



Article

Scand J Work Environ Health [1999;25\(1\):38-39](#)

General psychosocial and work-related stress and reduced fertility

by [Henriksen TB](#)

Key terms: [abortion](#); [bias epidemiology](#); [case-referent study](#); [fecundability](#); [follow-up study](#); [psychological stress](#); [reproduction](#); [stress](#)

This article in PubMed: www.ncbi.nlm.nih.gov/pubmed/10235407



This work is licensed under a [Creative Commons Attribution 4.0 International License](#).

General psychosocial and work-related stress and reduced fertility

by Tine Brink Henriksen, MD¹

Henriksen TB. General psychosocial and work-related stress and reduced fertility. *Scand J Work Environ Health* 1999;25 suppl 1:38—39.

Key terms abortion, bias-epidemiology, case-referent studies, fecundability, follow-up studies, psychological, reproduction, stress.

Animal studies suggest that factors beyond those related to basic needs such as nutrition and physical environment play an important role in reproduction. Consistent with the animal studies, several biological hypotheses relate stress to human subfertility. They include hypotheses of stress acting on the central nervous system, the hypothalamic-pituitary-adrenal axis, which interferes with hormones involved in ovulation, and spermatogenesis. Direct influence on the reproductive organs from the autonomic nervous system has also been suggested (1). Furthermore animal studies support the hypothesis of early embryonal loss due to stress. However, various problems exist in human stress research, a major one being the lack of consensus on how to define and measure stress. Selye (2) defined general stress as an individual state of arousal and displeasure, whereas the exposures resulting in stress can be defined as stressors. Various intermediate factors that can modify a person's reaction towards stressors have been described. They include social network and coping strategies, including stress-modulating habits such as smoking and caffeine and alcohol intake. The fact that difficulties in obtaining a pregnancy do not necessarily pertain to one person may also complicate research on stress and fertility; the problem may pertain to the male, the female, or the couple. Thus couples may have problems with fertility due to the disruption of hormones essential to ovulation or spermatogenesis, interference with transport of the ovum or sperm cells, inhibited fertilization, inhibited transportation of the fertilized ovum, lack of implantation, or early pregnancy loss.

The aim of this report is to provide a short review of human studies on general psychosocial stress, stressors, work-related psychosocial factors and infertility. Social network and coping strategies have only been considered as potential modifiers or confounders of the association.

Methods

The literature was searched in MEDLINE by the use of the following key words: stress, human; stress, psychological; reproduction; strain; infertility; fertility; work; pressure. In addition a manual search of references cited in the literature retrieved from MEDLINE was carried out.

Results

Very little literature exists on the effects of psychological stress on male reproduction (3). Most human studies have been carried out on samples from infertility clinics, and the majority of them are case-referent studies not considering male-mediated effects. In most studies the cases were women with infertility problems, while the referents were selected from populations of pregnant women, women with no pregnancy experience or desire, women from pre-pregnancy planning centers, or women booking for tubal ligation (4). These studies result in knowledge about the potential coexistence of psychological stress and subfertility, but fail to clarify the causal direction. A variety of stress-related measures have been used, including measures of grief, anxiety, depression, self-esteem, psychosocial adaptation, and sexual identity. Most studies found that women with infertility problems report higher levels of stress than referents. No difference in the level of stress was found between women with infertility due to tubal damage and ovulatory failure. Longitudinal studies of couples during the examination and treatment for infertility also show an increasing level of stress with time (5).

Studies based on general populations defined by work (lawyers, slaughterhouse, hospital or office workers, college students), or living area have also been conducted. In these studies the stress exposure was irregular or in-

¹ Perinatal Epidemiological Research Unit, Department of Gynecology and Obstetrics, Aarhus University Hospital, Skejby, Aarhus, Denmark.

Reprint requests to: Dr Tine Brink Henriksen, Perinatal Epidemiological Research Unit, Department of Gynecology and Obstetrics, Aarhus University Hospital, Skejby, DK—8200 Aarhus N, Denmark. [E-mail: skejtbh@aau.dk]

convenient workhours, piecework, a high level of job or study demands, lack of job control, and psychosomatic symptoms, stressful life events or psychological distress (6, 7). The effect on fertility was measured as waiting time to pregnancy, menstrual disturbances, abortions, or semen characteristics.

Most studies of stress and spontaneous abortions have been well designed and have used validated stress measures with extensive adjustment for potential confounders. However, data have mostly been collected after the women became aware of the pregnancy outcome. In the study of Neugebauer et al (8) all the participants had experienced an abortion. They found that the risk of chromosomally normal abortions increased with increased level of stress when compared with chromosomally abnormal abortions. All the other studies on stress and spontaneous abortion show consistently increased risks of abortion with an increased level of stress although two of the studies were not statistically significant.

Studies on menstrual cycle characteristics and semen characteristics are more heterogeneous, and the findings less evident. Hjollund et al (9, 10) have carried out a follow-up study on general and work-related psychosocial factors and waiting time to pregnancy among 393 couples recruited by nationwide mailing to some 50 000 selected trade union members. They were first-time pregnancy planners without knowledge of their own reproductive capability. Distress was assessed by the general health questionnaire (GHQ), and work-related stressors were measured according to Karasek's model for job demands and decision latitude. Exposure assessment was carried out in each menstrual cycle prior to the knowledge about whether pregnancy was obtained. Extensive adjustment for potential confounders, including frequency of intercourse, was carried out. Menstrual cycles in which the women experienced a high level of distress (>80 percentile on GHQ score) were less likely to result in a clinically recognized pregnancy [fecundability odds ratio (OR) = 0.6, 95% confidence interval (95% CI) 0.4-1.0]. A total of 297 women worked more than 25 hours per week. Women with job strain (a high level of job demands and lack of job control) were less likely to conceive (OR 0.9, 95% CI 0.5-1.5) than other women; both results were statistically insignificant.

Discussion

The case-referent studies of stress among infertile couples are heterogeneous, but the results are obvious. The interpretation is hampered by the lack of knowledge about the direction of causality. Furthermore, the finding of a similar level of stress among women with tubal and ovulatory infertility fail to support the hypothesis of stress causing infertility through hormonal or neurohormonal pathways.

Studies on stress and spontaneous abortion are prone to recall bias, except for the study of Neugebauer et al (8), in which all the participants had experienced abortion.

Cross-sectional and retrospective studies of waiting time to pregnancy are prone to recall bias, planning bias, behavioral modification bias, and medical intervention bias, and several other sources of bias described in detail by Weinberg et al (11). Hjollund and his colleagues attempted to avoid these potential problems by including only couples without knowledge of their own fecundity. Recall bias was eliminated by assessing the exposure prior to knowledge about the outcome. However, participation in the study was rather demanding. Thus the study population may have been selected couples, with low levels of stress and little exposure contrast explaining the insignificant associations.

Concluding remarks

Further studies designed to bypass the potential sources of bias are needed to explore the association between stress and human fertility. Measures of biological markers such as sex hormones and stress-associated hormones would allow additional testing of specific biological hypotheses of the association.

References

1. Schenker JG, Meirou D, Schenker E. Stress and human reproduction. *Eur J Obstet Gynecol Biol* 1992;45:1-8.
2. Selye H. The effect of adaptation to various damaging agents on the female sex organs in the rat. *Endocrinology* 1939;25:615-24.
3. McGrady AV. Effects of psychological stress on male reproduction: a review. *Arch Androl* 1984;13:1-7.
4. Wright J, Allard M, Lecours A, Sabourin S. Psychosocial distress and infertility: a review of controlled research. *Int J Fertil* 1989;34:126-42.
5. Bovin J, Takefaman JE. Stress level across stages of in vitro fertilization in subsequently pregnant and non-pregnant women. *Fertil Steril* 1995;64:802-10.
6. Messing K, Saurel-Cubizolles MJ, Bourguin M, Kaminski M. Menstrual-cycle characteristics and work conditions of workers in poultry slaughterhouses and canneries. *Scand J Work Environ Health* 1992;18:302-9.
7. Schenker MB, Eaton M, Green R, Samules S. Self-reported stress and reproductive health of female lawyers. *J Occup Environ Med* 1997;39:556-68.
8. Neugebauer R, Kline J, Stein Z, Shrout P, Warburton D, Susser M. Association of stressful life events with chromosomally normal spontaneous abortion. *Am J Epidemiol* 1996;143:588-96.
9. Hjollund NHI, Jensen TK, Bonde JP, Henriksen TB, Andersson AM, Kolstad HA, et al. Psychological distress and time to pregnancy. In: *International symposium on environment, lifestyle and fertility: book of abstracts*. Aarhus, 1997: 134-5.
10. Hjollund NHI, Kold Jensen T, Bonde JPE, Henriksen TB, Kolstad HA, Andersson AM, et al. Job strain and time to pregnancy. *Scand J Work Environ Health* 1998;24:344-350.
11. Weinberg CR, Baird DD, Wilcox AJ. Sources of bias in studies of time to pregnancy. *Stat Med* 1994;13:671-81.