e-ISSN: 2746-4474
DOI=10.20473/iabj.v2i2.163

Indonesian Andrology and Biomedical Journal

Original research

Relationship Between Smoker Male Partner and Intrauterine Insemination Success in Kasih Ibu General Hospital Denpasar

Albert Salim[1], Yukhi Kurniawan[2], I Gusti Ngurah Pramesemara[2]*

[1] Medical Program, Faculty of Medicine, Universitas Udayana, Denpasar, Indonesia
[2] Department of Andrology and Sexology, Faculty of Medicine, Universitas Udayana, Denpasar, Indonesia

ARTICLE INFO

Received: September 23, 2021
Accepted: November 09, 2021
Published: December 10, 2021

*) Corresponding author:
E-mail:
pramesemara@unud.ac.id

Keywords:
Smoker
Intrauterine Insemination
Pregnancy
Male Infertility

Abstract

Background: *Assisted reproductive technology, one of which is intrauterine insemination (IUI) allows infertile couples to get pregnant. The pregnancy success of IUI procedure varies among individuals.*
Objective: *The study aim is to determine whether there is a relationship between smoker male partners and IUI success.*
Methods: *This research is an analytic study with cross-sectional approach conducted at Kasih Ibu General Hospital Denpasar with purposive sampling technique. There are 35 male couples aged 25-50 years who underwent the IUI procedure selected as samples. The research data was gathered from patient's medical records and statistically analyzed using the Chi-Square test.*
Results: *The study found that of the 35 samples, 13 (37.1%) were smokers, whereas 22 (62.9%) male partners were non-smokers. There were 6 (17.1%) samples' partners who were pregnant after undergoing the IUI procedure, and 29 (82.9%) samples' partners were not pregnant. It was found that there was no significant relationship between male partner smokers and the success of IUI at Kasih Ibu General Hospital Denpasar (p=0.832). However, in descriptive analysis and relative risk calculation, smoker male partner is less likely to achieve pregnancy than non-smoker's male partner (RR=0.85).*
Conclusion: *Smoker male partners may not contribute to IUI success. Further studies should be done with a higher number of samples, multicenter, and more controlled risk factors to make it more accurate in determining the relationship.*

Cite this as: Salim, A., Kurniawan, Y., & Pramesemara, I.G.N. (2021). Relationship Between Smoker Male Partner and Intrauterine Insemination Success in Kasih Ibu General Hospital Denpasar. *Indonesian Andrology and Biomedical Journal*, 2(2):42–47. http://doi.org/10.20473/iabj.v2i2.163

1. Introduction

Infertility is a reproductive system problem characterized by a couple's failure to achieve pregnancy after having regular sexual activity without contraception for one year or more period.[1] The global prevalence of male and female infertility is found to increase every year.[2] In Indonesia, infertility affects as many as 10-15% of reproductive-age couples.[3] Due to social pressure and stigmatization, economic tension, or even marital conflict that can lead to divorce, this condition has a negative impact on the quality of life of both couples and families.[4]

Infertile couples have been able to conceive thanks to advances in assisted reproductive technology (ART). Intrauterine insemination (IUI) is one of the ART choices among other options because the procedure is less invasive and relatively cheaper.[5] The success of IUI is multifactorial, so it is not only determined by the female partner factor but also the male partner factor. One of the male partner factors that influence the success of IUI includes sperm quality.[6]

Cigarettes are processed tobacco products that are widely consumed by the public. The prevalence of adult male smokers in Indonesia was found to be 66% and as much as 22.4% in Bali Province.[7] Chemical compounds contained in cigarettes have many negative impacts on health through various mechanisms, one of which is on sperm quality. Smoker males tend to have abnormal semen analysis results compared to non-smoker males.[8]

Research conducted in Istanbul found a relationship between smoker male partner and IUI success. In smoker males' partner, 5.6% of them was pregnant, meanwhile, in non-smoker males' partner, 12.1% of them was pregnant. It can be concluded that a lower pregnancy rate was found on smoker male partners.[9]

The description above shows that smoking harms reproductive function and IUI success. Research on the relationship between smoker male partner and IUI success in Bali has never been done. Therefore, it is necessary to perform research to reveal smoker male partner and IUI success relationship at one of the health centers in Bali, Kasih Ibu General Hospital Denpasar as it is associated with controlling risk factors that can reduce the success of IUI.

2. Method

This study was conducted at Kasih Ibu General Hospital Denpasar in March-May 2021 as an analytic observational study with a cross-sectional approach. Komisi Etik Fakultas Kedokteran Universitas Udayana has given the study its ethical approval with letter number 176/UN13.2.2.VII.14/LT/2021. The data was obtained from the patient's medical record, which included sociodemographic, age, infertility history, alcohol consumption, cigarette profile, IUI success, and semen analysis.

Purposive sampling approaches were used to pick samples, in which people were chosen based on inclusion and exclusion criteria. The inclusion criteria included males aged 25-50 years, married and live with wife, infertile, perform IUI at Kasih Ibu General Hospital Denpasar in January-December 2020, and patient's medical record consists full variable. The Patient's medical record which did not consist of full variables were excluded. Based on that criterias, there were 35 samples selected. Samples' semen analysis is grouped based on the 6th edition of World Health Organization (WHO) laboratory manual for the examination and processing of human semen, 2021.

The data collected was analyzed statistically using the 26.0 version of Statistical Package for the Social Science (SPSS) for Windows 10. Univariate analysis was presented to obtain data on the distribution of research subjects' characteristics. The Chi-Square Test was used to do bivariate analysis to determine the relationship between smoker male partner with intrauterine insemination success and semen analysis.

3. Result

The research results are as follows

Table 1. Sociodemographic characteristics of subjects

Sociodemographic	Frequency	Percentage (%)
Job		
Civil Servant	3	8.6
Private Employee	21	60.0
Academician	1	2.9
Military/ Police	2	5.7
Doctor/Nurse/Medic	4	11.4
Others	4	11.4
Origin		

Denpasar	8	22.9
Outside Denpasar	24	68.6
Outside Bali	3	8.6
Infertility Type		
Primary	19	54.3
Secondary	16	45.7
Preparation		
Density Gradient Centrifugation (DGC)	26	74.3
Washing and Swim Up	9	25.7
Age		
25-35	20	57.1
36-50	15	42.9
Alcohol consumption		
Never	12	34.3
On certain event	20	57.1
Sometimes	2	5.7
Often/Almost everyday	1	2.9
Length of Marriage		
1-5 years	19	54.3
6-10 years	11	31.4
11-15 years	5	14.3
Female Partner's Condition		
Without Disorders	22	62.9
Ovulation Disorders	5	14.3
Tube and Pelvic Disorders	5	14.3
Uterine Disorders	3	8.6
Total	35	100.0

Table 1 presents subjects' sociodemographic characteristics. Generally, most of the subjects are private employees (60.0%) and come from other cities in Bali outside Denpasar (68.6%). The majority of the samples is primary infertility (54.3%) and DGC technique is used for most sperm preparation (74.3%). Based on age categorization, there were 20 samples (57.1%) at the 25-35 years category, while 15 samples (42.9%) at the 36-50 years category. Investigation on alcohol consumption is also carried out and the majority of the samples consume alcohol on a certain event, with a total of 20 samples (57.1%). Most of the subjects have been married for 1-5 years, as many as 19 samples (54.3%). Analysis of the female partner's condition showed that 22 samples (62.9%) did not have any disorders, 5 samples (14.3%) with ovulation disorders, 5 samples (14.3%) with tube and pelvic disorders, and 3 samples (8.6%) with uterine disorders.

Table 2. Subject distribution based on cigarette profile

Parameter	Frequency	Percentage (%)
Smoker Male Partner		
Smoker	13	37.1
Non smoker	22	62.9
Numbers of Cigarette Consumed per Day		
Never smoke	22	62.9
< 1 pack (< 10 cigarettes)	8	22.9
≥ 1 pack (≥ 10 cigarettes)	5	14.3
Total	35	100.0

Table 2 presents the distribution of the samples based on cigarette profiles. There are 13 smoker samples (37.1%) and 22 non-smoker samples (62.9%). Furthermore, 8 smoker samples (22.9%) consume no more than 1 pack of cigarettes per day and 5 smoker samples (14.3%) consume more or equal to 1 pack of cigarettes per day.

Table 3. Subject distribution based on intrauterine insemination success

Pregnancy Success	Frequency	Percentage (%)
Pregnant	6	17.1
Not Pregnant	29	82.9
Total	35	100.0

Table 3 presents the distribution of the samples based on IUI success. The determinant of pregnancy is based on clinical and chemical. There are 6 samples (17.1%) who achieved pregnancy and 29 (82.9%) who failed to achieve pregnancy.

Table 4. Pre preparation semen analysis characteristics according to the 6th edition of WHO laboratory manual for the examination and processing of human semen, 2021

Semen Analysis Parameter	Smoker n (%)	Non-Smoker n (%)	Total n (%)
Concentration (10^6/mL)			
Normal (≥16)	8 (28.6%)	20 (71.4%)	28 (100.0%)
Abnormal (<16)	5 (71.4%)	2 (28.6%)	7 (100.0%)
Mean	24.7±15.8	51.7±51.8	

Total Motility (%)			
Normal (≥42)	11 (34.4%)	21 (65.6%)	32 (100.0%)
Abnormal (<42)	2 (66.7%)	1 (33.3%)	3 (100.0%)
Mean	61.0±24.2	66.5±15.0	
Volume (mL)			
Normal (1,4-6,2)	12 (36.4%)	21 (63.6%)	33 (100.0%)
Abnormal (<1,4)	1 (50.0%)	1 (50.0%)	2 (100.0%)
Mean	3.1±1.1	2.9±1.1	
Total	13 (37.1%)	22 (62.9%)	35 (100.0%)

Table 4 presents the characteristic of patients' pre-preparation semen analysis. The data was categorized based on the 6th edition of WHO laboratory manual for the examination and processing of human semen, 2021. The semen analysis parameter result below the lower reference limit is considered as an abnormal result.[10] Data in table 4 shows that abnormal concentration and total motility are more common in the smoker male partner group, while the abnormal volume is found equally in smoker male partners and non-smoker male partners. Moreover, the numbers of normal concentration, total motility, and semen volume were found more in non-smoker male partners.

Table 5. Intrauterine insemination success in smoker male partner group

Number of Cigarettes Consumed per Day	Pregnant n (%)	Not Pregnant n (%)	Total n (%)
< 1 pack (< 10 cigarettes)	2 (25.0%)	6 (75.0%)	8 (100.0%)
≥ 1 pack (≥ 10 cigarettes)	0 (0.0%)	5 (100.0%)	5 (100.0%)
Total	2 (15.4%)	11 (84.6%)	13 (100.0%)

Table 5 presents the IUI success in the smoker male partner group. In the sample group who smokes no more than 1 pack of cigarettes per day, as many as 2 samples (25.0%) achieve pregnancy after IUI, meanwhile, 6 samples (75.0%) failed to get pregnant. Moreover, there were no samples who smokes more or equal to 1 pack of cigarettes per day succeed in IUI.

Table 6. Bivariate analysis of smoker male partner and intrauterine insemination success

Smoker Male Partner	Intrauterine Insemination Success				Total		p	RR
	Pregnant		Not Pregnant					
	n	%	n	%	n	%		
Smoker	2	15.4	11	84.6	13	100.0	0.832	0.846
Non-Smoker	4	18.2	18	81.8	22	100.0		
Total	6	17.1	29	82.9	35	100.0		

The cross-tabulation between smoker male partner and IUI success are presented in table 6. It was found that from 35 samples, IUI success was more common in non-smoker male partners, namely 4 samples (18.2%), although pregnancy can be achieved too by smoker group, as many as 2 samples (15.4%). As many as 11 smoker samples (84.6%) were found to fail to achieve pregnancy. Additionally, the table shows that unsuccess IUI can also occur in non-smoker groups as many as 18 samples (81.8%).

The Chi-Square Test was used to determine the relationship between these variables, and the p-value was found to be 0.832. This value is more than 0.05, indicating that there is no relationship between smoker male partner and IUI success. The relative risk calculation was also performed and the value obtained was 0.846. It can be interpreted that smoker male partner is less likely 0.846 times to achieve pregnancy than non-smoker's male partner in IUI procedure.

4. Discussion

According to this study, there is no relationship between smoker male partner and IUI success (p=0,832). However, according to descriptive analysis, smoker male group has more abnormal sperm concentration, abnormal total motility, and lower IUI success than non-smoker male group. Furthermore, from the relative risk calculation, it was found that a smoker male partner is a risk factor that can reduce the success of IUI (RR=0.85). In addition, the success of the IUI procedure is ranged from 10-20%. [5] This pregnancy rate is lower than other ART techniques, in vitro fertilization (IVF) which can achieve 50% on women aged below 30 years.[11]

The success of IUI varies from individual to individual and is influenced by various factors, both internal and external factors for men and women. Internal factors related to the age of the male and female partners, the quality of gamete cells, both sperm and oocytes, and medical conditions such as endometriosis. External factors related to the temperature of the work environment and smoking habits.[12,13]

Cigarettes and their metabolites will induce inflammatory reactions and cause oxidative stress, thereby affecting sexual and reproductive function which can be seen in sperm quality.[9] Nicotine in cigarettes also affects the hypothalamic-pituitary-adrenal axis and causes suppression of LH and FSH hormone levels, thus giving a negative effect on the process of spermatogenesis and testicular function. The sperm analysis result including sperm count, motility, morphology, concentration tend to be lower in smoker group than non-smokers.[14] This negative effect is also directly proportional to the daily consumption of cigarettes. This means that the more cigarettes consumed daily, the worse the sperm quality, so that sperm's ability to fertilize the egg cell decreases.[15]

The findings of this research differ from the findings of Irez et al. According to the study, there is a significant relationship between smoker male partner with IUI success, with a significant p-value of less than 0.001. In this study, the pregnancy rate in the smoker group was 5.6%, while in the non-smoker group was 12.1%.[9] Moreover, study conducted by Huyghe et al also shows that smoker male partners negatively affect IUI success, with p-value equal to 0.017. This study found that non-smoker group has a higher pregnancy rate 10.9% than smoker group, who smoke 1-14 cigarettes per day as 5.9%.[16]

Sperm cells are not the only factor that determines pregnancy, but oocyte cells and the patency of the female reproductive organs also play a role. Reviewing the IUI process, processed sperm are placed in the female uterus.[17] The process of pregnancy starts from the spermatozoa that meet the oocyte in the fallopian tube and fertilization occurs. Furthermore, the embryo in the fallopian tube moves with the help of smooth muscle movement of the cilia of the epithelium of the fallopian tube towards the uterus for implantation. Therefore, the female factor also plays a role in the success of IUI.[18]

This study is more focused on the relationship between smoker male partners and the success of IUI. Several data regarding IUI success risk factors were collected in this research but not investigated deeply, such as male age, alcohol history which are associated with decreased sperm quality was used as a confounding variable. While other risk factors have not been generalized, further research is needed to be carried out in the future. Author also recommends further research with a higher number of samples and done in multicenter.

5. Conclusion

There was no significant relationship between smoker male partner and the success of IUI at Kasih Ibu General Hospital Denpasar. However, in a descriptive analysis, smoker male partner has lower IUI success than non-smoker male partners. Calculation of the relative risk (RR) shows that smoker male partners are 0.85 times less likely to achieve pregnancy than non-smokers male partners.

Further studies are needed with a higher number of samples and from another IUI center in Bali to represent a wider population. In addition, it is necessary to control other risk factors for intrauterine insemination success including patient's medication, obesity, stimulation technique, and female factor to achieve more accurate relationship. Finally, a male who is going to perform IUI is suggested to stop smoking, exercise regularly, and live healthily.

References

1. World Health Organization. WHO | Infertility definitions and terminology. WHO [Internet]. 2016 [cited 2020 Sep 27]; Available from: http://www.who.int/reproductivehealth/topics/infertility/definitions/en/
2. Sun H, Gong TT, Jiang YT, Zhang S, Zhao YH, Wu QJ. Global, Regional, and National Prevalence and Disability-Adjusted Life-Years for Infertility in 195 Countries and Territories, 1990-2017: Results from a Global Burden of Disease Study, 2017 [Internet]. Vol. 11, Aging. Impact Journals LLC; 2019 [cited 2020 Nov 20]. p. 10952–91. Available from: /pmc/articles/PMC6932903/?report=abstract
3. Harzif AK, Santawi VPA, Wijaya S. Discrepancy in perception of infertility and attitude towards treatment options: Indonesian urban and rural area. Reprod Health [Internet]. 2019 Aug 19 [cited 2020 Nov 16];16(1). Available from: /pmc/articles/PMC6700767/?report=abstract
4. Centers for Disease Control and Prevention. National Public Health Action Plan for the Detection, Prevention, and Management of Infertility. Atlanta, Georgia; 2014 Jun.

5. Yang S, Peng HY, Li Y, Zhou LY, Yuan L, Ma YM, et al. Intrauterine insemination treatment strategy for women over 35 years old: Based on a large sample multi-center retrospective analysis. Chin Med J (Engl). 2016;129(23):2873–5.
6. Goldman RH, Batsis M, Hacker MR, Souter I, Petrozza JC. Outcomes after intrauterine insemination are independent of provider type. 2015;211(5):1–11.
7. Pusat Data dan Informasi Kementrian Kesehatan RI. Situasi Umum Konsumsi Tembakau di Indonesia. Pusat Data dan Informasi Kementrian Kesehatan RI. 2018. 06–07 p.
8. Kovac JR, Khanna A, Lipshultz LI. The Effects of Cigarette Smoking on Male Fertility. 2015;127(3):338–41.
9. İrez T, Öcal P, İdil M, Kaleli S, Uyar Y, Aydoğan B, et al. Effects of smoking cigarette on intrauterine insemination outcomes. Basic Clin Sci. 2013;2(1).
10. World Health Organization. WHO laboratory manual for the examination and processing of human semen [Internet]. 6th ed. Geneva: World Health Organization; 2021 [cited 2021 Jul 30]. Available from: https://www.who.int/publications/i/item/9789240030787
11. Tan TY, Lau MSK, Loh SF, Tan HH. Female ageing and reproductive outcome in assisted reproduction cycles. Singapore Med J [Internet]. 2014 [cited 2021 Aug 13];55(6):305. Available from: /pmc/articles/PMC4294057/
12. Govindarajan M, Mallikarjunan S, Ahmed HSR, Lakshmanan N, Silambuchelvi D, Sujatha M, et al. Retrospective study of factors affecting intrauterine insemination pregnancy outcome: The impact of Male habits and working environment. J Hum Reprod Sci [Internet]. 2017 Apr 1 [cited 2020 Oct 24];10(2):114–8. Available from: /pmc/articles/PMC5586084/?report=abstract
13. Krishnapillai J, Abraham S, Nambiar D. Factors affecting success of intrauterine insemination: a 3 year prospective study. Int J Reprod Contraception, Obstet Gynecol. 2016;(January):1077–83.
14. Itatahine A, Demmouche A, Maï H, Khalloua ZC, Ferrag D, Bekhadda H, et al. Impact of Cigarette Smoking on Sperm Parameters of Infertile Men in Center of Algiers (Capital of Algeria). J Drug Deliv Ther. 2020;10(4-s):193–6.
15. Harlev A, Agarwal A, Gunes SO, Shetty A, du Plessis SS. Smoking and Male Infertility: An Evidence-Based Review. World J Mens Health. 2015;33(3):143.
16. Huyghe S, Verest A, Thijssen A, Ombelet W. Influence of BMI and smoking on IUI outcome with partner and donor sperm. Facts, views Vis ObGyn [Internet]. 2017 Jun [cited 2020 Nov 26];9(2):93–100. Available from: http://www.ncbi.nlm.nih.gov/pubmed/29209485
17. Allahbadia GN. Intrauterine Insemination: Fundamentals Revisited. J Obstet Gynecol India. 2017;67(6):385–92.
18. Sadler TW, Langman J. Langman's Medical Embryology. 12th ed. Philadelphia: Lippincott Williams & Wilkins; 2012.