

Urinary Incontinence and its impact on Quality of Life among Frail Elderly Males

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Abstract

Background: Urinary incontinence (UI) is a major geriatric problem, that is underestimated in frail older males.

Aim: To identify risk factors of impaired QOL among frail older males with UI.

Methods: A cross-sectional study including 120 frail older males attending Geriatric Hospital at Ain Shams University Hospitals. Sixty subjects had UI. Participants were tested by the Arabic version of International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form (ICIQ-UI SF), the American Urological Association symptom index (AUA-SI) and the Arabic version of Incontinence Impact Questionnaire; short form (IIQ-7 SF) to measure the severity of UI, lower urinary tract symptoms and health-related QOL respectively.

Results: Mixed form of UI (40%) was the most prevalent type followed by urge UI (38.3%). Prevalence of depression was 56.67%. More than 90% expressed emotional health affection and more than two thirds had difficulty praying, travelling and performing physical and social activities. Most of the domains were affected in patients with mixed or urge urinary incontinence, compared with other types of UI. A positive relationship was found between severity of UI symptoms and severity of QOL impairment in all domains. UI-associated QOL was positively affected by social isolation, depression, functional dependence, advanced frailty status, severe UI, long UI duration, presence of chronic constipation and using alpha-blockers. Social isolation was the only independent predictor for decreased UI-associated QOL.

Conclusion: UI exerts negative impact on QOL of frail older males through social and psychological factors, functional level, frailty status, comorbidity, medication use, and severity and duration of UI symptoms.

Keywords: urinary incontinence, frail older males, QOL

Background

Urinary incontinence (UI) is one of the geriatric giants that affects 15-30% of community dwelling older adults and up to 80% of nursing homes residents (*Prud'homme et al., 2018*) [1].

Older population is a rapidly growing population that encompasses wide range of individuals varying in physical, functional and cognitive capabilities (*Fonda et al., 2005*) [2].

Frail elderly represent a clinical phenotype characterized by reduced physiological reserve and high vulnerability to morbidity and mortality with acute stressors (*Kojima et al., 2019*) [3]. They usually have multiple comorbidities and functional dependence (*Fonda et al., 2005*) [2].

UI is a common condition in frail older people due to the presence of multiple interacting factors that precipitate loss of continence and aggravate urinary symptoms (*Wagg et al., 2014*) [4].

The perspectives of frail older people regarding health-related QOL include physical (health) and

psychological wellbeing, self-dependence and social interaction (*Kwong et al., 2014*) [5] (*Puts et al., 2006*) [6]. It was found that prevalent and incident UI exert negative influence on different domains of QOL in frail older individuals (*DuBeau et al., 2006*) [7]. This may support the concept which states that improving UI enhances health-related QOL and decreases adverse outcomes of UI as falls, pressure ulcers and urinary tract infections. Some authors consider that the use of disease specific tools to assess QOL is more sensitive than general tools to find out the aspects of this disease (*Dugger, 2010*) [8].

UI had long been studied in females, meanwhile it is a prevalent distressing problem among older males that increases with advancing age (*Anger et al., 2006*) [9]. Elderly males may have variable bothersome lower urinary tract symptoms (LUTS) including UI, which are all forms of bladder dysfunction (*Griebling, 2008*) [10]. In the current study, we are trying to focus on this understudied group i.e. frail elderly incontinent males and to analyze the means by which UI can affect health-related QOL by using a disease-specific tool in

evaluating quality of life.

Aim of the study:

The aim of the study was to determine the impact of type, severity and duration of UI symptoms on different domains of QOL, and to define the predictors of impaired UI-associated QOL among frail older males in the Geriatric Medicine Hospital at Ain Shams University Hospitals.

MATERIALS AND METHODS

The current study is a cross-sectional study. A total of 120 frail elderly males attending Geriatric Hospital (outpatient clinics and inpatient department) at Ain Shams University Hospitals were examined along a period of 6 months. Sample size was calculated using Pass program, setting the type-1 error (α) at 0.05 and the confidence interval width at 0.1. Result from previous study (Prudhomme et al., 2017) showed that 6.6% of males had a lifetime prevalence of Urinary incontinence. Calculation according to these values produced a sample size of 120 males, taking in account 20% drop out rate. Amongst them, 60 patients had UI symptoms and continued the assessment. Inclusion criteria were: frail males aged 60 years or more. We excluded patients with dementia, subjects who were unwilling to participate in the study, catheterized patients and non-frail patients. Assessment included the Mini-Mental State Examination; MMSE (Folstein et al., 1975) [12], Arabic version (Elokl et al., 2002) [13] for exclusion of cognitively impaired subjects.

Diagnosis of frailty was done using the clinical frailty scale (CFS) (Rockwood et al., 2005) [14]. The CFS ranges from 1 (very fit) to 9 (terminally ill) based on descriptors and pictographs of activity and functional status (Juma et al., 2016) [15]. Patients were classified into 3 categories: mild, moderate and severely frail.

Data collected from participants were: background characters as age, education level, special habits of medical importance such as smoking and alcohol intake. Comprehensive Geriatric Assessment was done, through a thorough medical history including comorbid conditions, medications review and assessment of UI regarding type, duration and severity. Baseline functional level was assessed by using activities of daily living (ADL) (Katz et al., 1963) [16] and instrumental activities of daily living (IADL) (Lawton and Brody, 1969).

Screening for depression was done through using the Arabic version (Shehata et al., 1998) [18] of geriatric depression scale (GDS-15) (Sheikh and Yesavage, 1986) [19]. The scale comprises 15 Yes/No questions, the subject is considered to be depressed if the final score is ≥ 5 .

The type of incontinence was determined according through answering some questions (Lagro-Janssen et al., 1995) [20]: "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 is considered in subjects that have involuntary loss of urine due to functional inability to reach toilet in time due to physical or mental impairment (D'Ancona et al., 2019) [21]. Mixed incontinence, in our study, is 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) (Hashim et al., 2006) [22] is used in the assessment of the severity of UI. It comprises three-scored items to assess the frequency of urinary incontinence (score 0-5), the amount of urinary incontinence (score 0-6), and its impact on the individual's QOL (score 0-10). There is an unscored self-diagnostic item to assess the perceived causes of leakage. The score is obtained by adding the scores from the three-scored items together, to give a score range between zero and 21. The higher the score the greater the severity: mild (1-5), moderate (6-12), severe (13-18), very severe (19-21).

The American Urological Association symptom index (AUA-SI) was used to assess the severity of lower urinary tract symptoms (LUTS) symptoms. It includes 7 questions covering frequency, nocturia, weak urinary stream, hesitancy, intermittence, incomplete emptying and urgency (Barry et al., 1992) [23]. Every question measures the frequency of symptoms; none (0), less than one time in 5 (1), less than half the time (2), about half the time (3), more than half the time (4) or almost always (5). By adding scores of the 7 questions together the score ranges from 0 to 35, categorized into: mild (score 0-7), moderate (score 8-19) or severe (score 20-25).

The health-related QOL is measured by using the Arabic version of Incontinence Impact Questionnaire; short form (IIQ-7 SF) (El-Azab and Mascha, 2009) [24]. The (IIQ-7) questionnaire is a seven-item questionnaire designed to assess different domains of QOL impairment. The original IIQ-7 questionnaire consists of seven items covering four domains: physical activities, social relationships, travel, and emotional health. In Arabic version inquiring about prayer was added, inquiring about entertainment was deleted, and inquiring about social activities was modified to suit Egyptian culture. It has a four-point rating scale: 0=not at all, 1= slightly, 2= moderately, and 3= greatly; the higher the score the poorer QOL (El-Azab and Mascha, 2009) [24].

The Charlson comorbidity index (Charlson et al., 1987) [25] is used for assessing the burden of co-

morbidity. It consists of 17 comorbidity categories. Each comorbidity category is presented by a numerical weight based on relative 1-year mortality risk, and the sum of these weights gives a total comorbidity score (*Quan et al., 2011*) [26].

Statistical analysis:

The collected data were coded, tabulated, and statistically analyzed using IBM SPSS statistics (Statistical Package for Social Sciences) software version 22.0, IBM Corp., Chicago, USA, 2013. Quantitative data, e.g., age, weight, will be presented as mean and standard deviation.

Frequency and percentages are presented for all qualitative variables. Comparison between quantitative variables was done using t-test and 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. While positive r-value indicates direct correlation, negative r-value indicates inverse relationship between the variables. Significance level was determined according to P value (Probability): $P > 0.05$ insignificant, $P \leq 0.05$ significant and $P < 0.01$ highly significant.

Results

The research population comprised 120 males meeting frailty criteria, 50% of them reported urinary incontinence, those represented our study group.

The basic characteristics of the study population are shown in [Table \(1\)](#). The participants had a mean age of 74.55 years, 53.33% were illiterate, 75% were smokers and 33.33% were obese. Most of them (80%) were married. Regarding frailty status as assessed by CFS, 38.33% were mildly frail, 43.43% were moderately frail, and 18.33% were severely frail. By using GDS, 56.67% of participants were found depressed.

[Table \(2\)](#) shows the distribution of urinary incontinence types among the study population, the most prevalent type found was mixed UI (40%) followed by urge UI (38.3%).

Many domains of health-related QOL found to be affected in the study group, as shown in [Table \(3\)](#). Nearly 93% of incontinent subjects expressed emotional distress in the form of sense of depression and hopelessness, and 90% had sense of anxiety or frustration.

Regarding social activities, 86.6% experienced impairment of social participation and 80% reported decreased physical activities. About 85% of subjects reported a negative impact of UI on praying, while 81.6% reported difficulty travelling for quite long duration i.e.; more than 30 minutes. About 68%

reported affection of ability to do housekeeping. Most of these domains were affected in patients with mixed or urge urinary incontinence, compared with other types of urinary incontinence including praying ($P=0.024$), housekeeping ($P=0.041$), social activities ($P=0.009$), travelling ($P=0.002$), and emotional health; in the form of depression/hopelessness ($P=0.02$).

Incontinent individuals expressing severe symptoms of UI as detected by high ICIQ-UI score show significant affection of quality of life. [Table \(4\)](#) showing relatively high ICIQ-UI scores were associated with severe impairment of all domains: praying ($P=0.002$), housekeeping ($P<0.001$), physical recreational activities ($P<0.001$), social activities ($P<0.001$), travelling ($P=0.013$), feeling of anxiety/frustration ($P=0.001$), and feeling of depression/hopelessness ($P<0.001$).

Participants with significant LUTS symptoms (as detected by AUA-SI) showed significant affection of 2 QOL domains (praying, emotional health; in the form of depression/hopelessness) as shown in [table \(5\)](#). By qualitative assessment, all domains of QOL were affected in subjects having mild to moderate LUTS, but the quantitative comparative analysis showed a positive correlation between severity of LUTS and severity of QOL affection regarding praying ($P=0.005$) and sense of depression ($P=0.002$).

A positive correlation was detected between duration of UI and some domains of quality of life. As shown in [table \(6\)](#) physical activities ($P=0.001$), social activities ($P=0.001$) and travelling ($P=0.015$) were the most to be affected.

[Table 7 \(a and b\)](#) represent a bivariate ANOVA analysis for IIQ-7 score as the dependent variable to determine risk factors of decreased UI-associated QOL. A significant positive relationship was found between multiple factors and high scores of IIQ-7: social isolation ($P<0.001$), depression ($P=0.003$), functional dependence by ADL and IADL ($P=0.002$, $P=0.001$), advanced frailty status ($P=0.002$), severe UI symptoms ($P<0.001$), severe LUTS ($P=0.004$), long durated UI symptoms ($P=0.001$), chronic constipation ($P=0.021$) and using alpha-blockers ($P=0.013$).

[Table \(8\)](#) shows that social isolation is the only independent predictor for decreased UI-associated QOL, by multivariate linear regression analysis for IIQ-7 score as the dependent variable.

Table (1): Baseline Characteristics of the Studied Population:

Age (years)	Range	60-89	
	Mean ±SD	N	%
Education	Illiterate	32	53.33
	Educated	28	46.67
Smoking	Yes	45	75.00
	No	15	25.00
Obesity	Yes	20	33.33
	No	40	66.67
Marital state	Married	48	80.00
	Not Married	12	20.00
CFS	Mild	23	38.33%
	Moderate	26	43.43%
	Severe	11	18.33%
GDS	Depressed	34	56.67%
	Not depressed	26	43.33%
ADL	Independent	19	31.66%
	Assisted	31	51.66%
	Dependent	10	16.66%
IADL	Assisted	38	63.33%
	Dependent	22	36.66%

Obesity; defined as BMI of 30 or more, CFS; Clinical Frailty Scale, GDS; Geriatric depression scale, ADL; Activities of daily livings, IADL: Instrumental activities of daily living.

Table (2): The Prevalence of Different Types of Urinary Incontinence among the Studied Population

Type of UI	N	%
Urge	23	38.33
Stress	1	1.67
Overflow	3	5.00
Functional	9	15.00
Mixed	24	40.00
Total	60	100.00

UI; Urinary incontinence

Table (3): The Relationship between Types of Urinary Incontinence and QOL:

IIQ	Type of UI	IIQ										Chi-Square	
		Never		Mild		Moderate		Severe		Total		X ²	P-value
		N	%	N	%	N	%	N	%	N	%		
IIQ-1	Urge	7	77.78	10	50.00	1	6.25	5	33.33	23	38.33	23.432	0.024*
	Stress	0	0.00	0	0.00	1	6.25	0	0.00	1	1.67		
	Overflow	0	0.00	0	0.00	2	12.50	1	6.67	3	5.00		
	Functional	1	11.11	0	0.00	5	31.25	3	20.00	9	15.00		
	Mixed	1	11.11	10	50.00	7	43.75	6	40.00	24	40.00		
IIQ-2	Urge	9	47.37	12	48.00	0	0.00	2	28.57	23	38.33	21.711	0.041*
	Stress	1	5.26	0	0.00	0	0.00	0	0.00	1	1.67		
	Overflow	0	0.00	3	12.00	0	0.00	0	0.00	3	5.00		
	Functional	3	15.79	0	0.00	4	44.44	2	28.57	9	15.00		
	Mixed	6	31.58	10	40.00	5	55.56	3	42.86	24	40.00		
IIQ-3	Urge	8	66.67	11	37.93	1	11.11	3	30.00	23	38.33	14.628	0.262
	Stress	0	0.00	1	3.45	0	0.00	0	0.00	1	1.67		
	Overflow	0	0.00	3	10.34	0	0.00	0	0.00	3	5.00		
	Functional	2	16.67	2	6.90	3	33.33	2	20.00	9	15.00		
	Mixed	2	16.67	12	41.38	5	55.56	5	50.00	24	40.00		
IIQ-4	Urge	5	62.50	11	45.83	0	0.00	7	50.00	23	38.33	26.566	0.009*
	Stress	1	12.50	0	0.00	0	0.00	0	0.00	1	1.67		
	Overflow	0	0.00	3	12.50	0	0.00	0	0.00	3	5.00		
	Functional	1	12.50	3	12.50	4	28.57	1	7.14	9	15.00		
	Mixed	1	12.50	7	29.17	10	71.43	6	42.86	24	40.00		
IIQ-5	Urge	5	45.45	12	60.00	1	5.88	5	41.67	23	38.33	31.236	0.002*
	Stress	1	9.09	0	0.00	0	0.00	0	0.00	1	1.67		
	Overflow	0	0.00	3	15.00	0	0.00	0	0.00	3	5.00		
	Functional	3	27.27	2	10.00	4	23.53	0	0.00	9	15.00		
	Mixed	2	18.18	3	15.00	12	70.59	7	58.33	24	40.00		
IIQ-6	Urge	5	83.33	10	41.67	4	22.22	4	33.33	23	38.33	13.045	0.366
	Stress	0	0.00	1	4.17	0	0.00	0	0.00	1	1.67		
	Overflow	0	0.00	1	4.17	2	11.11	0	0.00	3	5.00		
	Functional	0	0.00	2	8.33	5	27.78	2	16.67	9	15.00		
	Mixed	1	16.67	10	41.67	7	38.89	6	50.00	24	40.00		
IIQ-7	Urge	4	100.00	9	45.00	4	22.22	6	33.33	23	38.33	24.096	0.020*
	Stress	0	0.00	1	5.00	0	0.00	0	0.00	1	1.67		
	Overflow	0	0.00	1	5.00	2	11.11	0	0.00	3	5.00		
	Functional	0	0.00	0	0.00	7	38.89	2	11.11	9	15.00		
	Mixed	0	0.00	9	45.00	5	27.78	10	55.56	24	40.00		

IIQ-1; Praying, IIQ-2; Housekeeping, IIQ-3; Physical recreational activities, IIQ-4; Social activities, IIQ-5; Travelling. IIQ-6; Anxiety/Frustration, IIQ-7; Depression/Hopelessness

Table (4): Relationship between Severity of Urinary Incontinence (ICIQ-UI) and QOL:

		ICIQ-Total score				ANOVA	
		N	Mean	±	SD	F	P-value
IIQ-1	Never	9	7.889	±	4.457	5.791	0.002*
	Mild	20	10.250	±	4.983		
	Moderate	16	12.313	±	4.715		
	Severe	15	15.467	±	4.612		
IIQ-2	Never	19	9.579	±	3.948	7.385	<0.001*
	Mild	25	10.520	±	5.636		
	Moderate	9	15.333	±	3.082		
	Severe	7	17.429	±	3.309		
IIQ-3	Never	12	8.167	±	4.448	11.101	<0.001*
	Mild	29	10.655	±	4.857		
	Moderate	9	12.889	±	3.516		
	Severe	10	18.200	±	2.573		
IIQ-4	Never	8	7.750	±	4.803	9.215	<0.001*
	Mild	24	10.125	±	4.543		
	Moderate	14	11.786	±	4.209		
	Severe	14	16.786	±	4.300		
IIQ-5	Never	11	9.727	±	5.293	3.896	0.013*
	Mild	20	11.150	±	5.851		
	Moderate	17	10.765	±	3.784		
	Severe	12	16.000	±	4.348		
IIQ-6	Never	6	7.500	±	6.221	6.193	0.001*
	Mild	24	9.625	±	5.037		
	Moderate	18	14.278	±	3.997		
	Severe	12	14.333	±	4.185		
IIQ-7	Never	4	4.750	±	1.258	13.292	<0.001*
	Mild	20	8.500	±	4.407		
	Moderate	18	13.278	±	3.893		
	Severe	18	15.389	±	4.434		

ICIQ; International Consultation on Incontinence Questionnaire, UI; Urinary incontinence, IIQ-1; Praying, IIQ-2; Housekeeping, IIQ-3; Physical recreational activities, IIQ-4; Social activities, IIQ-5; Travelling, IIQ-6; Anxiety/Frustration, IIQ-7; Depression/Hopelessness

Table (5): The Relationship between AUA-SI score and QOL:

		AUA-SI Score						Chi-Square	
		Mild		Moderate		Total		X ²	P-value
		N	%	N	%	N	%		
IIQ-1	Never	8	15.38	1	12.50	9	15.00	12.933	0.005*
	Mild	19	36.54	1	12.50	20	33.33		
	Moderate	16	30.77	0	0.00	16	26.67		
	Severe	9	17.31	6	75.00	15	25.00		
IIQ-2	Never	18	34.62	1	12.50	19	31.67	6.428	0.093
	Mild	22	42.31	3	37.50	25	41.67		
	Moderate	8	15.38	1	12.50	9	15.00		
	Severe	4	7.69	3	37.50	7	11.67		
IIQ-3	Never	12	23.08	0	0.00	12	20.00	5.570	0.134
	Mild	26	50.00	3	37.50	29	48.33		
	Moderate	6	11.54	3	37.50	9	15.00		
	Severe	8	15.38	2	25.00	10	16.67		
IIQ-4	Never	8	15.38	0	0.00	8	13.33	3.338	0.342
	Mild	22	42.31	2	25.00	24	40.00		
	Moderate	11	21.15	3	37.50	14	23.33		
	Severe	11	21.15	3	37.50	14	23.33		
IIQ-5	Never	10	19.23	1	12.50	11	18.33	2.153	0.541
	Mild	18	34.62	2	25.00	20	33.33		
	Moderate	13	25.00	4	50.00	17	28.33		
	Severe	11	21.15	1	12.50	12	20.00		
IIQ-6	Never	6	11.54	0	0.00	6	10.00	5.673	0.129
	Mild	22	42.31	2	25.00	24	40.00		
	Moderate	16	30.77	2	25.00	18	30.00		
	Severe	8	15.38	4	50.00	12	20.00		
IIQ-7	Never	4	7.69	0	0.00	4	6.67	14.808	0.002*
	Mild	20	38.46	0	0.00	20	33.33		
	Moderate	17	32.69	1	12.50	18	30.00		
	Severe	11	21.15	7	87.50	18	30.00		

AUA-SI; American Urological Association Symptom Index, IIQ-1; Praying, IIQ-2; Housekeeping, IIQ-3; Physical recreational activities, IIQ-4; Social activities, IIQ-5; Travelling. IIQ-6; Anxiety/Frustration, IIQ-7; Depression/Hopelessness

Table (6): Relationship between Duration of Urinary Incontinence and QOL:

		UI Duration				ANOVA	
		N	Mean	±	SD	F	P-value
IIQ-1	Never	9	2.722	±	2.279	0.365	0.778
	Mild	20	3.050	±	2.389		
	Moderate	16	3.625	±	2.187		
	Severe	15	3.100	±	2.037		
IIQ-2	Never	19	3.026	±	2.300	2.305	0.087
	Mild	25	2.540	±	2.096		
	Moderate	9	4.222	±	2.048		
	Severe	7	4.429	±	1.813		
IIQ-3	Never	12	1.875	±	1.539	5.854	0.001*
	Mild	29	2.845	±	2.228		
	Moderate	9	5.333	±	1.732		
	Severe	10	3.700	±	1.767		
IIQ-4	Never	8	2.125	±	1.808	6.653	0.001*
	Mild	24	2.125	±	2.060		
	Moderate	14	4.500	±	1.605		
	Severe	14	4.214	±	2.082		
IIQ-5	Never	11	2.636	±	2.111	3.780	0.015*
	Mild	20	2.150	±	2.289		
	Moderate	17	3.941	±	1.713		
	Severe	12	4.250	±	2.050		
IIQ-6	Never	6	2.583	±	2.333	2.663	0.057
	Mild	24	2.542	±	2.141		
	Moderate	18	3.250	±	2.225		
	Severe	12	4.583	±	1.730		
IIQ-7	Never	4	2.125	±	2.016	1.789	0.160
	Mild	20	2.450	±	2.276		
	Moderate	18	3.528	±	2.317		
	Severe	18	3.833	±	1.855		

IIQ-1; Praying, IIQ-2; Housekeeping, IIQ-3; Physical recreational activities, IIQ-4; Social activities, IIQ-5; Travelling. IIQ-6; Anxiety/Frustration, IIQ-7; Depression/Hopelessness

Table (7a): Bivariate ANOVA analysis for IIQ-7 score:

		IIQ-7 Total score				T-Test or ANOVA	
		N	Mean	±	SD	T or F	P-value
Obesity	No	40	9.850	±	5.294	-1.155	0.253
	Yes	20	11.450	±	4.536		
Social isolation	Yes	14	15.714	±	3.539	5.488	<0.001*
	No	46	8.761	±	4.311		
GDS	Depressed	34	12.059	±	4.729	3.137	0.003*
	Not depressed	26	8.192	±	4.733		
ADL	Independent	19	7.579	±	4.788	6.720	0.002*
	Assisted	31	10.935	±	4.524		
	Dependent	10	14.000	±	4.738		
IADL	Assisted	38	8.763	±	4.907	-3.558	0.001*
	Dependent	22	13.182	±	4.113		
CFS	Mild	23	7.609	±	5.097	6.874	0.002*
	Moderate	26	11.808	±	3.826		
	Severe	11	12.818	±	5.344		
ICIQ-UI	Mild	9	5.111	±	3.887	16.137	<0.001*
	Moderate	22	8.409	±	3.347		
	Severe	23	12.652	±	4.344		
	Very severe	6	16.833	±	2.927		
AUA Score	Mild	52	9.654	±	5.009	-3.031	0.004*
	Moderate	8	15.125	±	2.100		
Type of UI	Urge	23	8.261	±	5.553	2.469	0.055
	Stress	1	5.000	±	0.000		
	Overflow	3	9.667	±	0.577		
	Functional	9	12.333	±	5.362		
	Mixed	24	12.000	±	4.054		
HTN	Yes	32	11.000	±	5.042	1.007	0.318
	No	28	9.679	±	5.107		
Chronic liver disease	Yes	7	7.857	±	6.067	-1.414	0.163
	No	53	10.717	±	4.897		
Congestive heart failure	Yes	15	10.600	±	5.262	0.189	0.850
	No	45	10.311	±	5.067		
DM	Yes	29	11.103	±	4.065	1.065	0.291
	No	31	9.710	±	5.849		
Thyroid	Yes	4	13.500	±	5.260	1.279	0.206
	No	56	10.161	±	5.034		
OA	Yes	26	9.885	±	4.141	-0.663	0.510
	No	34	10.765	±	5.716		
Lumbar spondylosis	Yes	7	13.571	±	3.690	1.803	0.077
	No	53	9.962	±	5.106		
Stroke	Yes	11	11.364	±	4.523	0.706	0.483
	No	49	10.163	±	5.206		
Recurrent UTI	Yes	8	11.875	±	3.796	0.892	0.376
	No	52	10.154	±	5.233		
Renal stones	Yes	2	10.000	±	1.414	-0.108	0.915
	No	58	10.397	±	5.157		
CKD	Yes	14	12.500	±	5.125	1.818	0.074
	No	46	9.739	±	4.933		
BPH	Yes	34	11.147	±	4.698	1.343	0.185
	No	26	9.385	±	5.456		
Chronic constipation	Yes	29	11.931	±	4.415	2.374	0.021*
	No	31	8.935	±	5.285		
ACEI	Yes	17	12.118	±	5.476	1.691	0.096
	No	43	9.698	±	4.798		
Diuretic	Yes	18	11.944	±	5.263	1.580	0.119
	No	42	9.714	±	4.900		
Antidepressants	Yes	7	11.571	±	6.294	0.656	0.514
	No	53	10.226	±	4.941		
Alpha blockers	Yes	17	12.941	±	4.479	2.570	0.013*
	No	43	9.372	±	4.981		
Alpha reductase inhibitor	Yes	10	11.000	±	4.761	0.418	0.677
	No	50	10.260	±	5.170		
Anticholinergics	Yes	2	11.500	±	9.192	0.314	0.754
	No	58	10.345	±	5.011		

Table (7 b): Bivariate correlation analysis for IIQ-7 score:

	IIQ-7 Total score	
	r	P-value
UI Duration	0.404	0.001*
ICIQ-Total	0.703	<0.001*
Number of drugs	0.229	0.095
Charlson comorbidity index	0.049	0.712

Table (8): Multivariate linear regression analysis for predictors of QOL (IIQ-7 score) in older frail males with UI :

	Unstandardized Coefficients		Standardized Coefficients	T	P-value
	B	Std. Error	Beta		
	Social isolation	-4.585	1.399		
GDS	-0.724	1.186	-0.071	-0.610	0.545
ADL	-1.018	1.299	-0.137	-0.784	0.437
IADL	1.171	1.446	0.112	0.810	0.422
CFS	0.529	1.168	0.076	0.453	0.652
ICIQ-UI	0.845	1.624	0.145	0.520	0.605
AUA Score	2.110	1.631	0.143	1.294	0.202
Chronic constipation	-2.073	1.083	-0.206	-1.914	0.062
Alphablockers	0.269	1.319	0.024	0.204	0.839
UI Duration	0.144	0.256	0.062	0.563	0.576
ICIQ-Total	0.193	0.287	0.201	0.670	0.506

Discussion

The influence of UI on different QOL domains is well-known. The current study tries to pinpoint this relation and to determine the controlling factors in frail elderly males who have been underestimated in literature concerning UI. UI is considered a silent disease in elderly men, and this may negatively affect physical and psychosocial health in this population (*Griebling et al., 2008*) [10]. Besides, the co-existence of frailty and UI syndromes in older individuals have deleterious effects on health-related QOL (*Carlos, 2012*) [27].

In the current study, we found subjects with severe incontinence symptoms (especially mixed forms or pure urge UI), long UI symptoms duration and relatively severe LUTS, showing marked affection of health-related quality of life. Psychological and religious life domains were the most to be affected.

The most prevalent type of UI among the studied population was mixed forms of UI (40% of participants) with approximate prevalence of urge UI (38.3%).

It is worthwhile mentioning that, in our study, mixed UI was statistically analyzed as the combination of 2 or

more types of UI. In most participants, 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.

Most of the studies have shown that urge UI is the prevalent type of UI among elderly males (*Griebling, 2008*) [10]. In a prospective cohort study performed by *Wehrberger et al. (2011)* [28] to assess LUTS and UI in geriatric population, it was found that 50% of men had overactive bladder (OAB) symptoms (29% OAB-dry and 21% OAB-wet). Another study conducted by *Aniulienė et al. (2016)* [29], regarding types of UI among primary care patients, showed that 60% of men were classified as having pure urge UI. *Teunissen et al. (2009)* [30] study showed that 70% of men recruited had urge UI and 11% had stress UI. A mailed survey done by *Song et al. (2007)* [31] revealed that urge UI was the most prevalent subtype (44.6%) among men reporting this condition. In the study of *Wang et al. (2017)* [32], 440 men aging 80 years and older were

recruited, where the overall prevalence of UI was 19.1% (mostly urge UI: 51.2% and functional UI: 41.7%).

In a systemic review (which included a total of 20 studies) conducted by *Shamliyan et al. (2009)* [33], it was found that urge UI was the most prevalent type of UI; 11.7% in those older than 65 years. Urge UI is one of the main storage symptoms caused by detrusor over-activity; which is the most common form of bladder dysfunction encountered in older males. (*Lee et al., 2017*) [34].

Previous studies had demonstrated the impact of UI in affecting QOL in older adults by using general tools in continent versus incontinent subjects, with enrollment of confounding factors as baseline function, cognition and comorbid conditions (*DuBeau et al., 2006*) [7] (*Ko et al., 2005*) [35]. Using a disease-specific health-related QOL questionnaire in the current study was more sensitive in measuring this relationship in frail elderly. In our study, about 80-90% of incontinent subjects experienced impaired QOL with varying degrees. Most of participants reported affection of emotional wellbeing (feelings of depression, hopelessness and frustration) and more than two thirds had problems with travelling, outside physical activities and social participation.

This agrees with a cross-sectional survey performed by *Teunissen et al. (2006)* [30] to study the impact of UI on daily life in community dwelling elderly using IIQ that showed that 37% of patients reported restricted transportation, 10% were restricted in their physical activities and up to half of them felt nervous, embarrassed and frustrated. The difference in proportions of subjects affected in each domain can be explained by the discrepancy in baseline characters of study populations. In the study of *Teunissen et al. (2006)* [30], the impact score for some items were significantly higher in men than in women, and men compromised only 15.8% of study group. Furthermore, urge UI is more bothersome than stress UI, which is the predominant type in our study population.

Nearly 85% of participants reported a negative impact of UI on praying, which is actually not an item in the original IIQ and was added in the Arabic version to suit our population. Praying is a unique feature of Muslims daily life activities. Other studies had explored the impact of UI on praying. In the study of *El-Azab et al. (2007)* [36] 90% of incontinent group were distressed by their restricted ability to pray. Another study conducted by *Van den Muijsenberg and Lagro-Jansse (2006)* [37] to examine the impact of urinary incontinence on daily lives of Moroccan and Turkish women, showed that most of participants had difficulties with praying and maintaining ritual purification. Both of these studies recruited adult women, whereas data concerning older men population was deficient.

The previously mentioned domains were affected in patients with mixed or urge urinary incontinence,

compared with other types of urinary incontinence. That was in agreement the findings of *Coyne et al. (2003)* [38], who examined the impact of each type of UI (stress, urge, and mixed) on health-related QOL in both sexes using OAB-q (a health-related QOL scale for over OAB). It was found that mixed UI and urge UI groups reported significantly lower health-related QOL ($P<0.02$) and ($P<0.001$) respectively and greater symptom bother ($P<0.001$) in both groups than the stress UI group. The previous findings were explained by the unpredictable nature of urge incontinence and less efficient coping mechanisms (*Coyne et al., 2003*) [38]. In the same way, a cross-sectional study, applied in residential homes on a total of 1110 elderly by *Aslan et al. (2009)* [35], showed that urge UI had more impact on the QOL than that of stress or functional UI.

A population-based cohort study by *Wehrberger et al. (2012)* [28], assessing LUTS and UI in elderly subjects, revealed that 46% of the male cohort stated that their QOL was affected by LUTS and UI, such that nocturia was the most bothersome symptom (29.7%), followed by daytime frequency (9.5%), strong uncontrollable urgency (4.1%) and UI (2.7%). Furthermore, the study showed that individuals with pure urge UI or mixed UI reported a greater negative impact on QOL than those with pure stress UI.

Participants with severe symptoms of UI (regarding amount, frequency and subjective impact as detected by ICIQ-UI) showed severe affection of QOL in all domains compared to those with mild to moderate symptoms. In the study of a *Aguilar-Navarro et al. (2012)* [40] assessing QOL by the Short Form Healthy Survey questionnaire (SF-36) in an elderly group, participants with severe UI symptoms (by the Sandvik Severity Index) showed lower scores on the physical component summary of the SF-36.

UI is one of the diverse LUTS experienced by the elderly populations. The LUTS can be voiding symptoms (intermittency, weak stream, straining) and/or storage (frequency, urgency, urge UI and nocturia) and post-micturitional (incomplete emptying and post-void dribbling). In the current study, incontinent subjects were further assessed by AUA-SI. Patients with significant LUTS (as detected by AUA-SI) showed significant affection of emotional health; in the form of depression/hopelessness ($P=0.02$) besides affection of praying domain ($P=0.05$) as detected by IIQ-7.

In the EPIC study (*Irwin et al., 2009*) [41] men with OAB symptoms were more likely to experience multiple LUTS subtypes including urgency, nocturia, terminal dribble and sensation of incomplete emptying. Authors reported that LUTS severity may have been underestimated by the AUA-SI as it does not assess UI in details. The most reported symptom was urgency followed by nocturia. A subset of men expressed symptom bother due to OAB, that increased with urgency severity and severity and number of associated LUTS, which comes in agreement with our findings.

Emotional health impact was a significantly prominent feature in patients experiencing LUTS and UI, where a positive relationship can be outlined through assessment with different tools. More than two thirds of our study group reported emotional affection which is a subjective sense of depression and hopelessness. Subjects were screened by GDS-15 to obtain an objective assessment for depression, and 56.67% were found to be depressed. This agrees with the study of *Enberg et al. (2001)* [42] performed on a group of homebound males and females elders with UI, where the prevalence of depression found to be 50% by GDS-15.

Our findings also agreed with the cross-sectional study done by *Wang et al. (2017)* [43], where subjects with UI expressed more depressive symptoms (as assessed by GDS-5, $p=0.02$). In a study performed by *Tamanini et al. (2009)* [44] on a Brazilian elderly population for the analysis of factors influencing UI, 34% of incontinent individuals reported depression and it was observed that having moderate or severe depression increased the chance of UI presentation by a factor of 2.49 for both sexes. This agrees with the hypothesis that these two conditions might have the same biological basis. In the study of *Chen et al. (2009)* [45], a population of elderly institutionalized Chinese males were evaluated by the GDS-15 and the Minimum Data Set (MDS) tool, and revealed that incontinent subjects had statistically significant depressive symptoms.

Participants experiencing UI symptoms for relatively long durations showed affection of physical recreational activities, social activities and travelling domains. This agrees with the findings of *Iglesias et al. (2000)* [46], where durations of more than 5 years of UI symptoms were associated with negative impact on incontinent subjects' lifestyles (OR = 2.30).

UI-associated QOL was found to be affected by some confounding factors in the current study including social and psychological factors, functional level, frailty status, comorbidity (chronic constipation), medication use (i.e. alpha-blockers), the presence of other LUTS and severity and duration of UI symptoms. Multivariate linear regression analysis revealed that social isolation is an independent predictor of impaired UI-associated QOL. These findings reflect the complex underlying precipitating factors of UI which may affect QOL in older frail males through direct and indirect pathways.

Previous studies have demonstrated the relationship between UI and social isolation, as UI has been found to be associated with loneliness. This may result from social avoidance secondary to feelings of shame, embarrassment, and decreased self-confidence (*Stickly et al., 2017*) [47]. On the other hand, social isolation was found to exert negative impact on the health and behavioral habits as well as the psychological and cognitive wellbeing (*Nicholson, 2012*), thus affecting QOL in older adults. In the study of *Fultz and Herzog (2001)* [48], aimed at understanding this relationship,

subjects with higher scores of social desirability reported less impact of UI. This agrees with our findings where social isolation was positively associated with worse UI-associated QOL.

The influence of functional impairment on QOL in patients with UI had been demonstrated by other studies. In the study of *Iglesias et al. (2000)* [46], subjects with mild disability showed a greater impact of UI on their lifestyles according to multivariate analysis (OR=2.6) and in the study of *DuBeau et al. (2006)* [7], poorer UI-associated QOL was noticed in residents with moderate ADL impairment.

More advanced frailty status was positively related to worse UI-associated QOL. Frailty had been related to lower physical capacity and impaired QOL dimensions (*Langlois et al., 2012*) [50]. This may precipitate functional UI and affect overall QOL in incontinent patients. In continuum with the findings of *Chong et al. (2018)* [51], where frailty was found to be a predictor for UI, frailer status may be a predictor for more severe UI thus more impaired QOL.

In the study of *Aslan et al. (2009)* [39], the influence on UI-associated QOL was explored. The dependent variable was the QOL assessed by King's health questionnaire. Covariates were age, gender, cognitive function, comorbid conditions, and associated LUTS as urgency and frequency. It was found that the presence of comorbid conditions was associated with worse QOL in UI ($P=0.002$). Our findings were distinct regarding the effect of chronic diseases on QOL in UI. This may be explained by the subjective perspectives of QOL in frail elderly, where frail individuals reported social contacts as the most important factor for quality of life, while non-frail reported health as the most important (*Puts et al., 2007*) [6].

The effect of comorbidities on UI in frail elderly is well identified in literature (*Fonda et al., 2005*) [2]. In chronic constipation, rectal distention may exacerbate LUTS, including UI (*Tannenbaum et al., 2013*) [52]. Furthermore, previous studies have found that chronic constipation exerts negative effect on QOL in older adults (*Norton, 2013*) [53].

The positive relationship between alpha-blockers use and impaired UI-associated QOL may be related to the increased severity of UI symptoms and frequent use of alpha-blockers. Alpha-blockers are one of the main treatment lines used in UI secondary to bladder outlet obstruction (*Jarvis et al., 2014*) [54].

According to our findings, UI exerts a negative influence on QOL through several ways including duration and severity of UI symptoms, UI resultant adverse effects (depression and social isolation) and UI risk factors (functional level, frailty status, comorbid conditions). These factors may interact together potentiating the negative impact on QOL.

Although total cure of UI in frail older people is challenging due to its multifactorial complex etiology, but addressing the fore-mentioned factors through non-pharmacological and pharmacological measures may

improve different aspects of quality of life. QOL is considered as a "central concern" for frail people (Fonda et al., 2005) [2]. This can be supported by the findings of our study, while other prospective studies may be needed to demonstrate and measure the effect of treatment of UI on QOL in frail older male patients. The strength of this study is that it uncovered data concerning the impact of UI on QOL in an understudied population i.e. frail elderly males and it used quantitative methods for analyzing the problem. New aspects were explored in this frail population including the severity and duration of UI symptoms and their relation to the degree of QOL affection as well as the effect of confounding factors on UI-associated QOL. These factors can be targets for therapy to improve QOL in these patients. The limitations of this study is the use of a disease-related questionnaire which didn't allow the assessment of QOL in continent counterparts.

Conclusion:

UI exerts negative impact on all domains of QOL of frail older males with varying degrees. Improving risk factors of UI, severity of symptoms, social and psychological effects of UI are important targets to enhance QOL in this group.

Ethical considerations

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, Faculty of Medicine, Ain Shams University.

Disclosure Statement

There is no conflict of interest.

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