

## Intravaginal Pressure Assessed by the Kegel Perineometer<sup>1</sup>

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*A first attempt was made to provide norms for intravaginal pressure in normal women measured by the Kegel perineometer. Data obtained from 78 white females and 64 black females indicate that resting pressure approximates 5 mm Hg, and pressure with appropriate pelvic musculature contracted reaches an average of 15 mm Hg. The difference between resting and contracted pressures is unrelated to the former. There is a moderate negative correlation between number of vaginal births and contracted pressure in the white sample.*

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**KEY WORDS:** female sexuality; sexual dysfunction; perineometer; pubococcygeus.

### INTRODUCTION

Kegel first reported on the perineometer, a simple manometric device for the measurement of intravaginal pressure, 29 years ago (Kegel, 1950; Kegel and Powell, 1950). His interest was in assessing the outcome of urinary stress incontinence as a sequela of parturition. Kegel noted that the same pelvic musculature appeared to be involved in voluntarily contracting the vaginal barrel so as

This research was supported by a grant to the senior author from the Association for the Advancement of Mental Health Research and Education, Inc.

<sup>1</sup> Presented at the annual conference of the International Academy of Sex Research, Toronto 1978.

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to increase intravaginal pressure and in involuntarily controlling the functioning of the bladder. The relevant musculature is, of course, the levator ani, but it is still not certain which specific muscle unit is responsible, although it is generally believed to be the pubococcygeus.

The perineometer consists of a 3½-inch shaft inserted into the vagina from which a flexible rubber tubing leads to a pressure dial calibrated from 0 to 100 mm Hg. Despite its appealing simplicity, the perineometer is a bit tricky to use clinically. Readings will vary with the position of the body at the moment of measurement and will tend to be attenuated if the shaft is not inserted completely into the vagina. More importantly, the perineometer is sensitive to contractions of pelvic musculature other than the levator ani, including the gluteal and abdominal muscles. The patient ordinarily requires some instruction to guide her in the use of the correct muscles, a point that Kegel was careful to make in his first two reports.

These mechanical problems require careful application of the instrument but are hardly insurmountable. Clinical use of the instrument is, however, chronically hampered by an absence of normative data. Kegel (1952a) claimed to have examined over 3000 women with the perineometer and ventured a number of presumably data-based normative statements but failed to publish actual normative data. Furthermore, his normative statements are not consistent among themselves. In his original publication (Kegel, 1950) he appears to suggest that the average differences between resting intravaginal pressure and pressure produced by deliberate contraction of the pubococcygeus muscle is around 40 mm Hg. Two years later (Kegel, 1952a, b) he seems to suggest that the difference is only 20 mm Hg. The latter statement – which seems more realistic – taken in conjunction with still another of his reports (Kegel, 1951) can be construed to mean that resting pressure in normal women is around 25 mm Hg and reaches 45 Hg on the average with voluntary contraction of the musculature.

Unfortunately, Kegel published no more on the perineometer, with the exception of a 1952 report on measurement of outcome of treatment of urinary stress incontinence (Jones and Kegel, 1952), which, by the way, suggested that the normal increase in intravaginal pressure was about 10 mm Hg.

It is not at all uncommon to find a perineometer in an obstetrics/gynecology clinic to be used to assist the postpartum women in strengthening traumatized musculature. But, as far as we are aware, there has been only one report of normative intravaginal pressure data using the perineometer, appearing only a few years ago (Logan, 1975).

A treatment procedure that employs pubococcygeal muscle exercises has been recently proposed by Kline-Graber and Graber (1978). These authors claim to have found “widespread deficiencies in the condition of the pubococcygeus” in anorgasmic women and report a correlation between orgasmic capacity and muscle strength. No data are presented, however.

Neglect of Kegel's device may have been due to the fact that medical specialists in the female pelvis do not regard urinary stress incontinence as a serious problem and believe that it usually remits in a short time without formal treatment. A new generation of medical specialists was on the scene when Masters and Johnson in their pioneer work (Masters and Johnson, 1966) indirectly implicated the pubococcygeus muscle in a female problem that not only was widespread but also did not remit spontaneously: orgasmic dysfunction. By that time, the perineometer was largely forgotten despite the fact that Kegel himself claimed to have serendipitously discovered that ability to voluntarily produce increased intravaginal pressure was associated with sexual satisfaction in women (Kegel, 1952a).

Hartman and Fithian (1972) were the first to call attention to the possible relationship between the findings of Kegel and Masters and Johnson and to reintroduce the perineometer as a sex therapy device. There is as yet no empirical support for the relationship, and the use of the perineometer continues to be restricted by the absence of normative data. The purpose of the research reported herein is to attempt to provide such data.

## PROCEDURE

All patients who came to the Wishard Hospital Family Planning Clinic at the Indiana University Medical Center in Indianapolis for their annual pelvic examination during the month of August 1977 were asked to participate in an investigation of intravaginal pressure, including a brief, personal interview. Fifty-three women declined to participate and 142 women agreed but interview data were obtained from only 92.

The use of the perineometer was demonstrated to each patient during the interview or, if there was no interview, immediately preceding measurements. Measurements were made with the patient in the conventional pelvic examination position by an OB nurse practitioner. To avoid sterilization problems, the shaft of the perineometer was covered with an unlubricated condom. Actual measurements were preceded by several practice contractions until the nurse practitioner was satisfied that the patient was consistently isolating and contracting the appropriate muscles.

A series of eight consecutive measurements was made for each woman in a resting position and with the musculature voluntarily contracted.

## SUBJECTS

The average age of the sample was 23.2 years, with an average body weight of 138 lb. The sample had had an average of 1.4 vaginal births. Seventy-

eight of the patients were white, 64 were black; there were no differences between racial groups on the descriptive variables.

### RELIABILITY OF THE PERINEOMETER

Reliability of measurement across the eight occasions for each of the racial groups separately was determined by Cronbach's  $\alpha$  (Cronbach, 1951). Coefficients ranged from 0.985 to 0.994 for the black and white samples and the total sample, in both the resting and the contracted muscle conditions. Obviously, measurement can be made using the perineometer with high reliability.

### NORMATIVE DATA

Mean scores were computed for the black and white samples separately and for the two samples combined. Mean scores in the resting muscle condition ranged from 5.17 to 5.61 for the three groups. No differences were statistically significant. Mean scores with muscle contracted voluntarily ranged from 14.5 to 16.0. Again, differences were not significant. However, all contracted muscle readings were significantly greater than the comparable resting measurements. On the average, patients were able to increase intravaginal pressure by 9.8 mm Hg by voluntary muscle contraction.

We found significant  $r$ 's between relaxed and contracted muscle pressures ranging from 0.61 to 0.65 for the three samples. Correlations between contracted pressure and the difference between resting and contracted pressures ranged from 0.77 to 0.89. However, there was no relationship between relaxed pressure and the difference between pressures in any of the groups. Thus the absolute level of contracted pressure is directly dependent on the level of relaxed pressure, but the difference between the two is unrelated to the relaxed pressure.

Age was not related to contracted pressure ( $r$ 's ranging from  $-0.17$  to  $-0.18$ ) as this is merely a confounding of the probable causal factor, number of vaginal births. This factor was unrelated to resting pressure but was significantly negatively related to contracted pressure and differential pressure ( $-0.29$  and  $-0.33$ ) in the white sample. Coefficients in the black sample are not significant but are in the same direction ( $-0.08$  and  $-0.10$ ). The implication is that, at least for the white women, parity reduces somewhat the capacity to voluntarily increase intravaginal pressure, although it does not affect relaxed pressure.

## DISCUSSION

Our data indicate that the average resting intravaginal pressure measured by the perineometer is approximately 5 mm Hg, rising to 15 mm Hg with voluntary contraction of the appropriate musculature. These findings are clearly in conflict with Logan's report of a resting pressure of 15 mm Hg and a contracted pressure of 37 mm Hg (Logan, 1975). They would seem also to be at variance with our estimates of Kegel's findings of 25 and 45 mm Hg.

There are several possible reasons for these discrepancies. To begin with, neither Kegel nor Logan specifies the position of the woman at the moment of measurement. We have found the perineometer to be sensitive to variations in position of the torso and legs. Another possibility is the use of incorrect muscles, a tactic that almost invariably increases intravaginal pressure speciously.

Our data were obtained from a group of women who were primarily in the third decade of life and had had at least one child. Logan's sample of college students was probably largely or entirely nulliparous and 3-5 years younger on the average than ours. This possibility is supported by the negative relationship in our data between contracted pressure and number of vaginal births, a finding that suggests that nulliparous women should have higher pressures, other factors being equal. Kegel does not describe his sample, although it may be safely assumed that it consisted largely of women who had given birth. In sum, the source of the difference between our data and those of Logan is likely to be either sampling or procedure, or both. An explanation of the discrepancy between our data and Kegel's is not immediately apparent, since it would appear that both his sample and his measurement procedure were essentially similar to ours and it is unlikely that he was guilty of permitting incorrect musculature to distort his data. Perhaps the most reasonable explanation is that we have somehow misconstrued Kegel's results.

We believe that our results provide intravaginal pressure norms that apply approximately to women between the ages of 20 and 40 who have had one or two children. These norms should facilitate clinical research into the relationship between intravaginal pressure and sexual function and dysfunction.

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