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# Epidemiology of Pelvic Floor Disorders between Urban and Rural Female Inhabitants

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## ABSTRACT

*The aim of this study was to investigate the prevalence of pelvic organ prolapse in urban and rural women and to identify possible related factors. They were 1749 participants; one thousand four hundred seventeen (81%) urban women and 332 rural residents (19%). The urban and rural women were congruently regarding to age, parity, using oral contraceptives and postmenopausal status. The urban women were more often obese ( $p < 0.01$ ), estrogen replacement users ( $p < 0.001$ ), smokers ( $p < 0.001$ ), with mild ( $p < 0.001$ ) and high ( $p < 0.001$ ) education, and they were often divorced ( $p < 0.05$ ) than rural women. Rural women were more often alcohol consumers ( $p < 0.001$ ), with low level of education ( $p < 0.001$ ) and more often married ( $p < 0.05$ ) than rural examinees. There were no association between the presence of prolapse and: weight, menopausal status, oral contraceptives and estrogen replacement using, smoking, alcohol consuming and marital status. There were not observed differences in prevalence of prior hysterectomy, urinary incontinence, uroinfectio, sexual and bowel dysfunction between both groups. The prevalence of cystocele, rectocele and uterine prolapse were similar among urban and rural participants. In conclusion, a more complete picture of factors associated with genital prolapse would include in investigation, such as molecular and genetic ones.*

**Key words:** pelvic organ prolapse, urban, rural

## Introduction

Pelvic organ prolapse is the abnormal descent or herniation of the female pelvic organs from their normal attachment sites or their normal position in the pelvis. Pelvic organ prolapse and urinary incontinence are common conditions affecting millions of adult women today. The pathogenesis of genital prolapse is not fully understood. Possible causes of genital prolapse are childbirth, congenital factors, iatrogenic factors (mainly hysterectomy), and increased intraabdominal pressure in obesity or chronic respiratory disease. The endopelvic fascia and the connective tissue of the pelvic floor might be damaged during pregnancy as a result of stretching or torn or ruptured during childbirth. The pelvic floor muscles could be injured by lacerations or incisions during childbirth, and weakening of the pelvic floor is obvious after childbirth. Denervation injuries of the pelvic floor caused by childbirth may contribute to prolapse. An abnormal collagen metabolism has been shown in women with genital prolapse, probably as a result of congenital factors. The

prevalence of pelvic floor dysfunction increases with age. As the population ages, the incidence of pelvic prolapse in women is expected to increase<sup>1–11</sup>. Management of pelvic organ prolapse is an important component of gynecologic care. Treatment of elderly women is complicated by frailty and an increased incidence of associated medical disorders. Uterine prolapse is the most frequent indication for hysterectomy in older women<sup>10–14</sup>. The concept of genital prolapse usually includes cystocele, rectocele, enterocele, or uterine descent and combinations of these. In 1996, the International Continence Society defined a system of pelvic organ prolapse quantification<sup>1</sup>.

Uterine prolapse was first recorded on the Kahun papyri in about 2000 BCE. Hippocrates described numerous nonsurgical treatments for this condition. In 98 CE, Soranus of Rome first described the removal of the prolapsed uterus when it became black. The first successful vaginal hysterectomy for the cure of uterine pro-

lapse was self-performed by a peasant woman named Faith Raworth, as described by Willouby in 1670. She was so debilitated by uterine prolapse that she pulled down on the cervix and slashed off the prolapse with a sharp knife. She survived the hemorrhage and continued to live the rest of her life debilitated by uterine prolapse. From the early 1800s through the turn of the century, other successful surgical approaches were used to treat this condition<sup>15,16</sup>.

The aim of this study was to estimate the prevalence of symptomatic pelvic organ descensus in urban and rural female population.

### Subjects and Methods

Between January 12, 1998, and December 15, 2002, one thousand seven hundred and forty-nine women with diagnoses of genital descensus, who were seen for annual gynecologic examinations, were recruited in our study. They were 1417 (81%) urban women and three hundred thirty-two rural residents (19%). All women entered into this study were over the age of 30 years (range 31–79 years). Exclusion criteria were ongoing pregnancy, lactation, mental retardation or dementia. The evaluations included medical history, gynecologic examination, and stress test at bladder filling of 300 ml sterile water. Stress incontinence was diagnosed when involuntary loss of urine occurred with coughing. Pelvic examinations were performed with the subject placed in the dorsal lithotomy position by means of either a birthing chair or pelvic examination chair. Then the speculum was placed into the vagina and measurements were made during maximum Valsalva maneuver. Signs of genital prolapse were recorded during the pelvic examination, particularly speculum and bimanual examinations, and were described according to the *modified pelvic organ prolapse quantification system*<sup>17,18</sup>. The different degrees of prolapse were classified as described in Table 1. Women after previously hysterectomy with vaginal prolapse were classified as anterior or posterior prolapse. Urinary incontinence was classified as stress incontinence, urge incontinence, or mixed incontinence. Body mass index (BMI, kg/m<sup>2</sup>) was calculated for every woman. Women were

classified as being of normal weight (BMI 20–25), overweight (BMI 26–30), or obese (BMI >30). All examinees completed questionnaire regarding common symptoms of pelvic organ prolapse, gynecologic and reproductive history, and socio-demographic data. All subjects gave written consent to use their data for research.

Statistical analysis was performed using Statistics for Windows (Stat Soft Inc, USA, Version 6,0). For comparisons of metric or categorical variables between examinees Student *t*-test or  $\chi^2$  test were used. For multivariate analyses of factors associated with prolapse, logistic regression analysis was used. In single variable comparisons the *p* values less than <0.05 were considered statistically significant.

### Results

One thousand seven hundred and forty-nine women with genital descensus participated in the study. They were 1417 (81%) urban residents and three hundred thirty-two (19%) rural women. Subject characteristics are listed in Table 2. Mean age of the urban women was 52.6 years, and the rural participants had similar age of 54.5 years. Statistically significant differences were not found in age, parity, menopausal status and oral contraceptives using among urban and rural participants. Hormone replacement had received 11% of the urban women versus 2% of the rural residents (*p*<0.001). Urban examinees were more often smokers than rural women (19% versus 2%, *p*<0.001). On the other hand, rural residents were statistically significant more often alcohol consumers than urban women (18% versus 4%, *p*<0.001). Urban women had more often obesity (21% versus 11%, *p*<0.01), but rural participants had more often normal body mass index (47% versus 36%, *p*<0.05). Table 2. shows statistically significant difference on education level; in general rural inhabitants had less education (*p*<0.001). Urban women were more often married (*p*<0.01) and divorced (*p*<0.05) than rural women, but were not found statistically significant differences in single and widow status between both groups.

The following variables were entered into the logistic regression model for the outcome of prolapse: age, BMI,

TABLE 1  
DEFINITIONS AND CLASSIFICATIONS OF PELVIC ORGAN PROLAPSE

| Severity of prolapse | Location of prolapse   |  |  |
|----------------------|--|--|--|
|                      | Anterior prolapse  | Uterine prolapse   | Posterior prolapse   |
| Mild                 | <i>Mild cystocele</i> (visible after speculum insertion)   | <i>1st degree</i> (into vagina)  | <i>Mild rectocele</i> : rectum protruding towards vaginal wall   |
| Moderate             | <i>Moderate cystocele</i> (vaginal wall overlying bladder just visible at introitus)                 | <i>2nd degree</i> (cervix visible at introitus)  | <i>Moderate rectocele</i> (vaginal wall overlying the rectum visible at the introitus)                             |
| Severe               | <i>Severe cystocele</i> (protrusion of bladder with overlying vaginal wall outside of the introitus) | <i>3rd degree</i> ; uterine descent outside of the introitus (partial or complete procidentia) | <i>Severe rectocele</i> (protrusion of rectum with overlying vaginal wall extending outside the vaginal introitus) |

**TABLE 2**  
ANTHROPOMETRIC AND CLINICAL PROFILES OF EXAMINEES

|                               | Urban (n=1417) | Rural (n=332) | p        |
|-------------------------------|----------------|---------------|----------|
| Age (years, X±SD)             | 52.6±10.2      | 54.5±8.7      | NS*      |
| Body mass index (BMI)         |                |               |          |
| normal (%)                    | 36             | 47            | <0.05*   |
| overweight (%)                | 43             | 42            | NS*      |
| obese (%)                     | 21             | 11            | <0.01*   |
| Parity (X±SD)                 | 2.3±1.3        | 2.7±1.7       | NS**     |
| Postmenopausal (%)            | 84             | 89            | NS**     |
| Hormone replacement users (%) | 11             | 2             | <0.001** |
| Oral contraceptives users (%) | 3              | 0             | NS**     |
| Smokers (%)                   | 19             | 2             | <0.001** |
| Alcohol consumers (%)         | 4              | 18            | <0.001** |
| Education                     |                |               |          |
| low (%)                       | 35             | 84            | <0.001** |
| mild (%)                      | 53             | 16            | <0.001** |
| high (%)                      | 12             | 0             | <0.001** |
| Marital status                |                |               |          |
| married (%)                   | 64             | 77            | <0.01**  |
| single (%)                    | 11             | 9             | NS**     |
| widowed (%)                   | 19             | 14            | NS**     |
| divorced (%)                  | 6              | 0             | <0.05**  |

\**t*-test, \*\* $\chi^2$  test, NS – not significant

parity, menopausal status, oral contraceptives and hormone replacement using, smoking and alcohol consuming, education and marital status. Urban women 65 years and older had a lower risk of prolapse than did those younger than 65 years (OR 0.50, 95% CI 0.29–0.91). There were no found other correlations between age and genital prolapse. Rural women with 0 deliveries had a marked reduction in risk for pelvic organ prolapse compared with parous women (OR 0.05, 95% CI 0.007–0.35 for 0 versus 1–2 deliveries; OR 0.06, 95% CI 0.008–0.47 for 0 versus 3–4 deliveries; and OR 0.06, 95% CI 0.009–0.54 for 0 versus  $\geq 5$  deliveries). However, increasing levels of parity were not associated with further increases in prolapse risk. Furthermore, only lower education level in both groups predicted prolapse, with OR 2.11 (95% CI 1.14–4.17) and OR 1.65 (95% CI 1.12–2.55), respectively. There were no association between the presence of prolapse and: BMI, menopausal status, oral contraceptives and hormone replacement using, smoking and alcohol consuming, and marital status.

The results of clinical characteristics are shown in Table 3. There were not observed statistically significant differences in prevalence of prior hysterectomy, stress and urge incontinence, existence of uroinfection, sexual and bowel dysfunction between investigated groups. When a severe posterior prolapse (rectocele) and severe uterine prolapse were present, 19% urban and 16% rural residents reported problems with emptying the bowel at defecation. Twenty-seven percent urban women and 24%

rural women reported any kind of sexual dysfunction. Urban women had statistically significant more often prior urogynecologic operations ( $p < 0.05$ ) and mixed incontinence ( $p < 0.05$ ) than rural residents. Only prior hysterectomy in urban women predicted cystocele and/or rectocele, with OR 1.62 (95% CI 1.05–2.48).

Table 4 reveals results of clinical gynecological examinations regarding pelvic organ prolapse between urban and rural examinees. The combinations of anterior/posterior vaginal prolapse and uterine prolapse, in women with uterus, were categorized as uterine prolapse. The prevalence of cystocele, rectocele and uterine prolapse among urban and rural women were similar, and investigation no found statistically significant differences between both groups. The most common were mild and moderate uterine prolapse in both groups.

## Discussion

Pelvic floor disorders, a group of conditions affecting adult women, include pelvic organ prolapse and urinary incontinence. The criteria for diagnosis of pelvic organ prolapse used in this study were the classic categories of *mild*, *moderate* and *severe* degrees. Vaginal childbirth and aging are risk factors, and weakening of the pelvic support structures is a major aspect of the pathology<sup>1-3,5-7</sup>. However, the underlying molecular mechanism remains unknown<sup>8</sup>. Female reproductive organs are rich in elastic fibers that turn over slowly in most adult tissues

**TABLE 3**  
CLINICAL CHARACTERISTICS OF EXAMINEES

|   | Urban (n=1417) |    | Rural (n=332) |    | p**   |
|---|----------------|----|---------------|----|-------|
|   | N              | %  | N             | %  |       |
| Prior hysterectomy                                    | 43             | 3  | 6             | 2  | NS    |
| Prior urogynecology surgery                           | 25             | 2  | 1             | 0  | NS    |
| Urinary incontinence                                  |                |    |               |    |       |
| stress  | 254            | 18 | 46            | 14 | NS    |
| urge  | 150            | 11 | 26            | 8  | NS    |
| mixed   | 248            | 17 | 40            | 12 | <0.05 |
| Uroinfectio (symptomatic or asymptomatic bacteriuria) | 97             | 7  | 16            | 5  | NS    |
| Sexual dysfunction                                    | 383            | 27 | 80            | 24 | NS    |
| Bowel dysfunction                                     | 269            | 19 | 53            | 16 | NS    |

\*\* $\chi^2$  test

**TABLE 4**  
PELVIC ORGAN PROLAPSE DEGREE

|                                    | Urban (n=1417) |    | Rural (n=332) |    | p** |
|------------------------------------|----------------|----|---------------|----|-----|
|                                    | N              | %  | N             | %  |     |
| Anterior or/and posterior prolapse |                |    |               |    |     |
| Mild                               | 186            | 13 | 53            | 16 | NS  |
| Moderate                           | 178            | 13 | 57            | 17 | NS  |
| Severe                             | 91             | 6  | 19            | 6  | NS  |
| Uterine prolapse                   |                |    |               |    |     |
| Mild                               | 407            | 29 | 86            | 26 | NS  |
| Moderate                           | 379            | 27 | 79            | 24 | NS  |
| Severe                             | 176            | 12 | 38            | 11 | NS  |

\*\* $\chi^2$  test

but undergo massive remodeling in the reproductive organs through pregnancy and birth<sup>8,9</sup>. The prevalence of genital descensus increases with age<sup>5-7</sup>.

To our knowledge, there are no published data on the prevalence of prolapse in a broader age range of women in the general population in Croatia. There were no a great number of authors who investigated pelvic organ prolapse of rural women. Possible, this fact is based on social difference of rural inhabitants. Clinical gynecological examination represents the most important tool for diagnosing pelvic organ prolapse. Gynecological examination is very intimate examination for rural women, which may explain the scarcity of data on the prevalence of pelvic organ prolapse. Another explanation is that rural women deliberately chose not to reveal their condition to doctor. On the other hand, reports about prevalence of pelvic organ prolapse among urban residents are very different<sup>1,3,7,9,19</sup>. Many authors from developing countries reported about women with mild and moderate genital prolapse, but infrequently reported about women with severe prolapse. This may be because affected wo-

men in developed countries are more likely to have sought and received treatment, as well as the much lower overall prevalence of pelvic organ prolapse in women in studies from industrialized countries. Strengths of this study are data regarding just to pelvic floor disorders of rural residents. The findings of our study showed that urban women had more often greater weight and greater level of education than rural women. They were more often hormone replacement users and smokers than rural women. Our findings are similar to others<sup>19</sup>. Rural women were more often alcohol consumers.

In general, our investigation found no association between age, parity, weight (BMI), menopausal status, hormone replacement and pelvic organ prolapse. Our findings are similar to most other studies<sup>11-13,17,19</sup>. Possibly explanations are that the most women from our region had one or two deliveries, and vaginal delivery results in relatively mild pelvic support defects. The women, who delivered children at an advanced maternal age, would be more likely to have prolapse, because older women have less muscle mass than younger women. In most



cases, our child-bearing women are younger than in other countries, and they have lower BMI, on average. Other researchers reported that age, obesity, parity, smoking and postmenopausal status promote genital prolapse<sup>1–7,18</sup>. In addition, we found no association between estrogen replacement and prevalence of prolapse, but some authors reported that estrogen replacement improves metabolism of collagen and improves the symptoms of pelvic organ prolapse<sup>18–20</sup>.

However, given the high rate of hysterectomies in the Croatia, it will be important for future work to further delineate the role hysterectomy may play in the incidence of pelvic organ prolapse.

Pelvic organ prolapse is a benign condition, but a severe degree uterine prolapse can result in ureteric obstruction. Incomplete bladder emptying might lead to recurrent urinary tract infections, with renal involvement. Improved education and health advice are crucial if these women are to understand that prophylaxis and treatment of pelvic organ prolapse are both possible and available.

In conclusion, only few risk factors for pelvic organ prolapse were identified in our study. A more complete picture of factors associated with pelvic organ prolapse would include not only demographic factors, such as those studied here, but also molecular and genetic ones.

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## UČESTALOST SPUŠTENIH GENITALNIH ORGANA U GRADSKIH I RURALNIH STANOVNICA

### SAŽETAK

Cilj ove studije bio je ispitati učestalost spuštenih genitalnih organa u gradskih i ruralnih stanovnica i otkriti moguće uzročne čimbenike. U ispitivanje je uključeno 1749 žena; tisuću četiri sto i sedamnaest (81%) gradskih stanovnica i 332 (19%) stanovnica sela. Stanovnice grada i žene sa sela bile su sličnih karakteristika u pogledu životne dobi, broja poroda, uzimanja oralnih kontraceptiva i trajanja poslijemenopauze. Gradske stanovnice bile su deblje ( $p < 0,01$ ), češće su koristile hormonsko nadomjesno liječenje ( $p < 0,001$ ), češće su bile pušačice ( $p < 0,001$ ), češće su imale srednje ( $p < 0,001$ ) i visoko ( $p < 0,001$ ) obrazovanje, i češće su bile razvedene u odnosu prema ženama sa sela. Stanovnice sela češće su uživale alkohol ( $p < 0,001$ ), češće imale niže obrazovanje ( $p < 0,001$ ) i češće bile u braku ( $p < 0,05$ ) u odnosu na gradske stanovnice. Nije uočena povezanost prolapsa s tjelesnom masom, uzimanjem oralnih kontraceptiva i hormonske nadomjesne terapije, trajanja poslijemenopauze, pušenja, uzimanja alkohola i bračnog stanja. Nije nađena različita učestalost prethodne histerektomije, uroinfekcija, inkontinencije urina, seksualnih poremećaja i smetnji sa strane crijeva između ispitivanih grupa. Učestalost cistocele, rektocele i prolapsa maternice bila je slična u objema skupinama. Zaključno valja kazati kako je potrebno uključiti više čimbenika u svezi s genitalnim prolapsom u istraživanje, naročito molekularne i genske čimbenike.