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PERSUADE OF LIFESTYLE FACTORS ON REPRODUCTIVE HEALTH AND INFERTILITY- A LITERARY REVIEW

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ABSTRACT
Industrial development, population explosion, poverty causes changes in the quality of food and environmental conditions, which lead to drastic modification in the life style of modern man, like fast, stressful and competitive life and unhealthy food habits. Such life style factors are the modifiable habits and ways of life that can greatly influence overall health and wellbeing, including fertility. Ayurveda emphasized on the preventive as well as curative approach towards health. Ayurveda life style protocols (*Dinacharya* and *Ritucharya*) are very useful for the healthy life, including reproductive health and fertility. Professional exposures, shift duties, non-nutritional food habits and addiction to tobacco, wine and different drugs cause qualitative as well as quantitative compromise with the sperm of the male population. Following the life style as per Ayurveda along with use of *Vajeekarana* medicine looks to be reducing extent of infertility in today's modern world. Present article explains about life style factors influencing reproductive capacity and protocols and guidelines of Ayurveda for the healthy reproductive life as well as fertility to produce the healthy and long living progeny.

KEYWORDS: lifestyle, fertility, reproductive health, Ayurveda.

INTRODUCTION
Infertility primarily refers to the biological inability of a person to contribute to conception. In women, it may also refer to the state when she is not able to carry a pregnancy to its full term. Approximately 10 to 15% of couples are impacted by infertility. Recently, the pivotal role of lifestyle factors in the development of infertility has generated a considerable amount of interest. Lifestyle factors are the modifiable habits and ways of life that can greatly influence overall health and well-being, including fertility. Many lifestyle factors such as the age at which to start a family, nutrition, weight, exercise, psychological stress, environmental and occupational exposures, and others can have substantial effects on fertility; lifestyle factors such as cigarette smoking, illicit drug use, and alcohol and caffeine consumption can negatively influence fertility.

Decreasing the number of people affected by infertility has become a top priority for many health organizations.[1] Lifestyle factors can be modified to enhance overall well-being and they are ultimately under one's own control. They play a key role in determining reproductive health and can positively or negatively influence fertility. 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, alcohol use, caffeine consumption, environmental and occupation exposure, clothing choices, hot water etc. although many aspects of life are not modifiable, lifestyles may be changed. This article is aimed to highlight the role of Lifestyle Factors on Reproductive Health and Infertility.

MATERIAL AND METHOD
Data relative to lifestyle factors influencing reproductive health and infertility from available classical texts, websites and published research articles.

Factors influencing fertility
Age
The age of a man or woman is a factor among others that can affect fertility. Due to pursuit of education and other factors, many couples are choosing to delay childbearing. Fertility peaks and then decreases over time in both men

and women, thus the reproductive timeline may be one aspect to consider when determining the ideal time to start a family. As men age increases, testosterone levels begin to decrease and hypogonadism results. However, if testosterone is used to treat hypogonadism, it can suppress spermatogenesis.[2] Semen parameters also begin a steady decline as early as age 35[3]; semen volume and motility both decrease and morphology may become increasingly abnormal. After the age of 40, men can have significantly more DNA damage in their sperm, as well as decline in both motility (40%) and viability (below 50%).The reproductive timeline for women is complex. A woman is born with all the oocytes she will ever have, and only 400–500 are actually ovulated.[4] As the number of oocytes decline, a woman's menstrual cycle shortens, infertility increases, and menstrual irregularity begins 6–7 years before menopause. Increasing age increases a woman's time to pregnancy. When under the age of 30, a woman's chances of conceiving may be as high 71%; when over 36, it may only be 41%.[5] The chances of becoming pregnant and being able to maintain a pregnancy are also affected. The rates of euploidy decrease 50% for women under 35, decrease 40% for women between the ages of 35 and 40, and decrease 33.3% for women over 40.[5] In addition, chromosomal abnormalities and aneuploidy may increase the risk of spontaneous abortion and implantation loss with increasing age.[2, 4] Overall, women's fertility is significantly lower in the 30s and 40s.

Impacts of diet and exercise

Nutrition

Eating a healthy and varied diet may be a key part of maintaining good overall health. However, there are certain vitamins and food groups that could have a greater impact on reproductive health than others. Aspects of a male's diet may have an impact on his fertility. Consuming a diet rich in carbohydrates, fiber, folate , and lycopene [6] as well as consuming fruits and vegetables correlates with improved semen quality. Consuming lower amounts of both proteins and fats are more beneficial for fertility.[6] Another potential benefit could be antioxidants, which play a pivotal role in the body by scavenging reactive oxygen species (ROS). Antioxidants are molecules such as albumin, ceruloplasmin, and ferritin; and an array of small molecules, including ascorbic acid, α-tocopherol, β-carotene, reduced glutathione, uric acid, and bilirubin .Antioxidants help remove the excess ROS in the seminal ejaculate and assist in the conversion of ROS to compounds that are less detrimental to cells. If there is more ROS than the local antioxidants can remove, it results in oxidative stress. Oxidative stress can result in sperm protein, lipid and DNA damage and sperm dysfunction.[7] A high amount of antioxidants has been demonstrated to increase semen quality, compared to low or moderate amounts. A woman's diet may ultimately affect her fertility, particularly ovulation.[8]

Weight

An individual's weight is often associated with his or her eating habits and amount of activity. Body weight can have significant effects on Health, including cardiovascular disease, diabetes, and infertility.[9]

Obesity

The obesity epidemic has recently become a serious issue, particularly in industrialized nations. The rising number of obese individuals may be due in part to an energy-rich diet as well as insufficient physical exercise.[9] In addition to other potential health risks, obesity can have a significant impact on male and female fertility. A relationship also exists between obesity and erectile dysfunction (ED)

Eating disorders and being underweight

Obesity is not the only way in which weight can impact fertility. Men who are underweight are also at risk of infertility. Men who are underweight tend to have lower sperm concentrations than those who are at a normal BMI.[10] As the majority of the available literature focuses on the impact of obesity, more research is needed into the effects that being underweight may have on male fertility.

For women, being underweight and having extremely low amounts of body fat are associated with ovarian dysfunction and infertility.[11] Additionally, the risk of ovulatory infertility increases in women with a BMI below 17.[10]

Exercise

Excessive exercise can negatively alter energy balance in the body and affect the reproductive system.[12] When energy demand exceeds dietary energy intake, a negative energy balance may occur and may result in hypothalamic dysfunction and alterations in gonadotropin-releasing hormone (GnRH) pulsality, leading to menstrual abnormalities, particularly among female athletes. Increased frequency, intensity, and duration of exercise were found to be significantly correlated with decreased fertility in women.

Psychological effects

Stress is a prominent part of any society, whether it is physical, social, or psychological. Infertility itself is stressful, due to the societal pressures, testing, diagnosis, treatments, failures, unfulfilled desires, and even fiscal costs with which it is associated.[13] Males who experienced more than two stressful life events before undergoing infertility treatment are more likely to be classified below WHO standards for sperm concentration, motility, and morphology[14] Stress can increase after diagnosis of infertility, follow up appointments, and failed IVF treatments.[15] When men present to fertility clinics, 10% met the criteria for having an anxiety disorder or depression, the latter being more common.[16] Coping with various life styles also affect fertility. It is reported that actively coping with

stress, such as being assertive or confrontational, may negatively impact fertility[16,17], by increasing adrenergic activation, leading to more vasoconstriction in the testes. This vasoconstriction results in lower testosterone levels and decreased spermatogenesis. While men are not often thought to report their anxiety or sexual stress but link between anxiety and sexual stress is surprisingly strong.[18] Decreased stress levels have been associated with improvements in fertility.

Physical stress has been implicated in influencing female fertility. Psychological stress, such as anxiety disorder or depression, affects 30% of women who attend infertility clinics, possibly due in part to infertility diagnosis and treatments.[17] Positive moods correlated with increased chances of delivering a live baby while higher levels of anxiety increased chances of stillbirth. Fertilization of oocytes also decreased when stress increased. A possible explanation for these associations may lie in stress hormone levels. One study reported that alpha amylase, but neither cortisol nor adrenalin, negatively correlated with fertility, and that the chances of conceiving in the short time period surrounding ovulation decreased. Although the mechanisms by which alpha amylase may decrease fertility are unknown, it is hypothesized that catecholamine receptors could alter the blood flow in the fallopian tubes.[18]

Recreational substances

Cigarette smoking

While it is well documented that cigarette smoke contains over 4,000 chemicals[19] and is associated with a number of potential health complications such as cardiovascular disease, more research is needed to establish a link to infertility. It is estimated that 35% of reproductive-aged males smoke.[20] Men who smoke before or during attempts to conceive risk decreasing their fertility in comparison to non-smokers.[19] Men who smoke tend to have a decrease in total sperm count, density, motility, normal morphology, semen volume, and fertilizing capacity.

Smoking also can impact DNA integrity of the sperm, with several studies noting an increase in DNA damage.[20, 21] Endocrine function may also be affected by smoking, as increases in serum levels of both FSH and LH and decreases in testosterone have been reported.

Among women who are of reproductive age, 30% are smokers.[22] The reductions in fertility among female smokers may be due to decreases in ovarian function and a reduced ovarian reserve. These disruptions in endocrine function could contribute to the menstrual dysfunction and infertility. The uterine tube and uterus may also be targets of cigarette smoke. Chemicals in cigarette smoke may impair oocyte pick-up and the transport of fertilized embryos within the oviduct, leading to an increased incidence of ectopic pregnancies. Alterations in ovarian, uterine tube, and uterine functioning, as well as disruptions in hormone levels likely contribute to the infertility observed in women who smoke.

Drugs

Illicit drugs

Use of illicit drugs appear to have a negative impact on fertility, though more in-depth research in this area is required to make a clear link.

Cocaine has been demonstrated to adversely affect spermatogenesis, which may be due to serum increases in prolactin, as well as serum decreases in total and free testosterone.[31] Opiates comprise another large group of illicit drugs. Opiates, such as methadone and heroin, are depressants that cause both sedation and decreased pain perception by influencing neurotransmitters. In men taking heroin, sexual function became abnormal and remained so even after cessation. Sperm parameters, most noticeably motility, also decrease with the use of heroin and methadone.[32] In women, placental abruption with the use of heroin may also be a cause of infertility.

Caffeine has become an integral part of higher society. caffeine has been reported to have negative effects on female fertility. Caffeine has been associated with an increase in the time to pregnancy of over 9.5 months, particularly if the amount is over 500 mg per day.[33] The negative effects that are emphasized in recent research are miscarriage, spontaneous abortion, fetal death and still birth.

Alcohol

Many studies have been conducted on the effects of alcohol and aspects of health, including fertility. While there are studies that demonstrate the link between alcohol and infertility, it is not entirely clear what amount relates to an increased risk. In men, alcohol consumption has been linked with many negative side effects such as testicular atrophy, decreased libido, and decreased sperm count [36]. Teratozoospermia, oligozoospermia is also found in alcoholic males. Alcohol seems to have a large impact on both sperm morphology and sperm motility.[37]

While alcohol may have effects on sperm morphology, there is little conclusive evidence linking alcohol with oxidative stress, and infertility. Oxidative stress has been found to systemically increase with alcohol consumption[38], but there is not yet a clear link between sperm oxidative stress and alcohol. While it is clear alcohol can have an impact, the amount it takes to negatively influence reproductive function is not clear as there is no standard “drink”. Amounts of alcohol ranging from one drink a week to 5 units a day can have various effects including increasing the time to pregnancy[38], decreasing probability of conception rate by over 50%[39] and decreasing implantation rate, increasing both the risk of spontaneous abortion and of fetal death[41], and causing anovulation, luteal phase dysfunction, and abnormal blastocyst development.[44] Researchers believe

that these effects may be due to hormonal fluctuations including increases in estrogen levels, which reduce FSH and suppress both folliculogenesis and ovulation.[45, 46]

Environmental and occupational exposures

Many potential threats to reproductive health are encountered in every-day life through biological (viruses), physical (radiation), and toxic (chemicals) sources. While the human body has defenses to protect itself, these threats can still influence one's health through inhalation, ocular and dermal contact, ingestion, and vertical and horizontal transfer.[47] These hazards may also have negative ramifications for fertility.

Occupation and hobbies

Both men and women can be exposed to chemicals and other materials that may be detrimental to their reproductive health while on the job. Heavy metals and pesticides have many negative side effects, particularly for those who work around them. Men working in agricultural regions and greenhouses which use pesticides have higher concentrations of common pesticides in their urine[48], overall reduced semen parameters, oligozoospermia , lower sperm counts , and sperm concentrations decreased by as much as 60%.[48] Organic solvents may also prove detrimental. Men who work with these substances often experience indirect consequences with their female partner having decreased implantation rates.[49] Welding is another possible source of occupational exposure, and plays a role in reduced reproductive health. There are also consequences for working in factories that manufacture chemicals and heavy metals. Factories that produce batteries where workers are exposed to lead may have negative impacts on reproductive capabilities, including asthenospermia and teratospermia.[50]

Hobbies, while not often associated with excessive amounts of exposure, may be just as damaging as manufacturing. Gardeners may be in contact with pesticides[50]; crafters making jewelry, ceramics, and even stained glass may come in contact with lead; painters may also come in contact with lead-based paints. Whether it is manufacture or hobby, using any kind of heavy metal or pesticide likely will result in some exposure, and possibly reduce fertility.

Clothing

The type of clothing a man chooses to wear may have effects on reproductive health. Many studies have been conducted hoping to find an answer to the question of what type of clothing is best for fertility. The view that elevation of scrotal temperature negatively impacts spermatogenesis and sperm parameters is universally acknowledged.[52] But the question of whether tight-fitting innerwear actually has an effect on scrotal temperature and therefore semen quality has long been debated. There have been studies that have found significantly higher temperatures with tight-fitting clothing versus loose-fitting or no clothing. Increases in scrotal temperatures could be due to an increase in temperature of about 3.5°C of the air between the clothing and the skin in comparison the ambient air.[53]

DISCUSSION

Lifestyle factors, including age when starting a family, nutrition, weight management, exercise, psychological stress, cigarette smoking, recreational drugs use, alcohol and caffeine consumption, environmental and occupational exposures, preventative care, and other behaviors are modifiable and may impact fertility. The evidence suggests that age may play a large role in determining fertility. Attempting pregnancy before the age of 30 for women and before 35 for men may provide the highest chances of success. While it is important for one partner to consider their age, it is when both partners consider their ages together that they may be able to thoroughly increase their odds of having a successful pregnancy.

Proper nutrition, weight, and exercise may impact fertility. Though no definitive link has been drawn, choosing proper nutrition, whether it be choosing supplements or food groups, before and during attempts to conceive may be vital for improving fertility for both men and women. Men and women who are underweight or overweight are also at risk for negative side effects, including changes in hormone levels that heavily influence their fertility. Recent research suggests that weight plays an important role in fertility, and controlling and maintaining an ideal weight may provide a way for couples to increase their fertility. Exercise is suggested to be beneficial, though too much may be detrimental. Lean and underweight men or women who exercise vigorously may put themselves at risk for a decrease in fertility, thus finding a balance may provide the best chances of achieving a pregnancy. While there are associations between psychological effects and infertility, it is hard to establish a cause-effect relationship. Tests are subjective, and there is no general consensus on how to measure psychological stress. Recreational substances also appear to have significant impact on fertility. There is evidence to support that alcohol does have an impact on fertility, it is also difficult to establish a definitive link as there is no standard "drink" or comparative way to measure alcohol consumption. Concerning environmental exposures, assessing the exposures of each individual may be crucial to reproductive health of the couple. Taking care of a current fertility problem may provide better fertility in the future.

Treatment

Taking preventative steps may help fertility. As prevention is better than cure, firstly the factors that drastically influence the fertility but are easily avoidable should be taken into consideration and lifestyle should be changed accordingly. Following Ayurveda *Dinacharya*, *Ratricharya* and *Ritucharya* along with *Sadavritta* and *Achar Rasayana palana*, proper dietary habits can

definitely solve the problem of infertility and reduce the burden on society.

CONCLUSION

The lifestyle factors discussed in the present review have the potential to impact fertility. It is important to understand the ways in which lifestyle behaviors may benefit or harm fertility in order to minimize complications and to maximize fertility outcomes. By understanding the collision of lifestyle on reproductive health, and by actively modifying lifestyle behaviors, men and women can become capable of controlling their own fertility potential.

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