THE IMPACT OF LIFE STYLE FACTORS ON INFERTILITY AND REPRODUCTIVE PERFORMANCE

DR.REDDY, P.B , SUSHMA, P.

Abstract: Infertility is a reproductive disorder when a couple cannot conceive in spite of having regular unprotected sex. Infertility can be caused by a variety of disorders and lifestyle factors. On the other hand, fertility problems cannot be clarified in around a third of cases. The present research is an evidence-based review and mainly focuses on the impact of non-contagious lifestyle factors on reproductive performance in the general population and the infertile population undergoing assisted reproductive technology (ART) treatment. The impact of numerous daily life factors like age, weight, smoking, diet, exercise, psychological stress, caffeine consumption, alcohol consumption and exposure to environmental pollutants are included in the review.

The secondary databases of various websites like Google scholar, Pub Med, Medline and Cinahl were explored to recognize significant related publications. We found that there is strong confirmation that age, weight and smoking show impact on general health and adversely on reproductive performance. The relationship between diet and various levels of exercise on reproductive performance requires further research. There are a number of other factors such as caffeine consumption, psychological stress, alcohol consumption and exposure to polluted environment have been found to influence the reproductive performance but the evidence is unclear. It is concluded that alteration in the lifestyle can help couples to conceive or optimize their possibilities of conception with ART treatment.

Keywords: age, infertility, life style, obesity.

Introduction: The capacity to produce offspring is known as fertility. However, the inability to become pregnant after 12 months of unprotected intercourse is known as clinical infertility. It has been estimated that roughly 15% of the population in developed countries and 34% from under developed countries are suffering from clinical infertility [1].The reasons of infertility are extensive. It mainly includes ovulatory disorders, tubal disease, endometriosis, chromosomal abnormalities, sperm factors and unexplained infertility due to changes in life style. The impact of lifestyle on reproductive performance may vary depending on individual lifestyle and conditions.

Everyday life factors have had a remarkable impact on general health and the capacity to reproduce. Different issues of lifestyle such as smoking and over body weight (obesity) can influence general health and comfort. For instance, smoking enhances the risk of cardiovascular disease of the individual [2] and undesirable consequences linked with obesity comprise increased risk of cardiovascular disease, diabetes and some cancers [3]. There is growing evidence that lifestyle factors like smoking and alcoholism can affect the reproductive performance including the chances of conception [4]. Similarly, obesity is often related with lack of exercise and unsuitable diet [5], delayed child bearing, smoking and exposure to environmental pollutants and chemicals.

The aim of this paper is to study the impact of a specific range of modern lifestyle factors on fertility. This assessment highlights on the non-communicable aetiology for fertility related with possible adjustable lifestyle factors. These factors include female age, smoking, weight, diet, exercise, psychological stress, caffeine consumption, alcohol consumption and exposure to environmental pollutants. The aim of this paper is to review the impact of a detailed variety of existing lifestyle factors on fertility.

Methodology: The information databases of Google scholar, Pub Med, Medline and Cinahl, Medline, Pub Med and Cinahl were explored to spot relevant publications written in English between 1988 and 2010. Other publications from various journals related to infertility and reproductive performance and specific lifestyle factors were also reviewed. Especially, reports that studied general populations or infertile

populations undergoing assisted reproductive technology (ART) were targeted. Various life style factors like, smoking, weight, age, caffeine, alcohol consumption, exercise and diet were sought using key words like infertility, fertility, sub fecundity, fecundity, preconception, pregnancy, smoking, age, weight, obesity, environment, exercise, diet, nutrition, IVF and ART. Additionally, many press notes have been evaluated on a regular basis. Meeting with gynecologists from Indore and Ujjain and researchers of reproductive biology of Vikram University, Ujjain, have also been a useful source of information.

Results and discussion:

Age: In recent times, women tend to be career-oriented and decide to get married only after they have established themselves. This causes a postponement in their marriage and they are usually in their late 30s when they finally make a decision to get married. On the other hand, a woman's capacity to produce fertile ovum decreases significantly after she reaches her 30s [6], [7]. It is due to that every woman is born with a fixed quantity of eggs. At the commencement of her menstrual cycle, a girl has about 300,000 to 500,000 eggs, and by the time she reaches menopause she wear out all of them. Not like men who produce new sperms every month, women do not produce new eggs. One of their existing eggs matures and develops every month. After the age of 35, there is a quick fall in the quality of eggs as well, making it even harder for women to conceive [8]. In addition, the frequency of genetic abnormalities and unplanned abortion increase clearly with maternal age [9].The effect of the age of women undergoing ART is similar to the general population with pregnancy rates declining with increasing age [10].

Smoking: Smoking has been linked with undesirable effects on fertility, though this is not extensively documented [11]. The reports related adverse effects of smoking and its ingredients on both the general and infertile population follow different biochemical pathways. In males, smoking reduces sperm production, movement and morphology and is linked with an increased risk of DNA damage [12]. In the female, smoking may have an effect on the follicular atmosphere and modify hormone levels in the luteal phase. [13]. It is also reported that menopause may occur even 1–4 years prior for women who smoke compared to non-smokers [14]. Another recent study confirmed an increased thickness of the zona pellucida of ovum in smokers, which may create more complicated for sperm penetration [15]. In a case study of 14,893 pregnant women with exposure to both active and passive smoking found a major delay in conception [16]. In a case study of couples from 10 European countries also found a strong involvement between female smoking and sub fecundity [17]. **Weight**: Obesity is linked with a variety of undesirable health consequences. Mostly documented are the increased risks of cancer, cardiovascular disease and diabetes. Low body weight and obesity can crash the reproductive function by causing hormone imbalances and ovulatory dysfunction. In a case study Edwards et al [18] examined 116,678 American nurses of which there were 2527 cases of married women who had attempted to become pregnant for >1 year with no success because of ovulatory infertility. In support of the above findings, a case study that investigated lifestyle factors in 2112 pregnant women. Increased time to conception was found for women with a BMI of ≥25 and <19. Other lifestyle factors, like age and menstrual pattern, compared to normal weight to overweight women with a BMI of 25–39, women with a BMI of ≥25 or <19 had a relative risk of time to conception. [19]. One more huge study of women from five European countries. Bolumar et al., [20]. found that a high BMI increased the time taken to conceive, but only for smokers. Male BMI of <20 or >25 has also been related with a decrease in sperm quality [21] which can impact on fertility. Even it was found that the distribution of body fat also affects on reproductive function but the mechanism for this effect is unclear [22]. Studies also found that increasing waist–hip ratio was negatively associated with the probability of conception [23]. Lifestyle alteration programmes that include exercise have been shown to help women to lose weight, get better fitness, boost psychological happiness and improve reproductive functioning[24].

Diet:Intake of a healthy food consisting of suitable composition and caloric intake is essential to maintain a condition of optimum physical and psychological health. Diet mediates

body weight and composition and should be believed as fundamental to reproduction. But, an association has been demonstrated between maternal nutritional status and adverse pregnancy results [25], [26] the effect of a women's nutritional status prior to pregnancy has rarely been studied [27]. Premature pregnancy is a vulnerable period for embryo and fetal development. It can even impact on the developing embryo and subsequent long-term health of the child [27]. Research studies directly relating dietary components to the chance of conceiving is insignificant in humans. Nevertheless, there is strong evidence that a well-balanced healthy diet is beneficial for general well-being and optimum body functioning [28] and it has been suggested that diet before pregnancy may influence fetal well-being [29]. Therefore, healthy and balanced diet is required for better reproductive function. Exercise: Regular physical exercise influences an individual's general health and happiness and perhaps provides some protection from cardiovascular disease, obesity, diabetes, hypertension, osteoporosis and psychological stress. Research in relation to physical fitness and reproduction is mainly focused on sportspersons rather than women who have a reasonable level of fitness. In a case study Rich-Edwards et al [30] found that exercise was associated with a fall in risk of ovulatory infertility. He found that strong exercise per week was connected with a relative risk reduction of 5%, telling that physical activity may protect ovarian functioning independent of BMI. On the other hand, there was no relationship with moderate exercise. This report is in contrast to the Clark et al. [31]. Daily work out can increase the insulin level which further improves ovarian function and the chance of conception [32]. Even during pregnancy exercise has also been reported to increase maternal well-being [33]. On the whole physical, emotional and increased general well-being benefits of being physically fit are well documented [34]. However, there is a need for further research regarding the effects that moderate and low-level exercise may have on reproductive performance. It is practical to imagine that the general health benefits associated with moderate levels of exercise and the consumption of a well-balanced diet would also apply to fertility. These lifestyle practices should therefore be recommended to couples attempting pregnancy. Further research is needed to clarify the effect that exercise on this issue. Psychological Stress: Psychological stress may decrease both male and female reproductive performance in many ways through autonomic nervous system or endocrine and immune systems have all been associated [35]. However, there is a need of clear consent as to the definition and measurement of 'psychological stress' [35], [36] bringing into question the nature and strength of any assumed association. Known that infertility and ART treatment are associated with stress [37], determination of whether stress contributes to or is a consequence of infertility and ART treatment is challenging. A number of data of a negative effect of increased levels of stress and IVF success were reported [38]. In a case study [38] couples who obtained counseling and support during their IVF cycle had lesser anxiety and depression achieves and higher pregnancy rates, compared with a control group receiving usual care. In a case study based on data from clinics of California clearly found an association between stress levels and infertility [39]. This research work studied the effect of different types of stress on a variety of factors including oocytes recovered, fertilization, pregnancy and live birth. Stress was assessed using standardized psychological tests that were administered prior to treatment and during treatment. It was found that the chance of pregnancy and live birth delivery was decreased with increasing stress measures. The number of fertilized oocytes also reduced with increased stress. A number of studies have found stress to reduce pregnancy rates [40] following ART treatment. **Caffeine**:The use of caffeine has been connected with decreased fecundity in the general population. Due to its stimulant properties, caffeine has led to its well-known use as a beverage (coffee, tea and soft drinks) and some foods such as chocolate. Its use has been reported to prolong the time to pregnancy though the mechanism for this is indistinct. Caffeine may affect female reproduction by targeting ovulation and corpus luteal function through modifications to hormone levels [41] and has been associated with higher early follicular E2 levels in females [42]. The consumption of caffeine has been associated

with reduced fecundity in the general population. In a potential study of 104 women attempting pregnancy found strong evidence of a decreased chance of pregnancy with increasing caffeine consumption [43]. The women were examined at enrolment and again at 3 and 6 months and their consumption of coffee, tea and soft drinks were recorded. The regularity of interviews permitted accurate recall of their caffeine consumption. Daily information was also recorded regarding menstrual bleeding and intercourse until a pregnancy was confirmed. The data were adjusted for variables of age, frequency of intercourse, smoking, weight and age at menarche. Women who consumed less than one cup of coffee were twice as likely to become pregnant compared with the moderate coffee drinkers, with the risk of failing to become pregnant increasing with higher consumption. Caffeine consumption has also been associated with other causes of infertility including tubal factors and endometriosis [44]. (Grodstein et al., 1993) and increased risk of spontaneous abortion [45]. (Tolstrup et al., 2003). A meta-analysis [46]. (Fernandes et al., 1998) found a modest but significant risk of spontaneous abortion and low birth weight associated with moderate to heavy caffeine consumption during pregnancy. A high level of caffeine consumption during pregnancy has also been associated with an increased risk of stillbirth [47]. (Wisborg et al., 2003). A European study of 88 483 pregnant women found that compared with non-consumers, the consumption of four or more cups of coffee was linked with a statistically considerable risk of increased fetal death. However, the concept of reverse causation due to unrecognized fetal problems may explain why women continued to drink large quantities of coffee during pregnancy. Alcohol: Alcohol is a known teratogen [48],[49] and its consumption has been reported to decrease fertility, although the level of consumption related with risk is unclear. Alcohol consumption at the excessive level is known to be risky to the unborn child [50], but the effect at lower levels is less certain. The mechanisms by which alcohol could weaken conception are unclear but may include an alcohol-induced rise in estrogen, which decreases FSH secretion inhibiting folliculogenisis and ovulation. It may also have a direct effect on the maturation of the ovum, ovulation, blastocyst development and implantation [51]. Reasonable levels of alcohol consumption (seven to eight drinks per week) have been linked with reduced fertility and an increased risk of impulsive abortion [52]. Amount as low as one drink per week has also been linked with decreased conception [53].The consumption of alcohol has also been shown to have adverse effects on pregnancy result and the most susceptible time for the unborn child is the first few weeks after conception [54]. Existing evidence is questionable regarding what dose of alcohol may be safe to consume during pregnancy, making it difficult to predict the risk [55]. Environmental pollutants:

The ecological and work-related exposures to chemicals and pollutants along with lifestyle factors are said to be key factors to affect the infertility [56]. Certain environmental exposures have been concerned in adverse effects on reproduction performance.

Effects of radiation on male and female reproduction have been verified in various animal species as well as human beings [57]. The reproductive system of both sexes is sensitive to radiation causing short-term or permanent infertility dependent on dose, duration and dose rate [57], [58]. Get in touch with pesticides and various chemicals have been linked with decreased sperm count and viability. [59], [57]. Sperm counts were reported to be 40% lesser in fertile men exposed with pesticides in an agricultural area. They also had higher urine concentrations of commonly used pesticides [59]. Men exposed to pesticides and welding have been shown to be at risk for oligozoospermia [60] and other chemicals such as phthalates have also been associated to infertility. Certain phthalate metabolites are linked to decrease in semen quality [61] and endometriosis in women [62]. One more report in females found cosmetics have been connected with an increased threat of abortion and exposures to various factors in the home, such as glues, have been associated with infertility [63]. Further studies have not found any relationship between work-related exposures and infertility [64]. Even though further investigation is required to explain and improve the existing knowledge in this area.

Cellular phone use: Recently few concerns are rising about the probable adverse effects of cell phone use on human health and the male reproductive system. A small number of observational studies have revealed that extended use of cell phones may have negative effects on like sperm count, motility, viability and normal morphology [65]. However, further research is required to find out the impact of radiofrequency electromagnetic waves on semen quality.

Recreational drug use: Only a few reports investigated the effects of recreational drugs like cocaine or cannabis use on semen quality and the male reproductive system, and our knowledge is still very preliminary. [66]. evaluated the relationship of cocaine use with sperm concentration, motility and morphology and found that cocaine use for five or more years was more common in men with low sperm motility and large percentage of abnormal forms. Whan et al [67] examined the effects of delta-9-tetrahydrocannabinol (Delta [9]-THC) on human sperm function *in vitro*, showing reduced sperm progressive motility and acrosome reaction and reduced mitochondrial O2 consumption**.** On the whole these studies highlight the possible adverse effects of recreational drugs on male fertility though more research investigations are required to confirm these findings.

Conclusion: Conclusions: The above evidences associated with age, smoking and weight confirm that there is strong validation of an adverse relationship between these lifestyle factors and the risk of impaired fertility. Couples defective to conceive either by natural conception or through ART should be advised to attempt pregnancy before the female partner reaches the age of 35 or earlier, stop smoking and maintain a healthy weight. The above data has clearly acknowledged a series of variable lifestyle factors that potentially impact on fertility both in the general people and the people undergoing ART. Furthermore, the danger factors for fertility acknowledged here repeatedly have other associated serious health implications, such as the significance of smoking as a risk factor for cardiovascular disease and cancer. Efforts to get better reproductive performance may, therefore, have other associated health benefits and vice versa. On behalf of the general people there are opportunities for primary prevention to protect reproductive health, and for those undergoing ART, there are opportunities for secondary prevention to get better reproductive performance from treatment. The majority of lifestyle factors are hypothetically changeable, and couples attempting to conceive should be counselled and advised regarding their personal lifestyle factors. A well planned programme of education, support and access to specialist health professionals should back counseling to encourage and assist suitable lifestyle changes. This will help the condition of optimum health care to couples.

References:

1. Healy, D.L, Trounson, A.O and Andersen A.N (1994). Female infertility: causes and treatment. Lancet 343, 1539–1544.
2. Leone, A, (2003). Relationship between cigarette smoking and other coronary risk factors in atherosclerosis: risk of cardiovascular disease and preventive measures. Curr. Pharm. Des 9, 2417–2423.
3. Haslam, D.W and James W.P. (2005). Obesity. Lancet 366, 1197–1209.
4. Augood, C, Duckitt, K and Templeton, A.A (1998). Smoking and female infertility: a systematic review and meta-analysis. Hum. Reprod. 13, 1532–1539.
5. Cameron A.J, Wellborn, T.A, Zimmet, P.Z, Dunstan D.W, Owen N, Salmon J, Dalton M, Jolley, D and Shaw J.E (2003). Overweight and obesity in Australia: the 1999-2000 Australian Diabetes, Obesity and Lifestyle Study (AusDiab). Med .J. Aust. 178,427–432.
6. Pal, L and Santoro, N. (2003). Age-related decline in fertility. Endocrinol. Metab .Clin. North Am 32,669–688.
7. Kaplan, B, Nahum R, Yairi Y, Hirsch M, Pardo J, Yogev Y and Orvieto. R. (2005). Use of various contraceptive methods and time of conception in a community-based

population. Eur. J. Obstet. Gynecol. Reprod Biol, 123, 72–76.
8. Baird DT, Collins J, Egozcue J, Evers LH, Gianaroli L, Leridon H, Sunde A,Templeton A, Van Steirteghem A and Cohen J et al. (2005) Fertility and ageing. Hum Reprod Update 11,261–276.
9. Nasseri A and Grifo J.A (1998). Genetics, age, and infertility. Maturitas 30,189–192.
10. Chuang C.C, Chen, C.D, Chao, K.H, Chen, S.U, Ho H.N and Yang, Y.S (2003). Age is a better predictor of pregnancy potential than basal follicle-stimulating hormone levels in women undergoing in vitro fertilization. Fertil. Steril, 79, 63–68.
11. Roth, L.K and Taylor, H.S. (2001). Risks of smoking to reproductive health: assessment of women's knowledge. Am. J. Obstet. Gynecol, 184,934–939.
12. Kunzle, R, Mueller, M.D, Hanggi, W, Birkhauser M.H, Drescher, H and Bersinger, N.A. (2003) Semen quality of male smokers and nonsmokers in infertile couples. Fertil. Steril, 79,287–291.
13. Younglai, E.V, Holloway A.C and Foster W.G (2005). Environmental and occupational factors affecting fertility and IVF success. Hum Reprod, Update 11, 43–57.
14. Baron J.A, La Vecchia, C and Levi F (1990). The antiestrogenic effect of cigarette smoking in women. Am .J. Obstet. Gynecol, 162,502–514.
15. Shiloh H, Lahav-Baratz S, Koifman M, Ishai D, Bidder D, Weiner-Meganzi Z and Dirnfeld M (2004) The impact of cigarette smoking on zona pellucid thickness of oocytes and embryos prior to transfer into the uterine cavity. Hum Reprod, 19,157–159.
16. Hull, M.G, North K, Taylor H, Farrow A and Ford W.C (2000). Delayed conception and active and passive smoking. The Avon Longitudinal Study of Pregnancy and Childhood Study Team. Fertil. Steril, 74,725–733.
17. Bolumar F, Olsen J and Boldsen, J (1996). Smoking reduces fecundity: a European multicenter study on infertility and sub fecundity. The European Study Group on Infertility and Sub fecundity. Am. J. Epidemiol, 143,578–587.
18. Edward Edi, Wallach E.E, Kempers, R.D. Modern Trends in Infertility and conception control Volume 4. 1988. 487-498.
19. Hassan MA and Killick, S.R (2004). Negative lifestyle is associated with a significant reduction in fecundity. Fertil. Steril, 81,384–392.
20. Bolumar, F, Olsen J, Rebagliato, M, Saez-Lloret, I and Bisanti, L. (2000). Body mass index and delayed conception: a European Multicenter Study on Infertility and Sub fecundity. Am. J. Epidemiol, 151, 1072–1079.
21. Jensen, T.K, Andersson, A.M, Jorgensen N, Andersen A.G, Carlsen E, Petersen J.H and Skakkebaek, N.E (2004). Body mass index in relation to semen quality and reproductive hormones among 1,558 Danish men. Fertil. Steril, 82,863–870.
22. Norman, R.J, Noakes M, Wu R, Davies M.J, Moran, L and Wang J.X (2004). Improving reproductive performance in overweight/obese women with effective weight management. Hum Reprod. Update 10,267–280.
23. Zaadstra, B.M, Seidell J.C, Van Noord, P.A, te Velde E.R, Habbema J.D, Vrieswijk, B and Karbaat J (1993). Fat and female fecundity prospective study of effect of body fat distribution on conception rates. BMJ 306,484–487.
24. Clark A.M, Thornley, B, Tomlinson L, Galletley C and Norman R.J (1998). Weight loss in obese infertile women results in improvement in reproductive outcome for all forms of fertility treatment. Hum Reprod, 13, 1502–1505.
25. Fall C.H, Yajnik, C.S, Rao, S, Davies A.A, Brown N and Farrant, H.J (2003). Micronutrients and fetal growth. J .Nutr. 133, p1747S–1756S.
26. Keen CL, Clegg MS, Hanna LA, Lanoue L, Rogers JM, Daston GP, Oteiza P and Uriu-Adams JY (2003) The plausibility of micronutrient deficiencies being a significant contributing factor to the occurrence of pregnancy complications. J. Nutr. 133,597S–1605S.
27. Chapin R.E, Robbins W.A, Schieve, L.A, Sweeney A.M, Tabacova, S.A and Tomashek K.M (2004). Off to a good start: the influence of pre- and periconceptional exposures, parental fertility, and nutrition

on children's health. Environ .Health Perspect, 112, 69–78.
28. Sanders T.A (2004). Diet and general health: dietary counselling. Caries Res 38(Suppl 1), 3–8.
29. Moore, V.M and Davies M.J (2005) Diet during pregnancy, neonatal outcomes and later health. Reprod. Fertil. Dev, 17,341–348.
30. Rich-Edwards J.W, GoldmanM.B, Willett, W.C, Hunter D.J, StampferM.J, Colditz G.A and Manson J.E (1994). Adolescent body mass index and infertility caused by ovulatory disorder. Am .J. Obstet. Gynecol, 171,171–177.
31. Clark A.M, Ledger W, Galletly, C, Tomlinson L, Blaney, F, Wang X and Norman, R.J (1995). Weight loss results in significant improvement in pregnancy and ovulation rates in anovulatory obese women. Hum Reprod, 10, 2705–2712.
32. Norman R.J and Clark A.M (1998) Obesity and reproductive disorders: a review. Reprod. Fertil. Dev, 10, 55–63.
33. Morris S.N and Johnson N.R (2005). Exercise during pregnancy: a critical appraisal of the literature. J. Reprod. Med 50,181–188.
34. Kull M (2002). The relationships between physical activity, health status and psychological well-being of fertility-aged women. Scand .J. Med Sci. Sports, 12,241–247.
35. Hjollund, N.H, Jensen T.K, Bonde, J.P, Henriksen, T.B, Andersson, A.M, Kolstad, H.A, Ernst E, Giwercman, A, Skakkebaek, N.E and Olsen J. (1999). Distress and reduced fertility: a follow-up study of first-pregnancy planners. Fertil. Steril, 72, 47–53.
36. Domar, A.D, Clapp D, Slawsby, E.A, Dusek J, Kessel, B and Freizinger, M (2000). Impact of group psychological interventions on pregnancy rates in infertile women. Fertil Steril, 73,805–811.
37. Olivius C, Friden B, Borg G and Bergh C (2004). Why do couples discontinue in vitro fertilization treatment? A cohort study. Fertil. Steril, 81,258–261.
38. Terzioglu, F (2001). Investigation into effectiveness of counseling on assisted reproductive techniques in Turkey. J. Psychosom. Obstet. Gynaecol, 22,133–141.
39. Klonoff-Cohen H (2005) Female and male lifestyle habits and IVF: what is known and unknown? Hum Reprod. Update 11,179–203. Klonoff-Cohen H, Chu E, Natarajan, L and Sieber W (2001). A prospective study of stress among women undergoing in vitro fertilization or gamete intrafallopian transfer. Fertil. Steril. 76,675–687.
40. Smeenk, J.M, Verhaak C.M, Vingerhoets A.J, Sweep, C.G, Merkus J.M, Willemsen S.J, van Minnen A, Straatman H and Braat D.D (2005),Stress and outcome success in IVF: the role of self-reports and endocrine variables. Hum Reprod, 20,991–996.
41. Klonoff-Chohen, H, Bleha, J and Lam-Kruglick,P (2002). A prospective study of the effects of female and male caffeine consumption on the reproductive endpoints of IVF and gamete intra-Fallopian transfer. Hum Reprod. 17, 1746–1754.
42. Lucero J, Harlow B.L, Barbieri R.L, Sluss P and Cramer D.W (2001). Early follicular phase hormone levels in relation to patterns of alcohol, tobacco, and coffee use. Fertil. Steril. 76,723–729.
43. Wilcox A, Weinberg C and Baird D (1988). Caffeinated beverages and decreased fertility. Lancet 2, 1453–1456.
44. Grodstein, F, Goldman M.B, Ryan L and Cramer D.W (1993). Relation of female infertility to consumption of caffeinated beverages. Am. J. Epidemiol. 137, 1353–1360.
45. Tolstrup J.S, Kjaer, S.K, Munk C, Madsen L.B, Ottesen B, Bergholt, T and Gronbaek, M. (2003). Does caffeine and alcohol intake before pregnancy predict the occurrence of spontaneous abortion? Hum Reprod. 18, 2704–2710.
46. Fernandes O, Sabharwal M, Smiley T, Pastuszak A, Koren, G and Einarson, T (1998). Moderate to heavy caffeine consumption during pregnancy and relationship to spontaneous abortion and abnormal fetal growth: a meta-analysis. Reprod Toxicol. 12,435–444.
47. Wisborg K, Kesmodel U, Bech B.H, Hedegaard M and Henriksen T.B (2003). Maternal consumption of coffee during pregnancy and stillbirth and infant death in first year of life: prospective study. BMJ 326,420.
48. Randall C.L (1987). Alcohol as a teratogen: a decade of research in review. Alcohol Suppl, 1,125–132.

49. Chaudhuri, J.D (2000). An analysis of the teratagenic effects that could possibly be due to alcohol consumption by pregnant mothers. Indian J. Med Sci. 54,425–431.
50. Krulewitch, C.J (2005). Alcohol consumption during pregnancy. Annu. Rev Nurs. Res. 23,101–134.
51. Eggert, J, Theobald, H and Engfeldt, P (2004). Effects of alcohol consumption on female fertility during an 18-year period. Fertil. .Steril. 81,379–383.
52. Grodstein F, Goldman M.B and Cramer D.W (1994). Infertility in women and moderate alcohol use. Am. J. Public Health 84, 1429–1432.
53. Hakim R.B, Gray R.H and Zacur, H (1998). Alcohol and caffeine consumption and decreased fertility. Fertil. Steril. 70,632–637.
54. Collier A.C, Tingle M.D, Paxton J.W, Mitchell M.D and Keelan, J.A (2002). Metabolizing enzyme localization and activities in the first trimester human placenta: the effect of maternal and gestational age, smoking and alcohol consumption. Hum Reprod. 17, 2564–2572.
55. Mukherjee, R.A, Hollins S, Abou-Saleh M.T and Turk, J (2005). Low level alcohol consumption and the fetus. BMJ 330,375–376.
56. Czene K, Lichtenstein P and Hemminki K (2002) Environmental and heritable causes of cancer among 9.6 million individuals in the Swedish Family-Cancer Database. Int. J. Cancer 99,260–266.
57. Kumar, S (2004). Occupational exposure associated with reproductive dysfunction. J. Occup. Health 46, 1–19.
58. Parker L, Pearce MS, Dickinson HO, AitkinMand Craft A.W (1999). Stillbirths among offspring of male radiation workers at Sellafield nuclear reprocessing plant. Lancet 354, 1407–1414.
59. Oliva A, Spira, A and Multigner L (2001). Contribution of environmental factors to the risk of male infertility. Hum Reprod. 16, 1768–1776.
60. Wang J.X, Davies M and Norman R.J (2000). Body mass and probability of pregnancy during assisted reproduction treatment: retrospective study. BMJ 321, 1320–1321.
61. Duty, S.M, Silva M.J, Barr D.B, Brock J.W, Ryan L, Chen Z, Herrick R.F, Christiani, D.C and Hauser R (2003). Phthalate exposure and human semen parameters. Epidemiology 14,269–277.
62. Cobellis L, Latini G, de Felice C, Razzi S, Paris I, Ruggieri F, Mazzeo P and Petraglia F (2003). High plasma concentrations of di-(2-ethylhexyl)- phthalate in women with endometriosis. Hum Reprod. 18, 1512–1515.
63. Ford, J.H, MacCormac, L and Hiller J (1994). PALS (pregnancy and lifestyle study): association between occupational and environmental exposure to chemicals and reproductive outcome. Mutat. Res. 313,153–164.
64. Gracia, C.R, Sammel M.D, Coutifaris C, Guzick D.S and Barnhart, K.T (2005). Occupational exposures andmale infertility. Am. J. Epidemiol. 162,729–733.
65. Agarwal A, Deepinder F, Sharma R.K, Ranga G, Li J. (2008). Effect of cell phone usage on semen analysis in men attending infertility clinic: an observational study. Fertil. Steril, 89: 124-8.
66. Bracken M.B, Eskenazi B, Sachse K, McSharry J.E, Hellenbrand K, Leo-Summers L. (1990). Association of cocaine use with sperm concentration, motility, and morphology. Fertil. Steril. 1990; 53: 315-22.
67. Whan L.B, West M.C, McClure N, Lewis S.E.2006. Effects of delta-9-tetrahydrocannabinol, the primary psychoactive cannabinoid in marijuana, on human sperm function in vitro. Fertil. Steril. 85: 653-60.

* * *

REDDY,P.B. Assoc.Professor.PG Department of Zoology, Govt. PG. College. Ratlam.M.P.
reddysir@yahoo.co.in

Sushma, IMRF Coordinator, IMRF India ,Vijayawada, A.P