Effect of Different Types of Textiles on Sexual Activity
Experimental Study

Key Words
Impotent
Potent
Penis
Textile
Polyester
Electrostatic Potentials
Erection

Abstract
The effect of wearing different types of textiles on sexual activity was studied in 75 rats which were divided into five equal groups: four test groups and one control. Each of the four test groups were dressed in one type of textile pants made of either 100% polyester, 50/50% polyester/cotton mix, 100% cotton or 100% wool. Sexual behaviour was assessed before and after 6 and 12 months of wearing the pants and 6 months after their removal. The rate of intromission to mounting (I/M) was determined. The electrostatic potentials generated on penis and scrotum were also measured by electrostatic kilovoltmeter. At 6 and 12 months of wearing the polyester and polyester-cotton mix pants, the I/M ratio was significantly reduced compared to the pre-test levels and the controls (p < 0.0001). The reduction was more manifest in the polyester than in the polyester-cotton mix group, and at the 12th month than at the 6th month of examination. The I/M ratio of the cotton and wool groups showed insignificant changes (p > 0.05) at the 6th month of the study and a significant increase at the 12th month (p < 0.01). Six months after removal of the pants, the I/M ratio returned to the pre-test levels (p > 0.05) in the four groups. The polyester-containing pants generated electrostatic potentials while the other textiles did not. These potentials seem to induce 'electrostatic fields' in the intrapenile structures, which could explain the decrease in the rats' sexual activity.

Impotence is a challenging problem to both the patient and the medical profession. There are many causes of impotence including psychologic [1–3], neurogenic [4, 5], hormonal [6], arterial [7], venous and sinusoidal [8, 9] disorders.

Recent studies on dogs and human volunteers [10–13] have shown that wearing polyester underpants caused oligospermia in dogs and some volunteers, which was reversible when the pants were removed. In contrast, wearing cotton pants caused insignificant semen changes.

A thermal effect of the pants on the scrotum was excluded by fashioning the pants in a way as not to interfere with the testicular thermoregulatory function.

The studies [10–13] revealed that polyester pants worn by human volunteers generate electrostatic charges which create an 'electrostatic field' that traverses the scrotum.
and seems to affect the germ cells in the testicle and/or epididymis, leading to diminished spermatogenesis.

Although wearing pure polyester underpants may not be common for men, mixed textiles containing polyester are used. In Egypt, polyester clothes such as trousers are sometimes worn directly on the skin without an underlying wear. Furthermore, shorts of pure or mixed polyester are worn directly over the buttocks and genitalia during sports, on the beach and during the holidays. For this reason, the effect of wearing different types of textile fabric on the sexual activity was studied. The present communication verifies the results of this study in rats.

**Materials and Methods**

75 adult male Sprague-Dawley rats, 3 months old, were used in the study. They varied in weight from 150 to 220 g (mean 186.6 ± SD 22.3 g). The rats were housed 2 per cage, and received the standard rat chow and bedding. The animals were exposed to 12 h light and 12 h darkness cycles. Erectile function was tested with female rats in artificially induced estrus. The rats selected for the study were those which practiced intromission within 20 min of introduction to female rats. The 20-min period was selected to standardize the test; furthermore, intromission within this period would indicate a highly potent rat. Normally, male rats attempt copulation 13–70 times in 15–20 min [14].

The 75 rats were divided into five groups: four test groups and one control group. Underpants were prepared from 100% polyester (polyethylene terephthalate) for the 1st group, 50/50 polyester/cotton mix for the 2nd group, 100% cotton for the 3rd group and 100% wool for the 4th group. The rats of the 5th group were left without pants and acted as controls.

The underpants were fashioned to cover the distal one third of the rat’s back as well as the scrotal and penile areas, perineum and the upper parts of the hind limbs (fig. 1). Openings were made for the anal orifice, penis and tail. The rats wore the pants day and night for 12 months; the garments were changed by fresh ones whenever soiled.

**Sexual Activity Testing**

Mating behavioral studies were performed before and after 6 and 12 months of wearing the pants, and 6 months after their removal. The estrous female was introduced to the male. Behavioral response was rated as ‘potent’ if the rat's penis was erected and entered the vagina. The rat was considered ‘impotent’ if it adopted the copulatory position but failed to erect the penis.

The degree of sexual activity was measured by recording the total number of mounts and intromissions for each studied group during a 30-min observation period.

**Table 1. Sexual activity of the 5 studied groups before and after 6 and 12 months of wearing the pants and 6 months after removing the pants**

<table>
<thead>
<tr>
<th>Group</th>
<th>Rats</th>
<th>Before study</th>
<th>6 months of wearing pants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>M</td>
<td>I</td>
</tr>
<tr>
<td>Polyester (100%)</td>
<td>15</td>
<td>40.5 ± 4.2</td>
<td>36.4 ± 3.6</td>
</tr>
<tr>
<td>Cotton/Polyester (50/50%)</td>
<td>15</td>
<td>52.4 ± 5.3</td>
<td>40.2 ± 4.4</td>
</tr>
<tr>
<td>Cotton (100%)</td>
<td>15</td>
<td>60.6 ± 5.9</td>
<td>48.5 ± 4.2</td>
</tr>
<tr>
<td>Wool (100%)</td>
<td>15</td>
<td>44.8 ± 3.8</td>
<td>36.7 ± 3.1</td>
</tr>
<tr>
<td>Control</td>
<td>15</td>
<td>48.2 ± 4.2</td>
<td>40.3 ± 2.8</td>
</tr>
</tbody>
</table>

Values are given as mean ± standard deviation. M = Total number of mounts of all animals in each group. I = total number of intromissions of all animals in each group; I/M = intromission to mount ratio.

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**Effect of Different Types of Textiles on Sexual Activity**

Shafik
Determination of Electrostatic Potentials on Penis and Scrotum

The electrostatic potentials, generated on the surface of the penis and scrotum when the rats were wearing the different types of textiles were measured 1 h after wearing the pants. During this hour, the rats were moving freely in the cage. The room temperature varied from 28 to 32°C (mean 30.2 ± SD 1.8°C). The test was repeated at least 4 times every month during the period of wearing the pants, each time on a separate day, and the mean value was calculated for each rat.

The apparatus used for measuring the electrostatic potentials was the electrostatic kilovoltmeter with a sensitive probe (Model IVE, Hallmark Standards, USA). The measurements were taken by volt/ unit area of the probe. They were done during the day between 9 and 11 a.m. The technique of recording comprised applying the probe to the surface of the underpant at different sites of the scrotal and penile areas, and the readings from each site were recorded. The mean of these readings was then calculated. No rat had electrostatic potentials on the penile or scrotal area before wearing the pants.

Statistical Analysis

The results were analysed statistically using Student's t test.

Results

Table 1 shows the results of the study. For group comparison, the ratio of intromission to mounts (I/M) was used. According to Quinlan et al. [15], the intromission to the mounting ratio correlates better with the overall behavioral sexual function than the individual values. The control group showed behavioral responsiveness which was similar for the 6 and 12 months' study (p > 0.05).

At the 6th month examination, the polyester and polyester/cotton mix groups showed significantly lower I/M ratios than before the study and than the controls (p < 0.0001 for polyester, p < 0.001 for mix group), although the numbers of mounts were significantly higher in both groups (p < 0.001) (table 1). At the 12-month study, both groups showed significant increases in the number of mounts (p < 0.001) and decreases in the number of intromissions and I/M ratio (p < 0.0001) compared to before the study and the controls. Furthermore, there was significant reduction in the number of intromissions (p < 0.05) and I/M ratio (p < 0.01) compared to the 6-month examination (table 1). Furthermore, the I/M ratio at the 6th and 12th month of wearing the pants was lower in the polyester than in the polyester/cotton mix group (p < 0.01) (table 1).

The I/M ratio in the cotton and wool groups showed insignificant changes from the pre-test values in the 6-month study (p > 0.05), and was significantly increased in the 12-month study (p < 0.01). The increase was due to the increase in the number of intromissions in the cotton group and both intromissions and mounting in the wool group (table 1). The I/M ratio in the control rats showed insignificant changes (p > 0.05) during the period of study.

Six months after removing the pants, the I/M ratio of the polyester and polyester-cotton mix groups reverted to the pre-test levels without a significant difference (p > 0.05) (table 1), and the increased I/M ratio of the cotton and wool groups recorded at the 12th month of wearing the pants returned to the pre-test level (p > 0.05) (table 1).

The aforementioned results were reproducible in each individual rat.

<table>
<thead>
<tr>
<th>12 months of wearing pants</th>
<th>6 months after removal of pants</th>
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<tbody>
<tr>
<td></td>
<td>I/M</td>
</tr>
<tr>
<td>I/M</td>
<td>0.19***</td>
</tr>
<tr>
<td></td>
<td>0.36***</td>
</tr>
<tr>
<td></td>
<td>0.57*</td>
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<td></td>
<td>0.77*</td>
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<tr>
<td></td>
<td>0.80*</td>
</tr>
<tr>
<td>Intromiss</td>
<td>*p&gt;0.05; *p&lt;0.01; **p&lt;0.001; ***p&lt;0.0001.</td>
</tr>
</tbody>
</table>
Electrostatic Potentials

The measured readings of the electrostatic potentials from the penile and scrotal areas of the five studied groups are shown in Table 2. No potentials could be detected in the cotton or wool pant group or in controls. The polyester pants generated the highest potentials (mean 442.8 ± SD 58.8 V/cm²) while the readings of pants of polyester/cotton mix were approximately half as high (mean 238.6 ± SD 41.7 V/cm²; p < 0.01) (Table 2). These results were reproducible.

Discussion

The present study demonstrates a significant decrease in the number of intromissions and in the I/M ratio of the rats wearing the polyester and polyester-cotton mix underpants after 6 and 12 months of wearing the pants. The decrease was more manifest with the pure polyester pants than with the polyester-cotton mix ones, and in the 12-month test more than in the 6-month test. The pure cotton and wool pants showed insignificant changes in the I/M ratio at the 6-month study and a significant increase at the 12th month against the pre-test readings. However, 6 months after removal of the pants, the I/M ratio returned to the pre-test values in all the studied groups, without significant differences.

The study has demonstrated that the polyester-containing pants generate electrostatic charges in the penile and scrotal areas of rats. The charges were significantly higher with the pure polyester than with the polyester/cotton mix pants. Neither the cotton, wool nor the control groups demonstrated electrostatic charges in the penile and scrotal areas.

The inhibited sexual activity in the polyester-containing pants postulates a relationship between the two. The constancy of this relationship is ascertained by the reproducibility of the results in the individual animal. The mode of action of the polyester material on the sexual response needs to be discussed.
Effect of Polyester-Containing Pants on Penile Potency

With the use of polyester-containing underpants, friction occurs between it and the penile skin, resulting in generation of electrostatic charges [10, 11]. A negative charge is created on the inner surface of the pants and a positive one on the outer surface of the penile skin in contact with the pants (fig. 2). An equal but opposite charge to that on the inner surface of the pants occurs on its outer surface. Figure 2 demonstrates a cross-section of the penis showing the skin, 2 corpora cavernosa, the corpus spongiosum and the urethra. Friction of the textile with the penile skin (fig. 2) produces equal and opposite charges on the inner surface of the textile and the outer surface of the skin which will be positively charged. Subsequently, a series of induced electrostatic potentials are generated in the intrapenile structures.

With the positively charged penile skin, positive charges are induced on the outer surface of the corpus cavernosum (fig. 2), and consequent negative charges on the opposing surface. The latter generates positive charges on the outer surface of the corpus spongiosum and negative charges on its inner surface (fig. 2). The opposite charges on the opposing surfaces of the corpora create 'electrostatic fields' [10, 11] that extend from one side of the corpus to the other (fig. 2). The electric fields act on the various parts of the penis by different magnitudes depending on their size, i.e. on the distance between the two surfaces with different charges [16–18]. As the size of the part increases, the magnitude of the electrostatic field decreases.

The effects of the electric field on biological structures have been demonstrated by many investigators [16–22]. A deleterious effect on the cells was recorded when the electric field was applied in direct current pulses [16–18]; a potential difference was created across the cell membrane. The lethal effect was not due to heating or electrolysis and was independent of current density and energy input. It was dependent on the field strength and the total time of exposure [16–18]. The electric current was proposed to create a field across the cell resulting from formation of equal and opposite charges on the cell membrane; this field seems to cause cell dysfunction [18–21]. The various species differed in their sensitivity to the electrical field [16–18].

Pathologic Effect of Electrostatic Potentials on the Penile Erection

The present study postulates that the dressing of polyester-containing pants creates electrostatic fields across the intrapenile structures. It seems that these fields are responsible for the diminished sexual activity of the polyester-dressed rats. This is evidenced by the fact that the reduced I/M ratio occurred only in the rats dressed in pure polyester or polyester-cotton mix. The reduction in the I/M ratio was more manifest in the pure polyester than in the mix group, in the 12th month more so than in the 6-month study. Furthermore, 6 months after removal of the underpants, the I/M ratio was normalized in both groups: polyester and mix. It could be that the electrostatic field produced by the polyester material induces its effect on the tissue in a way similar to that induced by the electric field when applied in direct-current pulses; the difference between the two is probably in the intensity of the field. The effect of high voltage pulsation on suspension of cells was studied [18–20]. Exposure of human erythrocytes to a high-voltage pulse of a few kv/cm leads to total hemolysis of the red cells [21]. Short electric pulses in the 20 kv/cm range led to changes in cell membrane permeability and release of the stored biologic amines [22]. Meanwhile, the electrostatic potentials may induce their pathologic effects by influencing other organs such as the dorsal nerve of the penis or through the penile venous or arterial supply; however, these points need further investigations.

The cause of the significant increase in the number of mounts despite the diminished I/M ratio in the polyester and polyester-cotton groups after 6 and 12 months of wearing the pants seems to be attributable to repeated trials of intromission compensatory to intromission failure. The increase in the I/M ratio of the cotton and wool groups at the 12th month of the study against the pre-test levels could be due to the better care and housing conditions provided to the rats during the study. However, this increase did not occur in the control group. Alternatively, it could be due to warmth induced by the wool or cotton pants increasing the penile circulation with a resulting increase of the number of both mounts and intromissions.

Acknowledgment

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References