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## Original Research Article

# The influence of menopause on urinary incontinence in the women of the community: a cross-sectional study from North India

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### ABSTRACT

**Background:** Urinary incontinence is defined as the complaint of any involuntary loss of urine that is a social or hygienic problem. Worldwide, over 200 million people are living with urinary incontinence and as the life expectancy of women is increasing, more number of women are bound to suffer from it. The aim of the present study is to find out the effect of menopause on the occurrence of Urinary Incontinence in women and to find out risk factors in post-menopausal women associated with Urinary Incontinence.

**Methods:** It was a community based cross-sectional study involving post-menopausal women living in the urban and rural areas registered under Community Medicine, J.N. Medical College, Aligarh, India. A total of 530 women were taken for this study. Descriptive statistics as well as simple proportion were calculated with SPSS 20.0. Tests of significance and Binary Logistic regression analysis were used for analysis.

**Results:** Significant differences were found in the association of Urinary Incontinence with increasing age groups and consequent years spent in menopause, rural area of residence, illiteracy, lower socio-economic class, inadequate housing standards, obesity, smoking, parity, history of hysterectomy, and co-morbidities such as Urinary Tract Infection and Pelvic organ prolapse.

**Conclusions:** From a public health perspective, there is considerable opportunity to improve women's quality of life by increasing health education about urinary incontinence and its treatment by taking steps for life style modifications.

**Keywords:** Menopause, Post-menopausal women, Risk factors, Rural, Urban, Urinary incontinence

### INTRODUCTION

Urinary incontinence is a common problem amongst adults living in the community.<sup>1</sup> Control of micturition is a complex physiological and anatomical process which often fails in women. According to the International Continence Society (ICS), urinary incontinence (UI) is defined as: the complaint of any involuntary loss of urine that is a social or hygienic problem.<sup>2</sup> Worldwide, over 200 million people are living with urinary incontinence.<sup>3</sup> It is three times more common in women than men.<sup>4</sup>

Urinary incontinence is a troublesome and probably underreported disorder in women.<sup>5</sup> Estimated 19% of women under the age of 45 experience UI and 29% of women over the age of 80 also experience this condition.<sup>6</sup> The prevalence of UI in community-dwelling women ranges from 10% to 40%. In general, the overall prevalence rate of UI increases with age.<sup>7</sup> Numerous epidemiologic studies show that the incidence of UI increases with age, with the range of prevalence estimates among community dwelling patients varying enormously from 2% to 58%.<sup>8</sup> Elderly women are the most affected,

with a mean prevalence of 34%.<sup>9</sup> Women suffering from urinary incontinence constitute about 70-80% of female patients reporting to a physician due to urinary system diseases.<sup>10</sup> It is estimated that 25-45% of women of different ages have involuntary urine loss and 9-39% of women over 60 years report daily urinary leakage.<sup>11,12</sup> The prevalence of urinary incontinence peaks at 50-54 years of age and may diminish quality of life and disrupt daily routines.<sup>13</sup> Recently, as the average life expectancy of women has increased and an increasing number of women maintain various social roles after menopause, urinary incontinence (UI) has become an important medical and social issue.<sup>14</sup>

### ***Etio-pathology***

Urinary continence is due to the fact that bladder pressure remains lower than urethral closure pressure, and incontinence may result from bladder or urethral impairment; when closure pressure is lower than bladder pressure, leakage occurs.<sup>15</sup> The low estrogen production during and after menopause produces symptoms from the autonomic nervous system such as flushing and perspiration and psychiatric symptoms such as depression. Furthermore, the mucous membranes of the genitourinary tract undergo atrophy resulting in vaginitis, dyspareunia and cyato-urethritis.<sup>16</sup>

### ***Types of UI***

Three types of incontinence are generally known: stress urinary incontinence (SUI); urge urinary incontinence (UII), and mixed urinary incontinence (MUI), which associates the first two.<sup>15</sup> Stress is most common occurring in pure or mixed forms, in 80% women with incontinence defined as the complaint of involuntary leakage on effort or exertion, or on sneezing or coughing.<sup>11,14,16</sup> In a majority of cases urinary incontinence in women is stress-related before the age of 50 and mixed after the age of 50.<sup>17</sup> Despite its high prevalence, little is known about associated risk factors, and the etiology of urinary incontinence is poorly written. Various factors associated with lifestyle are thought to precipitate lower urinary tract symptoms and urinary incontinence, for example, ageing, pregnancy, vaginal delivery, obesity physical forces (exercise, work), smoking, caffeine and fluid intake, constipation, posture.<sup>15,18,19</sup> Urinary incontinence upsets persons' freedom and ability to function in everyday life. It has therefore become a public health problem, with a high economic and human impact.<sup>20</sup> Although interest is growing in the investigation, treatment, and management of incontinence, its prevalence in the general population has so far been based on estimates made in selected groups of people of different ages.<sup>21</sup> Therefore, the following study was carried out with the two objectives; one is to find out the effect of menopause on the occurrence of Urinary Incontinence in women and second is to find out risk factors in post-menopausal women associated with Urinary Incontinence.

## **METHODS**

It was a community based cross sectional study. All the households registered under Urban Health and Training Centre (UHTC) and Rural Health and Training Centre (RHTC), Department of Community Medicine, J. N. Medical College, Aligarh were taken under the sampling frame. The study period was one year i.e. from June, 2012 to May, 2013. All postmenopausal women who are residents of the study areas of UHTC and RHTC were included. Women who did not give consent, those who had not attained menopause, those who were receiving hormone replacement therapy (HRT). Systematic random sampling and proportionate to population size method (PPS). Sample Size estimated after doing a thorough Review of Literature where it was found that the prevalence ranges from 0-60%.<sup>6-10,20-24</sup> Taking a mean prevalence as 30%, relative error of 20% of p. Using Formula:  $N = z^2pq/L^2$ , we got the sample size as 233. Taking design effect of 2 and applying non-response rate of 5 %, we finally took a sample size of 530 post-menopausal women. They were chosen by systematic random sampling with population proportion to sample (PPS) method taking equal samples from rural and urban areas.

### ***Study Tool***

Four-item incontinence questionnaire was used to assess the type of urinary incontinence was defined by an affirmative response to one of four questions:

- During the past 12 months have you experienced urine loss when coughing, sneezing, laughing, or doing some other activity?
- During the past 12 months have you ever had to urinate and then wet yourself before getting to the toilet?
- Do you have to urinate more than eight times in the daytime?
- Do you have to urinate more than three times at night?

Mixed incontinence was defined as an affirmative answer to the first question and to the second, third, or fourth question; stress incontinence as "yes" to only the first question; urge incontinence as "yes" to the second, third, or fourth question ("no" to the first question). No incontinence was defined as "no" to all questions. The severity of stress incontinence was assessed by the frequency of urine loss during performance of ordinary to provocative activities: sneezing and coughing (mild); jumping, running, stair climbing, and carrying heavy things (moderate); dish or hand washing, walking, and daily routines (severe). These questions have been proven to have high specificity and sensitivity for stress and urge incontinence.<sup>21</sup> Severity of UI was assessed by Urinary incontinence severity indicator given by Sandvik et al.<sup>22</sup>

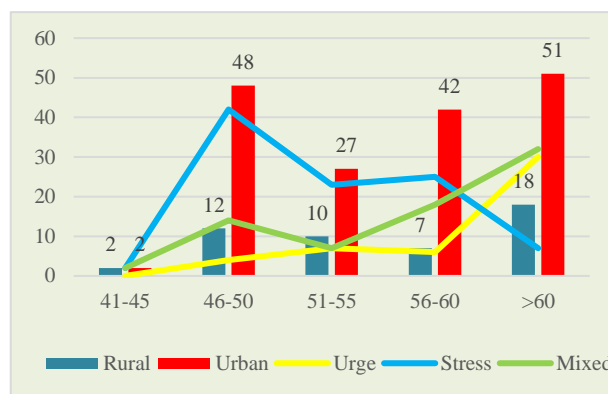
### ***Statistical analysis***

Data was analyzed using Statistical package for social sciences (SPSS) version 23.0 (IBM, Chicago, USA). Descriptive statistics as well as simple proportion were calculated for the data. Chi-square test and logistic regression with 95% confidence interval to find the most important variable affecting diabetes related foot problems were used. The value of  $p < 0.05$  was considered as significant for this study.

## RESULTS

As shown by the Figure 1, the present study shows presence of UI varying over different age groups in the urban and rural areas. Figure 2 shows a bar graph depicting the type of UI stratified according to age groups. Maximum patients were of Mild UI, followed by moderate and severe age groups in all age groups. As the age increases, the number of patients increase except for the age group 51-60 years which is due to the reason that the maximum number of study participants were from this age group. Figure 3 shows the complaints of the patients. More number of patients were from urban areas and they complained of increased frequency of

micturition, pain or burning sensation during micturition, dribbling of urine and urgency of urination in decreasing order.



**Figure 1: Type of urinary incontinence (UI) among the study participants according to area of residence and age (X axis: Age groups, Bar graph showing Area of residence and line diagram showing type of UI, Y axis: Number of study participants).**

**Table 1: Association of type of urinary incontinence (UI) with age and number of years spent in menopause.**

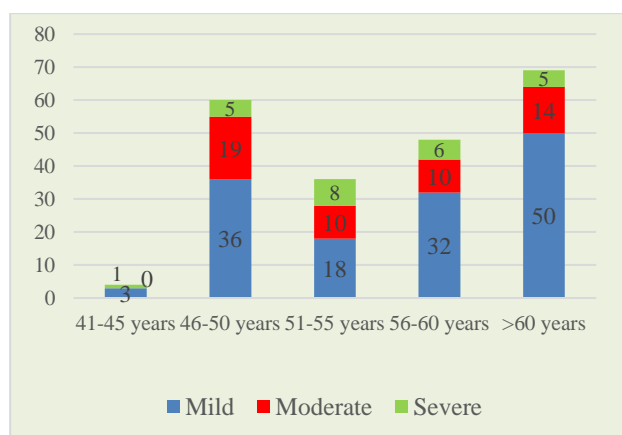
	Urge UI	Stress UI	Mixed UI	UI Absent	Chi square value	p value
<b>Age groups</b>						
41-45 years	0 (0.0)	2 (16.7)	2 (16.7)	8 (66.7)	85.121	0.000
46-50 years	4 (3.5)	42 (36.8)	14 (12.3)	54 (47.4)		
51-55 years	7 (7.1)	23 (23.5)	7 (7.1)	61 (62.2)		
56-60 years	6 (3.8)	25 (15.9)	18 (11.5)	108 (68.8)		
>60 years	30 (20.1)	7 (4.7)	32 (21.5)	80 (53.7)		
<b>Years spent in menopause</b>						
1-5	11 (6.7%)	56 (34.1)	16 (9.8)	81 (49.4)	82.424	0.000
6-10	3 (2.3)	23 (17.6)	11 (8.4)	94 (71.8)		
11-15	4 (4.6)	13 (14.9)	18 (20.7)	52 (59.8)		
>15	29 (19.7)	7 (4.8)	28 (19.0)	83 (56.5)		
Uni-variate analysis of variation: post hoc Bonferroni test between number of years spent in menopause and type of UI using SPSS 23.0						
Years in Menopause (I)	Years in menopause (J)	Mean Difference (I-J)	Standard Error	p value	95% Confidence Interval (CI)	
1-5	6-10	-21.7251*	5.53030	0.001	-36.3710	-7.0792
	11-15	-10.1989	6.25966	0.623	-26.7763	6.3785
	>15	-6.8229	5.36037	1.000	-21.0187	7.3730
6-10	1-5	21.7251*	5.53030	0.001	7.0792	36.3710
	11-15	11.5262	6.52722	0.468	-5.7598	28.8122
	>15	14.9022	5.67052	0.053	-0.1150	29.9194
11-15	1-5	10.1989	6.25966	0.623	-6.3785	26.7763
	6-10	-11.5262	6.52722	0.468	-28.8122	5.7598
	>15	3.3760	6.38388	1.000	-13.5304	20.2824
>15	1-5	6.8229	5.36037	1.000	-7.3730	21.0187
	6-10	-14.9022	5.67052	0.053	-29.9194	0.1150
	11-15	-3.3760	6.38388	1.000	-20.2824	13.5304

Based on observed means. The error term is Mean Square (Error) = 2227.359. \*The mean difference is significant at the 0.05 level.

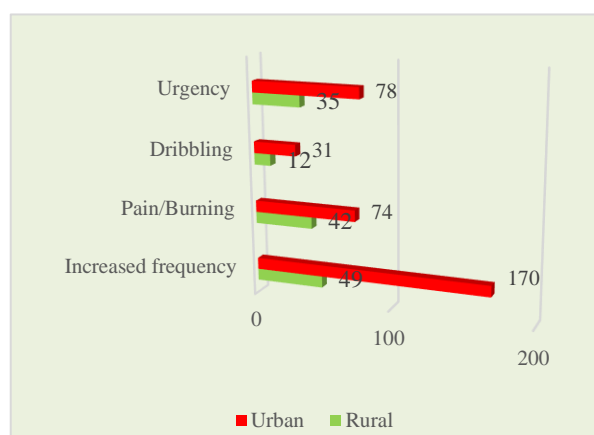
**Table 2a: Socio-demographic profile related to the presence of urinary incontinence (UI) in the study participants.**

Variable	Absent *N (%)	Present *N (%)	Chi square value	p value	Odd's ratio	95% Confidence Interval (Upper limit-Lower Limit)	
<b>Residence</b>							
Rural	216 (81.5)	49 (18.5)	1.139	0.000	0.127	0.085-0.189	
Urban	95 (35.8)	170 (64.2)			1 (ref)		
<b>Religion</b>							
Hindu	172 (67.5)	83 (32.5)	15.739	0.001	0.483	0.067-3.468	
Muslim	133 (50.8)	129 (49.2)			0.970		0.1335-.989
Christian	4 (44.4)	5 (55.6)			1.250		0.118-3.240
Others	2 (50.0)	2 (50.0)			1 (ref)		
<b>Marital status</b>							
Married	241 (71.5)	96 (28.5)	66.014	0.000	0.247	0.168-0.363	
Single	3 (16.7)	15 (83.3)			3.102		0.865-11.11
Widowed	67 (38.3)	108 (61.7)			1 (ref)		
<b>‡ Education status</b>							
Illiterate, Non-formal education	268 (62.8)	159 (37.2)	25.286	0.000	0.334	0.144-0.773	
Primary	12 (27.9)	31 (72.1)			1.452		0.506-4.169
High school	22 (62.9)	13 (37.1)			0.332		0.114-0.965
Intermediate and above	9 (36.0)	16 (64.0)			1 (ref)		
<b>‡ Occupation</b>							
Unemployed/retired/homemaker	263 (61.2)	167 (38.8)	6.439	0.169	1.270	0.114-14.115	
Unskilled/ Semi-skilled	34 (48.6)	36 (51.4)			2.118		0.184-24.437
Skilled	2 (50.0)	2 (50.0)			2.000		0.090-44.350
Clerical/ /Shopkeeper / Farmer	10 (43.5)	13 (56.5)			2.600		0.205-32.904
Professional	2 (66.7)	1 (33.3)			1 (ref)		
<b>Source of Income</b>							
Self	40 (45.5)	48 (54.5)	38.356	0.000	0.400	0.120-1.337	
Spouse	99 (79.8)	25 (20.2)			0.084		0.025-0.283
Children	152 (56.3)	118 (43.2)			0.259		0.081-0.823
Old age pension Schemes	16 (50.0)	16 (50.0)			0.333		0.088-1.256
Others	4 (25.0)	12 (75.0)			1 (ref)		

‡Adapted from Kuppaswamy's socioeconomic status scale 26; \*N= Number of study participants.



**Figure 2: Severity and distribution of urinary Incontinence over increasing age groups in post-menopausal women in the present study (X axis: Age groups (in years), Y axis: Number of patients (N)).**



**Figure 3: Bar graph depicting urinary complaints of the study participants according to area of residence in the present study (X axis: Number of patients (N), Y axis: Complaints).**

Table 1 documents the significant difference found between years spent in menopause and type of UI diagnosed on the basis of history from the patient. It is shown that the maximum number of patient are of Stress UI. As the age increases, the number of cases of Mixed UI increases. On application of Univariate analysis of variation, post hoc Bonferroni test, it is seen that a signification association is seen between. Table 2 (a and b) shows the Socio-demographic profile related to the presence of Urinary Incontinence in the study participants. 49 (18.5%) from the rural areas and 170 (64.2%) from the urban areas were diagnosed with the

condition and the difference was found to be significant with odds of 0.127 (CI 0.085-0.189) of rural against urban area of residence. 129 (49.2%) of the Muslims had UI. Majority of the patients having UI were widowed, illiterate and unemployed/ retired or homemakers with their children as the main source of income. Most of the cases of UI belonged to Modified BG Prasad's Class II having a medium Standard of Life Index. Regarding the residential conditions, 136 (41.7%) of the study participants living in congested localities, 122 (39.0%) of those having overcrowded households and 59 (31.2%) having inadequate ventilation in their households had UI.

**Table 2b: Socio-demographic profile related to the presence of urinary incontinence (UI) in the study participants.**

Variables	Absent *N (%)	Present *N (%)	Chi square value	p value	Odd's ratio	95% Confidence Interval (Upper limit-Lower Limit)
<b>Standard of living index</b>						
Low	138 (72.6)	52 (27.4)	32.236	0.082	0.635	0.380-1.060
Medium	109 (45.8)	129 (54.2)			1.993	1.239-3.207
High	64 (62.7)	38 (37.3)			1 (ref)	
<b>†Socio-economic classification</b>						
I	139 (71.6)	55 (28.4)	66.697	0.000	0.778	0.454-1.334
II	62 (34.8)	116 (65.2)			3.680	2.151-6.294
III	30 (83.3)	6 (16.7)			0.393	0.148-1.049
IV	21 (63.6)	12 (36.4)			1.124	0.488-2.589
V	59 (66.3)	30 (33.7)			1 (ref)	
<b>Locality of home</b>						
Congested	190 (58.3)	136 (41.7)	0.055	0.443	0.958	0.671-1.368
Not Congested	121 (59.3)	83 (40.7)			1 (ref)	
<b>Over-crowding</b>						
Present	191 (61.0)	122 (39.0)	1.731	0.110	1.266	0.891-1.798
Absent	120 (55.0)	97 (44.7)			1 (ref)	
<b>Ventilation</b>						
Present	130 (68.8)	59 (31.2)	12.368	0.000	0.513	0.353-0.746
Absent	181 (53.1)	160 (46.9)			1 (ref)	
<b>   Obesity</b>						
Present	213 (62.5)	128 (37.5)	5.647	0.011	0.647	0.452-0.927
Absent	98 (51.9)	91 (48.1)			1 (ref)	
<b>Smoking</b>						
Present	52 (46.0)	61 (54.0)	9.496	0.002	1.923	1.264-2.925
Absent	259 (62.1)	158 (37.9)			1 (ref)	
<b>Pack-years</b>						
<10 years	4 (50.0)	4 (50.0)	11.191	0.011	1.639	0.404-6.647
10-20 years	28 (41.2)	40 (58.8)			2.342	1.390-3.946
>20 years	20 (54.1)	17 (45.9)			1.393	0.709-2.740
Non-smokers	259 (62.1)	158 (37.9)			1 (ref)	
<b>Tobacco chewing</b>						
Present	59 (54.6)	49 (45.4)	0.971	0.198	1.231	0.804-1.885
Absent	252 (59.7)	170 (40.3)			1 (ref)	

†Modified B. G. Prasad Classification<sup>27</sup>; \*N= Number of study participants; || Body Mass Index= Weight in Kilograms/ (Height in centimeters).

After calculating BMI and assessing with the help of WHO Classification for Asians, Obesity, 128 (37.5%) of the patients having BMI>23 were found to be suffering from UI. This was found to be significant with an odds of 0.647 as compared to the smokers, amongst whom 61 (54.0%) were found to be suffering from UI with an odds of 1.923 (CI 1.264-2.925) for the presence of UI. When the number of pack years were calculated and compared, the value of p was found to be significant. Compared with the non-smokers, the odds for smokers with pack-years of less than 10 years, 10-20 years and more than 20 years were 1.639 (95% CI 0.404-6.647), 2.342 (95% CI 1.390-3.946) and 1.393 (95% CI 0.709-2.740) respectively. Among those women who had the habit of tobacco chewing, 49 (45.4%) had UI. This was not found to be significant.

As shown by Table 3, the increasing number of years spent in menopause had a significant association with the presence of UI in the study population. For 1-5, 5-10, 11-15 and >15 years spent in menopause by a woman, the odd's for the presence of UI was found to be 1.329 (95% CI 0.850-2.078), 0.510 (95% CI 0.309-0.842) and 0.873 (95% CI 0.509-1.496) respectively. Increasing parity has

always been found to be involved in the etiology of UI. In the present study, however significant difference was found in association was found between parity and UI, the odd's were 1.983 (95% CI 1.092-3.601) and 2.00 (95% CI 1.364-2.931) for parity <3 and 3-5 compared to parity more than 5 respectively. Nearly all study subjects had vaginal delivery out of whom 213 subjects (41%) had UI. The odds were 0.463 (95% CI 0.129-1.659). UI was present in 47 (54.0%) of the total subjects who were hypertensive, 17 (25.9%) of those who had Diabetes Mellitus, 77 (92.8%) who had urinary tract infection and 51 (50%) of all those who had the added morbidity of Pelvic Organ Prolapse. Out of these four co-morbidities, significant value of p was found with all except Diabetes Mellitus.

Among the significant ones, on applying Univariate logistic regression, the odd's ratio for the presence of UI was 1.851 (95% CI 1.165-2.941) for Hypertension, 27.565 (95% CI 11.731-64.767) for Urinary Tract Infection and 1.548 (95% CI 1.003-2.388) for the simultaneous presence of Pelvic Organ Prolapse in the women.

**Table 3: Association of urinary incontinence (UI) with patient specific history and examination findings.**

Variable	Absent N (%)	Present N (%)	Chi square value	p value	Odd's ratio	95% Confidence Interval (Upper limit-Lower Limit)
<b>Years spent in menopause</b>						
1-5 years	81 (49.4)	83 (50.6)	15.405	0.002	1.329	0.850-2.078
6-10 years	94 (71.8)	37 (28.2)			0.510	0.309-0.842
11-15 years	52 (59.8)	35 (40.2)			0.873	0.509-1.496
>15 years	83 (56.5)	64 (43.5)			1 (ref)	
<b>Parity</b>						
<3 children	25 (49.0)	26 (51.0)	14.846	0.001	1.983	1.092-3.601
3-5 children	82 (48.8)	86 (51.2)			2.000	1.364-2.931
>5 children	204 (65.6)	107 (34.4)			1 (ref)	
<b>Type of delivery</b>						
All vaginal	307 (59.0)	213 (41.0)	1.467	0.226	0.463	0.129-1.659
Caesarean	4 (40.0)	6 (60.0)			1 (ref)	
<b>Hysterectomy</b>						
Present	4 (5.5%)	69 (94.5%)	98.821	0.000	0.028	0.010-0.079
Absent	307 (67.2%)	150 (32.8%)			1 (ref)	
<b>Hypertension</b>						
Present	40 (46.0)	47 (54.0)	6.926	0.006	1.851	1.165-2.941
Absent	271 (61.2)	172 (38.8)			1 (ref)	
<b>Diabetes Mellitus</b>						
Present	20 (54.1)	17 (45.9)	0.351	0.335	1.225	0.626-2.395
Absent	291 (59.0)	202 (41.0)			1 (ref)	
<b>Urinary tract infection</b>						
Present	6 (7.2)	77 (92.8)	1.074	0.000	27.565	11.731-64.767
Absent	305 (68.2)	142 (31.8)			1 (ref)	
<b>Pelvic organ prolapse</b>						
Present	51 (50.0)	51 (50.0)	3.924	0.031	1.548	1.003-2.388
Absent	260 (60.7)	168 (39.3)			1 (ref)	

## DISCUSSION

The present study shows a greater burden of UI in urban areas, increasing with age, although not linearly in both the areas. Many studies have supported this finding.<sup>23-25</sup> Maximum number of patients of mild Incontinence shows that a major chunk from the burden of disease goes unreported. In a urodynamic clinic, patients attend with two main types of incontinence, stress urinary incontinence and incontinence caused by detrusor instability; these affect 90% of the population at some time in their lives.<sup>11</sup> As seen in the present study, it has been suggested that vaginal delivery is the main contributing factor, possibly because of damage to important muscle tissue or nerves.<sup>19</sup> Although a study documents that incontinence was not related to the type of delivery, and post-natal exercises for the pelvic floor were not beneficial.<sup>1</sup> Our study shows increased risk of UI is increased in postmenopausal women who had undergone hysterectomy compared with women with uteri as shown by other research studies.<sup>18,19</sup> We found a risk of nearly 27 times for UI in the co-presence of UTI (95% CI 11.731-64.767). Jackson et al reported that a history of urinary tract infection (UTI) and measures of general health were associated with UI and women with diabetes reported disproportionately more severe incontinence, BMI confounds the relationship between diabetes and incontinence among healthy postmenopausal women.<sup>3</sup> Although we found a significant relationship in our study with obesity, but the relationship with Diabetes Mellitus was not found to be significant. Similar results were quoted by a multivariate analyses by Brown et al.<sup>20</sup>

Although not life-threatening, urinary incontinence (UI) is a major clinical problem that has a profound effect on quality of life and activities of daily living.<sup>5-7</sup> Stress urinary incontinence and pelvic organ prolapse may coexist.<sup>10, 24-25</sup> Present study showed a 1.5 odds (95% CI 1.003-2.388) of urinary incontinence in the presence of pelvic organ prolapse.

## CONCLUSION

Although urinary incontinence is a common symptom, it is often not reported to doctors, which leads to under treatment. From a public health perspective, there is considerable opportunity to improve women's quality of life by increasing health education about urinary incontinence and its treatment.<sup>2</sup> Stress and urge incontinence are common in postmenopausal women and have different risk factors, suggesting that approaches to risk-factor modification and prevention also might differ and should be specific to types of incontinence.<sup>20</sup> Estimates may not accurately reflect the full scope of urinary incontinence as an embarrassment, and perceived stigmatization may cause women to be reluctant to communicate their concerns to physicians. The substantial psychosocial consequences of urinary incontinence stress the need for more public health and medical attention.

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