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Prevalence and Risk Factors of Infertility in a Sample of Iranian Couples

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Abstract

Objectives: The objectives of the present study were to assess prevalence and risk factors of current infertility in couples of child-bearing age.

Study design: This population based cross sectional study was conducted from September 2014 to June 2015 in Kohgiluyeh and Boyer-Aahmad province, Iran. A total of 2400 couples whose women were 19-49 year old through a multistage sampling were randomly selected. Measurements of age, education, occupation, weight and height of men and women, residential place, weather temperature state of the residence region of the couples and the pregnancy history of the wives were gathered. Data were statistically described. Multiple logistic regression analysis was used to detect risk factors for infertility.

Results: The prevalence of current infertility among the couples was 10.9%. Woman's age of 35 years or older (OR 1.38 95% CI 1.03-1.85 p=0.032), resident in regions with hot weather condition (OR 1.47 95% CI 1.02-2.11 p=0.039), rural residential state (OR 1.54 95% CI 1.13-2.1 p=0.007) and illiteracy of women (OR 1.96 95% CI 1.24-3.09 p=0.004) significantly increased the risk of infertility occurrence among the couples.

Conclusion: Infertility is a concerned health and social problem in the studied population. Rural residential condition, living in regions with hot temperature, illiteracy of woman and the age at 35 and older in women were detected as the risk factors of infertility presence in the studied couples.

Keywords: Prevalence; Infertility; Couples; Residential temperature; Iran

Introduction

Infertility is recognized as a critical problem of couples during reproductive age around the world [1-3]. It is defined as the failure to conceive after at least 12 months of regular unprotected sexual intercourse [4-6]. Infertility is an increasingly prevalent health issue, which affects 10-15% of couples worldwide [7-9]. World Health Organization (WHO) has reported that more than 25% of couples in developing countries experience infertility [10]. Furthermore, numerous studies have revealed that infertility is a major health problem in Asian countries [11]. Mascarenhas et al. [12] in a systematic analysis of 277 studies around the world reported a prevalence rate of whole infertility among women at childbearing age globally as 12.5%, while the highest infertility prevalence belonged to the Middle Eastern countries [12].

The experience of infertility has a negative impact on individual's well-being and living through manifestation of depression, anxiety, stress, frustration, sexual dysfunction, social stigma, and low self-esteem [3,13-17]. In addition, infertility imposes a high economic burden on involved couples and can lead to violence, isolation and divorce among people experiencing fertility problem [3,18]. Despite being a major decreasing factor of birth rate and a complicated social-psychiatric problem in populations [19], there is a shortage of data of prevalence and influencing factors of infertility in both developed and developing countries [5,20,21].

Infertility has been prevalent in more than 20% of married couples and has an increasing trend in Iran [22,23]. Furthermore, because of importance of sociocultural, economic and religious aspects of a couple's childbearing status, infertile individuals are faced with serious and hard implications, undesired results and social detriments in the country [14]. Whereas, regarding the diversity of socio-economic, cultural, ethnic and geographical conditions, information of the prevalence and contributory factors of infertility experience among Iranian couples is limited [16,24,25]. The objectives of this study were to assess prevalence of current infertility and to identify socio-demographic and environmental risk factors of current infertility in a sample of couples at childbearing age, Iran.

Methods

Study setting and design

This analytical population-based cross-sectional study was conducted at Kohgiluyeh and Boyer-Ahmad province, southern Iran, from September 2014 to June 2015. It was approved by the Research and Ethics Committee of the Yasuj University of Medical Sciences.

Study participants, sample size and sampling method

Study population comprised of married couples who were living together more than 1 year, couples 'wives were at reproductive age 19-49 years and resident in urban and rural places throughout the province. Sampling frame was consisted of couples which women were under the health care system served through urban and rural health centers. According to an estimated prevalence rate of infertility

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attained from published national studies as 10% and considering a 95% confident interval around it, the type one error (α) as 5%, and a design effect equals 2, the size of a representative sample was enumerated as 2400 couples. A multistage stratified cluster random sampling method was implemented to recruit the sample as bellow. Firstly, according to climatic conditions, the province was divided in to three strata include hot, moderate and cold area. Secondly, in each division, a random sample of townships includes urban and rural places were selected and the subsamples of couples attributed to health centers were proportionally allocated. Finally, proportional to frequencies of age groups, women were taken randomly from health centers 'lists. The couples with women aged 19 to 49 years and in a de-facto marriage currently living with their husbands that 1 year or more attempting to be pregnant and were local resident of the region were included in the study. The couples which women had systemic disease could influence in their fertility status, excluded from the study.

Data collection and measures

A structured questionnaire was provided and pretested before initiating the study. A team of professional midwifes who have been employed in health centers were selected and trained to interview with the husband and the wife of every sampled couple and to fulfill the questionnaire. Iranian couples, especially those with wives in reproductive age are under health care system that serves through governmental urban and rural health centers. At the centers the profiles of couples including fecundity/fertility and child bearing status must be annually checked, updated and completed. The code addresses of sample couples were extracted from documents in the health centers and an informative consent form was developed. Then, cooperators invited the selected couples to participate in the study. Thus, while women refereed to health centers, after taking their approval and signed consent forms, interviewers recorded their information in the questionnaires. In cases, such as avoiding to refer to the centers, midwifes gathered the data in referring to women's house. The collected data were demographic, socioeconomic and anthropometric characteristics including age, residence, height, weight, education, occupation and marriage statuses for both women and men, pregnancy history of the wives and the weather temperature of the couple's residential region. In this study current infertility was investigated. Therefore, a couple was diagnosed as infertile, if during last 12 months, the woman did not become pregnant despite regularly unprotected sexual intercourse [2,26]. Prevalence of infertility was defined as the number of infertile cases to the total number of couples in each group.

Statistical analysis

The distribution of the couples according to socio-demographic characteristics of the husbands and wives were provided in contingency tables in terms of frequency (n) and percentage (%). Body mass index (BMI) was computed as weight (kg)/square of height (m^2). Quantitative variables were described by mean and standard deviation statistics. Chi-square (x^2) test was used to compare infertility prevalence among groups. Univariate and Multivariate logistic regression analysis were implemented to detect factors significantly associated with the infertility (not present versus present) as dependent variable among the couples. The backward stepwise method was used and odds ratio (OR) with 95% confidence interval (CI) were computed to assess the strength of association of risk factors with current infertility. All statistical analysis were done using SPSS software version 24 (SPSS Inc., Chicago, IL, USA). Significant level considered as p value (p) less than 0.05.

Results

Characteristics of the studied couples

Of the total 2400 couples who had involvement (necessary) conditions, 2284 couples participated in the study such that response rate was 95.2%. The mean (SD) age of women and men of the couples were 33.12(7.54) and 38.59(9.35) years, respectively. While, the women showed a mean (SD) BMI of 25.87 (4.69), the mean (SD) BMI of their husbands was 25.19 (8.67). Furthermore, the couples who have been lived in rural and/or hot regions were 33.2 and 65.2%, respectively. Of the women 41.7% and of the husbands 63.3% were aged greater than or equal 35. Most of the women educated at primary to high school level (42.4%) and/or were house wife (89.3%). In addition, education condition of most of the men (34.7%) was primary to high school and most of the men (63.9%) were freelancers. Socio-economic characteristics of the investigated couples are shown in Tables 1 and 2.

Prevalence of current infertility according to the characteristics of the couples

Out of 2284 couples who actively trying to be pregnant during last year, 249 couples were infertile. Therefore, the current infertility rate among sampled couples was 10.9%. Bivariate analysis of association of fertility status and socio-demographic characteristics of the couples are demonstrated in Table 3. The prevalence of infertility among rural couples was significantly higher than that of urban couples (p=0.041). Moreover, the prevalence of infertility significantly decreased as husband's education level and/ or woman's education level increased (p=0.001 and p<0.001, respectively). In addition, the prevalence of infertility among the couples which woman's age and/or husband's age was greater than 35 years were significantly higher than peers (p=0.005 and p=0.016, respectively). However, there was not found any significant association between infertility and the occupation of both husbands and women (p=0.89 and p=0.35, respectively), the BMI of both men and women (p=0.103 and p=0.934, respectively) and weather condition of residence place of the couples (p=0.2).

Characteristic	n	%
Total couples	2284	100
Woman age (years)		
15-19	37	1.6
20-24	258	11.3
25-29	539	23.6
30-34	495	21.7
35-39	423	18.5
40-44	336	14.7
45-49	194	8.5
Husband's age (years)		
15-24	52	2.3
25-29	311	43.6
30-34	483	21.2
35-39	490	21.5
40-44	413	18.1
45-49	268	11.8
≥50	263	11.5
n: Number (count), %: Percent.		

Table 1: Distribution of the couples men and women in terms of age groups (n=2284).

Characteristic	n	%
Residential place		
Rural	758	33.2
Urban	1526	66.8
Climatic (weather) condition		
Cold	523	22.9
Moderate	272	11.9
Hot	1489	65.2
Woman's education level		
Illiterate	192	8.5
Primary to high school	953	42.4
Complete high school	668	29.7
University	434	19.3
Woman's occupation		
House wife	2036	89.3
Not house wife	244	10.7
Woman's BMI		
<18.5	41	1.9
18.5-24.9	1996	45.5
25-29.9	781	35.7
≥30	372	17
Husband's BMI		
<25	1190	52.1
≥25	1094	47.9
Husbands education		
Illiterate	113	5
Primary to high school	786	34.7
Complete high school	628	27.7
University	741	32.7
Husband's occupation		
Employee	724	32.1
Freelancer	1441	63.9
Farmer	90	4
n: Number (count), %: Percent.		

Table 2: Distribution of the couples according to socio-demographic characteristics (n=2284).

Risk factors of infertility among the couples

All the independent variables that in the univariate regression analysis case had an association with infertility presence in the couples with a p value less than 0.25 were included in a multivariate logistic regression model using Backward Wald method. Woman's age, weather temperature state of living region, residence place and woman's education level were associated with the infertility presence among the couples. Women's age of 35 years or older (OR 1.38 95% CI 1.03-1.85 p=0.032), resident in regions with hot weather condition (OR 1.47 95% CI 1.02-2.11 p=0.039), rural residential state (OR 1.54 95% CI 1.13-2.1 p=0.007) and illiteracy of women (OR 1.96 95% CI 1.24-3.09 p=0.004) increased the risk of infertility occurrence among the couples (Table 4).

Discussion

In the present study, we showed that the prevalence of current infertility in the studied couples was 10.9%. The presented infertility rate is higher than the 12-month prevalence value ranged from 6.9% to 9.3% in less-developed countries reported by Boivin et al. [27] and around the estimated global rate as 10.5% by Mascarenhas et al. [12]. Moreover, the current infertility rate found in the present study was larger than the rate has been found in a national study conducted by safarinejad et al. [25] and as the same as the average rate has been reported in another national study [28].

Detection and modification the risk factors of infertility incidence in populations have been in the priorities proposed by the health policy-makers [23]. In the present study it was shown that woman's age was associated with infertility prevalence in the studied couples. This result is consisted with the findings of the previous studies [3,16,18]. The age of a woman is a factor among others that can affect the fertility of a couple. Due to pursuing to attain a desirable education level or a stable job, many couples plan to postpone childbearing. However, at age 35 years and over the risk of impaired fertility increases in women via secondary amenorrhea, polycystic ovary syndrome (PCOS), uterine myomas and endometriosis [9].

We showed that the risk of infertility occurrence in the couples with illiterate women was higher than that of the coupes which women were educated up to complete high school. In accordance with our result, the authors found that the risk of infertility has been decreased as education level of study participants increased [11,29]. However, two internal authors kazemijaliseh et al. [16] and Rostami-Davom et al. [30] reported different results. The difference may be due to different combinations of the participants in these studies in comparison with the present study. Because in the last studies couples were taken only from the urban regions. Educated women could access to a level of knowledge, attitude and income, which might help them better perceive and control infertility problems. Furthermore, in the present study the risk of infertility presence among rural couples was higher than that of urban residents. To our knowledge, no foreign published studies were found comparing infertility prevalence between rural and urban couples. However, contrary to our study, Safarinejad et al. [25] reported that infertility rate was higher in urban than rural areas. The difference may be attributed to the different types of the studies. Furthermore, being more exposed to radiation, heat, trauma and exhausting labors as well as having a lower socioeconomic situation than urban counterpart can predispose rural couples to experience more infertility problems [31].

In addition, as results show the odds of infertility experience among couples resident in regions with hot (climate) weather condition compared with that resident in cold weather regions was higher. Numerous studies have shown that environmental temperature has influenced on human reproductive physiology [32]. The men testes are created outside the body cavity and are surrounded by a regulator heat exchange system resulting in a temperature lower than body core temperature. This situation is seemed to be essential in facilitating spermatogenesis and clears the concept of elevated testicular temperature as a potential risk factor for infertility [33]. It has been revealed that human testes are sensitive to hot weather condition of the places where they lives and/or works [34]. Increasing of the scrotal temperature has been shown to cause impaired production of sperms which can lead to infertility in men [2,35]. In agreement with our result, Fisch et al. [32] explored the relationship of global air temperature change and human fertility among 19 industrial countries from 1900 to 1994. They found an inverse relationship between changes in global temperature and birth rates in all countries. Moreover, Barreca et al. in a study titled "Does hot weather affect human fertility?", reported that hot weather has reduced the fertility frequencies in the investigated countries [36].

The present study had some limitations. Fearing from stigmatic accusation and threatening consequences, some women might report incorrect data on their infertility status. By giving the women a confidence about privacy of their characteristics, we tried to make them

Characteristic	Fertile (n, %)	Infertile (n, %)	P value	OR (95% CI)
Residential place				
Rural	661 (87.2)	97 (12.8)	0.041	1.327 (1.012-1.74)
Urban	1374 (90)	152 (10)		1
Climatic (weather) condition			0.20	
Cold	477 (91.2)	46 (8.8)		1
Moderate	242 (89)	30 (11)	0.31	1.285 (0.791-2.088)
hot	1316 (88.4)	173 (11.6)	0.075	1.363 (0.969-1.918)
Woman's age (years)				
<35	1205 (90.7)	124 (9.3)		1
≥35	830 (86.9)	125 (13.1)	0.005	1.464 (1.124-1.905)
Woman's education level			<0.001	
Illiterate	153 (79.7)	39 (20.3)	0.001	2.325 (1.507-3.588)
Primary to high school	857 (89.9)	96 (10.1)	0.898	1.022 (0.734-1.422)
Complete high school	602 (90.1)	66 (9.9)		1
University	388 (89.4)	46 (10.6)	0.70	1.081 (0.727-1.609)
Woman's occupation				
House wife	1813 (89)	223 (11)	0.89	1.031 (0.671-1.585)
Not house wife	218 ((89.3)	26 (10.7)		1
Woman's BMI				
<25	938 (90.3)	101 (9.7)		1
≥25	1023 (88.1)	138 (11.9)	0.103	1.253 (0.955-1.644)
Husband's age (years)				
<35	771 (91.1)	75 (8.9)		1
≥35	1262 (87.9)	174 (12.1)	0.016	1.417 (1.066-1.885)
Husband's BMI				
<25	643 (89.3)	77 (10.7)		1
≥25	593 (89.4)	70 (10.6)	0.934	0.986 (0.700-1.386)
Husband's education level			0.001	
Illiterate	87 (77)	26 (23)	0.001	2.589 (1.558-4.301)
Primary to high school	701 (89.2)	85 (10.8)	0.778	1.05 (0.746-1.478)
Complete high school	563 (89.6)	65 (10.4)		1
University	670 (90.4)	71 (9.6)	0.636	0.918 (0.644-1.31)
Husband's occupation			0.35	
Employee	653 (90.2)	71 (9.8)		1
Freelancer	1281 (88.9)	160 (11.1)	0.357	1.149 (0.855-1.543)
Farmer	77 (85.6)	13 (14.4)	0.176	1.553 (0.821-2.935)
n: Number (count), %: Percent.				

Table 3: Prevalence of infertility according to socio-demographic and environmental characteristics of the couples.

Independent variables	OR	95% CI	P
Woman's age (year)			
<35	1		
≥35	1.379	1.029-1.848	0.032
Weather condition			
Cold	1		
Moderate	1.082	0.646-1.812	0.766
Hot	1.468	1.020-2.113	0.039*
Residence place			
Urban	1		
Rural	1.539	1.126-2.102	0.007*
Woman's education level			
Complete high school	1		
Illiterate	1. 957	1.238-3.094	0.004*
Primary to high school	0.923	0.653-1.305	0.649
University	1.190	0.796-1.781	0.397
*Significant (p<0.05).			

Table 4: Associated risk factors of infertility among couples based on the multivariate logistic regression analysis.

feel free to present correct data. Furthermore, in the present study only socio-demographic factors were investigated.

Conclusion

The current study showed that the presented prevalence of infertility was higher than the global and national average rates. Accordingly, the current infertility is a concerned health and social problem in the studied population. Rural residential condition, living in hot temperature places and illiteracy of woman as well as the age 35 and older in women were detected as the risk factors of infertility presence in the studied couples.

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