

KNOWLEDGE OF INFERTILITY AMONG THE ADULT SAUDI POPULATION IN AL HASSA REGION OF SAUDI ARABIA: A CROSS SECTIONAL SURVEY

Dr. Huda Ali Alramadhan^{1*}, Dr. Ahmed Alnewasser², Narjes Abdulmohsen Al-Hassan³, Dala Ahmed Al Mulhim⁴, Zainab Al Fayez⁵, Nora Alolayan⁶, Abdulaziz Abdullah Bushehab⁷, Ali Alshaqaeq⁸, Hasan Mohammed Alabbad⁹, Ahmed Ali Alhussain¹⁰

¹Resident, Obstetrics and Gynecology Department, Maternity and Children Hospital, Alhassa.

²Obstetrics and Gynecology consultant, AlHassa Health Cluster, Ministry of Health, Saudi Arabia.

³Obstetrics and Gynecology Unit, Alahsa Health Cluster, Ministry of Health, Saudi Arabia.

^{4,5,6}Nursing Unit, Alahsa Health Cluster, Ministry of Health, Saudi Arabia.

⁷Hereditary Blood Diseases Center, Alahsa Health Cluster, Ministry of Health, Saudi Arabia.

⁸Laboratory Unit, Alahsa Health Cluster, Ministry of Health, Saudi Arabia.

⁹Laboratory and Blood Bank Unit, Alahsa Health Cluster, Ministry of Health, Saudi Arabia.

¹⁰Al Jaber Ent Hospital, Alahsa Health Cluster, Ministry of Health, Saudi Arabia.

Received date: 26 March 2023

Revised date: 16 April 2023

Accepted date: 05 May 2023

*Corresponding Author: Dr. Huda Ali Alramadhan

Resident, Obstetrics and Gynecology Department, Maternity and Children Hospital, Alhassa.

ABSTRACT

Background: Knowledge of the most frequent factors associated with infertility may have a role in decreasing the incidence of infertility by avoiding such factors. Additionally, proper understanding of reproductive-related facts is essential to have proper decision regarding fertility among married couples. This study aimed to assess the awareness and knowledge of general population about infertility. **Material and methods:** A cross-sectional study was carried out online among general adult Saudi population living in AlHassa, Saudi Arabia. A valid reliable questionnaire was used for data collection, composed of socio-demographic data and nine knowledge statements regarding fertility and infertility. **Results:** A total of 371 adults living responded. Majority were females (91.1%). Their age ranged between 18 and 60 years with an arithmetic mean of 35.5 years and standard deviation of 7.7 years. Overall, knowledge of the participants about infertility was adequate among only 28.8% of them. Divorced/widowed and married participants were more knowledgeable about infertility than singles (level of adequate knowledge was 53.3% and 29.9% vs. 13.3%, respectively), $p=0.007$. More than half (51.9%) of postgraduates compared to only 24.4% of secondary school/below graduated expressed adequate knowledge about infertility, $p=0.016$. **Conclusion:** Knowledge of Saudi general population living in AlHassa regarding infertility biological concepts is overall inadequate. We recommended organizing educational activities for them at outpatient clinics of hospitals as well as primary care centers regarding the biological aspects of fertility/infertility.

KEYWORDS: Infertility, Knowledge, Adults, Saudi Arabia.

INTRODUCTION

Infertility, a disease of male and female defined as a failure to achieve a pregnancy after 12 months or more of regular unprotected sexual intercourse affects millions of people worldwide and has adverse impact on their families and communities. According to the World Health Organization (WHO), infertility is a global public health problem which not given a deserved attention, with a prevalence of 5%- 25.7%,^[1] and between 48 and 186 million couples live with infertility, half of them are living in Africa and South Asia.^[2] The most commonly

causes of male infertility includes problems in the ejection of semen, absence or low level of sperm or abnormal shape and abnormal motility of the sperm while the female infertility is caused by a range of abnormalities of the ovaries, fallopian tubes and the endocrine systems. Apart from this the study suggests the most frequently reported contributing factors reasons for infertility among the female to be sexually transmitted diseases (STDs), fibroids, polycystic ovary syndrome, endometriosis, sickle cell disease, tuberculosis, and decline in semen quality.^[3] However some modifiable

causes such as obesity, smoking, sexually transmitted diseases and alcohol drinking have also been associated with the development of infertility.^[4] The infertility can be primary or secondary. In primary infertility the pregnancy is never achieved by a person while in secondary fertility is when at least one pregnancy has been achieved.

Worldwide, the awareness and knowledge about infertility and its associated factors among adult general population are low to moderate using different assessment tools.^[5-8] Knowledge of the most frequent factors associated with infertility such as advanced maternal age, obesity, smoking, sexually transmitted diseases and alcohol drinking may have a role in decreasing the incidence of infertility by avoiding such factors.^[5] Additionally, proper understanding of reproductive-related facts is essential to have proper decision regarding fertility among married couples.^[9]

In conservative countries like Saudi Arabia, women might have numerous misconceptions about reproductive health and fertility. Also, as a result of the Arabic Islamic nature of Saudi Arabia, limited studies have been conducted to explore the level of knowledge or the perception towards infertility as it is considered a taboo element.^[10]

Awareness about fertility is indicated as a "woman's ability to identify the fertile period of the menstrual cycle."^[11] Three methods of fertility were identified; namely temperature, mucus and rhythm.^[12] Temperature and mucus are more accurate,^[13] however, rhythm is accurate only for less than a third of women.^[13] Recent studies on awareness and knowledge about infertility among general population conducted on global level revealed a lack of adequate knowledge about infertility. Studies conducted in this regards in the Kingdom of Saudi Arabia are scarce. The present study was conducted to assess the awareness and knowledge of general population about infertility to set an effective educational program to enhance their knowledge.

MATERIAL AND METHODS

It was a cross-sectional study which was carried out online among general adult Saudi population living in Al Hassa, Eastern Province of Kingdom of Saudi Arabia. All Saudi adults aged over 18 years living in Al Hassa, Saudi Arabia and attending the Maternity and Child hospital Al Hassa, throughout the period of data collection for the study were the study population. The sample size was calculated using the Cochran's formula for estimating sample size equation as follows.

$$N = \frac{Z_{\alpha/2}^2 \times p(1-p)}{D^2}$$

Where, n=Minimum sample size, $Z_{\alpha/2}$: the critical value of the Normal distribution at $\alpha/2$ (e.g. for a confidence level of 95%, α is 0.05 and the critical value is 1.96), P: Prevalence of inadequate knowledge of fertility as 59%,

based on a previous Saudi study carried out in Riyadh.^[10] D: Degree of precision So, the calculated minimum sample size was:371. Convenience non-probability sampling technique was adopted to invite people to participate in the study by filling in the online study questionnaire. A valid reliable questionnaire was used for data collection. It composed of two main parts. First part included questions about socio-demographic data (Age, gender, residence, marital status, having children, occupation, and educational level). The second part recorded the knowledge about fertility and infertility by nine knowledge statements; The knowledge questions were adopted from a similar previous published study carried out in India.^[14] The questionnaires were distributed through Google forms. The link of the questionnaire were sent to the participants through social media applications to the contacts of the researchers, who were asked to roll out the questionnaire to as many persons as possible, provided that they will have the inclusion criteria. Participants were given a score of "1" for correct responses and a score of "0" for incorrect or missing responses for each of the nine statements. Total score was computed and its percentage was estimated for each participants. Those scored below 50% were considered having inadequate knowledge whereas those scored at or above 50% were considered having adequate knowledge. Approval of the Research and Ethics committee at Maternity and Children Hospital, Al Hassa was obtained. Written online consent was taken from all participants prior to data collection, present before the questions. Confidentiality and privacy were assured throughout the study. The data were entered and analysed by using Statistical Package for Social Sciences software (SPSS), version 28 was software. Categorical variables were described utilizing frequency and percentage whereas quantitative continuous variables were described using the arithmetic mean and standard deviation. Chi-square test / Fischer exact test /was applied to test for the association between categorical variables whereas independent samples t-tests was applied to compare mean of a continuous variable between two different groups and p-value<0.05 was considered for statistical significance.

RESULTS

A total of 371 Saudi adults living in Al Hassa responded to the online questionnaire. The majority were females (91.1%), living in urban regions (96%) and married (83.9%). The mean age of the respondent was 35.5 years \pm Std. Dev. 7.7 years (Range 18-60 years). Majority of them were either employed (46.9%) or housewives/not working (42.3%). Almost two-thirds of them (66%) have children and 57.4% were university degree holders. The details of the demographic characteristics of the participants are shown in table 1.

Table 1: Sociodemographic characteristics of the participants (n=371)

Variables	Frequency	Percentage
Gender		
Male	33	8.9
Female	338	91.1
Age (years)		
Range	18-60	
Mean±standard deviation	35.5±7.7	
Residence		
Urban	356	96.0
Rural	15	4.0
Occupation		
Employee	174	46.9
House wife/not working	157	42.3
Student	24	6.5
Retired	16	4.3
Marital status		
Single	45	12.1
Married	311	83.9
Divorced/widowed	15	4.0
Having children		
No	126	34.0
Yes	245	66.0
Highest educational level		
Secondary school/below	131	35.3
University	213	57.4
Postgraduate	27	7.3

Knowledge about infertility

Majority of the respondents (85.7%) knew that at age of 20-30 years, it is easier to become pregnant. About two-thirds of them (64.7%) could recognize that at halfway between two menstrual cycles, it is most likely to become pregnant. More than half of them (55.5%) knew that after 1 year of unprotected sex without becoming pregnant, a woman attempting to become pregnant have to consult a fertility specialist if she is aged less than 35

years while only 37.2% of them knew that after 6 months of unprotected sex without becoming pregnant, a woman attempting to become pregnant have to consult a fertility specialist if she is aged more than 35 years. On the other hand, minority of women (15.4%) knew correctly that a 50-year-old woman can become pregnant, if utilized assisted reproduction with the oocytes of a donor. The details of the responses on the knowledge questionnaires are shown in table 2.

Table 2: Response of the participants to knowledge questions about fertility and infertility.

Knowledge questionnaires	Knowledge		
	Correct answer	No.	%
At what age is there a marked decrease in women`s ability to become pregnant?	36-40 years	110	29.6
At what phase of menstrual cycle you are most likely to become pregnant?	Halfway between two periods	240	64.7
At what age it is easier to become pregnant?	20-30 years	318	85.7
Which of these factors is the highest infertility risk factor?	Being over 35 years old	103	27.8
Is past history of intake of oral contraceptive pills associated with infertility?	No	114	30.7
When does a woman attempting to become pregnant have to consult a fertility specialist if she is aged less than 35 years?	After 1 year of unprotected sex without becoming pregnant	206	55.5
When does a woman attempting to become pregnant have to consult a fertility specialist if she is aged more than 35 years?	After 6 months of unprotected sex without becoming pregnant	138	37.2
A 50-year-old woman has become pregnant. Which is the most likely option?	Pregnancy following assisted reproduction with the oocytes of a donor	57	15.4
Which of these factors can increase fertility?	Lying down for 10 minutes after sex	123	33.2

Score of knowledge regarding infertility.

The majority of the participants (71.2%) had poor knowledge about the fertility and infertility. The details of the knowledge score is shown in the figure 1.

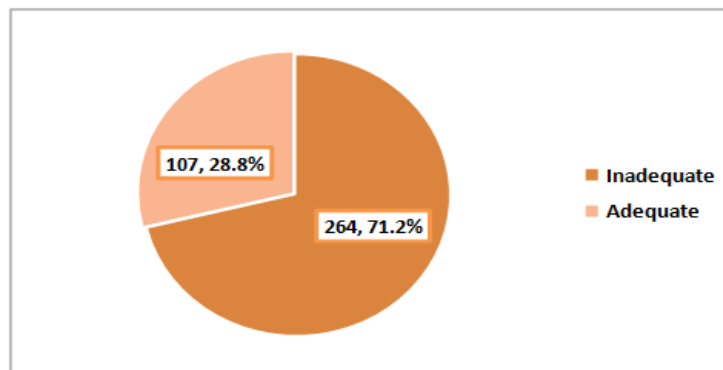


Figure 1: Showing the knowledge score about the infertility among the participants.

Association of knowledge about the infertility with the demographic characteristics

As far as the association between the demographic characteristics and the knowledge about the infertility is concerned, marital status and educational level of the participants were significantly associated with the level of knowledge about infertility. Divorced/widowed and married participants were more knowledgeable about infertility than singles (level of adequate knowledge was

53.3% and 29.9% vs. 13.3%, respectively), $p=0.007$. More than half (51.9%) of postgraduates compared to only 24.4% of secondary school/below graduated expressed adequate knowledge about infertility, $p=0.016$. Participants` gender, age, residence, occupation and having children were not significantly associated with level of knowledge. The details of the association of demographic characteristics and the knowledge of infertility is shown in table 3.

Table 3: Factors associated with participants` knowledge about infertility.

Variables	Knowledge about infertility		p-value
	Inadequate N=264 N (%)	Adequate N=107 N (%)	
Gender			
Male (n=33)	24 (72.7)	9 (27.3)	0.835*
Female (n=338)	240 (71.0)	98 (29.0)	
Age (years)			
Mean±standard deviation	35.32±7.26	35.84±8.26	0.555 [†]
Residence			
Urban (n=356)	252 (70.8)	104 (29.2)	0.327**
Rural (n=15)	12 (80.0)	3 (20.0)	
Occupation			
Employee (n=174)	117 (67.2)	57 (32.8)	0.484*
House wife/not working (n=157)	117 (74.5)	40 (25.5)	
Student (n=24)	18 (75.0)	6 (25.0)	
Retired (n=16)	12 (75.0)	4 (25.0)	
Marital status			
Single (n=45)	39 (86.7)	6 (13.3)	0.007*
Married (n=311)	218 (70.1)	93 (29.9)	
Divorced/widowed (n=15)	7 (46.7)	8 (53.3)	
Having children			
No (n=126)	94 (74.6)	32 (25.4)	0.294*
Yes (n=245)	170 (69.4)	75 (30.6)	
Highest educational level			
Secondary school/below (n=131)	99 (75.6)	32 (24.4)	0.016*
University (n=213)	152 (71.4)	61 (28.6)	
Postgraduate (n=27)	13 (48.1)	14 (51.9)	

*Chi-square test, **Fischer exact test, [†]Student` t-test

DISCUSSION

Reviewing of literature for similar studies yielded relatively limited recent studies with only one conducted in the Kingdom of Saudi Arabia.^[10] Therefore, this study is considered one of the very limited studies carried out in Saudi Arabia to assess the knowledge of the general public (males and females) about the concepts of fertility and infertility. The importance of the present study lie in understanding that infertility is a public health problem that affects almost one sixth of couples on worldwide level, particularly in developing countries.^[17] Infertility is very depressing for couples and may impacts their sexual life and relationship with family.^[15] The concepts of fertility and infertility are surrounded by various misconceptions, and incorrect knowledge, which negatively impact its management.^[17]

In the present study, knowledge of the adult Saudi population about infertility was adequate among only 28.8% of them. Specifically, only 29.6% of them knew that at age of 36-40 years, there a marked decrease in women's ability to become pregnant. Similarly recently in Japan, women tended to overestimate the age limit for childbearing as 21.9% answered that women aged > 45 years could get pregnant.^[18] Most of studies carried out regarding assessment of knowledge about infertility were carried out among infertile couples who should be more knowledgeable. However, in an Indian study,^[15] among infertile couples, knowledge about reproduction and fertility was suboptimal as majority of them (85%) were not aware of the ovulatory period in the menstrual cycle and only 8% could recognize that age more than 35 years as the most significant risk factor for infertility compared to 27.8% in the present study conducted among general public.

In this study ,55.5% and 37.2% of adults knew that after 1 year or 6 months, respectively of unprotected sex without becoming pregnant, a woman attempting to become pregnant have to consult a fertility specialist if she is aged less or more than 35 years, respectively. In Japan, also about 40% of the women had possible subclinical infertility and were unaware of that and almost 70% considered themselves infertile.^[18] Also in India, most of the infertile couples were unaware concerning when to seek treatment for infertility after trying for pregnancy.^[15] Reasons for not consulting help from infertility clinics in conservative communities could include unfamiliarity with a gynecologist and being shy regarding the gynecologic examination.

In the present study, only 15.4% of adults knew correctly that a 50-year-old woman can become pregnant, if utilized assisted reproduction with the oocytes of a donor. However, in India, almost half of infertile couples identified the need for assisted fertility treatment and donor oocytes in advanced age.^[16] This could be explained by the conduction of Indian study among infertile couples whereas our study was conducted among general public.

In the present study, divorced/widowed and married participants were more knowledgeable about infertility than singles. Additionally, more educated people were more knowledgeable about infertility. In the US, overall knowledge about women's fertility among university students was higher among female students and medical students.^[19] In Spain, oral education about infertility has improved women's knowledge among women attended a fertility centre for oocyte donation.^[20] In Australia, minority (2.1%) of women correctly identified the fertile period of the menstrual cycle while majority of them (92.2%) believed women should receive education regarding fertility.^[21]

The current study has an important limitation that should be addressed; as it included only women living in Al Hassa, Eastern Province, Kingdom of Saudi Arabia and having an internet access and this impacts the generalizability of results over women living in other areas of KSA and those don't having internet access. However, we included men as they play an important role in decisions-related to pregnancy and its timing. Despite of this limitation, the study could have a public health importance in defining defective elements of general public knowledge regarding infertility, which could help decision makers to organize educational interventional programs.

CONCLUSION AND RECOMMENDATIONS

Knowledge of Saudi general population living in AlHassa regarding infertility biological concepts is overall inadequate. Divorced/widowed and married participants as well as more educated people were more knowledgeable about infertility than their peers. Based on the results of the study, we recommended organizing educational activities for general population at outpatient clinics of hospitals as well as primary care centers regarding the biological aspects of fertility/infertility, particularly for newly married couples. Further study is recommended to include women from other Saudi regions to have a clearer image.

REFERENCES

1. Boivin J, Bunting L, Collins JA, Nygren KG. International estimates of infertility prevalence and treatment-seeking: potential need and demand for infertility medical care. *Hum Reprod*, 2007; 22: 1506–1512.
2. Mascarenhas MN, Flaxman SR, Boerma T, Vanderpoel S, Stevens GA. National, regional, and global trends in infertility prevalence since 1990: a systematic analysis of 277 health surveys. *PLoS Med*, 2012; 9: e1001356.
3. Centers for Disease Control and Prevention. (2015). Infertility FAQs: What is infertility? Retrieved January 7, 2016, from <http://www.cdc.gov/reproductivehealth/infertility/>
4. Petraglia F, Serour GI, Chapron C. The changing prevalence of infertility. *Int J Gynaecol Obstet*, 2013

- Dec; 123 Suppl 2: S4-8. doi: 10.1016/j.ijgo.2013.09.005.
5. Maeda E, Sugimori H, Nakamura F, Kobayashi Y, Green J, Suka M, et al. A cross sectional study on fertility knowledge in Japan, measured with the Japanese version of Cardiff Fertility Knowledge Scale (CFKS-J). *Reprod. Health*, 2015; 12: 10.
 6. Chan CH, Chan TH, Peterson BD, Lampic C, Tam MY. Intentions and attitudes towards parenthood and fertility awareness among Chinese university students in Hong Kong: a comparison with Western samples. *Hum. Reprod*, 2015; 30: 364-372.
 7. Vassard D, Lallemand C, Nyboe Andersen A, Macklon N, Schmidt L. A population-based survey on family intentions and fertility awareness in women and men in the United Kingdom and Denmark. *Ups J Med Sci*, 2016; 121(4): 244–51.
 8. Hammarberg K, Setter T, Norman RJ, Holden CA, Michelmore J, Johnson L. Knowledge about factors that influence fertility among Australians of reproductive age: a population-based survey. *Fertil. Steril*, 2013; 99: 502–507.
 9. Daniluk JC, Koert E. The other side of the fertility coin: a comparison of childless men's and women's knowledge of fertility and assisted reproductive technology. *Fertil Steril*, 2013; 99(3): 839–46
 10. Abolfotouh MA, Alabdrabalnabi AA, Albacker RB, Al-Jughaiman UA, Hassan SN. Knowledge, attitude, and practices of infertility among Saudi couples. *International Journal of General Medicine*, 2013; 6: 563–573
 11. Fehring RJ, Schneider M, Raviele K. Variability in the phases of the menstrual cycle. *J Obstet Gynecol Neonatal Nurs*, 2006; 35: 376–84.
 12. Trussell J. Contraceptive failure in the United States. *Contraception*, 2004; 70: 89–96.
 13. Pallone SR, Bergus GR. Fertility awareness-based methods: Another option for family planning. *J Am Board Fam Med*, 2009; 22: 147–57.
 14. Fehring RJ, Schneider M, Raviele K. Variability in the phases of the menstrual cycle. *J Obstet Gynecol Neonatal Nurs*, 2006; 35: 376–84.
 15. Mahey R, Gupta M, Kandpal S, Malhotra N, Vanamail P, Singh N, et al. Fertility awareness and knowledge among Indian women attending an infertility clinic: a cross-sectional study *BMC Women's Health*, 2018; 18: 177. Available at: <https://doi.org/10.1186/s12905-018-0669-y>.
 16. Gnoth C, Godehardt E, Frank-Herrmann P, Friol K, Tigges J, Freundl G. Definition and prevalence of subfertility and infertility. *Hum Reprod Oxf Engl*, 2005; 20(5): 1144-7.
 17. Namujju J. Knowledge, attitudes and practices towards infertility among adults 18–40 years in Kalisizo, Rakai District in Uganda. Uganda Scholarly Digital Library, thesis, 2008. Available from: <http://dspace.mak.ac.ug/handle/123456789/972>. Accessed January 12, 2013.
 18. Iino K, Fukuhara R, Yokota M, Yokoyama Y. Fertility awareness and subclinical infertility among women trying to get pregnant at home. *BMC Women's Health*, 2022; 22: 43. doi.org/10.1186/s12905-022-01626-z
 19. Meissner C, Schippert C, von Versen-Höyneck F. Awareness, knowledge, and perceptions of infertility, fertility assessment, and assisted reproductive technologies in the era of oocyte freezing among female and male university students. *J Assist Reprod Genet*, 201; 33: 719-729. DOI 10.1007/s10815-016-0717-1.
 20. García D, Vassena R, Prat A, Vermaeve V. Increasing fertility knowledge and awareness by tailored education: a randomized controlled trial. *Reprod Biomed Online*, 2016 Jan; 32(1): 113-20. doi: 10.1016/j.rbmo.2015.10.008.
 21. Hampton K, Mazza D. Fertility-awareness knowledge, attitudes and practices of women attending general practice. *Aust Fam Physician*, 2015; 44(11): 840-5.