ESTROGEN EFFECT ON VAGINAL EPITHELIUM IN WISTAR RATS

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ABSTRACT

Objective: *To study the effect of estrogen on vaginal epithelium.* ***Material & method:*** *We divided 30 female wistar rats into three groups, ten wistars underwent bilateral ovariectomy, 10 wistars underwent bilateral ovariectomy, and estrogen replacement and 10 wistars served as control. The second group received estradiol 1 mg/kg/day, directly after ovariectomy. After 4 weeks the vagina was then harvested and stained with hematoxylin-eosin to evaluate the thickness of epithelial layer of vagina. A paired T-test was used for statistical analysis.* ***Results:*** *Estrogen ablation decreased the thickness of epithelial layer in the vagina. The mean thickness of epithelial layer in the vagina were 3, 5, and 10 for each group respectively. The mean epithelial layer of the first group as well as the second group showed significant difference compared with the control group (p>0,05), while the first group showed insignificant difference compared with the second group.* ***Conclusion:*** *Estrogen ablation seems to decrease the thickness of vaginal epithelium, while estrogen replacement revealed insignificant effect.*

Keywords: *Estrogen, vaginal epithelium, epithelial layer, estrogen replacement therapy, lower urinary tract symptoms.*

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INTRODUCTION

Female urinary tract and reproductive tract are sensitive to steroid hormone, because both of those organ systems originate from the same embryological tissue. Estrogen receptor and progesterone receptor are present in female reproductive and urinary tracts. It has been widely known that the change of estrogen circulation in women during menstruation, pregnancy, and menopause may result in organic function disorder of the urinary tract. Additionally, in menopausal women there are increasing incidence of lower urinary tract symptoms (LUTS), such as frequent urination, nocturia, disuria, stress incontinence, and recurrent urinary tract infection. Lower estrogen concentration suggested as the cause of these abnormalities. Several studies revealed improvement effect with estrogen administration to overcome frequent urination, nocturia, and recurrent urinary tract infection. Some studies have proved that there are an increasing number of intermediate cells and superficial cells in the vagina of menopausal women. These changes may also occur in the epithelium of the bladder. The thickness of vaginal squamous epithelium in women with estrogen deficiency is lower than that in normal or in those with excessive estrogen. Clear information about the effect of castration and estrogen therapy on bladder function and the change of bladder structure remains rare. In this study, we evaluated the change of vaginal epithelial thickness after oovarectomy and estrogen replacement therapy in wistar rats.[1-4]

OBJECTIVE

To find the effect of estrogen on vaginal epithelial changes, which in turn, can support the treatment of lower urinary tract symptoms in women with reduced estrogen concentration.

MATERIAL & METHOD

Thirty wistar rats were divided into three groups, 10 had bilateral oovarectomy, 10 with bilateral oovarectomy and estrogen replacement therapy, and 10 without treatment (control). The first group was

subjected to oovarectomy after being aenesthesized with phenobarbital (35 mg/kg). Group two received estrogen replacement, presenting as ethynil estradiol 1 mg/kg BW/day for 30 days since the first day of bilateral oovarectomy. After week 4, the rats were operated to remove the vaginas from each group. Subsequently, the vaginas were submitted to the Department of Anatomical Pathology for tissue incision and staining with haematoxylin eosin. Tissue preparations were observed under light microscope for vaginal epithelial layers in each group. Data was analyzed using paired T-test.[5-7]

RESULTS

Even though estrogen concentration was not measured in this study, another study in rabbits has proved that the estrogen concentration was 17 pg/mL. With bilateral oovarectomy, the concentration reduced to 2 pg/mL. The administration of ethynil estradiol of 1 mg/kg BW may increase estrogen concentration up to 180 pg/mL. The thickness of epithelial layer is influenced by the estrogen concentration. In this study, the mean of epithelial thickness in each group was 3, 5, and 10. If the change of epithelial thickness between control group and group 1 or control group and group 2 was compared, there was significant difference ($p<0,05$), while the epithelial thickness in group 1 and group 2 was not significant ($p>0,05$).[6,8]

DISCUSSION

The variation of estrogen cycle in women may induce lower urinary tract symptom. The increase of the incidence in lutheal phase of menstrual cycle is related with high progesterone and low estrogen concentrations. It has been known that 10 - 40% of post-menopausal women have lower urinary tract symptoms, and 20% of them search for medical help. In addition, 2 of 3 women of more than 75 years old have genitourinary tract atrophy.[1]

A study in the Netherlands evaluated the prevalence of lower urinary tract symptoms in 2157 women. From all, 27% was found to have dry vagina and dyspareunia, while the incidence of incontinence and infection reached 36%. Interestingly, women who previously had hysterectomy showed more severe symptoms compared to those who had not, while genitourinary atrophy and dyspareunia are related with menopausal age. The use of estrogen as replacement therapy has been investigated in the management of lower urinary tract symptoms, such as urgent voiding, frequent voiding, and urge incontinence. It was proposed that estrogen had encouraging effect in those patients. However, estrogen itself is not much beneficial in incontinence stress therapy. Estrogen therapy in the management of recurrent urinary tract infection should be investigated further, even though there are some evidences that transvaginal administration provide satisfactory effect. However, lower transvaginal estrogen dose can be used as therapy for patients with lower urinary tract symptoms as a result from genitourinary atrophy.[1,2]

Zuckerman (1936) had performed experiment in animals and proved that lower urinary tract epithelium influenced by estrogen. Estrogen affects proliferation, desquamation, and cornification of epithelial cells.[2] Furthermore, Smith elaborated alterations in urethral squamous epithelium due to the change of estrogen concentration. It was also suggested that estrogen deficiency in post-menopausal women is generally accompanied with urethritis atropic symptom, and the administration of estrogen replacement therapy may alleviate the symptom satisfactorily.

This study has proved that the change of estrogen concentration may cause changes in epithelial layer of wistar rats' vagina. The reduction of estrogen in wistar rats lead to atrophy in vaginal epithelium. However, the atrophy is reversible. By providing estrogen replacement therapy, the thickness of the epithelial layer can be relieved. The result of this study may help providing explanation on the occurrence of urinary tract infection in women with estrogen deficiency, which may result from the reduction of epithelial layer since the latter is the barrier against foreign materials, including urinary tract infection-causing bacteria.[8,9]

CONCLUSION

Estrogen ablation reduces the thickness of vaginal epithelium, while estrogen replacement therapy does not provide significant effect.

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