## ORIGINAL RESEARCH—WOMEN'S SEXUAL HEALTH

# Efficacy of Vaginally Applied Estrogen, Testosterone, or Polyacrylic Acid on Sexual Function in Postmenopausal Women: A Randomized Controlled Trial

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**ABSTRACT**

***Introduction.*** Female libido is multifactorial and complex. Declining estrogen levels in postmenopausal women affects vaginal function.

***Aim.*** The aim of this study was to evaluate female sexual function after using topical estrogen, testosterone, or polyacrylic acid as vaginal lubricants with K-Y jelly as a placebo lubricant.

***Methods.*** This was a randomized controlled clinical trial on 80 postmenopausal women between 40 and 70 years of age with follow-up at the Menopause Clinic of the CAISM Unicamp. The women were randomized to treatment with topical vaginal estrogen, testosterone, polyacrylic acid, or oil lubricant alone, three times a week for a period of 12 weeks from November 2011 to January 2013.

***Main Outcome Measure.*** We used the Female Sexual Function Index (FSFI) to assess changes in sexual response at baseline, and after 6 and 12 weeks.

***Results.*** After 12 weeks of treatment, polyacrylic acid and topical testosterone produced improvements in the FSFI domains of sexual desire, lubrication, satisfaction, reduced pain during intercourse, and total score compared with lubricant alone. Treatment with topical estrogen in comparison with lubricant alone showed an improvement in the FSFI field of desire. The intragroup analysis over the time of the treatment showed improvements in the fields of desire, lubrication, and reduced pain for polyacrylic acid, testosterone, and estrogen. Furthermore, women who used testosterone showed improvements over time in the fields of arousal, orgasm, and satisfaction.

***Conclusions.*** Treatment of postmenopausal women with symptoms of vaginal atrophy with polyacrylic acid, testosterone, and estrogen for 12 weeks produced improvements in self-reported female sexual function when compared with a placebo lubricant. **Fernandes T, Costa-Paiva LH, and Pinto-Neto AM. Efficacy of vaginally applied estrogen, testosterone, or polyacrylic acid on sexual function in postmenopausal women: A randomized controlled trial. J Sex Med 2014;11:1262–1270.**

***Key Words.*** Vaginal Atrophy; Sexuality; Hormones

### Introduction

Female libido is multifactorial and complex. It is negatively affected by organic diseases, psychological factors, and relationship difficulties with a partner. Declining estrogen levels in postmenopausal women affects vaginal function and often leads women to complain of dryness, itching, burning, dyspareunia, and urinary dysfunction [1,2]. Such changes are often related to coital discomfort and pain, with a consequent negative influence on female sexual function [3,4]. A study involving 3,046 postmenopausal women in the United States with symptomatic vaginal atrophy showed that 59% of women felt that this impaired their level of sexual satisfaction [5]. Therefore, it is believed that the complex interaction of factors that affect sexual dysfunction in women after

menopause might be associated with progressive vaginal atrophy [6]. For women who need treatment for their urogenital symptoms, several clinical research studies have consistently documented the effectiveness of estrogen therapy administered orally and vaginally; moreover, topical application is more effective and faster [7–9]. Furthermore, the use of topical estrogen provides better sexual satisfaction and reduces pain during intercourse [10]. Although intravaginal formulations have been developed to decrease systemic exposure, it is known that topical use can also increase the serum level of estrogens [11]. Given the known risks of estrogen therapy, many postmenopausal women do not want to use this method or have a contraindication to it.

Testosterone has been investigated in the treatment of menopausal symptoms, especially for women complaining of decreased libido and sexual desire. Recent studies using subcutaneous injections of testosterone for 3 months showed improved physiological and psychological symptoms of menopause, including improvements in vaginal atrophy and sexual function [12–14]. Other studies showed that the use of topical testosterone and vaginal estrogen either alone or in combination showed improvements in vaginal trofism associated with an improvement in sexuality [15,16].

Alternatively, one nonhormonal therapy used by women for the treatment of vaginal atrophy is the topical moisturizer, polyacrylic acid [17]. This is a calcium salt of divinyl glycol that can absorb 60 times its weight in water. This remarkable absorption capacity is the basis of its therapeutic effect and provides vaginal lubrication and hydration. Its efficacy in improving symptoms of vaginal atrophy is similar to that of topical estrogen [17–19]. Such water-based lubricants, although widely used, do not improve vaginal trofism per se but partially improve some symptoms such as dryness and pain during intercourse [20].

Given that topical testosterone and polyacrylic acid provide good alternative treatments to estrogens for relieving the symptoms of vaginal atrophy and improving sexuality, it is necessary to compare the results for such agents with those obtained with topical estrogen. This could help in the development of other treatment options for improving sexual function in postmenopausal women. The present study aimed to evaluate sexual function in postmenopausal women during treatment for 12 weeks with topical estrogen, testosterone, polyacrylic acid, or lubricant alone using the Female Sexual Function Index (FSFI) [21,22].

## Methods

### *Study Participants*

Out of a cohort of 1,112 postmenopausal women interviewed in the Menopause Clinic CAISM Unicamp, the first 80 women who met the inclusion and exclusion criteria of the study were invited to participate in a randomized controlled trial involving 12 weeks of topical treatment with an assessment of sexual function.

Inclusion criteria were women aged 40–70 years with physiological menopause and a history of amenorrhea for >3 years with a follicle-stimulating hormone level of >30 mIU/mL.

They had not taken hormonal treatment for menopausal symptoms in the past 6 months, had shown normal Pap smears and mammograms for the past 12 months, and had complaints compatible with the symptoms of vaginal atrophy (vaginal dryness, vulvovaginal irritation/itching, and pain at sexual activity 6 months ago). Exclusion criteria consisted of women who were expected to undergo an oophorectomy or hysterectomy and those with a body mass index <18.5 kg/m$^2$ or >30 kg/m$^2$. We excluded those women with a contraindication for the use of estrogen or testosterone, namely those with a history of myocardial infarction, severe hypertension, diabetes mellitus, thromboembolic disease, liver failure, ulcerative colitis, Crohn's disease, breast or endometrial cancer, fibrocystic breast disease with atypical hyperplasia, genital bleeding of unknown origin, a family history of breast cancer, endometrial hyperplasia, or positive serology for human immunodeficiency virus, hepatitis B, or C. Finally, women were excluded if they had a vaginal infection at the time of their gynecological examination.

This study was conducted between November 2011 and January 2013. The protocol was approved by the Ethics Committee of the Faculty of Medical Sciences—Unicamp number 990/2011. CONSORT guidelines were observed and cataloged in the Brazilian Registry of Clinical Trials (Rebec): UTN identifier U1111–11255434. All participants signed an informed consent form prior to the baseline evaluation.

### *Randomization*

After the initial screening, 80 women were assigned to the 4 treatments, with 20 women in