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Original Article

The trend of infertility in Iran, an original review and meta-analysis

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ABSTRACT

Background & Aim: Worldwide prevalence of infertility has been reported to be 3-7% of all couples. There are varieties among the results of studies conducted on the prevalence of infertility in Iran. The present study aimed to evaluate the trend of infertility using meta-analysis method in Iran.

Methods & Materials: We systematically reviewed all published papers in Medline database of the National Library of Medicine and their Persian equivalents (2001–2011). Findings which met the inclusion criteria were included. Random effects meta-analysis was applied to the data of 13 selected populations. Data manipulation and statistical analyses were performed using STATA.

Results: Overall, 13 studies met our inclusion criteria. The pooled prevalence of infertility was 13.2% (95% CI: 8-18.3). The pooled prevalence of primary and secondary infertility were reported to be 5.2% (95% CI: 3.7 - 6.6) and 3.2% (95%CI: 2 - 4.4), respectively. The lowest and highest frequency of lifetime prevalence of infertility was 2.8% in 2001 and 24.9% in 2010, respectively. Meta-regression scatter plot showed an increasing trend in the prevalence of infertility during 2001-2011 (P = 0.58). Meta-regression did not indicate a significant correlation between the sample sizes and the prevalence of infertility (P = 0.64).

Conclusion: The pooled infertility prevalence in Iran is higher than its mean worldwide, and lifetime infertility is increasing in recent years compared to the past in Iran.

Introduction

Infertility is one of the medical problems in the world today. Infertility is defined as the inability of a couple to conceive naturally after 12 months of regular and unprotected intercourse (1).

Infertilities are divided into two groups of primary and secondary (2). Primary infertility is defined as the failure to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse (3). However, secondary infertility is determined as the inability to conceive following a previous pregnancy (4).

Infertility has a number of adverse effects. One is its considerable economic burden (5). Moreover, Infertility can have societal repercussions, and cause personal suffering and psychological disorders (6, 7). In a study, the rate of remarriage was 3.5 times higher in infertile women (8).

Infertile couples experience marital discord particularly when they are under stress for making medical decisions (6). Infertile women have lower scores in desire and arousal domains and lower frequency of intercourse (5).

The prevalence of infertility has been reported to be 1.7% (1.7-2.2%) for primary and 10.5%

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(9.5-11.7%) for secondary infertility (9). The worldwide prevalence of infertility has increased 50% since 1955 (10).

Several studies conducted in Iran have shown different prevalence for infertility (11, 12). Some recent studies show that the actual prevalence of infertility is influenced by changing various factors (13).

More than one million infertile couples live in Iran. Several studies have shown that fertility plays an important role in strengthening and stabilizing the family. Fertility is of great importance in religion, history, and culture in Iran; therefore, infertility can be one of the reasons for divorce (14).

Several studies with various sample sizes have estimated the prevalence of infertility in different regions of Iran (11, 12). The sample size of the study and characteristics of the study participants have significant roles in estimating the prevalence infertility. Therefore, we aimed to conduct an original review and meta-analysis of reports of the prevalence of infertility to estimate the overall prevalence of the condition in the Islamic Republic of Iran. The meta-analysis was performed in order to perform systematic reviews of documents, summarize the quantitative results of the study, combine the results of different studies, and to provide a general interpretation of the results.

Methods

This original meta-analysis reviewed the prevalence of infertility in Iran. We searched the English medical literature published between 2001 and 2011 using the international databases including PubMed/Medline, Scopus, and ISI Web of Knowledge. Moreover, Scientific Information Databases (SID), Global Medical Article Limberly (Medlib), Iranian Biomedical Journals (Iran Medex), and the Iranian Journal Database (Magiran) were searched. Using the medical subject headings (MeSH), we searched “infertility”, “prevalence”, “Incidence”, and “Iran” including all subheadings. The Persian equivalents of these keywords were also searched and all probable combinations were considered. Moreover, the references of selected citations were hand-searched. All sources were searched with the same strategy and keywords.

In this study, infertility is defined as the failure to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse. This study was undertaken with the approval of the Ethical Committee of the Ilam University of Medical Sciences, Iran. The protocol was designed using widely recommended methods and reported according to PRISMA (15).

First, researchers collected all the articles related to infertility in Iran and prepared a list of abstracts of the articles. All articles with the above-mentioned keywords in Iran and incidence of infertility in Iran were listed in the primary list. Articles only on infertility factors were excluded from the list. Then, a list of necessary information for the study was provided; it included the researcher's name, title, year, location, sampling size, and study method, type of study, and assessment of infertility prevalence overall and in subgroups for final evaluation.

Researchers reviewed the final list and relevant articles were included. In the initial search, 32 articles were selected and then a list of 28 abstracts of relevant articles was compiled. For final assessment, qualitative assessment of the articles was conducted using research criteria including sample size, sample selection, methodology, duration of projects, and prevalence of overall infertility and subgroups including lifetime infertility, primary infertility, secondary infertility, and their history. Finally, 13 articles were used in the meta-analysis. The articles’ quality was assessed on a Strobe scale. Full text articles were reviewed for analysis.

Random effect models were used for meta-analysis, considering the possibility of significant heterogeneity between studies which was tested with the Q test ($P < 0.10$ was considered indicative of statistically significant heterogeneity) and the I2statistic (values of 25%, 50%, and 75% are considered to represent low, medium, and high heterogeneity, respectively). In our review showed 99.8% heterogeneity.

Stratified analyses were performed by study locations and years. Data manipulation and statistical analyses were undertaken using the Stata Statistical Software Package (Version 11.1, Stata Corporation, College Station, TX, USA).

Results

During the search of resources a total of 32 articles were found. After exclusion of duplicate, unavailable full paper and causes of infertility articles, finally 13 papers were selected for analysis (Figure 1).

In total, 55,658 individuals participated in the studies done from 2001 to 2011. The description of studies that met our eligibility criteria are presented in table 1 and figure 2.

Most studies have used two-stage stratified sampling. The prevalence of infertility is presented in 9 articles. The pooled of infertility rate in Iran is 13.2% (95% CI: 8-18.3). 7 studies reported the prevalence of primary and secondary infertility in the population. The prevalence of pooled primary and secondary infertility were reported to be 5.2% (95% CI: 3.7-6.6) and 3.2% (95% CI: 2-4.4), respectively (Table 2).

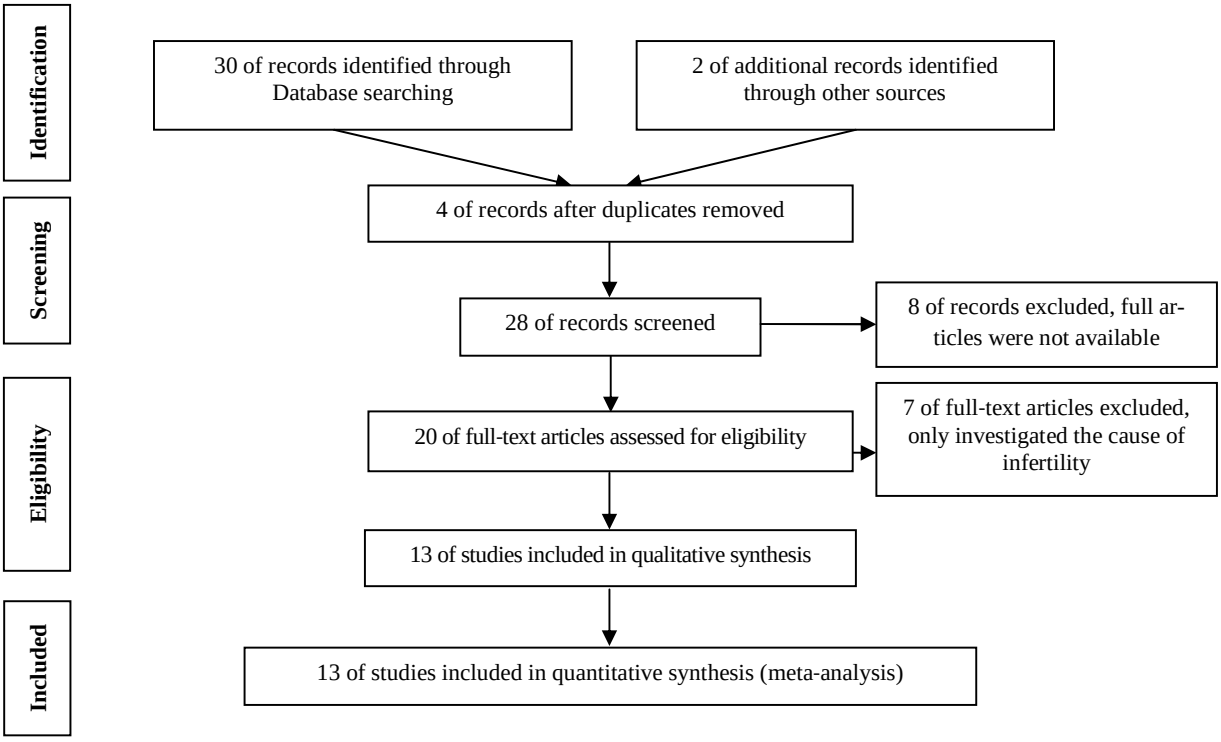

Figure 1. Results of the systematic literature search

Table 1. The description of studies that met our eligibility criteria

Year	N*	Locations	Prevalence (%)	CI 95%**
1997	1992	Tehran	22	20.2-23.8
2000	2593	Mazandaran	13.2	12-14.4
2007	380	Gonabad	11.9	8.6-15.2
2003	902	Sannandaj	18.2	15.9-20.9
2001	1200	Tehran	12	10.2-13.8
2005	5200	Yazd	5.5	4.9-6.1
2001	10418	National	2.8	2.5-3.1
2005	12000	National	25	24.2-25.8
2006	12285	National	8	7.5-8.5
Total	46916		13.2	8-18.3

*Number of participants; **Confidence Interval

Table 2. Prevalence of infertility based on type of infertility

Researcher	N*	Primary infertility		Secondary infertility	
		Prevalence (%)	CI 95%**	Prevalence (%)	CI 95%**
Moghaddam et al. (16)	2593	11.9	10.7-11.3	1.3	0.9-1.7
Sadegh Moghadam et al. (17)	380	6.5	4-9	5.4	3.1-7.7
Nojomi (18)	1200	5.5	4.2-6.8	3.7	2.6-4.8
Aflatoonian et al. (1)	5200	3.4	2.9-3.9	2.4	2-2.8
Vahidi et al. (12)	12000	3.4	3.1-3.7	5.3	4.9-5.7
Safarinejad (19)	12285	4.6	4.2-5	3.4	3.1-3.7
Houseini et al. (20)	2400	1.9	1.4-2.4	1.7	1.2-2.3
Total	36058	5.2	3.7-6.6	3.2	2-4.4

*Number of participants; **Confidence interval

Table 3. Relationship between year of study and the incidence of infertility in the one variable meta-regression model

			Standard Deviation	P value
Year	Coefficient	-0.0049	0.0084	0.580
	Cons	9.96	16.94	0.575
Number of participants	Coefficient	-2.70	5.55	0.641
	Cons	0.146	0.0395	0.888

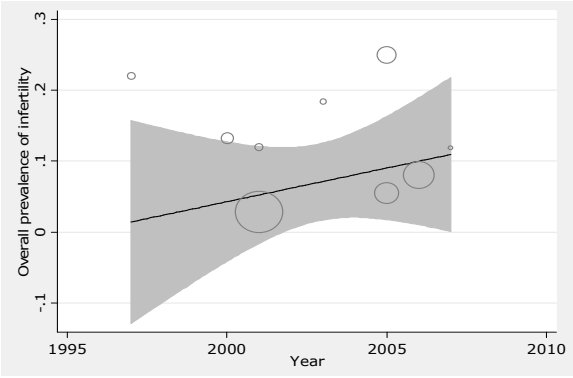

Figure 2. Meta-regression plot of the prevalence of infertility based on year of study

2.2% (95% CI: 1.2-3.3) of all participants in the mentioned studies had primary infertility at the study time. In reviewing primary infertility at the study time, the lowest and highest frequency was 3% and 12%, respectively.

Lifetime prevalence of infertility was another variable that we evaluated. The lowest and highest frequency of lifetime prevalence of infertility was 2.8% and 29.4%, respectively.

Meta-regression scatter plot showed an increasing trend in the prevalence of infertility during 2001-2011 (Figure 2), but the correlation between prevalence of infertility and year of study was not significance (P = 0.58) (Table 3).

Meta-regression did not indicated a significant correlation between the sample sizes and the prevalence of infertility (P = 0.64) (Figure 3).

Meta-regression models reported a higher incidence of secondary infertility in articles that had a higher score on the Strobe scale. There was no association between Strobe score and the prevalence of primary infertility (Figure 4).

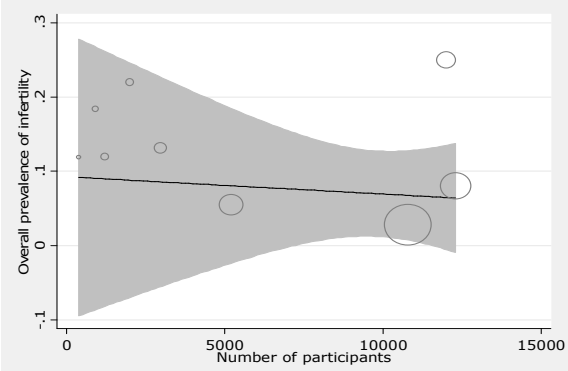

Figure 3. Meta-regression scatter plot of the prevalence of infertility based on sample size

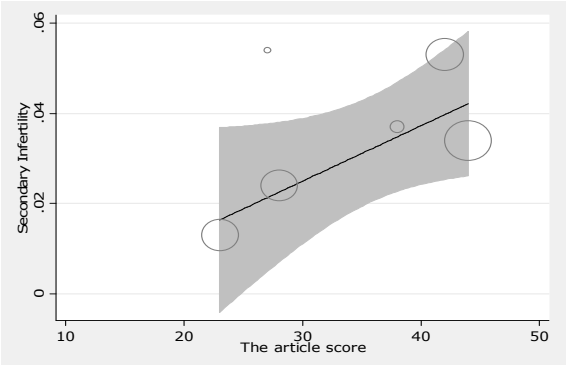

Figure 4. Meta-regression scatter plot of secondary infertility based on Strobe score

Discussion

This study examined the prevalence of infertility in different areas of Iran. Based on our results, the pooled prevalence of infertility was 13.2% (95% CI: 8-18.3) in Iran. Overall prevalence of primary and secondary infertility was 2.2% and 3.2%, respectively.

The present study reported the pooled prevalence of infertility to be 13.2% in Iran. Several studies have reported a wide range of infertility in various countries; the infertility rate has been reported 3% in China and 30% in Sheffield, England (21, 22). Consistent with the present study, 4.2% of the 60,000 women living in the UK had infertility (23). Another study reported that 7-3% of couples are facing unresolved infertility (24). In another study 10.6% of participants had primary infertility (25).

Based on our results, 2.2% of Iranian women have experienced primary infertility. However, this rate was reported to be 9.8% in Scottish women (26). Adamson et al. reported the prevalence of primary infertility to be 12.6% in their study population (27). This is about 6 times higher than our study. The age group of the participants is the possible cause of this difference. Most women in our study (92%) were 15-49 years of age. Adamson et al. evaluated 897 women of 15-30 years of age, which were sexually active. Sexually transmitted diseases are most common in young women. These diseases are the main cause of infertility in women (28-30). This could justify the higher incidence of infertility in the study of Adamson et al. Other studies confirmed the association between sexually transmitted diseases and infertility (26).

In the present study, 3.2% of the women had secondary infertility. In a study, 6.7% of all 728 participants had secondary infertility (25). Bhattacharya et al. studied 4466 women and reported that 7% of the study participants had secondary infertility (26).

In the present study, the meta-regression scatter plot showed that the prevalence of infertility has increased during 2001-2011. Other studies have shown an increased incidence of infertility in recent years (10). Today, the age of marriage has increased in most countries. Because of the increase in fertility rates as a result increase in age of marriage, these results are expected (11).

Our study has several potential Strengths**.** First, this study is the first systematic review and meta-analysis of infertility in Iran. Based on searches in scientific databases, the impact of some factors on the prevalence of infertility has been studied using a meta-analysis, but no studies have reported the prevalence of infertility.

Second, different explanations have been offered for infertility. In some studies infertility has been defined as failure to achieve pregnancy after one year of unprotected intercourse; however, other studies agree on two years (31). In all of the articles in the present study, infertility was considered as failure to achieve pregnancy after one year of unprotected intercourse.

Our systematic review and meta-analysis study has several limitations. The National databases do not have appropriate quantity (number of papers recorded) and quality (tool). These databases do not include all the journals. On the other hand, much of the scientific researches in Iran are thesis projects. Unfortunately, there is no comprehensive and coherent national database to cover the thesis projects.

Conclusion

In the present study, mean rate of infertility is 13.2% (CI 95%: 8- 18.3). The reported confidence intervals have a long length. Moreover, considering the change in the age of marriage and other factors effective on the prevalence of infertility, further studies to determine more accurately the incidence of infertility in Iran seem necessary.

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References

1. Aflatoonian A, Baghianimoghadam B,

Partovi P, Abdoli A, Hemmati P, Tabibnejad N, et al. A new classification for female infertility. Clin Exp Obstet Gynecol 2011; 38(4): 379-81.
2. Kumar D. Prevalence of female infertility and its socio-economic factors in tribal communities of Central India. Rural Remote Health 2007; 7(2): 456.
3. Zegers-Hochschild F, Adamson GD, de MJ, Ishihara O, Mansour R, Nygren K, et al. International Committee for Monitoring Assisted Reproductive Technology (ICMART) and the World Health Organization (WHO) revised glossary of ART terminology, 2009. Fertil Steril 2009; 92(5): 1520-4.
4. Inhorn MC. Global infertility and the globalization of new reproductive technologies: illustrations from Egypt. Soc Sci Med 2003; 56(9): 1837-51.
5. Millheiser LS, Helmer AE, Quintero RB, Westphal LM, Milki AA, Lathi RB. Is infertility a risk factor for female sexual dysfunction? A case-control study. Fertil Steril 2010; 94(6): 2022-5.
6. Volgsten H, Skoog SA, Ekselius L, Lundkvist O, Sundstrom P, I. Risk factors for psychiatric disorders in infertile women and men undergoing in vitro fertilization treatment. Fertil Steril 2010; 93(4): 1088-96.
7. Volgsten H, Skoog SA, Ekselius L, Lundkvist O, Sundstrom P, I. Prevalence of psychiatric disorders in infertile women and men undergoing in vitro fertilization treatment. Hum Reprod 2008; 23(9): 2056-63.
8. Jumayev I, Harun-Or-Rashid M, Rustamov O, Zakirova N, Kasuya H, Sakamoto J. Social correlates of female infertility in Uzbekistan. Nagoya J Med Sci 2012; 74(3-4): 273-83.
9. Mascarenhas MN, Cheung H, Mathers CD, Stevens GA. Measuring infertility in populations: constructing a standard definition for use with demographic and reproductive health surveys. Popul Health Metr 2012; 10(1): 17.
10. Oliva A, Spira A, Multigner L. Contribution of environmental factors to the risk of male infertility. Hum Reprod 2001; 16(8): 1768-76.
11. Naghavi M. Demographic and health survey in the Islamic Republic of Iran. Tehran, Iran: Department of Health, Ministry of Health and Medical Edu-cation; 2002. p. 45-7, 132-7. [In Persian].
12. Vahidi S, Ardalan A, Mohammad K. Prevalence of primary infertility in the Islamic Republic of Iran in 2004-2005. Asia Pac J Public Health 2009; 21(3): 287-93.
13. Gnoth C, Godehardt E, Frank-Herrmann P, Friol K, Tigges J, Freundl G. Definition and prevalence of subfertility and infertility. Hum Reprod 2005; 20(5): 1144-7.
14. Behjati Ardekani Z, Akhondi MM, Kamali K, Fazli Khalaf Z, Eskandari Sh, Ghorbani B, et al. Mental Health Status of Patients Attending Avicenna Infertility Clinic. J Reprod Infertil 2010; 11(4): 319-24. [In Persian].
15. Moher D, Liberati A, Tetzlaff J, Altman DG. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. J Clin Epidemiol 2009; 62(10): 1006-12.
16. Moghaddam A, Karimpour Malekshah A, Talebpour Amiri F, Taringou F. The prevalence of infertility in center region of Mazandaran province in 1999. J Mazandaran Univ Med Sci 2000; 10(27): 12-8. [In Persian].
17. Sadegh Moghadam L, Moslem AR, Gharche M, Chamanzari H. Study of women infertility of Gonabad. Horizon Med Sci 2008, 13(4): 82-5. [In Persian].
18. Nojomi M. Epidemiology of infertility in the west of Tehran in 2000. J Am Med Womens Assoc 2002; 57(4): 219.
19. Safarinejad M. Infertility among couples in a population-based study in Iran: prevalence and associated risk factors. Int J Androl 2008; 31(3): 303-14.
20. Hosseini J. Emadedin M. Mokhtarpour H. Sorani M. Prevalence of primary and secondary infertility in four selected provinces in Iran, 2010-2011. Iran J Obstet Gynecol Infertil 2012; 15(29): 1-7. [In Persian].
21. Che Y, Cleland J. Infertility in Shanghai: prevalence, treatment seeking and impact. J Obstet Gynaecol 2002; 22(6): 643-8.
22. Vayena E, Rowe PJ, Peterson HB. Assisted reproductive technology in developing countries: why should we care? Fertil Steril

2002; 78(1): 13-5.
23. Oakley L, Doyle P, Maconochie N. Lifetime prevalence of infertility and infertility treatment in the UK: results from a population-based survey of reproduction. Hum Reprod 2008; 23(2): 447-50.
24. Himmel W, Ittner E, Kochen MM, Michelmann HW, Hinney B, Reuter M, et al. Management of involuntary childlessness. Br J Gen Pract 1997; 47(415): 111-8.
25. Buckett W, Bentick B. The epidemiology of infertility in a rural population. Acta Obstet Gynecol Scand 1997; 76(3): 233-7.
26. Bhattacharya S, Porter M, Amalraj E, Templeton A, Hamilton M, Lee AJ, et al. The epidemiology of infertility in the North East of Scotland. Hum Reprod 2009; 24(12): 3096-107.
27. Adamson PC, Krupp K, Freeman AH, Klausner JD, Reingold AL, Madhivanan P. Prevalence & correlates of primary infertility among young women in Mysore, India. Indian J Med Res 2011; 134: 440-6.
28. Imudia AN, Detti L, Puscheck EE, Yelian FD, Diamond MP. The prevalence of ureaplasma urealyticum, mycoplasma hominis, chlamydia trachomatis and neisseria gonorrhoeae infections, and the rubella status of patients undergoing an initial infertility evaluation. J Assist Reprod Genet 2008; 25(1): 43-6.
29. Mares M, Socolov D, Doroftei B, Botezatu A, Goia CD. The prevalence of some bacterial markers in female patients undergoing an initial infertility evaluation in north-east Romania. Roum Arch Microbiol Immunol 2009; 68(3): 171-4.
30. Neofytou E, Sourvinos G, Asmarianaki M, Spandidos DA, Makrigiannakis A. Prevalence of human herpes virus types 1-7 in the semen of men attending an infertility clinic and correlation with semen parameters. Fertil Steril 2009; 91(6): 2487-94.
31. Gunnell DJ, Ewings P. Infertility prevalence, needs assessment and purchasing. J Public Health Med 1994; 16(1): 29-35.