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Prevalence and Associated Co-morbid Conditions of Urinary Incontinence in Frail Elderly Males

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ABSTRACT

Background: Urinary incontinence (UI) is considered one of the main geriatric giants and it is prevalent in elderly frail males as well as females.

Objective: To determine the prevalence and associated co morbid conditions of UI in frail older males.

Subjects and methods: A cross-sectional study was conducted in Ain-Shams Geriatrics Hospital. About 350 elderly males were screened for being frail using the clinical frailty scale. Among them, 120 frail older males were included in our study, they were screened for the presence of UI, its type, duration and severity using the Arabic version of International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form (ICIQ-UI SF). All participants were subjected to comprehensive geriatric assessment with assessment of cognition, depression, functional status, past medical history, associated co morbidities and laboratory investigations.

Results: The study participants had a mean age of 72.6 years, prevalence of UI was 50% and mixed UI was the most prevalent type. UI was significantly associated with older age, higher number of comorbidities, depression, functional impairment, pyuria, congestive heart failure, diabetes, osteoarthritis, chronic kidney disease, benign prostatic hyperplasia and chronic constipation, and only congestive heart failure, pyuria and depression were the independent predictors of UI. There was no significant relationship between type of UI and its severity while a significant relationship was between its duration and severity.

Conclusion: UI is one of the geriatric syndromes that commonly exists among frail older males affecting mood, function and quality of life.

Keywords: Co-morbidities, Frail older males, ICIQ-UI SF, Urinary incontinence.

INTRODUCTION

Urinary incontinence (UI) is major geriatric problem which is defined as: "complaint of involuntary loss of urine" [(1)]. Older people have the highest prevalence of UI, apart from those with special neurological disorders (e.g., spinal cord injury) [(2)]. Its prevalence was 15-30% in community dwelling older adults and 50-80% of older people residing in nursing homes [(3)].

The type distribution of UI differs in the male population from the female population, most likely as a result of anatomical and pathophysiological variations. According to recent studies, urge incontinence (40–80%), mixed forms of urine incontinence (10–30%), and stress incontinence (10%) are the three most prevalent types of UI in men [(4)].

It is believed that UI and frailty have a mutual or bidirectional relationship. Incident UI in people over 65 has been linked to a two-fold increased risk of impairment in daily activities and poor performance on three physical tests, suggesting that new UI may be an early indicator of the onset of frailty because both conditions share similar underlying etiologies like neurological and musculoskeletal pathologies [(5)].

Frail older population are more susceptible to develop UI through interaction between physiological factors including the effect of aging and gender, and pathological factors as associated co-morbidities, medications, and functional impairment. Greater concern is given to co-morbidity, physical dysfunction, polypharmacy and environmental factors due to their significant role in the development of UI in the frail older people [(6)].

Many factors can lead to UI in older population as age, obesity, smoking, many co morbid conditions as diabetes mellitus, congestive heart failure, stroke, depression, benign prostatic hyperplasia, chronic kidney disease, renal stones, recurrent urinary tract infection, degenerative joint disease, constipation, all these comorbidities are common in the older adult population; and UI can be caused by, associated with or worsened by them. One study found that UI is dependently associated with having at least one geriatric condition in 60% of study participants, at least two in 29% and at least three in 13% [(7)].

The frequency of UI in men is around one-third that of women, but it increases to the same rate in fragile older men who are 80 years and older. Males are also underrepresented in clinical trials for behavioural, pharmacological, and surgical treatments [(8)]. This under representation is unfortunate, because results from trials in frail women cannot be directly extrapolated to men for a variety of reasons: differences in comorbidity, differences in caregivers, benign prostatic disease, prostate cancer and risk of retention [(9)].

So the aim of this work is to determine the prevalence and associated co morbidities of UI in frail older males.

PATIENTS AND METHODS

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A cross-sectional study, was conducted in Ain-Shams Geriatrics Hospital, about 350 elderly males who attended our Geriatrics Hospital were screened for being frail using the clinical frailty scale. Among them, 120 frail older males diagnosed by the clinical frailty scale were included in our study along a period of 6 months. Their age was sixty years and above. They were screened for the presence of urinary incontinence, its type and severity using the Arabic version of International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form (ICIQ-UI SF).

Exclusion criteria included patients with mild, moderate or severe dementia, catheterized patients, and terminally ill patients.

All participants were subjected to comprehensive geriatric assessment in the form of history taking, physical examination, routine laboratory investigation with urine analysis and body mass index (BMI), with the following assessment done: Screening for dementia: using the Arabic version of Mini-Mental State Examination (MMSE) [(10)]**.** The MMSE was used for exclusion of older patients with cognitive impairment in our study. Screening for depression: using the Arabic version of Geriatric Depression Scale (GDS-15) [(11)]**.** Functional assessment: by using Activities of Daily Living (ADL) [(12)] and Instrumental Activities of Daily Living (IADL) [(13)]**.**

Diagnosis of frailty was done by the clinical frailty scale [(14)]**.** Assessment of urinary incontinence as the type of incontinence was determined through answering some questions [(15)]: "do you have a strong urge that leakage can occur on the way to toilet? "does leakage occur at moments of increased pressure, for example, when sneezing or coughing?" and "does leakage of few drops occur all the time?". Accordingly, urge incontinence is the involuntary loss of urine associated with urgency. Stress incontinence is the involuntary loss of urine on physical effort or sneezing or coughing. Overflow incontinence is the loss of small amounts of urine in the symptomatic presence of over-distended bladder. Functional/ disability associated incontinence was considered in subjects that have involuntary loss of urine due to functional inability to reach toilet in time due to physical or mental impairment**.** Mixed incontinence, in our study, was the combination of two or more types of incontinence. The Arabic version of International Consultation on Incontinence Questionnaire-Urinary Incontinence; Short Form (ICIQ-UI SF) translated and validated by **Hashim *et al.*** [(16)]**,** was used in the assessment of the severity of UI.

Ethical consent:

Informed consent was taken from every older male participating in this study. The study methodology was reviewed and approved by the Research Review Board of the Geriatrics and Gerontology Department and Ethical Committee of Faculty of Medicine, Ain Shams University. This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Statistical Analysis

Analysis of data was performed by using the 17th version of Statistical Package for the Social Sciences (SPSS). Description of all data was in the form of mean, standard deviation (SD), and range for all quantitative variables and as frequency and percentage for all qualitative variables. Comparison between quantitative variables was done using t-test, Comparison of qualitative variables was done using Chi square test. Correlations (r-value) were assessed by Spearman rank correlation to find relation between different variables. Multivariable techniques including logistic regression were used to evaluate the independent effect of each risk factor of urinary incontinence. $P \leq 0.05$ was considered significant and $P<0.01$ highly significant.

RESULTS

The study participants had a mean age of 72.6 years, with a mean number of 3 comorbidities, about 55% were illiterate, 77% were smokers and 34% were obese. Most of them (87%) were married. Depression screening showed that almost 39% were depressed. Regarding frailty status, 60% were mildly frail, 29% were moderately frail, and almost 11% were severely frail.

Prevalence of UI was 50% and mixed urinary incontinence was the most prevalent type of incontinence among the studied population, followed by urge urinary incontinence (40%, 38.3% respectively) while mean duration of UI among the affected patients was 3.1 years.

In our study we found that participants with urinary incontinence, compared to those without, were significantly older, with higher number of co morbidities, more likely to have pyuria and had higher degree of functional impairment in both ADL, IADL (Table 1).

Table (1): Comparison between participants with and without urinary incontinence as regards demographic characteristics

		Urinary incontinence (UI)				Chi-Square	
		Yes N (60)		No N (60)			
		N	%	N	%	X^2	P-value
Age	**Range**	60-89		60-90		2.848	0.005*
	Mean ±SD	74.550±7.810		70.717±6.904			
Number of comorbidities	**Range**	1-7		1-12		3.431	0.001*
	Mean ±SD	3.831±1.714		2.695±1.878			
						X^2	P-value
Smoking	**Yes**	45	75.00	48	80.00	0.430	0.512
	No	15	25.00	12	20.00		
Obesity	**Yes**	20	33.33	21	35.00	0.037	0.847
	No	40	66.67	39	65.00		
ADL	**Independent**	19	31.67	47	78.33	27.638	<0.001*
	Assisted	31	51.67	12	20.00		
	Dependent	10	16.67	1	1.67		
Total		60	100%	60	100%		
IADL	**Assisted**	38	63.33	56	93.33	15.908	<0.001*
	Dependent	22	36.67	4	6.67		
Total		60	100%	60	100%		
Pyuria	**Positive**	24	40.00	2	3.33	23.764	<0.001*
	Negative	36	60.00	58	96.67		
Total		60	100%	60	100%		
Prostatectomy	**Yes**	4	6.67	4	6.67	0.000	1.000
	No	56	93.33	56	93.33		
Total		60	100%	60	100%		
Spinal surgery	**Yes**	4	6.67	1	1.67	1.878	0.171
	No	56	93.33	59	98.33		
Total		60	100%	60	100%		

UI; Urinary incontinence, **ADL;** Activities of daily living, **IADL;** Instrumental activities of daily living, *: Significant

It was also a significant relationship between UI and presence of depression (positive screening by GDS-15 (Table 2).

Table (2): Relationship between urinary incontinence and depression (as detected by GDS-15)

UI	GDS (15)						Chi-Square	
	Depressed		Not depressed		Total			
	N	%	N	%	N	%	X^2	P-value
Yes	34	72.34	26	35.62	60	50.00	15.424	<0.001*
No	13	27.66	47	64.38	60	50.00		
Total	47	100.00	73	100.00	120	100.00		

GDS (15); Geriatric depression scale (15), **UI;** Urinary incontinence, *: Significant

On comparing associated co morbid conditions we found that congestive heart failure, diabetes, osteoarthritis, chronic kidney disease, benign prostatic hyperplasia and chronic constipation were significantly more prevalent in participants with urinary incontinence, compared to those without incontinence (Table 3)

Table (3): Comparison between participants with and without urinary incontinence as regards associated comorbidities

Comorbidity		UI				Chi-Square	
		Yes N (60)		No N (60)			
		N	%	N	%	X^2	P-value
Hypertension	Yes	32	53.33	27	45.00	0.834	0.361
	No	28	46.67	33	55.00		
Total		60	100%	60	100%		
Chronic liver disease	Yes	7	11.67	15	25.00	3.562	0.059
	No	53	88.33	45	75.00		
Total		60	100%	60	100%		
Congestive heart failure	Yes	15	25.00	5	8.33	6.000	0.014*
	No	45	75.00	55	91.67		
Total		60	100%	60	100%		
Diabetes	Yes	29	48.33	18	30.00	4.232	0.040*
	No	31	51.67	42	70.00		
Total		60	100%	60	100%		
Osteoarthritis	Yes	26	43.33	14	23.33	5.400	0.020*
	No	34	56.67	46	76.67		
Total		60	100%	60	100%		
Lumbar spondylosis	Yes	7	11.67	5	8.33	0.370	0.543
	No	53	88.33	55	91.67		
Total		60	100%	60	100%		
Stroke	Yes	11	18.33	5	8.33	2.596	0.107
	No	49	81.67	55	91.67		
Total		60	100%	60	100%		
Recurrent UTI	Yes	8	13.33	4	6.67	1.481	0.224
	No	52	86.67	56	93.33		
Total		60	100%	60	100%		
Renal stones	Yes	2	3.33	4	6.67	0.702	0.402
	No	58	96.67	56	93.33		
Total		60	100%	60	100%		
Chronic kidney disease	Yes	14	23.33	5	8.33	5.065	0.024*
	No	46	76.67	55	91.67		
Total		60	100%	60	100%		
BPH	Yes	34	56.67	12	20.00	17.062	<0.001*
	No	26	43.33	48	80.00		
Total		60	100%	60	100%		
Chronic constipation	Yes	29	48.33	18	30.00	4.232	0.040*
	No	31	51.67	42	70.00		
Total		60	100%	60	100%		

UI; Urinary incontinence**, UTI;** Urinary tract infections, **BPH;** Benign prostatic hyperplasia, *: Significant

On comparing medication use among our participants we found that use of diuretics, laxatives, antiplatelets, antidepressants, alpha-blockers or alpha reductase inhibitors was significantly more prevalent in participants with UI, compared to those without incontinence (Table 4).

Table (4): Comparison between participants with and without urinary incontinence as regards medication use

Medication		UI				Chi-Square	
		Yes N (60)		No N (60)			
		N	%	N	%	X^2	P-value
ACEIs	**Yes**	17	28.33	10	16.67	2.342	0.126
	No	43	71.67	50	83.33		
Total		60	100%	60	100%		
Diuretics	**Yes**	18	30.00	7	11.67	6.114	0.013*
	No	42	70.00	53	88.33		
Total		60	100%	60	100%		
Laxatives	**Yes**	20	33.33	3	5.00	15.545	<0.001*
	No	40	66.67	57	95.00		
Total		60	100%	60	100%		
Hypoglycemic agents	**Yes**	25	41.67	15	25.00	3.750	0.053
	No	35	58.33	45	75.00		
Total		60	100%	60	100%		
Thyroxine	**Yes**	6	10.00	7	11.67	0.086	0.769
	No	54	90.00	53	88.33		
Total		60	100%	60	100%		
Antiplatelets	**Yes**	22	36.67	9	15.00	7.350	0.007*
	No	38	63.33	51	85.00		
Total		60	100%	60	100%		
Antidepressants	**Yes**	7	11.67	1	1.67	4.821	0.028*
	No	53	88.33	59	98.33		
Total		60	100%	60	100%		
Alpha-blockers	**Yes**	17	28.33	3	5.00	11.760	0.001*
	No	43	71.67	57	95.00		
Total		60	100%	60	100%		
Alpha reductase inhibitors	**Yes**	10	16.67	1	1.67	8.107	0.004*
	No	50	83.33	59	98.33		
Total		60	100%	60	100%		
Anticholinergics	**Yes**	2	3.33	0	0.00	2.034	0.154
	No	58	96.67	60	100.00		
Total		60	100%	60	100%		

UI; Urinary incontinence, **ACEIs;** Angiotensin converting enzyme inhibitors, *: Significant

By using regression analysis to assess predictors of UI we found that the presence of pyuria, congestive heart failure and depression were the only independent predictors of UI (as a dependent factor) among our studied population (Table 5).

Table (5): Regression analysis to assess the predictors of urinary incontinence

	Odds ratio	95.0% C.I.	P-value
Age	0.976	0.897-1.062	0.576
ADL	0.300	0.079-1.147	0.079
IADL	0.700	0.085-5.784	0.741
Pyuria	10.352	1.343-79.778	0.025*
Congestive heart failure	9.669	1.640-57.005	0.012*
Diabetes	0.386	0.006-23.887	0.651
Osteoarthritis	3.436	0.804-14.693	0.096
Chest disease	0.857	0.186-3.945	0.843
Chronic kidney disease	3.215	0.425-24.324	0.258
BPH	1.791	0.328-9.776	0.501
Chronic constipation	0.795	0.151-4.186	0.787
Number of comorbidities	1.738	0.852-3.544	0.129
Diuretics	1.534	0.283-8.297	0.620
Laxatives	5.645	0.562-56.724	0.142
Hypoglycemic agents	7.409	0.136-402.885	0.326
Antiplatelets	2.034	0.457-9.063	0.352
Antidepressants	0.155	0.006-4.198	0.268
Alpha-blockers	3.569	0.394-32.326	0.258
Alpha reductase inhibitors	9.512	0.364-248.333	0.176
GDS	8.298	1.855-37.128	0.006*

ADL; Activities of daily living, **IADL;** Instrumental activities of daily living, **BPH;** Benign prostatic hyperplasia**, GDS;** Geriatric depression scale, *: Significant

Also there was no significant relationship between type of UI and its severity by using (ICIQ-UI SF) among the studied population, while there was a significant relationship between duration of UI and its severity being most severe in those with longer duration of incontinence (Tables 6 ,7).

Table (6): The relationship between type of UI and (ICIQ-UI SF) (Severity of Urinary Incontinence)

Type of UI	ICIQ-UI category										Chi-Square	
	Mild		Moderate		Severe		Very severe		Total			
	N	%	N	%	N	%	N	%	N	%	X^2	P-value
Urge	7	77.78	8	36.36	6	26.09	2	33.33	23	38.33	10.612	0.562
Stress	0	0.00	1	4.55	0	0.00	0	0.00	1	1.67		
Overflow	0	0.00	1	4.55	2	8.70	0	0.00	3	5.00		
Functional	0	0.00	4	18.18	4	17.39	1	16.67	9	15.00		
Mixed	2	22.22	8	36.36	11	47.83	3	50.00	24	40.00		
Total	9	100.00	22	100.00	23	100.00	6	100.00	60	100.00		

ICIQ; International Consultation on Incontinence Questionnaire, **UI;** Urinary incontinence

Table (7): The relationship between duration of UI and (ICIQ-UI SF) (Severity of Urinary Incontinence)

ICIQ-UI category	UI Duration		ANOVA	
	Range	Mean±SD	F	P-value
Mild	1-5	1.667±0.411	3.460	0.022*
Moderate	0.5-10	3.114±0.631		
Severe	0.5-7	3.283±0.516		
Very severe	3-7	5.167±1.134		

ICIQ; International Consultation on Incontinence Questionnaire, **UI;** Urinary incontinence, *: Significant

DISCUSSION

Since UI is multifactorial in nature - being linked to lower urinary tract function , physical functioning, cognitive status, psychological distress, mobility, medical comorbidities, and medication use - it is a significant and extremely frequent health concern in older persons [17].

The prevalence of UI among our studied population was 50% (60 out of 120 frail older males). The mean duration of UI among the affected patients was 3.1 years. Similar to our study, where the entire study population were frail subjects, **Silva and D'Elboux**[18] recruited prefrail and frail individuals, and showed a UI prevalence rate of 65%. Similarly, **Xu and Kane**[19] study enrolled residents in nursing homes in Minnesota, who were more likely to be frail. They reported a UI prevalence rate of 65.8%.

This differs from the figure reported by **Wang *et al.*** [20] in which the prevalence was 19% among a population of 440 males aged 80 years old and more. The forementioned study recruited community-dwelling older persons including frail and non-frail individuals, which may explain the lower reported UI prevalence rate compared to our study.

As regards the type of UI, our study found that mixed UI was the most prevalent type of UI among the studied population (40% of participants with UI), followed by urge UI (38.3%) however most of the studies have shown that urge UI is the most prevalent type of UI among older male [21-22]**.** As for our study, mixed UI was statistically analysed as the combination of 2 or more types of UI. In most cases, it was actually the combination of urge and functional UI. The large percentage of mixed UI was expected in this frail cohort with high mean age, impaired functional level and associated predisposing factors as associated comorbidities and medications.

In our study we found that subjects with UI were significantly older, expressing more depressive symptoms, had higher degrees of functional impairment in both ADLs and IADLs, and were more likely to have pyuria, in addition, incontinent subjects had significantly increased associated comorbidities. This goes with **Siroky** in his study, which investigated genitourinary changes with advancing age as reduced bladder capacity, increased uninhibited contractions, decreased urinary flow rate, and increased post-void residual urine volume, which can explain the association between UI and advancing age [23]. Also significant relationship between UI and depression was observed in our study as were observed in **Wang *et al.*** [20] and **Chen *et al.*** [24] in their studies, which support same results.

The current study showed that ADL and IADL were significantly affected in patients with UI compared with those without incontinence. This goes in line with **Chen *et al.*** [24] in their study. It was proposed that UI and functional decline are related through different pathways: UI may predispose to disability due to increased risk of falls and fractures, functional impairment may lead to UI due to decreased ability to reach the toilet, both UI and functional decline share common underlying aetiologies (as neurological and cardiovascular), UI and disability have the multifactorial framework of geriatric syndromes, and UI may act as an early indicator of frailty [25]**.**

Presence of pyuria was more prevalent in incontinent subjects in our study. It remained significant after regression analysis which showed that pyuria was among the independent predictors of UI (OR=10.35). This was in agreement with **Landi *et al.*** [17] **and Shamliyan *et al.*** [26]**.**

In the current study, there was a positive relationship between UI and number of co-morbidities, where participants with UI had significantly higher number of comorbidities. Incontinent group had mean number of 3.8 comorbidities this was confirmed also by **Vetrano *et al.*** [27]**,** in their study.

UI in the current study was associated with several co morbid conditions as the prevalence rates of congestive heart failure (CHF), diabetes mellitus (DM), osteoarthritis, benign prostatic hyperplasia (BPH), chronic constipation and chronic kidney disease (CKD), which were significantly higher in participants with UI, compared to those without UI. This goes with the results shown from different studies to confirm such associations [28-30].

Regarding the relation of medications use with UI, the current study showed that use of diuretics, antidepressants, laxatives, alpha-blockers, alpha reductase inhibitors, or antiplatelets was significantly more prevalent in participants with UI, compared to those without UI. This comes in agreement with **Finkelstein**[31] who found increased risk of UI among men using diuretics (OR=2.11), antidepressants (OR=1.79), and laxatives (OR=2.34). On the contrary, some studies found that use of antidepressants was associated with a decreased prevalence of UI [32] and others failed to find an association [33]**.** Regarding laxatives, **Blekken *et al.*** [34], concluded that UI was associated with constipation and laxative use as shown in our study, while the use of alpha blockers has shown to precipitate stress UI, but mainly in females [35].

This study is considered one of the few studies that addressed UI in frail older males. According to the forementioned findings, UI is prevalent geriatric syndrome which is associated and affected by multiple risk factors of wide diversity including advanced age, functional impairment, frailty status, several co-morbid conditions and depressive symptoms, this emphasizes the multi-dimensional approach to these patients regarding assessment and management.

The limitation of this study can be seen in the absence of a control non-frail group, which limited the study of the relationship between UI and frailty.

CONCLUSION

Urinary incontinence is one of the geriatric syndromes that commonly exists among frail older males affecting mood, function and quality of life.

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