

## Is hysterectomy a risk factor for urinary incontinence?

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### ABSTRACT

**Background:** Hysterectomy is the most common gynecological surgery performed. There are few studies evaluating hysterectomy as a risk factor for urinary incontinence. If hysterectomy is found to be a risk factor for developing urinary incontinence, women undergoing hysterectomy can be well informed prior to the procedure regarding the same. The objective of the present study was to study the prevalence of urinary incontinence in post-menopausal women and its relationship to hysterectomy. To evaluate the association of metabolic syndrome, to urinary incontinence.

**Methods:** This study was a prospective cohort study done in Christian Medical College and Hospital, Vellore, Tamil Nadu between December 2016- December 2017. Postmenopausal women both with natural and surgical menopause, were enrolled into the study after an informed consent. The UDI-6 questionnaire was used to assess urinary incontinence. The categorical variables were presented using frequencies and percentages. The comparison of categorical variables was done using Fisher's exact test. The odds ratio and confidence interval were calculated for the prevalence. P value < 0.05 was considered to be statistically significant.

**Results:** A total of 600 women were enrolled into the study with 300 women having attained natural menopause and 300 women with a surgical menopause. The prevalence of urinary incontinence among these post-menopausal women was 46.24%. The prevalence of urinary incontinence amongst the women with natural menopause was 47.3% and amongst the women with surgical menopause was 45% (p = 0.566). Women with metabolic syndrome suffered from urinary incontinence more than their counterparts without metabolic syndrome (55.8% vs. 36%, p < 0.0001).

**Conclusions:** The prevalence of urinary incontinence in the natural menopause and surgical menopause groups was similar, thus proving that hysterectomy is not a risk factor for developing urinary incontinence. However, metabolic syndrome was found to be associated with urinary incontinence.

**Keywords:** Menopause, Metabolic syndrome, Obesity, Urinary incontinence

### INTRODUCTION

Urinary incontinence is defined as involuntary leakage of urine, affecting quality of life. It can either be a stress urinary incontinence, urge urinary incontinence or a mixed type. Urinary incontinence affects women of all ages but is more prevalent in older women. The

worldwide prevalence of urinary incontinence among postmenopausal women is around 30-50%.<sup>1</sup> It is not a life-threatening condition but has a significant impact on the quality of life. Women are now living longer, demanding and deserving a good quality of life. The risk factors for urinary incontinence include age, parity, obesity, menopausal status and hysterectomy, of which

obesity and hysterectomy are modifiable ones. Hysterectomy is one of the most common gynecological surgeries performed worldwide. However, very few studies have evaluated hysterectomy as a risk factor for urinary incontinence.<sup>1-10</sup> The largest data available from the secondary analysis done on women who participated in the Women's health initiative trial (WHI trial), showed a positive association between hysterectomy and urinary incontinence.<sup>11</sup> The Storage and voiding symptoms like frequency, urgency and urge incontinence increases around menopause. The cause for the same may be due to ageing, menopausal status or both.<sup>12</sup> The decreasing levels of estrogen at menopause cause urogenital atrophy and decreased collagen synthesis thereby weakening the pelvic floor.<sup>12</sup> Urinary incontinence after hysterectomy may be due to lasting injury to the pelvic plexus at the time of uterosacral/cardinal ligament complex transection, bladder flap formation or possibly due to disruption of anatomical support to bladder neck and urethra.<sup>11</sup> Our research will aim at providing data on the prevalence of urinary incontinence in postmenopausal women and establish the association between hysterectomy and urinary incontinence. For more practical and objective assessment, standardized questionnaires have been developed, tested and proven in terms of validity, accuracy and correlation with clinical examination. The route of hysterectomy has been evaluated in certain studies as an influencing factor for the incidence of urinary incontinence.<sup>13,14</sup> Some studies have shown a higher incidence of urinary incontinence among women with vaginal hysterectomy while other studies have found no difference. Metabolic syndrome is an independent risk factor for urinary incontinence and there have been various studies proving the same.<sup>15-21</sup> Since metabolic syndrome is widely prevalent among the Asian population, as a secondary outcome, authors looked into the association of metabolic syndrome with urinary incontinence. In this study, authors classified women as having metabolic syndrome as per the International Diabetes Federation (IDF) criteria. According to the new IDF definition, metabolic syndrome is diagnosed if the patient has central obesity, which is defined as waist circumference of  $\geq 80$  cm in females, plus any two of the following:

- Raised triglycerides  $\geq 150$ mg/dl or specific treatment for lipid abnormality
- Reduced HDL cholesterol  $< 50$ mg/dl or specific treatment for lipid abnormality
- Raised blood pressure of systolic BP  $\geq 130$ mm of Hg or diastolic BP  $\geq 85$ mm of Hg or treatment of previously diagnosed hypertension
- Raised fasting plasma glucose with FPG  $\geq 100$ mg/dl or previously diagnosed type 2 diabetes mellitus.

Using standardized questionnaires and physical examination women were diagnosed with urinary incontinence and its correlation with metabolic syndrome was evaluated.

## METHODS

### Study setting

This is a prospective cohort study done in Christian Medical College and Hospital, a tertiary care center in Vellore district of Tamil Nadu, in southern India between December 2016- December 2017. The study was approved by the Institutional review board (IRB) and ethics committee with IRB no. 10432. Postmenopausal women both with natural and surgical menopause attending the Menopause clinic and Female Continence clinic during which time were enrolled into the study after a written informed consent.

### Inclusion criteria

- Women over 45 years who had attained menopause either naturally or surgically.
- Hysterectomy was done for a benign gynecological condition at least 12 months or more prior to the hospital visit.

### Exclusion criteria

- Post-menopausal women less than 45 years of age or who had undergone a hysterectomy for a malignancy.

The urinary distress inventory-6 (UDI 6) questionnaire was used to evaluate the presence of urinary incontinence. Complete pelvic examination was done to look for stress urinary incontinence if any.

### Sample size calculation

As already mentioned above, the global prevalence of urinary incontinence among postmenopausal women varied in different studies from 18% to 50%.<sup>22,23</sup> In a study by Singh et al the prevalence, was 20%.<sup>24</sup> Hence, using the lowest prevalence i.e. 18%, the required sample size to show an odd of about 1.8 times of urinary incontinence across women with hysterectomy and women without a hysterectomy, was calculated to be around 600, with 300 women in each arm, with 80% power and 5% level of significance.

### Statistical analysis

The mean with standard deviation or median with interquartile range were presented for all continuous variables. This summary measure was decided on the basis of distribution of each variable if they followed normal or not. The categorical variables were presented using frequencies and percentages. The comparison of categorical variables was done using Fisher's exact test, odds ratio and confidence interval were calculated for the prevalence. P value  $< 0.05$  was considered to be statistically significant. SPSS 16 was used for statistical analysis.

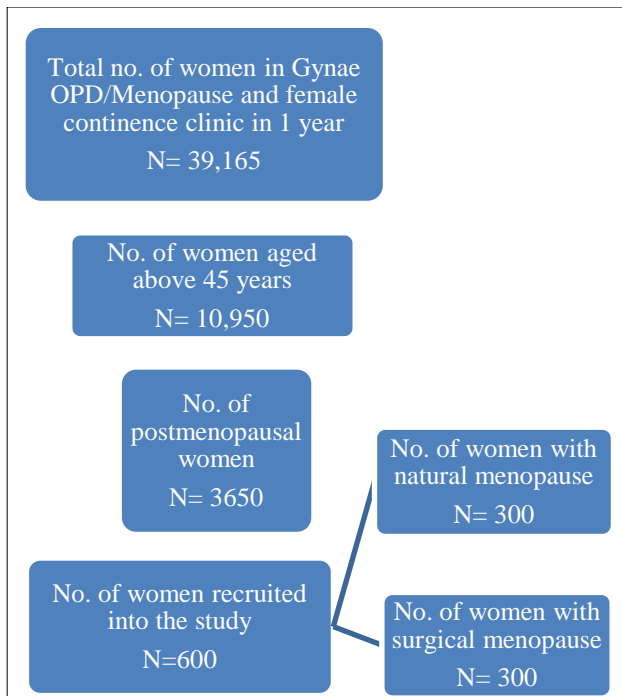


Figure 1: Sample size calculation.

**RESULTS**

A total of 600 women were recruited into the study, with 300 of them having attained natural menopause and the other 300 had undergone hysterectomy.

Table 1: Baseline characteristics of the study population.

Baseline characteristics	Menopause		P value
	Natural (%)	Surgical (%)	
<b>Age</b>			
≤55	137 (45.6)	216 (72)	<0.0001
56-65	118 (39.3)	61 (20.3)	0.01
≥66	45 (15)	23 (7.6)	0.38
<b>Parity:</b>			
Nulliparous	17 (5.6)	9 (3)	0.76
Multiparous	283 (94.3)	291 (97)	0.11
<b>No. of vaginal deliveries</b>			
At least one	265 (88.3)	270 (90)	0.52
None	35 (11.7)	30 (10)	0.82
<b>Instrumental delivery</b>			
Yes	16 (5.3)	16 (5.3)	1
No	284 (94.7)	284 (94.7)	1
<b>BMI</b>			
Underweight	15 (5)	6 (2)	0.75
Normal	102 (34)	105 (35)	0.87
Overweight	119 (39.7)	120 (40)	0.96
Obese	58 (19.3)	68 (22.7)	0.64
Morbidly obese	6 (2)	1 (0.3)	0.86

The baseline characteristics of the women in the two groups are given in Table 1. The two groups had women with similar parity status, number of vaginal deliveries, instrumental deliveries and BMI. However, the surgical menopause group had younger women than the natural menopause group. A total of 277 women experienced urinary incontinence giving a prevalence of urinary incontinence among menopausal women as 46.24% (Figure 2).

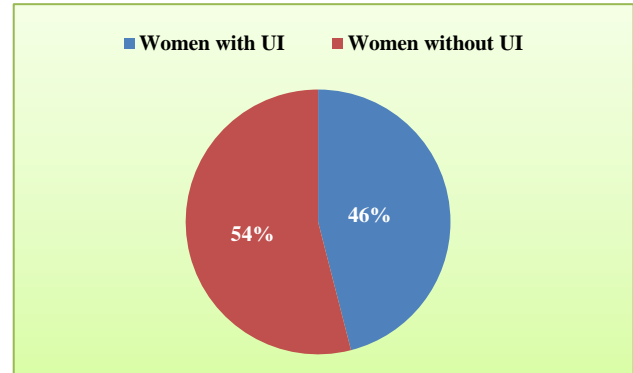


Figure 2: The prevalence of urinary incontinence among postmenopausal women.

142 women with natural menopause and 135 women with surgical menopause experienced urinary incontinence, as shown in Table 2. There was no statistically significant difference in the prevalence of urinary incontinence in the two groups with an odds ratio of 0.91 (95% CI 0.66-1.25).

Table 2: Correlation of urinary incontinence with the type of menopausal status.

Urinary incontinence	Natural menopause	Surgical menopause	p value
Yes	142(47.3%)	135(45%)	0.566
No	158(52.7%)	165(55%)	

42% of women experienced stress urinary incontinence, 15% had urge urinary incontinence and 43% had mixed urinary incontinence as seen in Figure 3.

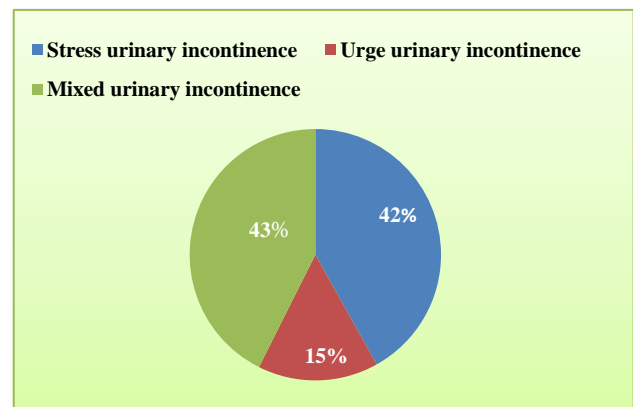


Figure 3: Types of urinary incontinence

In women with natural menopause, 42.3% of women had stress urinary incontinence, 19.7% had urge urinary incontinence and 38% had mixed urinary incontinence. In women with surgical menopause, 41.5% had stress urinary incontinence, 11.1% had urge urinary incontinence and 47.4% had mixed urinary incontinence (Table 3).

**Table 3: Correlation of menopausal status with type of urinary incontinence.**

	SUI (%)	UII (%)	MUI (%)
Natural menopause	42.3	19.7	38
Surgical menopause	41.5	11.1	47.4

46.3% of women who underwent abdominal hysterectomy experienced urinary incontinence (102/220), of which 46% (47/102) had stress urinary incontinence, 8% (8/102) had urge urinary incontinence and 46% (47/102) had mixed urinary incontinence. 42.8% of women who underwent vaginal hysterectomy experienced urinary incontinence (24/56), of which 33.3% (8/24) had stress urinary incontinence, 16.7% (4/24) had urge urinary incontinence and 50% (12/24) had mixed urinary incontinence.

There were 24 women who underwent a laparoscopic hysterectomy, of which 9 of them experienced urinary incontinence (37.5%) (Table 4). In this study authors found that an abdominal or a vaginal route of hysterectomy did not affect the prevalence of urinary incontinence ( $p = 0.63$ ).

**Table 4: Correlation of route of hysterectomy with urinary incontinence.**

Route of hysterectomy (n=300)	Type of incontinence			p
	SUI (%)	UII (%)	MUI (%)	
Abdominal (n=220)	46	8	46	
Vaginal (n=56)	33.3	16.7	50	0.63
Laparoscopic (n=24)	11.1	33.3	55.6	

Prevalence of urinary incontinence increased with increasing BMI and was highest among obese and morbidly obese women and this correlation was statistically significant ( $p = 0.0001$ ) (Table 5).

**Table 5: Correlation of urinary incontinence to BMI.**

BMI	Urinary incontinence		p value
	Yes (%)	No (%)	
Underweight	7 (33.3)	14 (66.7)	0.0001
Normal	75 (36.2)	132 (63.8)	
Overweight	114 (47.6)	125 (52.4)	
Obese	74 (61.8)	52 (38.2)	
Morbidly obese	7 (100)	0	

Authors also looked at metabolic syndrome as a risk factor for urinary incontinence and found that women with metabolic syndrome suffered from urinary incontinence more than their counterparts without metabolic syndrome (55.8% vs 36%,  $p < 0.0001$ ). This correlation was statistically significant (Table 6).

**Table 6: Correlation of urinary incontinence to metabolic syndrome.**

Urinary incontinence	Metabolic syndrome		p value
	Yes (%)	No (%)	
Yes	146 (55.8)	109 (36)	<0.0001
No	116 (44.2)	194 (64)	

## DISCUSSION

Urinary incontinence is a distressing condition though it is not life threatening but severely affects the quality of life. The worldwide prevalence of urinary incontinence among women was found to be around 50% which increased with advancing age.<sup>25</sup> A recent postal survey by Louise et al conducted in Germany and Denmark, included 8000 female participants, showed a prevalence of 48.3% among responders from Germany and 46.4% among responders from Denmark.<sup>25,26</sup> A Chinese study conducted in the Shanghai province had 5467 women older than 20 years of age recruited into the study reported a prevalence of 23.3% for urinary incontinence. Among these women, it was seen that stress urinary incontinence was more prevalent (14%), than urge urinary incontinence (3%) and mixed urinary incontinence (6.3%). In the study by Singh A et al, the prevalence was 20.74% among postmenopausal women with stress urinary incontinence being more prevalent (24.5%).<sup>24</sup>

The prevalence of urinary incontinence among postmenopausal women in this study was 46%, which was similar to the worldwide prevalence of 50%.<sup>25</sup> In this study mixed urinary incontinence predominated (43%) followed by stress urinary incontinence (42%). Studies done by Brown et al showed a prevalence of urinary incontinence among postmenopausal women to be 56%, and Schreiber et al and Liu et al also showed a similar prevalence of around 48%.<sup>23,26,27</sup>

There are various studies done globally evaluating hysterectomy as a risk factor for urinary incontinence with conflicting results. The largest data available on this is the secondary analysis of women who participated in the Women's Health Initiative (WHI) trial.<sup>11</sup> In the WHI study women who reported urinary incontinence after a hysterectomy was higher than in women who had a natural menopause, with an odds ratio of 1.25 (95% CI 1.19, 1.32). Hock et al, found a prevalence of 23.77% among surgical menopause women.<sup>28</sup>

Some studies showed a strong association however some studies showed no increased risk of urinary incontinence



in women with hysterectomy.<sup>2,4,6,9,11,28-30</sup> In the study by Hsieh et al, the prevalence of urinary incontinence in Taiwanese women who had a surgical menopause was 42.38% and 27.96% among women with a natural menopause, thus proving that hysterectomy is a risk factor for urinary incontinence.<sup>6</sup> However, in this study, the prevalence of urinary incontinence among women who had a surgical menopause was 45%, which was similar to women who had a natural menopause (47.3%), showing that hysterectomy is not a risk factor for developing urinary incontinence. Though the prevalence of urinary incontinence in women with a surgical menopause was similar as in the study by Hsieh et al, the prevalence among women with natural menopause was much higher than in Hsieh's study.<sup>6</sup>

The route of hysterectomy has been evaluated as an influencing factor in developing urinary incontinence. In the study by A El et al, there was no difference in the prevalence of urinary incontinence in women who underwent an abdominal or a vaginal hysterectomy, while in the study by Pei et al they found a higher prevalence among women who underwent vaginal hysterectomy.<sup>13,14</sup> In this study authors found no difference in the prevalence of urinary incontinence among women who underwent an abdominal and a vaginal hysterectomy ( $p=0.63$ ).

As a secondary outcome, authors looked into metabolic syndrome as a risk factor for urinary incontinence. The overall global data have shown a positive correlation between metabolic syndrome and urinary incontinence.<sup>19,20,29</sup> Zache et al, evaluated each component of the metabolic syndrome and found that obesity alone had a positive correlation with urinary incontinence, with an odds ratio of 1.09 (95% CI 1.05-1.13).<sup>29</sup>

In this study urinary incontinence was seen in 55.8% of women with metabolic syndrome, which was statistically significant when compared to women without metabolic syndrome with an odds ratio of 2.24 (95% CI 1.59-3.14). In this study, obesity had a positive correlation with urinary incontinence. 126 women were obese ( $BMI>30\text{kg/m}^2$ ) and 7 were morbidly obese ( $>35\text{kg/m}^2$ ). Among these women, 61% experienced urinary incontinence which was statistically significant ( $p<0.0001$ ).

## CONCLUSION

The overall prevalence of urinary incontinence among postmenopausal women is 46%. The prevalence of urinary incontinence in the natural menopause (47.3%) and surgical menopause (45%) groups was similar thus proving that hysterectomy is not a risk factor for developing urinary incontinence (OR 0.91 (95% CI 0.66-1.25)). Obesity was found to be strongly associated with urinary incontinence and more so when the woman was morbidly obese, with a prevalence of 61%. The route of

hysterectomy, whether abdominal or vaginal, did not influence the incidence of urinary incontinence. With increasing BMI, the prevalence of urinary incontinence increased, and it was statistically significant ( $p=0.0001$ ). Metabolic syndrome was also found to be associated with urinary incontinence with a prevalence of urinary incontinence being 55.8% among women with metabolic syndrome which was much higher than in women without a metabolic syndrome (OR 2.24, 95% CI 1.59-3.14).

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