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Review Article

THE IMPACT OF MODERN LIFE STYLE FACTORS ON FERTILITY – A REVIEW ARTICLE

Ekta Sutaria¹, Darshna Pandya²

1. M.D. Scholar, Department of Roga Nidana evam Vikriti Vigyana, Institute of Teaching and Research in Ayurveda(ITRA), Jamnagar
2. Assistant Prof., Department of Roga Nidana evam Vikriti Vigyana, Institute of Teaching and Research in Ayurveda(ITRA), Jamnagar

Address for correspondence:

Ekta Sutaria, M.D. Scholar, Department of , ITRA, Jamnagar

E-mail- ektasutaria@gmail.com

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ABSTRACT

Infertility means a man or woman is not being able to reproduce after one year of unprotected intercourse. Approximately 10 to 15% of partners are affected by infertility. In entire cases of infertility, man is directly responsible in about 30-40%, the female in 40-50% and both are responsible in 10% cases. The study was designed to find out the relation between infertility and modern life-style. In results - psychological Stress, smoking, coffee, alcohol, Pesticides, plastic items, Medicines like – Spironolactone, Nitrofurantoin, etc. Perfluorooctanoic acid in coated non-stick vessels, nonylphenol in detergent etc are found as major risk factor for infertility. In inference, the crucial role that lifestyle factors play in the development of infertility has generated a considerable amount of interest. Lifestyle factors are the modifiable habits and ways of westernise life that can greatly influence overall health and well-being, including fertility. The present literature review includes several lifestyle factors and places infertility in context for the both males and females; it aims to find the roles that lifestyle factors have major role in determining reproductive status. Other factors such as testicular heat stress, intense cycling training, lack of sleep and exposure to electromagnetic radiation from mobile phone use are briefly discussed.

Keywords: Infertility, modern Life-style, pre-mature ejaculation, Sperm quality.

Introduction

Infertility defined as the inability of a couple to achieve conception after one year of regular unprotected coitus.ⁱ Secondary infertility is the inability to conceive a child or carry a pregnancy to full term after previously giving birth.ⁱⁱ Now-a-days couples delay pregnancy with the intention of start their careers and those couples seek appraisal and treatment for infertility. Approximately 10 to 15% of couples of the reproductive-age population are facing the problem of infertility.ⁱⁱⁱ Conception depends on fertility potential of both partners. The male is responsible in about 30-40%, the female in 40-50% and both are responsible in 10% cases.^{iv} The remaining 10% is unsolved. For these couples, infertility is not just an inconvenience but also comparatively a disease of their reproductive system. \$ 3-5 billion a year industry per a year for Gamete Intra Fallopian Tube Transfer (GIFT), Zygote Intra Fallopian Transfer (ZIFT) etc as infertility treatments found in some research.^v Commonest causes of female infertility^{vi} are as follows – Tubal blockage, Ovarian factor, PCOD, Anovulation, Uterine factor, Pelvic causes, Cervical factors while pre-mature ejaculation, erectile dysfunction, Varicocele etc found as causes in man infertility. other common cause of infertility related to lifestyle such as excessive smoking, alcohol intake, obesity, age, inappropriate exercise, prescribed medicines, degrading environment, high pollution levels, changes in food habits, and deskbound work, psychological stress, chemicals etc. that affect fertility negatively in both partners. Present study was planned with aim to find out the relation between infertility & modern life-style.

Decreasing the number infertility patients has become an importance for several health organizations, including Healthy People 2020.^{vii} Lifestyle factors can be modified to improve overall health and they are ultimately under one's own control. The review focuses primarily on modifiable lifestyles including the age when starting a family, nutrition, weight management, exercise, psychological stress, cigarette smoking, recreational drugs use, medications, alcohol use, caffeine consumption, environmental and occupation exposure, preventative care, clothing choices, hot water, and lubricants. While several aspects of life are not adaptable, lifestyles may be changed.

Material&Methods

All-inclusive literature search online and offline, website data, newspapers articles etc. on infertility affecting factors were studied, analysed and used as material **to spot** and synthesise all relevant information, on **the main** lifestyle factors **related to** male and infertility. A manual search of bibliographies of the reports repossessed was conducted **to search out** other relevant articles.

Result & Discussion

Chemicals employed in routine life

1.1.1 Plastic container

Bisphenol-A (BPA) may a chemical often found in hard plastics, microwave-safe food containers, water bottles, Detergent Commercial laundry detergents use an artificial chemical called "nonylphenol"^{viii}, chlorinated water^{ix}, Non-stick cookware Perfluoroalkyl acids utilized in candy wrappers, fast-food wrappers, and pizza boxes. Studies have found that the higher the upper the amount of those chemicals in male, their sperm tested as abnormal or showed signs of suffering DNA damage and badly affects the feminine reproductive functions still.

1.1.2 Caffeine

The sources of caffeine within studies included coffee, tea, caffeine beverage (such as cola), cocoa and other drinks. Caffeine has been related to a rise within the time to pregnancy of over 9.5 months, particularly if the quantity is over 500 mg per day.^x The negative effects that are emphasized in recent research are miscarriage,

foetal death and still birth. The opposite published review showed that caffeine intake may need a negative effect on male reproductive function by damaging sperm DNA.^{xi}

1.1.3 Trans carboxylic acid (TFA)

Trans fatty acids can disturb spermatogenesis intensely. Male with high concentrations of trans-fatty acids, in their semen have 96% fewer sperm than male with low concentrations of trans-fatty acids in their semen.^{xii}

1.1.4 Meat & Beef

Red meat contains arachidonic acid that may cause or worsen internal inflammatory reactions.^{xiii} Sperm concentration was inversely associated mothers' beef meals per week. Hence, maternal beef consumption, and possibly xenobiotics in beef, may alter a man's testicular development in utero and unfavourably affect reproductive function.

1.1.5 sugar and soft drinks

Research in recent years has shown that consistently high sugar intake can negatively impact both male and feminine fertility. One study from Boston University found that only one sugary drinkable on a daily basis reduced conception rates in females by a quarter and in males by a third. This is often because it can interfere with reproductive hormones and damage egg and sperm quality.^{xiv}

Men who have high glucose were found to have higher levels of sperm DNA damage, an element that may negatively impact chances of conception and increase the likelihood of miscarriage.^{xv}

1.1.6 Pesticides & chemical fertilizers

The researchers found that the ladies in their study who ate the foremost pesticide-laced produce were 18 percent less likely to become pregnant and 26 percent less likely to supply a nascency, in comparison against women eating fruits and vegetables with the smallest amount pesticide exposure. exposure to pesticide-laced produce also has been related to lower semen quality in men.

1.1.7 Smoking and Nicotine

Chemicals (such as nicotine, cyanide, and carbon monoxide) in cigarette smoke speed up the loss rate of eggs. Infertility rates in both male and feminine smokers are about twice the speed of infertility found in non-smokers.^{xvi} Because smoking damages the genetic material in eggs and sperm, miscarriage and offspring birth-defect rates are higher among patients who smoke.^{xvii}

1.1.8 Alcohol

A recent meta-analysis involving 16 395 men reported that alcohol intake has a detrimental effect on semen volume and sperm morphology.^{xviii}

The actions of alcohol on the male system seem to occur in any respect levels of the hypothalamus–pituitary–gonadal (HPG) axis.^{xix} Alcohol appears to interfere with the assembly of GnRH, FSH, LH, and testosterone, furthermore as impair the functions of Leydig and Sertoli cells. Consequently, morphological development, the assembly, and maturation of spermatozoa may be reduced.

1.1.9 Metals & Occupational hazard

Hazardous agents include pesticides, solvents and heavy metals. The reproductive effects include reduced fecundity, abnormal sperm quality, increased risk of low birth weight, miscarriages and permanent sterility.^{xx}

Chemical solvents employed in cleaning the electronic components including xylene, acetone, petroleum distillates et al. in soldering vapours found as sperm killer.^{xxi}

1.1.10 Pollution

There is also a significant negative correlation found between sperm concentration and the amount of ozone to which a man was exposed.^{xxii} Both animal and human epidemiological studies support the idea that air pollutants cause defects during gametogenesis leading to a drop in reproductive capacities in exposed populations. Air quality has an impact on overall health as well as on the reproductive function.^{xxiii}

Stress

Present lifestyle and work pressure has brought stress into our lives. Decreased stress levels have been associated with improvements in fertility. In one study, higher ranks in the WHO (five) Well-Being Index correlated with higher sperm concentrations. A meta-analysis of 57 cross-sectional studies involving 29 914 participants reported that psychological stress could lower sperm concentration and progressive motility, and increase the fraction of sperm with abnormal morphology. Stress, in its many forms, may be detrimental to male reproductive potential. The classical stress response activates the sympathetic nervous system and involves the hypothalamus–pituitary–adrenal (HPA) axis. Both the HPA axis and gonadotrophin-inhibitory hormone (GnIH) exert an inhibitory effect on the HPG axis and testicular Leydig cells.^{xxiv} The resulting inhibition of the HPG axis reduces testosterone levels. This leads to changes in Sertoli cells and the blood–testis barrier, which ultimately causes spermatogenesis to be suppressed. Impairment of testosterone secretion forms the main basis underlying the detrimental effects of psychological stress on spermatogenesis.^{xxv} Psychological stress is associated with reduced paternity and abnormal semen parameters, and thus could be a causative factor in affecting male infertility.^{xxvi}

Modern Medicines

Some drugs like Sulphasalazine accustomed treat inflammatory bowel disease can drastically reduce semen quality.^{xxvii} In some studies, modern medicine found as enemy of fertility mentioned in Table -1.

Table 1: Medicine and their role in male infertility^{xxviii}

Sr. No.	Medicine	Role in male infertility
1.	Spironolactone	Decreases spermatogenesis
2.	Calcium channel blockers	Decreases fertilization capacity
3.	Anti-androgens	Decreases spermatogenesis
4.	Erythromycin	Decreases sperm density/motility
5.	Nitrofurantoin (high doses)	Decreases spermatogenesis
6.	Cyclosporine	Decreases spermatogenesis
7.	Colchicine	Decreases fertilization capacity
8.	Cimetidine	Decreases spermatogenesis

Impacts of diet and exercise:

Nutrition Eating a healthy diet is main a part of maintaining good overall health. However, there are certain vitamins and food groups that would have a greater impact on reproductive health than others.^{xxix} Consuming a diet rich in carbohydrates, fibre, folate, and lycopene in addition to consuming fruit and vegetables correlates with improved semen quality. Consuming lower amounts of both proteins and fats were more beneficial for fertility.^{xxx} Diets consisting of processed meat, full-fat dairy products, alcohol, coffee, and sugar-sweetened beverages were related to poor semen quality.^{xxxi}

Weight

Body mass index (BMI) is reported as variety. If it's below 18.5 it's considered malnourished, between 18.5 and 24.9 is normal, above 25 is overweight, and over 30 is measured obese. BMI have significant effects on health, including cardiovascular disorder, diabetes, and infertility. In female, the foremost specific reason is hormonal imbalance because of obesity^{xxxii}. It results in more steroid hormone binding globulins (SHBG) within the system, which binds to testosterone (which is accountable for sexual arousal), thus inhibiting normal concupiscence or libido.^{xxxiii} Several studies have demonstrated that an increase in BMI is correlated with a decrease in sperm concentration and a decrease in motility. For women, being underweight and having extremely low amounts of body fat are related to ovarian dysfunction and infertility.^{xxxiv}

Exercise

A healthy amount of exercise in men is beneficial. Physically active men who exercised a minimum of thrice per week for one hour typically scored higher in the majority sperm parameters Diet combined with exercise in obese male rats has been shown to extend both sperm motility and sperm morphology and to decrease both sperm DNA damage and reactive oxygen species. However, excessive exercise can negatively alter energy balance within the body and affect the genital system. Vigorous exercise may decrease fertility in women with normal weight, Moderate exercise, for over an hour and fewer than 5 hours per week, increases fertility all told women and Strenuous exercise, for quite 4 hours per week, decreases IVF success rates.

Radiation Exposure

Exposure to varied kinds and amounts of radiation can have lasting effects in humans. Radiation that's within the kind of x-rays and gamma rays will be devastating tothe sensitive cells of the build, including germand Leydig cells. The damage done depends on the age of the patient and dose, and ultimately may end up in permanent sterility.

The incredible convenience of the cellular phone has dramatically increased its usage within the last decade. However, it's many negative effects. There are an increasing number of studies demonstrating negative effects of the radiofrequency electromagneticwaves (RFEMW) utilized by cell phones on fertility.^{xxxv}

Advanced paternal age (APA)

Advanced maternal age is defined because the age of 35 years, beyond which there's significantly increased risks of adverse reproductive outcome for girls. age is maybe the one most vital consider assessing an ovarian reserve and reflects both the number and quality of oocytes. Paternal ageing causes genetic and epigenetic changes in spermatozoa, which could proceed through fertilisation into the offspring, causing a range of diseases within the resulting offspring. Therefore, couples must be counselled with equal emphasis on the contribution of APA and advanced maternal age as being potential risk factors of impaired offspring health.

Sleep

Disturbances in sleep might have adverse effects on male fertility, as semen volume was lower in patients with difficulty in initiating sleep, including people who smoked or were overweight. Sleep loss was found to affect sperm function in an animal study. Specific to women, sleep disturbances coincide with premenstrual dysphoria, pregnancy, postpartum depression, and therefore the menopausal transition.^{xxxvi}

Timing and Frequency of Sexual Intercourse

Most women have a 28-day menstrual cycle: this suggests there are 28 days between the beginning of 1 period and also the start of the following period. Ovulation (when an egg is released from the ovary) occurs on day 14 of a 28-day cycle. Whether or not that egg gets fertilised by a sperm depends on the day(s) within the cycle within which intercourse occurs. the prospect of getting pregnant is low at the start of the cycle and starts to extend from about day 8 onwards. Women are possibly to urge pregnant if they need sex 2 days before they ovulate (i.e. on day 12 of 28-day cycle). Couples that have regular sex 2-3 times every week are presumably to induce pregnant because this frequency ensures that a decent volume of fresh sperm are going to be present within the female reproductive tract at the time of ovulation. If couples are only having sex once every week, the possibility of getting pregnant is a smaller amount because there'll be less fresh sperm present within the female genital tract at the time of ovulation.

Medical Conditions

Some women may have medical conditions that may affect their fertility. These may or might not be known about when getting down to go for a family. a number of these conditions is also more general, for instance thyroid disease and viosterol deficiency whilst others is also more specific, as an example, polycystic ovary syndrome and endometriosis.

CONCLUSION

In today's era, male and feminine are constantly exposed to factors which affects the standard of reproduction system. In fact, our natural hormonal balance is under constant stress from several factors which can't be controlled. when exposure to food and toxic chemical contamination starts to chop, it's likely that the prevalence of infertility will decrease. this contemporary lifestyle invites infertility. Medicines alone cannot cure this problem. Unless we correct this destructive lifestyle. There are a good style of risk factors that would potentially influence sperm quality. These include lifestyle factors like cigarette smoking, alcohol intake, use of illicit drugs, obesity, psychological stress, age, diet, and caffeine intake. The researches advocate that age play an enormous role in defining fertility. Attempting pregnancy before the age of 30 for girls and before 35 for men may provide the best chances of success. While it's important for one partner to think about their age. Proper nutrition, weight, and exercise also effect fertility. Couples who are underweight or overweight are in danger for infertility and impaired pregnancy. Maintaining a perfect weight may provide the way for men and girls to extend their fertility. Exercise is helpful, though an excessive amount of could also be detrimental. If couples try to realize a pregnancy, limiting or smoking cessation are necessary for positive outcomes. Concerning environmental exposures, assessing the exposures of every individual could also be crucial to reproductive health of the couple. Eliminating every exposure isn't possible; however, identifying, eliminating, or minimizing even one factor may have significant positive effects on fertility for couples.^{xxxvii} However, exposure to those risk factors doesn't occur individually but rather simultaneously, with each being at a varying duration and severity of exposure. By identifying the impact of lifestyle on reproductive health, and by actively modifying lifestyle behaviours, men and ladies are capable of controlling their own fertility potential.

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