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# RELATIONSHIPS AMONG PLEASURE, ANXIETY AND PHYSIOLOGICAL RESPONSE PATTERNS DURING THE SEXUAL SEQUENCE IN NORMAL AND DISPERMIC SUBJECTS

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*Summary.*—We examined the reported subjective level of pleasure and anxiety usually perceived during the four phases of the sexual sequence by 18 dispermic patients and 18 normal subjects. Relevant differences exist between the two groups in their perception of both emotions. The role of pleasure and anxiety in modulating some reflexive biological responses of the sexual sequence is discussed.

The aim of this research was to examine some aspects of the experience of pleasure and anxiety in the sexual behavior of dispermic patients. Although there are many experimental investigations of sexual behavior, few concern the subjective aspects of the experience of pleasure. Usually researchers tend to examine objective phenomenological aspects of the sexual sequence: muscular contractions, neurovegetative changes, external genital changes, etc. (Bohlen, *et al.*, 1980; Heath, 1972; Kadefors & Petersen, 1970; Kaplan, 1976; Masters & Johnson, 1966; Olds & Milner, 1954; Petersen & Stener, 1970).

The early psychoanalytic literature (Freud, 1905) examined sexual behavior as an integrated pattern with both subjective and objective components. But further conceptualizations paid attention mostly to the subjective psychological aspects of pleasure (Libido), separating it from the somatic events of the sexual behavior.

We think that the sexual pattern described by Masters and Johnson (1966) is composed of both subjective and objective components and that the subjective sensation of pleasure (Anderson & Pennebacker, 1980; Cabanac, 1971) has a determining role in the development of the sexual sequence. We think that the pleasure is a behavioral modulator in the sexual sequence and that the emotional feeling is a subjective expression of the changes in the internal homeostasis, produced by the erogenous stimuli, which lead to new re-equilibrating vegetative and somatic responses. This effect is obtained by lowering the thresholds of the encephalic centers (anterior hypothalamus, septal area, limbic system) which control the further development of the sexual sequence. The emotional feeling is also related (through a feedback mechanism) to the peripheral changes that occur during the sequence (Kawakami & Kimura, 1978).

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In fact, the sexual sequence is the following. (a) External and internal erogenous stimuli, i.e., mental representation, recalling, etc., originate the initial somatic responses by enhancing the muscular tension (myographic scores, morphological changes of the external genitalia), and lowering the thresholds of cutaneous sensibility. (b) These peripheral changes are associated with pleasant subjective sensations of pleasant tension which usually are integrated in one perceptive experience. (c) The next stage is characterized by the sensations associated with the intromission of penis into vagina and their reciprocal friction. The pleasant sensation deriving from the penis, represents another component of the subjective feeling which is the starter of the vegetative responses (spinal and supraspinal level) of the ejaculation. The somatic response of automatic motor rythmic activity is also a reflexive pattern associated with local and general pleasure (pleasure tension of all the body, cutaneous sensitivity). (d) The components of pleasure during the orgasmic phase stem from not only the friction of penis and vagina but also the pleasant sensation of the expulsion of the semen and to the subjective feeling of a sudden lowering of tension. So we think that in the sexual sequence there are different forms of pleasure each of which is important in determining the passage from one stage to the other. *In this way the subjective feeling becomes a "functional bridge" between the various stages.*

In conclusion, the level of pleasure seems to influence the activity of the central nervous system, which is a determinant of more than one functional aspect of the sexual sequence, since it stimulates the spermatogenesis, the glandular and secretive activity, and the motor-expulsive activity. Also other authors (Amsterdam & Winokur, 1981) hypothesize a relationship between so called psychological states and spermatogenesis. In particular they thought that there is a change in the functional stage of the hypothalamic-pituitary axes of depressed patients and that conceivably it could influence spermatogenesis. Moreover, we think that for the dispermic patients an important role is played by their anxiety and that they could use the perceived sexuality to check their fertility. So the sexual activity could strengthen anxiety interfering with the normal physiological sequence of the sexual events. We want to examine the subjective level of pleasure and anxiety, and the changes of the somatic sources of pleasure *generally felt* by the subjects during the four phases of the sexual activity both between the groups and within each group (normal and dispermic). We also think that pleasure and anxiety are different aspects of the level of arousal-excitation present in the central nervous system. According to the psychophysiological literature (Epstein, 1973), a high level of excitation can stimulate the system of inhibitory responses. So in the group of dispermic subjects we expect to find a high level of anxiety and of "total emotionality" (pleasure + anxiety) together with a relatively reduced level of pleasure during the sexual sequence.

## METHOD

The dispermic group included 11 oligozoospermic patients (with sperm concentration/ml < 30 mill./ml.) and 7 azoospermic patients (with absence of spermatozoa), aged between 22 yr. and 42 yr., the mean age being 29 yr. The control group included 18 subjects who presented normal values for their semen parameters. The two groups where homogeneous for age, social class, and level of education.

*Semen Analysis*

The subjects delivered their semen to the V Medical Clinic of Policlinico Umberto I° of Rome from 8 to 9 a.m. The semen were collected in sterile plastic tubes through masturbation and after 3 to 5 days of abstinence. The initial examination of the semen (30 to 60 min.) should include viscosity, pH, liquefaction, and volume. A standard drop (20 ml.) of the well mixed semen was placed on a glass slide and covered with a cover glass. The motility of the spermatozoa was assessed by a subjective method using optical microscope (HPF 10x) by medical technicians. Motility assessments were performed within 30 min. and again after 2 and 4 hr. Then the diluted semen had to be carefully mixed before leaving a drop in the haemocytometer chamber for the sperm count. For the morphological assessment of the spermatozoa the Papanicolau technique was employed (Conti & Dondero, 1977; Dondero, 1977). The evaluation of the number, the morphology, and the mobility of the spermatozoa was made using an optical microscope and employing the technique of Papanicolau.

*Self-reports*

The subjects delivered the semen (collected within one hour) to the doctor in the clinic. In the separated section they had to indicate on a 10-point scale, the subjective level of pleasure and anxiety *generally felt* during the four phases of the sexual sequence described by Masters and Johnson (1966): (1) excitation, (2) plateau, (3) orgasm, (4) resolution. Then the subjects were asked to indicate the areas of localization (also using a figure) of the somatic and vegetative changes *usually perceived* during their sexual activity. Moreover, for each phase, the subjects answered questions relevant to specific pleasant sensations, i.e., sensations related to muscular contraction [thrill, shake, and tremor (Phases 1, 2, 3)], to expulsion of the semen (Phase 3) and to relaxation (Phase 4). We made sure that the subjects had understood the questions they were requested to answer.

## RESULTS

The means and the *SD*s of the subjective sensations of pleasure, anxiety, and total emotionality (pleasure + anxiety) of the patients and control group are shown in Table 1. As regards the sensations of pleasure, both groups present a progressive increase from Phase 1 to Phase 3 and a drop in Phase 4. In the

TABLE 1

VALUES OF STUDENT'S *t* FOR INDEPENDENT MEANS OF THREE SCORES

| Groups | | Phase 1 | Phase 2 | Phase 3 | Phase 4 |
|---|---|---|---|---|---|
| Pleasure | | | | | |
| Control | *M* | 7.50 | 8.33 | 8.80 | 6.30 |
| | *SD* | 1.41 | 1.01 | 1.07 | 1.91 |
| Dispermic | *M* | 6.80 | 7.94 | 8.13 | 6.55 |
| | *SD* | 2.19 | 1.76 | 2.05 | 2.57 |
| | *t* | –0.99 | –0.68 | –1.21 | 0.33 |
| Anxiety | | | | | |
| Control | *M* | 4.75 | 3.08 | 1.83 | 1.83 |
| | *SD* | 3.11 | 3.10 | 2.50 | 2.17 |
| Dispermic | *M* | 6.50 | 5.10 | 5.66 | 4.38 |
| | *SD* | 3.16 | 3.16 | 3.51 | 3.68 |
| | *t* | 1.80 | 1.90 | 3.76* | 2.56* |
| Total Emotionality | | | | | |
| Control | *M* | 12.02 | 11.36 | 10.63 | 8.08 |
| | *SD* | 3.05 | 3.30 | 2.57 | 2.42 |
| Dispermic | *M* | 13.38 | 13.05 | 13.80 | 10.88 |
| | *SD* | 4.09 | 3.59 | 3.76 | 5.13 |
| | *t* | 1.09 | 1.42 | 2.86* | 2.10* |

*$p < 0.05$., $df = 16$.

first three phases the control group reported mean values of pleasant sensations higher than those of the patients. In Table 1 are indicated the values of Student's *t* for independent means. The differences between the groups at each phase are not statistically significant. An analysis of the variance (two-way design, 2×4 for repeated measures) shows no statistically significant difference between the two groups ($F_{1/35} = 0.69$, $p > 0.01$) but there is a statistically significant difference among the repeated measures ($F_{3/35} = 12.47$, $p < 0.01$). In the control group differences in the subjective levels of pleasure among the four phases are statistically significant (Student's *t* for dependent scores are indicated in Table 2). For patients only one statistically significant difference appears among the four phases, i.e., between Phase 2 and 4. The one-way analysis of the variance for repeated measures shows statistically significant differences in the control group ($F_{3/17} = 15.42$, $p < 0.01$) but not for the patients ($F_{3/17} = 3.09$, $p > 0.01$).

As may be seen in Table 1, the patients present higher mean anxiety than that of the control group during all four phases. The difference between the groups in Phases 3 and 4 is statistically significant. The two-way analysis of the variance (2×4) for repeated measure shows a statistically significant difference between the two groups ($F_{1/35} = 10.16$, $p < 0.01$) and among the repeated measures ($F_{3/35} = 7.61$, $p < 0.01$). Also for level of anxiety there are differences in the various phases within each group. The differences among

TABLE 2

VALUES OF STUDENT'S $t$ FOR PLEASURE AND ANXIETY FOR THE TWO GROUPS

| Phases | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|
| | Pleasure | | | | Anxiety | | | |
| Dispermic Group | | | | | | | | |
| 1 | | −1.83 | −1.93 | 0.50 | | 1.66 | 0.87 | 2.36* |
| 2 | | | −0.62 | 2.17* | | | −0.97 | 0.86 |
| 3 | | | | 1.95 | | | | 1.68 |
| 4 | | | | | | | | |
| Control Group | | | | | | | | |
| 1 | | −2.38* | −3.77* | 2.01 | | 3.01* | 3.88* | 4.17* |
| 2 | | | −2.00 | 4.48* | | | 2.35* | 1.59 |
| 3 | | | | 4.70* | | | | 0.00 |
| 4 | | | | | | | | |

*$p < 0.05$, $df = 16$.

the phases are statistically significant (Student's $t$ for dependent scores as indicated in Table 2). On the contrary, in the patients we observe an increase in mean anxiety during the orgasmic phase. The only statistically significant difference is between Phase 1 and Phase 4; see Table 2. A one-way analysis of variance for repeated measures shows a statistically significant difference for the control group ($F_{3/17} = 7.88$, $p < 0.01$) but not for patients ($F_{3/17} = 1.70$, $p > 0.01$).

After considering pleasure and anxiety as different aspects of the more integrated central level of excitation, we have calculated an excitation score by adding pleasure and anxiety scores. We have called this score "total emotionality." In the control group the mean total emotionality scores drops progressively from the first phase to the last phase of the sexual sequence; see Table 1. On the contrary, the patients show an enhancement of the total emotionality reaching a peak during Phase 3. The differences between the two groups are statistically significant in the last two phases (Student's $t$ for independent scores, Table 1). Two-way analysis of the variance ($2 \times 4$) for repeated measures shows no statistically significant difference between the two groups ($F_{1/35} = 5.96$, $p > 0.01$). A one-way analysis of the variance for repeated measures shows a statistically significant difference in the control group ($F_{3/17} = 10.37$, $p < 0.01$) but not for patients ($F_{3/17} = 2.86$, $p > 0.01$). Then a relationship among some aspects of the spermatogenesis, pleasure, and anxiety exists for the control group. We cannot calculate the same relationship for patients because 7 azoospermic subjects presented values of zero on the parameters in the analysis of their semen. In the control group we can observe a statistically significant Pearson's correlation between anxiety and the number of typical cells ($r = 0.52$, $p < 0.05$, $df = 16$) for Phase 1; negative statistically significant correlations between pleasure and the number of typical cells, the total amount

of spermatozoa, and the spermatic volume in Phase 1 (respectively, $r = -0.40$, $-0.53$, $-0.47$; $p < 0.05$, $df = 16$). In Phase 2 there is a statistically significant positive correlation between the pleasure and the number of young cells ($r = 0.51$, $p < 0.05$, $df = 16$). Moreover, a statistically significant negative correlation appears between the total emotionality (pleasure + anxiety) during Phase 2 and the volume of the semen ($r = -0.44$, $p < 0.05$, $df = 16$).

Differences between the two groups appear in the localization of the somatic source of pleasure. For the control group there are some sensations which are more frequent than for the patients. These are precisely: the sensation of pleasure-warmth in the testicles in Phase 1 ($\chi^2 = 7.25$, $p < 0.05$, $df = 1$); the sensations of muscular contraction, thrill, shake, and tremor during Phases 1 and 2, respectively ($\chi^2 = 8.00$ and $9.75$, $p < 0.05$, $df = 1$).

## Discussion

Our data confirm the hypothesis that there are some differences in the experience of pleasure and anxiety of dispermic patients and normal subjects during the four phases of the sexual sequence. The control group shows a progressive enhancement of the subjective perception of pleasure which reaches its maximum during the orgasmic phase; see Table 1. This significant increase does not appear for the patients whose distribution curve is relatively flat. In fact in this group there are no statistically significant differences in the various phases for the level of pleasure. In the control group instead the differences are statistically significant.

As regards the level of anxiety, as may be seen in Table 1, the patients present higher mean anxiety than the control group during all the four phases of the sexual sequence. Also in the level of anxiety there are differences within each group during the various phases. In the control group the level of anxiety drops in the orgasmic phase; on the contrary in the patients we observe an increase in the level of anxiety; see Table 1.

After considering pleasure and anxiety as different aspects of the more integrated central level of excitation, we calculated an excitation score (total emotionality) by adding pleasure and anxiety scores. For the control group the mean total emotionality score drops progressively from the first to the last phase of the sequence. For this group the sexual activity reduces the total level of excitation. On the contrary, the patients show an enhancement for total emotionality which reaches a peak during the orgasmic phase. The differences between the two groups are statistically significant in the last two phases. We interpreted these data using Epstein's hypothesis (1973) that every increase in level of emotionality causes a corresponding inhibitory process. We hypothesize that in the dispermic patients the process following the two highest levels of emotionality may inhibit both spermatogenesis and motor-expulsive responses. Anxiety may moderately reduce the level of pleasure in the orgasmic

phase of dispermic subjects and may inhibit some functional responses by increasing the total emotionality.

As regards the hypothesis of a relationship between the level of pleasure and anxiety and the more complex functional responses of the organism, La Ferla (1978) emphasized that sexual arousal increased the level of luteinizing hormone in the blood while an inverse relationship between follicle-stimulating hormone and anxiety has been found. At the same time we think that the level of sexual arousal indicated by the subjective level of pleasure and anxiety could be related not only to the motor-expulsive activity but also to the spermatogenesis. In fact, in the control group an interesting relationship between some aspects of spermatogenesis, as indicated by number of typical cells, spermatic volume, total number of spermatozoa, and pleasure and anxiety exists during Phase 1. The first datum to note is that of a statistically significant correlation between anxiety and the number of typical cells. This fact can explain the role of a moderate high level of anxiety which appears in the first phase of the sexual arousal of the normal subjects. It is important to remember that in the control group, while the anxiety progressively diminishes during the whole sequence, the level of pleasure progressively increases until the orgasmic phase. In the last phase the level of anxiety drops. The initial anxiety indicates an excitation which could be necessary to the following events of the sexual sequence. For example, it could lead to lowering of the threshold for motor-expulsive responses (Santori, 1970; Santori & Caprioli, 1969; Caprioli & Santori, 1970). Then we found a negative, statistically significant correlation between the level of pleasure in Phase 1 and the number of typical cells, the total number of spermatozoa, and the spermatic volume. We interpret these data by hypothesizing an inhibitory effect of too high a level of pleasure in the first phase. As we have already seen, it should be possible for pleasure to increase further in Phase 3: a *precocious* enhancement might have an *inhibitory* effect. Another interesting datum is the statistically significant positive correlation between pleasure and the number of the young cells in the semen during Phase 2. This fact indicates pleasure as a starter or stimulator of the initial process of the spermatogenesis. On the contrary, the negative statistically significant correlation indicates that an high level of excitation might have an inhibitory effect on the spermatogenesis during Phase 2.

Differences between the two groups in the localization of the somatic source of pleasure emerge. The control group reports (a) a sensation of pleasure-warmth in the testicles with statistically significantly higher frequency than that of the experimental group; (b) the sensations of muscular contraction, thrill, shake, and tremor during the Phase 1 and 2—sensations which are absent in patients. These data indicate that the dispermic patients have in their testicular area not only a pathology of andrologic relevance but also reduced perception of pleasure-warmth during Phase 1. The reduced motor-

somatic activity (relative to a perception of pleasure with less muscular contraction, thrill, shake, and tremor) of these patients indicates a more complex difficulty in the performance in feeling and in the expression of the sexual sequence. But which occurs first? Do dispermic reductions cause psychological changes in subjective aspects of sexuality or do gradual developmental psychological changes correlate with such conditions? Further research will have to answer to this question.

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