ORIGINAL ARTICLE

Pregnancy outcomes with undescended testis husbands: influenced by wive's life style and surgical correction before 1 year

Supriyatiningsih Wenang[1*], Lidia Febrianti[2], Prahara Yuri[3], Arlina Dewi[4], Dicky Moch Rizal[5], Ralph J. Lelle[6]

ABSTRACT

Background

The most prevalent sexual differentiation disorder in males is undescended testis (UDT), which occurs when the testis is absent from the scrotum or cannot be brought down during a physical examination. Pregnancy outcome may be influenced by the wife's lifestyle and surgical correction within the past year

Objectives

This study aims to determine pregnancy outcome in Assisted Reproductive Technology (ART) on a wive with a UDT husband assessed by the wive's life style and surgery correction before 1 year.

Methods

A cross-sectional study was conducted. Data were taken from patients who underwent Assisted Reproductive Technology at AMC Hospital, Yogyakarta. Data collection from 2018 to 2021. Samples in the unilateral and bilateral groups were 20 husbands. Wilcoxon Signed Rank Test helped carry out the analyses.

Results

There was an association between infertility and UDT either unilaterally or bilaterally ($p = 0.009$). Most UDT husbands had a BMI in the overweight category and the average age was 28 and 29. Other factors such as the wive's life style and surgery correction before 1 year , including smoking habit, alcohol consumption, addictive drug and hormonal drug, had no significant effect on the success of pregnancy outcome ($p > 0.05$).

Conclusions

Although pregnancy outcome in unilateral and bilateral UDT patients was not statistically significant, clinically, the pregnancy outcome was better in husbands with unilateral UDT by IUI than in IVF.

Keywords

Undescended testis; Pregnancy outcome; Assisted reproductive technology; Wive's life style; Surgery correction

INTRODUCTION

The most common disruption of male sexual differentiation is cryptorchidism, which occurs when the testis is absent from the scrotum or cannot be brought down during a physical examination.[1,2,3] 1–4% of full-term and up to 45% of preterm male newborns are affected by cryptorchidism, also known as UDT. [2] UDT is classified into 2 types : unilateral and bilateral.[3,4] Unilateral UDT occurs four times as frequently as bilateral UDT [3]. The condition potentially compromises gonadal function.[2,3,4]

1. Supriyatiningsih Wenang, Department of Obstetrics and Gynecology, Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Yogyakarta, Indonesia & Obstetrics and Gynecology Department, PKU Muhammadiyah Gamping UMY Teaching Hospital.
2. Lidia Febrianti, Muhammadiyah Maternal and Child Health Center, Universitas Muhammadiyah Yogyakarta, Indonesia.
3. Prahara Yuri, Department of Surgery, Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada, Yogyakarta, Indonesia
4. Arlina Dewi, Department of Public Health, Master of Hospital Administration, Universitas Muhammadiyah Yogyakarta, Indonesia
5. Dicky Moch Rizal, Department of Physiology, Faculty of Medicine, Nursing and Public Health, Universitas Gadjah Mada, Yogyakarta, Indonesia
6. Ralph J. Lelle, Department of Obstetrics and Gynecology, Faculty of Medicine, Westfalische Wilhelms, University of Muenster, Germany

Correspondence

Supriyatiningsih Wenang, Department of Obstetrics and Gynecology, Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Yogyakarta, Indonesia & Obstetrics and Gynecology Department, PKU Muhammadiyah Gamping UMY Teaching Hospital. Email: supriyatiningsih.dr@umy.ac.id

Bangladesh Journal of Medical Science Vol. 23 No. 02 April'24

DOI: https://doi.org/10.3329/bjms.v23i2.72172

Therefore, early detection of UDT between the ages of 6 and 12 months is crucial for reducing germ cell loss and enhancing the fertility index of an individual.[1] Both gonocyte transformation into Ad spermatogonia and programmed germ cell death are impeded by undescended testes.[2,3]After puberty, abnormal sperm counts are associated with a defect in gonocyte transformation into Ad spermatogonia.[2,3] UDT affects about 10% of infertile men.[3] Even though they have a lower fertility rate, men who have undergone unilateral UDT have the same paternity rate as the general population.[2,3] Bilateral UDT patients have lower fertility and paternity chances. [3] Adults with bilateral UDT are more likely to be infertile.[1,2,3,4]

Infertility is defined as the inability to conceive after twelve months of unprotected sexual contact.[5] The UDT husband is predisposed to infertility and testicular cancer.[1,4] UDT is linked to an high risk of infertility and poor sperm quality in the future.[6] In order to prevent infertility, surgical correction of undescended testes should be performed prior to the age of one year.[7] Assisted Technology Reproductive is another method for enhancing paternity. IUI and IVF are two types of Assisted Reproductive Technologies (ART) that can assist infertile couples in achieving pregnancy.[8,9,10]. IUI is a common method for treating infertility caused by unknown factors and male infertility (certain sperm disorders). It can also be used to treat infertility and sexual dysfunction caused by problems with cervical mucus.[8] An IVF cycle typically begins with ovarian stimulation, followed by the retrieval of multiple mature oocytes that have been fertilized in the laboratory to create embryos.[8,11] Assisted reproductive technology encompasses a variety of clinical treatments and laboratory procedures, including the in vitro manipulation of human oocytes, ovarian tissue, sperm, testicular tissue, or embryos with the aim of establishing a pregnancy immediately.[10]

Both the husband and wife have an impact on the success of a pregnancy. A lifestyle is one factor that affects the wife's fertility.[12] As BMI rises, the negative effects of smoking and alcohol consumption on fecundity and gestational age intensify.[13,14] Recent observational and experimental studies have demonstrated that a healthy lifestyle improves the general health and IUI and IVF success rate of infertile patients.[12] The lifestyle of the mother prior to conception has a substantial effect on gamete function, early placentation, and embryo development.[14] Depending on their reproductive ambitions, many women require effective assisted reproductive technology.[13,15] Uncertainty persists regarding the factors influencing ART success and the most effective method for achieving pregnancy.[16] Couples with UDT husbands require emotional support in addition to a healthy lifestyle in order to mitigate the effects of anxiety and depressive disorders.[17] Therefore, this study aims to determine pregnancy outcome in ART on a wive with a UDT husband assessed by the wive's life style and surgical correction before 1 year.

METHODS

This research is non-experimental with a cross-sectional study. Data were taken from patients who underwent the Assisted Reproductive Technology (ART) process at the Obstetrics and Gynecology Clinic, Asri Medical Center Hospital (AMC), Yogyakarta. Data collection from 2018 to 2021. The data collection technique was total sampling with 20 Unilateral UDT husbands and 20 Bilateral UDT husbands. The inclusion criteria for this research were women who performed Assisted Reproductive Technology (IUI/IVF) at Asri Medical Center (AMC) Hospital, Yogyakarta with UDT (Unilateral/ Bilateral) husbands. The exclusion criteria for this study were women who performed Assisted Technology Reproductive (IUI/IVF) with their husbands UDT (Unilateral/ Bilateral) but their husbands refused to be respondents.

The data collection method used a checklist to assess the wive's life style, while the correction before 1 year and pregnancy outcome data were taken from the medical record. The wive's life style variable was categorized into "Yes" and "No". The smoking habit variable was active smokers, while the hormonal drug consumption variable was females who received oral hormone therapy and contraception. The dependent variable in this study was the result of Assisted Reproductive Technology (ART), namely IUI and IVF. Respondents in this study were given prior informed consent for the approval of data collection. The results of this study were carried out by SPSS data with Wilcoxon Signed Rank Test analysis. This analysis determined pregnancy outcome in ART on wive's with UDT husbands assessed by the

wives' life style and surgery correction before 1 year.

The studies involving human respondents were reviewed and approved by Gadjah Mada University (KE/FK/0783/EC/2021).

ETHICAL CLEARANCE

This research involving human participants were reviewed and approved by Gadjah Mada University (KE/FK/0783/EC/2021). Written informed consent for respondents was required for this research following the national legislation and the institutional requirements

RESULTS

According to Table 1, the mean BMI of unilateral and bilateral UDT husbands is 25.78 and 25.75, respectively. The mean BMI falls under the category of overweight. On the basis of age group characteristics, there was no significant difference between the two age groups (p = 0.083), with mean ages of 28 and 29 years, respectively. With respective p values of 0.78 and 0.562, there was no statistically significant difference between smoking and alcohol consumption. Moreover, infertility characteristics (p = 0.009) were significantly associated with undescended testis (UDT). Bilateral UDT resulted in a higher rate of infertility than unilateral UDT.

Table 1. Characteristics of UDT husband

Characteristics	Unilateral UDT		Bilateral UDT (N=20)		p-value
	n = 20	Percent	n = 20	percent	
BMI 18.5-24.9kg/m^2 25-29.9 kg/m^2 ≥ 30 kg/m^2 Mean	12 5 3 25.78 ± 4.60	 60% 25% 15%	5 15 - 25.75 ± 2.56	 25% 75% -	
Age 20-30 years 31-40 years Mean	15 5 27.50 ± 3.50	 75% 25%	14 6 28.70 ± 3.97	 70% 30%	0.083
Smoking habit	5	25%	7	35%	0.788
Alcohol consumption	4	20%	2	10%	0.562
Infertility	14	70%	18	90%	0.009

Table 2 shows that twenty UDT husbands (unilateral and bilateral) involved in this study performed Assisted Technology Reproductive (IUI/IVF). The study results were positive (pregnant) and negative (not pregnant). The results showed that most of UDT husbands had more positive pregnancy outcomes with the IUI method than IVF consecutively with IUI n = 14 (70%), and n bilateral = 15 (75%). Whereas in IVF unilateral n = 11 (55%), bilateral n = 14 (70%). Based on table 2, the p-value of UDT (unilateral = 0.439 and bilateral = 0.763). Thus, there was insignificant difference in pregnancy outcomes between unilateral and bilateral UDT husbands who performed IUI and IVF.

Table 2. Data of frequency pregnancy outcome UDT (Unilateral/Bilateral) husbands on performed ART (IUI/IVF)

Pregnancy outcome	Assisted Reproductive Technology (ART)					
	Unilateral			Bilateral		
	IUI (n = 20)	IVF (n = 20)	Sig 2 tailed	IUI (n = 20)	IVF (n = 20)	Sig 2 tailed
Pregnant (+)	14 (70%)	11 (55%)	0.439	15 (75%)	14 (70%)	0.763
Not pregnant (-)	6 (30%)	9 (45%)		5 (25%)	6 (30%)	

Table 3 shows that the wive's lifestyle is divided into smoking habits, alcohol consumption, addictive drugs, and hormonal drugs. The results are either positive (pregnant) and negative (not pregnant). The first is the smoking habit. Compared to those who did not have a smoking in unilateral and bilateral UDT husbands, wives who had a smoking habit showed more negative pregnancy outcomes than positive results. In unilateral UDT there was a negative pregnancy outcome, namely wives with smoking habits 3 (15%) and wives who did not smoke 11 (55%). Meanwhile, in bilateral UDT, 9 (45%) wives had smoking habits and 9 (45%). In addition, unilateral UDT (p = 0.573) and bilateral UDT (p = 1.00) did not have a significant relationship with smoking habit.

The second is alcohol consumption. The wives who consumed alcohol compared to those who did not consume alcohol showed more negative pregnancy outcomes than positive results. In unilateral UDT there was a negative pregnancy outcome : wive with 1 (5%) alcohol consumption and 13 (65%). Meanwhile, in bilateral UDT, wives who consumed alcohol were 1 (5%), and mothers who did not consume alcohol were 17 (85%). In addition, unilateral UDT (p = 0.502) and bilateral UDT (p = 0.732) did not have a significant relationship with alcohol consumption.

The third is addictive drugs. None of the wives

consumed addictive drugs. The majority of wives who did not use addictive drugs showed more negative results on pregnancy outcomes, namely n unilateral = 14 (70%) and n bilateral = 18 (90%) compared with positive results, namely n unilateral = 6 (30%) and n bilateral = 2 (10 %). The addictive drug factor had no p-value because none of the respondents used addictive drugs.

The last is hormonal drugs. Wives who consumed hormonal drugs compared to those who did not take hormonal drugs showed more negative pregnancy outcomes than positive results. In unilateral UDT, there was a negative pregnancy outcome, seven wives took hormonal drugs (35%) and equally, 7 wives did not take hormonal drugs (35%). Meanwhile in bilateral UDT, 15 (75%) wives consumed hormonal drugs, and 3 did not (15%). In addition, unilateral UDT (p = 0.492) and bilateral UDT (p = 0.531) did not have a significant relationship with hormonal drugs.

Table 3. Data of pregnancy outcome in UDT Husband (Unilateral/Bilateral) correlated with the wive's life style

Pregnancy Outcome							
Wive's life style		Unilateral (n= 20)			Bilateral (n =20)		
		Pregnant (+)	Not pregnant (-)	P value	Pregnant (+)	Not pregnant (+)	P value
Smoking habit	Yes	2 (10 %)	3 (15 %)	0.573	1 (5 %)	9 (45 %)	1.00
	No	4 (20 %)	11 (55 %)		1 (5 %)	9 (45 %)	
Alcohol consumption	Yes	0 (0 %)	1 (5 %)	0.502	0 (0 %)	1 (5 %)	0.732
	No	6 (30 %)	13 (65%)		2 (10 %)	17 (85 %)	
Addictive drugs	Yes	0 (0 %)	0 (0.0%)	-	0 (0 %)	0 (0%)	-
	No	6 (30 %)	14 (70 %)		2 (10 %)	18 (90 %)	
Hormonal drugs	Yes	4 (20 %)	7 (35 %)	0.492	2 (10 %)	15 (75 %)	0.531
	No	2 (10 %)	7 (35 %)		0 (0%)	3 (15 %)	

Table 4 shows the relationship of surgical correction before 1 year to pregnancy outcome. The majority of husbands who did not have surgery correction before 1 year showed more negative results on pregnancy outcomes, including n unilateral = 13 (65%), and bilateral n = 15 (75%) compared to positive results n unilateral = 4 (20%) and n bilateral = 1 (5%). In addition, unilateral UDT (p = 0.133) and bilateral UDT (p = 0.264) had no significant association with surgery correction before 1 year.

Table 4. Data of pregnancy outcomes correlated surgery correction before 1 year in UDT (Unilateral/Bilateral) Husband

Pregnancy outcomes							
Surgery correction before 1 year	Category	Unilateral (n = 20)			Bilateral (n = 20)		
		Pregnant (+)	Not pregnant (-)	Sig 2 tailed	Pregnant (+)	Not pregnant (-)	Sig 2 tailed
	Yes (+)	2 (10%)	1 (5%)	0,133	1 (5%)	3 (15%)	0,264
	No (-)	4 (20%)	13 (65%)		1 (5%)	15 (75%)	
	Total	6 (30%)	14 (70%)		2 (10%)	18 (90%)	

DISCUSSION

To investigate pregnancy outcome in ART on wive's with UDT husbands assessed from their life style and surgery correction before 1 year.

Characteristics of UDT Husbands

This study found that the mean BMI in UDT husbands included the overweight category. Obesity has a negative impact on the development of the penis and testicles.[18] There is a correlation between paternal obesity and a decline in male fertility. Due to higher DNA fragmentation levels, abnormal morphology, and low mitochondrial membrane potential in their sperm, obese men are more likely to be infertile.[19] Another study found that men with a BMI greater than 25.0 kg/m2 had a lower IVF pregnancy rate.[20] Obesity hinders the fertility of not only men but also women. A study stated that obesity is related to hyperandrogenism, hyperinsulinemia, insulin resistance, and metabolic syndrome in infertile women.[21] This study found that the majority of UDT husbands were between the ages of 20 and 30, with a mean age of 28 years for unilateral and 29 years for bilateral procedures. Age at diagnosis is an important prognostic factor for undescended testes because the risk of developing testicular cancer and infertility rises with age.[19,22]

Some of UDT's husbands are smokers and alcoholics. Male smokers had more methylation changes in their sperm DNA than nonsmokers, according to a study.[19] Another study stated that teratozoospermia was found in 72% of men who drank >80 g/day and 63% of men who drank moderately (40-80 g/day).[22] Undescending testes were also associated with infertility, according to the findings. Bilateral UDT was associated with a higher rate of infertility compared to unilateral UDT. In addition, men with bilateral UDT had significantly lower paternity rates than men with unilateral UDT and those without UDT.[23] Men with bilateral UDT are three-and-a-half times more likely to be infertile than men with unilateral UDT. After one year, the incidence of azoospermia in untreated undescended testes ranges from 13% to 89% in unilateral and bilateral cases.[2,4,19,24]

Data of frequency pregnancy outcomes UDT (Unilateral/Bilateral) husbands on performed ART (IUI/IVF)

Men with bilateral UDT had significantly lower paternity rates than men with unilateral UDT and those without UDT. Men with bilateral UDT are three-and-a-half times more likely to be infertile than men with unilateral UDT. After one year, the incidence of azoospermia in untreated undescended testes ranges from 13% to 89% in unilateral and bilateral cases.[1,2,3,19] Nearly 10% of men with fertility problems have a history of UDT and orchidopexy, 20-27% of adult men acquire azoospermia, and 3-8% have oligo-terato-asthenospermia previously identified with male descent testes; all of these conditions are associated with high rates of male infertility.[19] Twenty UDT husbands used the ART method, including IUI and IVF. This study did not show a significant difference in pregnancy outcomes between unilateral and bilateral UDT husbands who performed IUI and IVF. This finding could be due to the limited study sample. The weakness of this study lies in the small number of samples because the participants were only selected from one reproductive clinic.

However, the majority of UDT (Unilateral and Bilateral) husbands who achieved a successful pregnancy utilized IUI rather than IVF. Intrauterine insemination (IUI) and in vitro fertilization (IVF) are two Assisted Reproductive Technologies (ART) that may help infertile couples conceive.[8,9,25] Treatment with IUI in a stimulated cycle can result in a higher cumulative pregnancy rate than to other treatments. [22] The majority of husbands with unilateral UDT were more likely to have a successful pregnancy than those with bilateral UDT. Even after surgical correction, the prevalence of cryptorchidism can reach 32%, and nearly double in bilateral UDT. 89% of patients with bilateral cryptorchidism who are left untreated will develop azoospermia.[3,23,24].

Data of pregnancy outcome in UDT Husband (Unilateral/Bilateral) correlated with the wive's life style

1. Smoking habit in pregnancy outcome

Some studies have reported that smoking harms the ability to conceive for both men and women.[25] The negative effects of smoking before and during pregnancy include infertility, ectopic pregnancy, low birth weight, and preterm delivery.[18,26] This study showed that in wives who smoked and did not smoke, there was no significant difference in pregnancy outcomes, as evidenced by the majority of negative pregnancy outcomes. Due to the primary influencing factor, which was the husband's UDT. Men with a history of unilateral UDT, however, have a lower fertility rate.[2] Compared to non-smoking partners, smoking in women is associated with delayed conception, lower clinical pregnancy, and an increased rate of spontaneous miscarriage in both

naturally conceived couples and those undergoing in vitro fertilization (IVF) techniques.[18,25,26] Thus, women should be advised to stop smoking before they try to conceive.[8,18] Diet, physical activity, psychological stress, socioeconomic factors, BMI, smoking, alcohol, caffeine, and psychoactive substances all impact pregnancy success.[14,27]

2. Alcohol consumption in pregnancy outcome

Alcohol use has an impact on women's health.[12,23,24] This study showed that wives who consumed alcohol and did not consume alcohol had no significant difference in pregnancy outcomes, as evidenced by the majority of negative pregnancy outcomes. Due to the primary cause, which was the husband's UDT experience. In addition, it was affected by the lack of research samples, and the fact that the majority of participants did not drink alcohol. The effects of alcohol on endogenous hormone levels and embryo quality have been linked to lowered fertility and conception.[24] Abuse and consumption of alcohol during pregnancy has been linked to miscarriage, stillbirth, and fetal alcohol spectrum disorder.[23]

3. Addictive drugs in pregnancy outcome

Observational studies found that addictive drug use before and during pregnancy endangers fetal development and has implications for women's reproductive function and fertility.[24] This study showed that none of the wives used addictive drugs, and the majority had negative pregnancy outcomes. This can happen because the consumption of addictive drugs is not the only factor that affects infertility.

Another study stated that cocaine significantly increased the risk of primary tubal infertility among women with ovulatory dysfunction, tubal infertility, and age-matched fertile women, according to a population-based case-control study.[23] Both marijuana and cocaine have been demonstrated to decrease fertility.[14,23,28] According to a study, cocaine has an effect on decreasing pregnancy rates in women and adult spermatogenic forms in men.[28]

4. Hormonal drugs in pregnancy outcome

After taking fertility medications, endogenous hormonal alterations may occur.[23,24] Prior to the development of the synthetic production of reproductive hormones, there were many complications in reproduction, such as difficulty conceiving, instability of pregnancy, and complications at the time of birth; however, these complications have been reduced as a result of advancements in hormonal therapy.[29,30] However, this findings revealed that there was no significant difference in pregnancy outcomes between wives who used hormonal drugs and those who did not. The majority had failed pregnancies. This is possible because the husband with UDT is the primary influencing factor. Infertility is linked to undescended testes because they impede gonocyte transformation.[1,2,31] According to a study, hormonal drugs like letrozole are also commonly used to stimulate ovarian function and increase a woman's likelihood of becoming pregnant.[23,29] Human infertility is predominantly treated with non-hormonal medications. This is due to the fact that hormonal therapy requires a series of injections, intensive monitoring, and severe side effects, such as ovarian hyperstimulation syndrome.[29]

Lifestyle factors are not the only determinants of pregnancy outcomes. Particularly with severe infertility disorders such as UDT, the husband's influence can be crucial.[1,2] Other factors in male infertility do not depend on age but excessive consumption of tobacco, alcohol, high fat consumption of food, obesity, strenuous exercise, sedentary lifestyle, contact with chemicals or poisons, stress or psychological disorders can trigger infertility problems.[32] Therefore, interventions for infertility in husbands require psychological support in addition to medical methods such as ART.[33,34]

Surgical correction before 1 year in Assisted Reproductive Technology

Early detection and treatment of tests not dropped with orchiopexy between the ages of six and twelve months is thus critical to minimizing germ cell loss and increasing the individual's fertility index.[1] Two kind treatment of UDT have been used for many years and are accepted worldwide namely hormonal and surgical.[3,27,35] This study no significant difference in pregnancy outcome on the factor of surgical correction before 1 year. Which can happen for various reasons. Most babies with UDT come to health care facilities after 1 year. Healthcare infrastructure in Indonesia for primary care (PHC) is mainly based on Puskesmas/Pratama clinics (Indonesian type of outpatient facilities) and primary care hospitals (class D), whereas advanced care (AHC) is mostly provided in level C/B (secondary/tertiary) hospitals and at the national level (class A hospitals.[36] Delays in bringing a baby with undescended testicles to a health care facility has an impact on fertility in adulthood. Treatment result should be evaluated at

least one year after surgery and in childhood, primarily through examination.[3,27] Scrotal position and absence of testicular atrophy are indicators of successful UDT surgical treatment.[3] Complications from orchiopexy are uncommon approximately 1%.[3] Benefit of orchiopexy care is to pull the testicles down into the scrotum. It is implemented to prevent impaired spermatogenesis.[3,4,27,35] Long-term studies are still needed to link fertility and paternity rates with early orchidopexy.[35]

CONCLUSION

There was an association between infertility and UDT either unilaterally or bilaterally ($p = 0.009$). Most UDT husbands had a BMI in the overweight category and the average age was 28 and 29. Other factors, including smoking habit, alcohol consumption, addictive drug, hormonal drug and surgery correction before 1 year, had no significant effect on the success of pregnancy outcome ($p > 0.05$). Although the pregnancy outcome in unilateral and bilateral UDT patients was not statistically significant, clinically, the pregnancy outcome was better in husbands with unilateral UDT by IUI than IVF.

This research's disadvantage was limited participants in both unilateral and bilateral retrospectively. Since Indonesia has not had sufficient data about UDT's male babies and some patients come to the hospital after 1 year old, the authors only observed their infertility patients in their centre. A larger data collection in many centers of Indonesia will be essential longitudinal analysis and approach to women with UDT husbands who undergo Assisted Reproductive Technology.

Authors contribution

SW : Concept, Data Provision, Data Analysis, Data and Result in Interpretation, Writing and Discussion. LF : Data and Result In Interpretation, Writing and Discussion. AD : Concept, Discussion. PY : Concept, Discussion. DMR, RJL : Concept, Discussion. All authors contributed to the article and approved the submitted version.

Funding

This research was supported by grants from the Center for Research, Publication, and Community Development Muhammadiyah University of Yogyakarta (SW and AD).

Acknowledgments

The authors acknowledge the provision of data from Asri Medical Center Hospital, Yogyakarta and patients in the clinic

References

1. Ekwunife OH, Ugwu JO, Onwurah C, Okoli CC, Epundu LK. Undescended Testes: Contemporary Factors Accounting for Late Presentation. *African J Urol*. 2018;**24**(3):206–11.
2. Rohayem J, Luberto A, Nieschlag E, Zitzmann M, Kliesch S. Delayed treatment of undescended testes may promote hypogonadism and infertility. *Endocrine [Internet]*. 2017;**55**(3):914–24. Available from: http://dx.doi.org/10.1007/s12020-016-1178-0
3. Niedzielski JK, Oszukowska E, Słowikowska-Hilczer J. Undescended testis - Current trends and guidelines: A review of the literature. Vol. 12, *Archives of Medical Science*. *Termedia Publishing House Ltd*.; 2016. p. 667–77.
4. Viljoen JT, Zarrabi A, Merwe A Van Der. Management of cryptorchidism in adolescent and adult males. *African J Urol [Internet]*. 2020; Available from: https://doi.org/10.1186/s12301-020-00051-8
5. Skoracka K, Ratajczak AE, Rychter AM, Dobrowolska A, Krela-Kaźmierczak I. Female Fertility and the Nutritional Approach: The Most Essential Aspects. Vol. 12, Advances in Nutrition. *Oxford University Press*,202; p. 2372–86.
6. Rodprasert W, Virtanen HE, Mäkelä JA, Toppari J. Hypogonadism and Cryptorchidism. Vol. 10, Frontiers in Endocrinology. *Frontiers Media S.A*.; 2020. p. 906.
7. Hidas G, Chaim J Ben, Udassin R, Graeb M, Gofrit ON, Zisk-Rony RY, et al. Timing of orchiopexy for undescended testis in Israel: A quality of care study. *Isr Med Assoc J*. 2016 Nov 1;**18**(11):697–700.
8. Darvishi A, Goudarzi R, Zadeh VH, Barouni M. Cost-benefit Analysis of IUI and IVF based on willingness to pay approach; case study: Iran. *PLoS One [Internet]*. 2020;**15**(7 July):1–13. Available from: http://dx.doi.org/10.1371/journal.pone.0231584
9. Johnson MH. A short history of in vitro fertilization (IVF). *Int J Dev Biol*. 2019;**63**(3–5):83–92.
10. Minimum standards for practices offering assisted reproductive technologies: a committee opinion. *Fertil Steril*. 2021 Mar 1;**115**(3):578–82.

11. Ying L, Wu LH, Loke AY. The effects of psychosocial interventions on the mental health, pregnancy rates, and marital function of infertile couples undergoing in vitro fertilization: a systematic review. *J Assist Reprod Genet [Internet]*. 2017;**33**(6):689–701. Available from: http://dx.doi.org/10.1007/s10815-016-0690-8
12. Boedt T, Dancet E, Lie Fong S, Peeraer K, De Neubourg D, Pelckmans S, et al. Effectiveness of a mobile preconception lifestyle programme in couples undergoing in vitro fertilisation (IVF): The protocol for the PreLiFe randomised controlled trial (PreLiFe-RCT). *BMJ Open*. 2019;**9**(7):1–8.
13. Steegers-Theunissen R, Hoek A, Groen H, Bos A, van den Dool G, Schoonenberg M, et al. Pre-conception interventions for subfertile couples undergoing assisted reproductive technology treatment: Modeling analysis. *JMIR mHealth uHealth*. 2020 Nov 1;**8**(11).
14. van der Windt M, van der Kleij RM, Snoek KM, Willemsen SP, Dykgraaf RHM, Laven JSE, et al. Impact of a blended periconception lifestyle care approach on lifestyle behaviors: Before-and-after study. *J Med Internet Res*. 2020;**22**(9):1–11.
15. Cecchino GN, Canillas GM, Cruz M, García-Velasco JA. Impact of hypogonadotropic hypogonadism on ovarian reserve and response. *J Assist Reprod Genet*. 2019 Nov 1;**36**(11):2379–84.
16. Ozgu-Erdinc AS, Coskun B, Yorganci A, Hancerliogullari N, Yilmaz N, Engin-Ustun Y. The role of inflammatory hematological markers in predicting IVF success. *J Bras Reprod Assist*. 2021;**25**(1):71–5.
17. Anh et al. Anxiety, Depression and Some Related Factors in Infertile Couples Being Treated at a Provincial Reproductive Health Care Center, in the South of Vietnam. *Bangladesh J Med Sci [Internet]*. 2023;**22**(2). Available from: http://kiss.kstudy.com/journal/thesis_name.asp?tname=kiss2002&key=3183676
18. Zhang YD, Tan LN, Luo SY, Chen YX, Wei HY. Status of penis and testicular development and effects of overweight/obesity on them in boys in the Zhengzhou area. *Chinese J Contemp Pediatr*. 2017 Jan 1;**17**(1):72–6.
19. Durairajanayagam D. Lifestyle causes of male infertility. *Arab J Urol [Internet]*. 2018;**16**(1):10–20. Available from: https://doi.org/10.1016/j.aju.2017.12.004
20. Ahmad R. Obesity inflicted reproductive complications and infertility in men. *Bangladesh J Med Sci*. 2023;**22**(1).
21. Ishrat, S., & Hossain M. Obesity in relation to clinical, endocrine and metabolic parameters in infertile women with polycystic ovary syndrome: the South Asian perspective. *Bangladesh J Med Sci*. 2017;**11**(2):48–56.
22. Erin C. Dowd, M.D.a, Michael J. Frank, Ph.D.b, Anne Collins, Ph.D.c, James M. Goldd, and Deanna M. Barch PD., Kuschner. Smoking and Clinical Outcomes of Assisted Reproductive Technologies. *Physiol Behav*. 2019;**176**(3):139–48.
23. De Angelis C, Nardone A, Garifalos F, Pivonello C, Sansone A, Conforti A, et al. Smoke, alcohol and drug addiction and female fertility. *Reprod Biol Endocrinol*. 2020;**18**(1):1–26.
24. Ricci E, Noli S, Ferrari S, La Vecchia I, De Cosmi V, Castiglioni M, et al. Pretreatment maternal lifestyle and outcomes of assisted reproduction: An Italian cohort study. *BMJ Open*. 2020;**10**(11):1–8.
25. Shin J, Jeon GW. Comparison of diagnostic and treatment guidelines for undescended testis. *Korean J Pediatr*. 2020;**63**(11):415–21.
26. Kolon TF, Herndon CDA, Baker LA, Baskin LS, Baxter CG, Cheng EY, et al. Evaluation and Treatment of Cryptorchidism: AUA Guideline. *J Urol*. 2019;
27. Kurz D. Current Management of Undescended Testes Opinion Statement HHS Public Access. *Curr Treat Options Pediatr [Internet]*. 2019;**2**(1):43–51. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4856300/pdf/nihms-754548.pdf
28. Samplaski MK, Bachir BG, Lo KC, Grober ED, Lau S, Jarvi KA. Cocaine use in the infertile male population: A marker for conditions resulting in subfertility. *Curr Urol*. 2016;**8**(1):38–42.
29. Kaur H, Bansal GK, Althobaiti F, Aldhahrani A, Usmani S, Bala M. Prevalence of reproductive drugs usage in humans and animals: A pilot study in Patiala city of India. *Saudi J Biol Sci*. 2021 Jul 1;**28**(7):3727–34.
30. Gul S. "Reproductive Hormones and Implication of Synthetic Hormonal Preparations: Current Status." Biomed J Sci Tech Res. 2021;38(2):30156–9.
31. Yeap E, Nataraja RM, Pacilli M. Undescended testes what general practitioners need to know. *Aust J Gen Pract.* 2019;**48**(1–2):33–6.
32. Gul S, Ashraf H, Khawar O, Moid M. Prevalence and preventive measures of infertility in male by kruger's criteria, a randomized study in private and government health care hospitals. *Bangladesh J Med Sci*. 2019;18(1):94–9.
33. Mukhtar AF, Ismail SB, Sains U, Sains U, Kerian K, Kerian K, et al. Case Report: Mild Androgen Insensitivity Syndrome presenting in male with infertility and sexual difficulties. *Bangladesh J Med Sci*. 2023;**22**(02):442–4.
34. Yusuf et al. Complete Androgen Insensitivity Syndrome: Diagnosis and Psychological Impact in Adolescence, A Case Report. *Int J Hum Heal Sci.* 2021;(2):31344.
35. Ciongradi CI, Sârbu I, Iliescu Halițchi CO, Benchia D, Sârbu K. Fertility of cryptorchid testis—An unsolved mistery. Vol. 2021; **12**: Genes. MDPI;.
36. Schaefers J, Wenang S, Afdal A, Mukti G, Sundari S, Haier J. Population-based study on coverage and healthcare processes for cancer during implementation of national healthcare insurance in Indonesia. *Lancet Reg Heal - Southeast Asia [Internet].* 2022;**6**:100045. Available from: https://doi.org/10.1016/j.lansea.2022.100045