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Are hypertension and diabetes mellitus risk factors for pelvic organ prolapse?

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ABSTRACT

Objectives: Pelvic organ prolapse (POP) is an important problem for women with multifactorial etiology. This study aims to determine the role of hypertension (HT) and diabetes mellitus (DM) in POP.
Study design: The study included 586 women admitted to Bulent Ecevit University Hospital between September 2013 and April 2015 for hysterectomy, comprising 186 patients with POP and 400 patients without. The demographic characteristics, age, body mass index (BMI), obstetrical history, type of delivery, associated medical diseases, and benign gynecological diseases were recorded. HT, DM, or both together were particularly considered as coexisting medical diseases.
Results: Median gravida, parity, and live birth numbers were significantly higher in POP patients (4 vs. 3, 3 vs. 2, and 3 vs. 2 respectively, $p < 0.001$). POP patients were more obese than POP-absent patients ($p < 0.001$). Vaginal history of birth increased POP frequency to 25.8% with statistical significance ($p < 0.001$). There was no significant difference between groups regarding coexisting endometritis, endometrial polyp, endometriosis, endometrial hyperplasia ($p > 0.05$). There was a significant difference between groups regarding comorbid diseases ($p < 0.001$). Logistic regression analysis for risk factors of POP revealed age, BMI, vaginal parturition, and co-morbidity with HT + DM together significantly increased POP risk ($p < 0.05$). HT + DM together significantly increased risks with OR of 1.9 (1.1–3.16).
Conclusions: In addition to multiple factors increasing POP risk, comorbidities as HT + DM together should be considered as risk factors. Patients with these comorbidities should be encouraged to change their lifestyles to prevent POP.

Introduction

Pelvic organ prolapse (POP) is defined as the descent of the pelvic organ into the vagina, which mainly results from dysfunction of the pelvic floor support [1]. Generally, urinary incontinence, bowel dysfunction, and sexual or local pelvic problems are associated with the prolapse. In the United States (US), 23.7% of women experience at least one pelvic floor disorder, and 300,000–400,000 surgeries are performed for prolapse each year [2]. In Turkey, the prevalence of POP stage ≥2 according to the Pelvic Organ Prolapse Quantification System (POP-Q) is reported to be 27% [3]. However, only a small group of patients seek medical support. Surgical procedures for prolapse are a huge financial burden, costing more than one billion dollars per year in the US [2].

The etiology of pelvic prolapse is multifactorial. Age, obesity, smoking, menopause, race, connective tissue disorders, family history, genetics, previous hysterectomy, obstetrical trauma, and vaginal parturition have been reported as risk factors for prolapse [4–7]. Although vaginal parturition and obstetrical trauma have been proposed to be the major risk factors, it has been reported that one fifth of nulliparous women had some degree of prolapse [8]. Studies have shown that comorbidities such as hypertension (HT) or diabetes mellitus (DM) increase urinary incontinence, which is also associated with pelvic organ prolapse [9,10].

These comorbid diseases alone or together could possibly be risk factors for pelvic organ prolapse. Only a few studies have examined the association between DM and POP [11]. However, there has been no study assessing HT and DM together as risk

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factors for POP thus far. In this study, we evaluated the relationship between comorbidities of HT and DM with POP.

Materials and methods

This study was conducted retrospectively at Bulent Ecevit University, Zonguldak, Turkey. Records were examined for 586 patients admitted for hysterectomy between September 2013 and April 2015 to the Obstetrics and Gynecology Department of Bulent Ecevit University Hospital. Since the study is retrospective, it has been approved by the Institutional Review Board in the exempt category. The patients were separated into two groups based on whether they had POP or not. Patients undergoing hysterectomy due to cancer or carcinoma in situ were excluded, as were those who had a delivery within 6 weeks, a previous surgical procedure for POP, or urinary incontinence.

The demographic characteristics, age, body mass index (BMI), obstetrical history, type of delivery, associated medical diseases, and benign gynecological diseases were recorded. In gynecological examination of the patients, the status and type of pelvic prolapse were recorded. All the gynecological examinations were done by H.I., O.A., or by a resident under the supervision of these authors. The presence of benign gynecologic pathologies (endometritis, endometrial polyp, endometriosis, endometrial hyperplasia, myoma uteri, adenomyosis) were recorded.

Prolapse staging and terminology were performed according to standards set by the International Continence Society (ICS) [12]. Prolapse stage 2 or above according to the POP-Q system and their types were also recorded.

HT, DM, or both together were particularly considered as coexisting medical diseases. Blood pressure (BP) was recorded twice with the participant in a seated position. Hypertension was considered as systolic BP $\geq$140 mm Hg, diastolic BP $\geq$90 mm Hg, or the use of antihypertensive medication. DM was considered present based on fasting plasma glucose (FPG) $\geq$126 mg/dl (7.0 mmol/l) in two different times or HbA1c $\geq$6.5% (48 mmol/mol), or the use of oral antidiabetics or insulin [13].

Statistical analysis

Statistical analyses were performed with SPSS 19.0 software (SPSS Inc., Chicago, IL, USA). The distribution of data was determined using the Shapiro–Wilk test. Continuous variables were expressed as the mean ± standard deviation, while categorical variables were expressed as frequency and percent. Continuous variables were compared with the Independent Sample *t*-test or Mann–Whitney *U* test, and categorical variables were compared using Pearson's Chi-square test. Binary logistic regression analysis was performed to determine the risk factors of POP. *p* values less than 0.05 were considered statistically significant for all tests.

Results

At least one type of prolapse was present in 186 patients among the 586 women. The rest of the 400 patients had no POP. The median gravida, parity, and live birth numbers were significantly higher in POP patients (4 vs. 3, 3 vs. 2, and 3 vs. 2, respectively, $p < 0.001$). POP patients were more obese than the POP-absent patients ($p < 0.001$). The mean of BMI in the patients with POP was 31.04 ± 6.8 kg/m^2, whereas that in patients without POP was 27.8 ± 5.1 kg/m^2. The mean birth weight of neonates of the POP patients was significantly higher than for those without POP. Nulliparous women had less POP than parous women (Table 1). The patients with a history of cesarean history only but not normal delivery had POP with a frequency of 13.4%. However, a history of vaginal parturition with or without Cesarean section increased the frequency of POP to 46.2% (Table 1).

Table 1
Demographic properties of the pelvic organ prolapse (POP) present or absent groups. BMI: Body mass index, HT: hypertension, DM: Diabetes mellitus. The data is given as mean ± standard deviation or median (min–max).

Variables	POP present (n = 186)	POP absent (n = 400)	p value
Age	54.2	50.7	<0.001
Gravida	4 (0–9)	3(0–12)	<0.001
Parity	3 (0–8)	2 (0–8)	<0.001
Live birth	3 (0–8)	2 (0–8)	<0.001
BMI	31.04 ± 6.7	27.87 ± 5.1	<0.001
Weight of vaginally delivered infant	3724.86 ± 175.9	3283 ± 170.6	<0.001
Delivery mode			<0.001
Nulliparous	11 (13.8%)	69 (86.2%)	
Cesarean only	24 (13.4%)	155 (86.6%)	
Vaginal ± cesarean	151 (46.2%)	176 (53.8%)	
Associated pathology			
Endometritis	55 (31.6%)	119 (68.4%)	0.965
Endometrial polip	29 (17.7%)	135 (82.3%)	0.605
Endometrial hyperplasia	23 (30.7%)	52 (69.3%)	0.935
Endometriosis	16 (29.6%)	38 (70.4%)	0.844
Uterin leiomyoma	37 (16.2%)	191 (83.8%)	<0.001
Adenomyosis	26 (21.0%)	98 (79.0%)	0.004
Comorbid diseases			<0.001
No disease	91 (27.5%)	240 (72.5%)	
HT	34 (30.9%)	76 (69.1%)	
DM	12 (24.5%)	37 (75.5%)	
HT + DM	49 (51.0%)	47 (49.0%)	

Associated gynecologic pathologies were compared between the groups. There was no significant difference between the groups in regard to coexisting endometritis, endometrial polyp, endometriosis or endometrial hyperplasia ($p > 0.05$). However, uterine leiomyoma and adenomyosis were significantly more frequent in the POP-absent group (Table 1).

The groups were compared with regard to comorbid diseases (HT only, DM only, and HT + DM together). There was a significant difference between the groups in regard to comorbid diseases, and the difference was found when the subgroup of HT + DM together was added ($p < 0.001$). The POP types are shown in Table 2. The most common prolapse type was the anterior compartment with a frequency of 74.7%. The frequencies of apical and posterior compartments were 51.1% and 26.9%, respectively. POP was accompanied by stress incontinence in 55.6%, by urge incontinence in 20.4%, and mixed incontinence in 4.1% of the cases. There was no urge incontinence in the POP-absent group, and only one patient had stress incontinence.

Logistic regression analysis was performed for the risk factors of POP. As age increases, POP risk increases minimally (OR: 1.02, 95% CI: 1.00–1.04). BMI $\geq$25 increases POP risk 1.78 times. The maximal birth weight minimally increased the risk. Multiparity

Table 2
Pelvic organ prolapse and urinary incontinence types in the prolapse present group.

Variable	*N* (%)	
Prolapsus type	<Stage 2	≥Stage 2
Anterior compartment	47 (25.3%)	139 (74.7%)
Posterior compartment	136 (73.1%)	50 (26.9%)
Apical prolapsus	91 (48.9%)	95 (51.1%)
Urinary incontinence type	No	Yes
Stress	82 (44.4%)	104 (55.6%)
Urge	148 (79.6%)	38 (20.4%)
Mixed	162 (95.9%)	24 (4.1%)