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# Psychological factors of female infertility

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## Introduction

Clinical experience confirms that almost all infertile couples are confronted with emotional conflicts. Infertility tends to be a time of emotional crisis, because of the complex motivations involved: frustration and agression, depression and anxiety (Kubo, 1975). Infertile couples have a strong desire to conceive. The greater this desire, the greater is the frustration. Sexual intercourse can become an obsessional activity, compelled by the need of fertilization. Such intercourse without libido often does not culminate in orgasm, but in pain, and disorders of the autonomic nervous system. If such conditions last for a long period of time, disorders of testicular and ovarian functions, chronic abdominal vasocongestion and spasm of the Fallopian tubes are described (Nijs and Rouffa, 1975; Kipper et al., 1975).

The luteinized unruptured follicle (LUF) syndrome was described in 1978 (Koninckx et al., 1978; Brosens et al., 1978; Marik and Hulka 1978) as a cause of infertility in women with unexplained infertility and in women with pelvic endometriosis. Its existence was subsequently confirmed by steroid hormone assays in peritoneal fluid (Koninckx et al., 1980a; Donnez et al., 1982; Jansens, 1983) and by ultrasonography (Coulam et al., 1982). Although the incidence of this syndrome seems to be rather high – between 30 and 40% of women with unexplained infertility or endometriosis – its role as a cause of infertility is not yet exactly known (Koninckx and Brosens, 1983). It remains indeed to be established whether the syndrome occurs repetitively in each cycle, thus causing infertility, or whether the syndrome occurs only occasionally, thus reducing fertility by diminishing the number of fertile cycles.

The etiology of the LUF syndrome is still unknown. In rats, rabbits and monkeys an LUF syndrome can be induced by indomethacin treatment (Tsafiri et al., 1972; Armstrong, et al., 1974; Wallach et al., 1976; Maia et al., 1978). In the rhesus monkey, it was recently demonstrated that moderate and severe endometriosis causes an LUF syndrome (Schenken et al., 1983). In women, in contrast, it was suggested that mild endometriosis was not the cause, but the consequence of the LUF syndrome (Koninckx et al., 1980b), and that the LUF syndrome could be caused by stress (Koninckx and Brosens, 1982). In order to test the hypothesis, women with and without the LUF syndrome were evaluated by the state-trait anxiety inventory (STAI-test).

## Material and methods

### *Groups of women*

Three groups of women were investigated. *The first group* ($n = 10$) consisted of women with infertility in whom an LUF-syndrome was diagnosed at laparoscopy and confirmed by peritoneal fluid steroid hormone assays. Three women were evaluated prospectively, i.e. during the infertility investigation and before the diagnosis had been made; seven women were evaluated retrospectively. In *the second group* ($n = 15$) of women the infertility was sufficiently explained by tubal occlusion or male infertility, and the presence of an ovulation ostium was ascertained at laparoscopy. The evaluation was prospective in 2, and retrospective in 13 women. *The third group* was composed of normal women of proven fertility and with regular biphasic cycles who planned a pregnancy within 3 years ($n = 11$).

### *The State-Trait Anxiety Inventory*

A Dutch adaptation (Vanderploeg et al., 1980; Vanderploeg, 1981) of Spielberger's state-trait anxiety inventory (STAI) was used. This test evaluates separately the state and the trait anxiety. The former is defined as the emotional condition of the subject at a certain moment and is characterized by feelings of stress and by an increased activity of the autonomous nervous system. By definition, state anxiety thus fluctuates with time. The latter evaluates the liability of an individual to be stressed, i.e., the liability to increase his state anxiety when stressed. The test characteristics of the Dutch adaptation were as follows. The test-retest *reliability* ranged from 0.92 (after 1.5 h) to 0.75 (after 118 days) for the trait anxiety and from 0.86 to 0.25 for the state anxiety; measures of internal consistency for both scales ranged from 0.87 to 0.92. As for the *validity*, there was a significant difference in state anxiety under normal and stress conditions whereas the trait anxiety remained constant, and significant differences on both scales were found between anxious and non-anxious subjects as diagnosed by other measures and clinical judgment.

### *Statistical analysis*

Overall intergroup differences were evaluated by means of analysis of variance (ANOVA) and Scheffe's procedure was used to evaluate contrasts between groups (Kirk, 1968).

## Results

Age, duration of marriage and duration of infertility are listed in Table I. The three groups of women are similar, except that women in group III have been married for a slightly shorter period of time than women in group I or II.

The state and trait anxiety scores are listed in Table II. Women with an LUF-syndrome (group I) have a significantly higher trait anxiety score than women

without an LUF-syndrome, either infertile (group II) or fertile (group III). State anxiety, in contrast, is significantly higher in groups I and II than in group III.

## Discussion

Although Spielberger's STAI test is called an 'anxiety inventory', a careful analysis of this test reveals that it is a stress inventory, i.e., the liability to be stressed (trait-anxiety) and the stress level at a certain moment (state-anxiety).

The data support the hypothesis that women with an LUF-syndrome are more stress-prone (trait anxiety) than women suffering from results of mechanical or male infertility and than fertile women. State anxiety, in contrast, is significantly higher in both groups of infertile women than in the group of fertile women. This suggests – as could be expected – that the investigation itself in the outpatient clinic is more stressful for an infertile than for a fertile woman.

Although most of the women were investigated retrospectively, i.e., these women knew the diagnosis of their infertility at the moment of investigation, it is unlikely that an LUF-syndrome or the awareness of suffering from it would enhance the liability to being stressed (trait anxiety). On the contrary, we suggest that stress-prone women react to stress by developing an LUF-syndrome. The stress of infertility

TABLE I

Means and ranges for age, duration of marriage, or duration of infertility in the three groups of women, women with the LUF syndrome (Group I), women with explained infertility without the LUF syndrome (Group II) and women of proven fertility (Group III).

| | Group I ($n=10$) | Group II ($n=15$) | Group III ($n=11$) |
|---|---|---|---|
| Age | 29 (25–31) | 28 (23–38) | 26 (23–30) |
| Duration of marriage (yr) | 6 (3– 8) | 7 ( 3.5–16) | 3 ( (1–4) |
| Duration of infertility (yr) | 4 (2–7) | 4 ( (1–7) | |

TABLE II

State and trait anxiety

The means ± S.D. and the significance of the intergroup differences by ANOVA and Scheffe's test are indicated

| | State anxiety | Trait anxiety |
|---|---|---|
| Group I | 51.3 ± 11.6 | 48.7 ± 12.9 |
| Group II | 43.1 ± 10.6 | 38.1 ± 8.3 |
| Group III | 33.5 ± 6.8 | 36.4 ± 5.9 |
| $F$ ratio | 9.62 | 5.34 |
| $P$ value | < 0.005 | < 0.01 |
| Significant inter-group differences by Scheffe's test | Gr. I and Gr. II vs. Gr. III | Gr. I vs. Gr. II and Gr. III |

would similarly become an additional factor of infertility through the LUF-syndrome. This hypothesis is, moreover, consistent with several well-known but poorly understood facts in infertility. The spontaneous pregnancy rate during the investigations, which is 30% in women attending an infertility clinic, could be explained by this hypothesis. Attending an infertility clinic relieves stress when these women receive the expected help from 'professionals'. Similarly, an unexpected pregnancy is relatively often seen in women with unexplained infertility when all therapy is abandoned after years of treatment. These women are no longer stressed when they finally regard themselves as definitively infertile.

The mechanism by which stress could influence ovarian function or induce the LUF-syndrome can only be speculated upon at this moment. Stress increases prolactin secretion, and moderate hyperprolactinemia has been described as a cause of infertility. We were, however unable to establish different levels of prolactin concentrations between infertility patients, with and without the LUF-syndrome, because of the frequent occurrence of 'stress' – hyperprolactinemia (Koninckx, 1978). This finding is, moreover, consistent with the increased state anxiety in infertile women. Treatment of moderate hyperprolactinemia has been claimed to restore fertility. The published data (St. Micheland Dizerega, 1983) reveal, however, that bromo-$\alpha$-ergocryptine is not 'the' treatment, since only less than 40% of women conceived. Similarly, treatment of the LUF-syndrome with bromo-$\alpha$-ergocryptine only occasionally resulted in a pregnancy (unpublished results). From these data we suggest that although prolactin might be involved, it is not the only mechanism.

In conclusion, we have demonstrated that women with an LUF-syndrome are more stress-prone than women suffering results of mechanical or male infertility and than fertile women. We suggest that stress in general and more particularly the stress of infertility, as evidenced by an increased state anxiety, induces infertility or reinforces infertility in subfertile couples through the LUF-syndrome. The LUF-syndrome is thus presented as a mechanism of the 'so-called' psychological infertility.

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