through ART worldwide. In fact, children of ART have become a significant part of the population, so much attention should be paid to the safety of ART. Many of the artificial methods used during ART raise concerns that children from ART pregnancies may be exposed to more health risks than children from natural pregnancies.<sup>9</sup> Due to the fact that so far, no study has been done in Ardabil in the field of pregnancy rate by using assisted reproductive methods and the outcome of pregnancy resulting from them, the aim of this study was to investigate this issue.

## METHODS

This descriptive cross-sectional retrospective study was conducted on 380 women who visited the infertility center of Ardabil city Alavi hospital during October 2017 to September 2019 to get pregnant with assisted reproductive methods. A checklist containing demographic information including age and place of residence, body mass index (BMI) and information related to the causes of infertility, spouse's age were completed and the collected data were analyzed in statistical package for the social sciences (SPSS) version 24. Chi-square, independent t-test and analysis of variance (ANOVA) were used to investigate the relationship between quantitative and qualitative variables. P value less than 0.05 was considered as significant. The results were also reported in the form of tables and graphs. Completing the treatment course and not withdrawing from the treatment was one of the inclusion criteria in the study. This study was registered by the ethics committee of the Ardabil University of Medical Science with ethics code: IR.ARUMS.REC.1399.522.

## RESULTS

The average age of women and women's spouses was 31.67 and 35.99 years, respectively. In terms of BMI, the highest frequency belonged to the overweight group (BMI between 25 and 30) and the lowest frequency belonged to class 3 obesity (BMI above 40). The most important cause of infertility in women was ovarian causes with 36.5% (Table 1).

**Table 1: Distribution of BMI and causes of infertility in the studied women.**

Variable	Number	Percentage
<b>BMI</b>		
Thin	2	0.5
Normal	145	38.2
Overweight	201	52.9
Obesity	32	8.5
<b>Cause of infertility</b>		
Masculine	122	27.8
Uterine	35	7.9
Ovary	160	36.5
Tubal	68	15.5
Inexcusable	54	12.3

The average duration of infertility in women of the study was 3.92±3.5 years. The highest frequency in terms of the method used was assigned to IUI with 66.1%. In total, out of 380 people referred for infertility treatment, 82 people (21.6%) got pregnant. Among these 82 people, 51.2% gave birth to healthy full-term babies and 22.0% healthy and pre-term babies. Also, 26.8% were stillborn due to various reasons.

**Table 2: Distribution of fertility method, pregnancy rate and pregnancy outcome in study subjects.**

Variable	Number	Percentage
<b>Pregnancy method</b>		
IUI	251	66.1
ICSI	123	32.4
IVF	6	1.6
<b>Occurrence of pregnancy</b>		
Yes	82	21.6
<b>Pregnancy outcome</b>		
Birth of a healthy and full-term baby	42	51.2
The birth of a healthy and preterm baby	18	22
No birth of a baby	22	26.8

The average time elapsed from the time of referral to pregnancy in women who became pregnant (82 people) was 4.05±3.1 months. A total of 82 people (21.6%) got pregnant, of which 22 people had a miscarriage. 18 patients (82%) had miscarriages (6 cases of ICSI and 12 cases of IUI), of which 2 patients had a miscarriage with the diagnosis of abnormality that one case had a spontaneous abortion (IUI method) and one had a therapeutic abortion (IUI method). 3 patients also had miscarriages due to ectopic pregnancy, and all 3 cases were of IUI type. For one case, the pregnancy was terminated due to preeclampsia in the second trimester (week 17) and the method used in this case was ICSI. Among all the samples leading to pregnancy, 4 people (4.8%) had preeclampsia. Among the 4 cases of preeclampsia, 3 cases had a healthy and preterm birth (2

cases of IUI and one case of ICSI) and 1 case of no birth (due to termination of pregnancy in ICSI method) (Table 3). 18 cases of premature delivery resulted in the birth of healthy, preterm babies (10 cases of IUI and 8 cases of ICSI). Among the 6 cases of multiple pregnancies, 4 cases were twin pregnancies (3 cases of ICSI and 1 case of IUI) and 2 cases of triplet pregnancies (both cases of ICSI). Of these pregnancies, 3 cases led to the birth of healthy and full-term babies and 3 cases led to the birth of healthy and pre-term babies.

There was no significant relationship between the occurrence of pregnancy and the method used. The IUI method has been slightly more successful than other methods in terms of pregnancy incidence (22.3%) (Table 4).

There was a significant difference between the pregnancy outcome and the method used. Regardless of the IVF method (only 1 case of pregnancy leading to delivery), the IUI method was more successful than the ICSI method in the birth of a healthy and full-term babies (Table 5).

There was a significant difference between the ages of the women who got pregnant and the women who did not get pregnant (Table 6).

**Table 3: Distribution of preeclampsia, premature birth and multiple births in people who became pregnant.**

Variable	Number	Percentage
<b>Preeclampsia</b>		
Yes	4	4.8
No	78	95.2
<b>Preterm delivery</b>		
Yes	18	21.9
No	64	78.1
<b>Multiple births</b>		
Yes	6	7.3
No	76	92.7

There was no significant difference between the incidence and outcome of pregnancy with women's BMI.

**Table 4: The relationship between the method used and the incidence of pregnancy in the study subjects.**

Methods	Occurrence of pregnancy (%)		Total	P value
	Yes	No		
IUI	56 (22.3)	195 (77.7)	251	0.870
ICSI	25 (20.3)	98 (79.7)	123	
IVF	1 (17)	5 (83)	6	
<b>Total</b>	82 (21.6)	298 (78.4)	380	

**Table 5: Relationship between the method used and pregnancy outcome in the study subjects.**

Methods	Pregnancy outcome (%)			Total	P value
	Healthy and full-term	Healthy and preterm baby	No birth		
IUI	34 (60.7)	7 (12.5)	15 (26.8)	56	0.015
ICSI	7 (28)	11 (44)	7 (28)	25	
IVF	1 (100)	0 (0)	0 (0)	1	
<b>Total</b>	42 (51.2)	18 (22)	22 (26.8)	82	

**Table 6: Relationship between age and incidence of pregnancy in study subjects.**

Variables	Age		P value	Spouse's age		P value
	Average	Standard deviation		Average	Standard deviation	
<b>Occurrence of pregnancy</b>						
Yes	30.37	6.02	0.004	34.99	6.04	0.034
No	32.32	6.33		36.49	6.74	
<b>Consequences</b>						
Healthy and full-term	29.79	6.22	0.134	34.58	5.87	0.390
Healthy and preterm baby	29.14	5.10		34.19	5.44	
No birth	31.86	5.97		36.02	6.55	

**DISCUSSION**

Examining the results of different assisted reproductive methods as well as the effective factors in its success rate

are different depending on the cultural, health, geographical and human conditions in different parts of the world. The average age of the subjects in the present study indicated that most of the women and their wives were in

the age range of 30-40 years which was more than age group in the study of Kamali et al and it was consistent with the study of Chubineh et al.<sup>10,11</sup> In general, age is an important factor in pregnancy, so that after the age of 30, the probability of giving birth to a healthy child decreases by 3.5% per year.<sup>12</sup> This issue was also proven in a comprehensive study in 1996 and it was determined that the probability of fertility will decrease significantly after the age of 35.<sup>13</sup> In Masoumi et al study, this range for infertile men and women is mentioned as 30-40 and 20-30 years; respectively, which is consistent for men in the present study.<sup>14</sup>

In the present study, about 60% of people had a BMI higher than 25, which in Kazemi et al study, this rate is 95%, and the result of their study is consistent with the present study in this respect. It can be indicative of the fact that women's high weight has become one of the barriers to fertility. The most common cause of infertility was related to female causes (59.9%), followed by male causes (27.8%). In the study of Jannati et al, 30% of the causes of infertility were related to women, which is less than the present study. While in the studies of others, this rate has been mentioned as 50% to 55%, which is similar to the present study in Ardabil city. Among female factors, the most frequency was assigned to ovarian causes, which can be due to the high prevalence of polycystic ovary syndrome and low ovarian reserve due to this syndrome and other reasons in our region. Also, in our study, tubal causes accounted for about 26% of female causes, which has been reported as 25-39% in various studies (5717). In some studies, less than 10% of causes have been attributed to tubular causes.<sup>16-18</sup> The causes of this difference in the results can be related to the high prevalence of sexually transmitted infections that lead to salpingitis, which is due to differences in the cultural conditions of the places at different countries. The prevalence of this cause is within the range of national studies. Male causes in our study included 27.8% of the causes. This rate was 31.4% in the study of Jannati et al. Male causes have shown different rates in different studies. For example, in a study at Royan Research Institute, 50.5% was reported, while in the studies of Olatunji and Esimai, it was 26.8% and 21%, respectively.<sup>10,16,19,20</sup> In the present study, the success rate of treatment in studied women was 21.6%. In the study of Moeini and his colleague in Royan Research Institute; it was 15.5%, which is less than the present study.<sup>21</sup> Of course, it should be noted that the aforementioned study was completed in 2019 and the progress of treatment techniques and the change of variables related to infertility treatment should be considered in this difference. In the study of Moeini and his colleague, the success rate of pregnancy in IUI, IVF and ICSI methods was 17.5%, 10.3% and 17.9%, respectively. These cases in our study were 22.3%, 17.0% and 20.3%; respectively. In all cases, the results of pregnancy in the present study were higher than the results of the study of Moeini and his colleagues. The best method in the occurrence of pregnancy in the study of Moeini and his colleagues was ICSI and in the present study was IUI. In the present study, the success rate

of pregnancy in IVF method was 0.17%. In the whole world; few of the top clinics report a success rate of more than 40%, while a few others report success rates of less than 10%, and a large number of clinics fall in between these two ranges, which the present study also supports. Unfortunately, even in developed countries, the number of clinics with a low success rate is very high.<sup>22</sup> In the study of Sadeghi in 2018 on the occasion of the 40th anniversary of IVF; The 25% success rate of IVF has been introduced as the cut off of desirability, and the results of this study were lower than the desired level.<sup>23</sup> The success rate of IUI method in the present study was 22.3% and the rate of healthy baby delivery in this method was 73.2%. This method was superior to other methods examined in this study in terms of fertility rate, but it ranked second in terms of success in delivering a healthy baby. Despite advances in semen preparation and controlled ovarian stimulation techniques, reported success rates for IUI are lower than rates reported for other ART methods, which was not in line with the present study.<sup>24</sup> Data from the European Society of Human Reproduction and Embryology show that the pregnancy rate per IUI cycle has remained constant at around 12% for years.<sup>25-27</sup> The success rate of the ICSI method in this study was 20.3% and the rate of delivering a healthy baby in this method was 72.0%. In Saremi et al study, the success rate of this method was 18.3% and the delivery rate of healthy babies was 75% which was lower than our study rate, but in terms of delivery success, it was almost equal to the present study.<sup>28</sup>

### Limitations

Due to the corona pandemic, it was difficult to reach people and complete the checklist, but we overcame this limitation by spending more time and following health protocols (phone calls).

Due to the corona pandemic, visits to the infertility center decreased due to illness, quarantine conditions, and travel restrictions between cities and provinces, and sometimes cycles were cancelled due to the lack of women visits and the illness of people, and this itself caused a negative psychological burden. It was on the patients and this negative psychological burden increased the probability of failure of assisted reproductive methods and could affect the results.

### CONCLUSION

In general, it can be said that the results of treatment with pregnancy methods in Ardabil are acceptable compared to the national level. The IUI method had the highest percentage of pregnancy and the IVF method had the highest percentage of healthy babies. The BMI and age of mothers in Ardabil were higher than similar studies, and the effect of these factors on the failure of the used methods was proven during the investigations. It requires more attention from health policy makers in planning for public awareness in order to act faster for having children and pay attention to weight and BMI of women.

### Recommendations

Due to the corona pandemic, the number of people referring for infertility treatment or completion of treatment is likely to be less compared to other periods, so for a more detailed investigation, it is recommended to repeat the study in the post-corona period.

It is suggested that the current study be conducted at the national level with a much larger statistical population and the results obtained in different places be compared.

It is suggested that respected colleagues use the results of this study to guide patients and use more appropriate treatment methods.

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