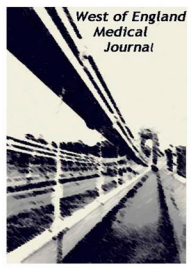

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Epidemiology and risk factors of urinary incontinence in patients with chronic obstructive pulmonary disease (COPD)

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SUMMARY:

Background:

Chronic obstructive pulmonary disease (COPD) has been reported to be one risk factor for urinary incontinence (UI). The prevalence and factors associated with increased rate of UI in UK COPD patients have not been previously reported.

Patients and methods:
This was a prospective study. A structured history was obtained from COPD patients during disease stability. UI was defined as a urinary leak of at least once weekly as reported by patients. Risk factors assessed were divided into 2 categories-, none respiratory (age-related) and respiratory. Rate of UI in previously reported population-based studies was taken as comparator.

Results:
A total 121 patients with COPD mean (SD) age 68.16 (7.9) years, with mean (SD) FEV1 48.9 (20.05) percentage of predicted values were enrolled in the study.
Rate of UI in COPD patients was 18.2% in all patients. For over 75 years the rate was 50%. For all patients, there was no significant difference between male and female. When applying univariate analyses, age, reduced mobility, and reduced min-mental (MMT) score were the main risk factors. There was no difference between those with and without UI for any of the rest of respiratory risk factors that we studied. When applying multiple regression analysis, only age contributed to increase rate of UI.
Conclusions:
The rate of UI in COPD patients was greater than previously reported. Increased age was the only independent risk factor for UI. This study supports incorporating strategies to detect and manage UI in particular in older COPD patients.

Key words: COPD, Urinary incontinence, FEV1, Old age

INTRODUCTION:

Urinary incontinence (UI), defined as involuntary urinary leakage [1] is a common problem in the elderly people [2-5]. UI in this population group is thought to be due to functional impairment, frailty, concomitant illnesses and drugs. UI has significant physical and psychological consequences including skin erosion, increase of the rate of urinary tract infections, embarrassment, reduced inclination of patients to leave their houses and increased fear of being stigmatised and alienated [5]. Previous studies also demonstrated that UI is associated with increased rate of depression[5].
The rate of UI in the general population varied amongst studies conducted in the Netherlands [6] and Italy [7]. On the whole it is estimated that at least one fifth of all people suffer from this condition.
Chronic obstructive pulmonary disease (COPD) is manifested by several respiratory symptoms that increase susceptibility of UI by increasing intra-abdominal pressure such as breathlessness, chest tightness, wheeze and cough. COPD is also associated with several co-morbid conditions that may increase the prevalence of UI by themselves and through their treatment. This includes impairment of mobility due to musculo-skeletal conditions and cardiovascular diseases requiring diuretics.

In two community studies from the Netherlands and Italy, the rate of UI in COPD was reported to increase by odds ratio of 1.53 and 1.49 respectively [6, 7]. Another study from Sweden [8] that was conducted amongst COPD patients, reported a high prevalence of UI in women (49%) and in men (30%). Obesity and cough were found to be the two risk factors for UI.
A review that focussed on the rate of UI in female patients with COPD in Japan reported that up to 176,000 COPD women had UI with a projected doubling of that number by 2025 [9]. None of the above mentioned studies formally investigated wide range of risk factors of UI in COPD patients. Also the results were not age-adjusted and many respiratory and non-respiratory risk factors for UI have not been explored. This research was set out to investigate this.
Our hypothesis was that, apart from age and cognitive impairment, patients with UI would had more severe lung disease, more impairment of airflow obstruction, increase impact of COPD, greater rate of COPD exacerbations requiring hospitalisations and had increased co-morbidity compared to those without UI.

PATIENTS AND METHODS:

This is a prospective exploration of possible risk factors of urinary incontinence (UI) in COPD patients. The research was non-interventional and was conducted within the Department of Respiratory Medicine, Bristol Royal Infirmary and at the South Bristol Pulmonary Rehabilitation Unit to which our COPD patients are referred.
Inclusion criteria were: COPD patients aged 40 years or older. All patients were included during disease stability defined as being away of acute exacerbations by at least 1 month. Diagnosis of COPD was made by respiratory physicians. All patients had a ratio of forced expiratory volume in the first second (FEV1) to forced vital capacity (FVC) of less the 0.7.
If spirometry was done within the year of the study, best values were recorded; otherwise a new spirometry was done. All spirometry measurements were performed by qualified and experienced lung physiologists unaware of the purpose of the study. The methods and machine calibration were performed according to the recommendations of the British Thoracic Society/Association of Respiratory Technicians and Physiologists (BTS/ARTP) guidelines [10]. Predicted values were calculated according to the European Coal and Steal reference figures [11].
A structured history was administered by one of the research team (PP). Basic data on age and gender were obtained. Two sets of risk factors were chosen based on our own observations and previous literature [6-8]. Respiratory risk factors included: spirometry, total number of COPD exacerbations and exacerbations requiring hospitalisations during the year prior to the interview and the number of respiratory and non respiratory drugs. For exacerbations, patients were divided into 2 groups: infrequent exacerbators defined as those who had 0-2 exacerbations in the year prior to study and frequent exacerbators were those who had more than 2 exacerbations. This based on previous studies where this distinction was found to influence the short and long term prognosis of COPD [12-14]. The impact of COPD was assessed on a 40-point scale using the COPD assessment test (CAT) [15]. The greater the score the worse would be the COPD impact.
Non-respiratory risk factors included: living circumstances- alone or with others, independence in mobility classified as independent or needing assistance with mobility by walking aids (stick or frame), by a wheelchair or by another person. Cognitive function was assessed on a 30 point scale using mini-mental test (MMT) [16] where the greater the score the better the cognitive status.

Reported UI was obtained from patients and were defined as urinary leak of any cause or type of at least once every week. This is similar to the definition that was used previously [8] and was more stringent than the definition used by Hampel et al that regarded UI to be present if occurred at least once every two months [17]. For the purpose of this study, we included all types of incontinence. This is because a previous study found that COPD patients had many types of UI with 66% of men reported post-micturation dribbling and 52% of women suffered from stress UI [8].

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STATISTICAL ANALYSES:

The statistical analyses for this research were made using Prism 4 and GB-Stat computer packages.

Firstly, all data were inspected for normality of distribution. Then standard statistical methods were applied. Comparisons for age, FEV1, FVC, FEV1/FVC ratio for patient with and without UI were made using two sided Student t- test.

Number of non-respiratory drugs, COPD assessment test (CAT) and mini-mental test (MMT) were not normally distributed, therefore these were compared in the two groups using Mann-Whitney-U test. For comparison between those with and without UI for gender, living circumstances, mobility and rate of patients who were hospitalised with and without UI, non parametric methods including Chi Squared analysis were used.

Finally, multivariate analysis using multiple regression analysis was applied. UI was the dependent variable and the predictor (independent) variables were age, living status (alone or with others), mobility (mobile or needing assistant) and MMT score.

RESULTS:

A total of 121 patients (51 female) were included in the study. Table 1 shows their demographic data.

Table 1: Demographic data for the study population.

Male: female (n)	70:51
Mean (SD) FEV1 (L)	1.21 (0.5)
Mean (SD) FEV1 (% of expected values)	48.9 (20.1)
Mean (SD) FVC (L)	2.36 (0.8)
Mean (SD) FVC (% of expected values)	76.2 (24.6)
Living alone: live with others (n)	56:65
Independently mobile: need assistance with mobility (n)	95:26
Hospitalisation for COPD exacerbations in the study year- yes: no (n)	69:52
Infrequent exacerbators: frequent exacerbators (n)	95:26

UI was reported by 22 patients (18.2%). The rate was slightly greater in female accounting for 11 out of 51 (21.6%) compared to 11 out of 71 (15.5%) of male, but the difference was not statistically significant; odds ratio 1.5, 95% CI 0.6-3.8, P=0.4.

There were 89 patients under the age of 75 and 32 patients over 75 years. There was an inverse correlation between age and MMT; Spearman's r = - 0.86 (Confidence interval -0.90 to -0.80; P<0.0001). The mean age of patients who needed assistance was greater than those who were independently mobile; mean (SD) 74.5 (7.4) years versus 66.42 (7.1) years respectively P<0.0001. Rate of reported UI significantly increased with age. It was reported by 6 patients (6.7%) in the former group and by 16 (50%) in the latter group P<0.0001 (figure 1).

Low MMT, reduced mobility and number of patients living alone were greater in those who reported UI than in those who did not (table 2). There was no difference between the two groups with regard to any respiratory risk factors (table 3).

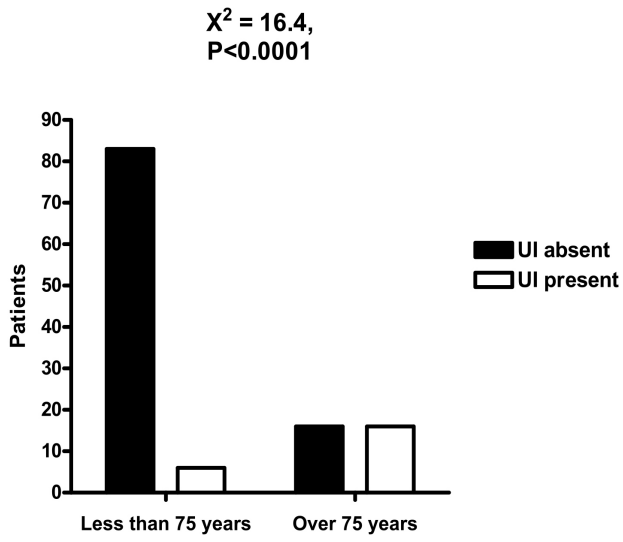

Figure 1: Comparison of the prevalence of UI in COPD patients under 75 years and those over 75 years of age. Odds ratio 13.83, 95% confidence interval (4.7-40.8)

When applying multiple regression analysis using UI as the dependent factor and age, mobility status and MMT as independent factors, the only factor that affected UI was age- (table 4).

DISCUSSION:

To our knowledge, this is the first published study to examine the epidemiology of UI and to examine risk factors for UI in UK patients with COPD.

Our definition of UI was more stringent that previous definitions [17]. We pragmatically regarded those who had at least once weekly episodes of UI to be clinically significant to require intervention.

We found that the rate of UI in patients with COPD, in particular in those over the age of 75

Table 2: Comparison of non-respiratory features in patients with reported and unreported UI

Feature	UI unreported	UI reported	Significance between groups P value
Number	99	22	
Mean (SD) Age (years)*	66.33 (6.8)	76.36 (7.1)	<0.0001
Male: Female (n)	59:40	11:11	0.5
Living alone : living with others (n)	46:53	10:12	0.9
Independently mobile: need assistance with mobility (n)*	83:16	12:10	0.008
MMT score (number out of 30)*			
Median	25.0	21.0	<0.0001
Range	16-30	15-29	

Table 3:
Comparison of respiratory risk factors in patients with reported and unreported UI

Feature	UI unreported	UI reported	P value
CAT score (out of 40)*			
Median	19	22	0.2
Range	5-38	8-37	
Number of none-respiratory medications			0.1
Median	2.0	4.0	
Range	0-10	1-8	
Hospitalisation for COPD exacerbation in the study year			
Yes	56	13	0.8
No	43	9	
Infrequent exacerbators: Frequent exacerbators	74:26	12:1	0.1
FEV1 (% predicted) - mean (SD)	49.2 (20.9)	47.8 (16.2)	0.8
FVC (% predicted) – mean (SD)	75.2 (24.4)	80.9 (25.5)	0.6
FEV1/FVC ratio (%)	0.51 (0.1)	0.5 (0.1)	0.2

--------CAT: COPD Assessment Test.

Table 4

Multiple regression analysis.
Urinary incontinence was the dependant variable and other factors were the predictor variables.

Independent variables	B- Coefficient	P value
Age*	0.2	0.05
Mobility (independent-needs assistant)	0.6	0.5
MMT score	-0.2	0.3

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years, was well in excess of the prevalence of UI in elderly population as reported by published literature.

In a population-based study from the UK, UI was reported in 173 out of 813 (21.3%) of people over the age of 85 years [2]. As some of patients included in this study were COPD sufferers (16.5% of all patients), the proportion of UI in non-COPD patients was lower. In another study conducted amongst non-institutionalised elderly individuals in Northern Italy [7], the prevalence of UI was found to be 11.2% amongst men (867 patients) and 21.6% amongst women (1531 patients). Amongst those who reported UI, 53% of women and 59% of men reported a daily or a weekly occurrence.

It is probable that the rate of UI reported in our study, as the case in other studies, was an underestimate. Reasons for under-reporting were probably due to embarrassment and fear of alienation, belief that incontinence was part of aging and lack of awareness of the presence of effective treatment. In addition, it is possible that patients with frequent episodes of UI are less likely to attend an outpatient hospital environment or pulmonary rehabilitation sessions.

Most studies found that incontinence rate to be greater in women than in men [1,5]. In our study and for COPD patients that rate of UI was similar in both genders. The reason might have been an under-reporting by women or due to the fact that cough, breathlessness, raised intra abdominal pressure due to airflow obstruction and drugs would have equal impact on both genders.

Contrary to our hypothesis, increased COPD severity as judged by reduced FEV1, greater degree of airflow obstructions as estimated by FEV1/FVC ratio, CAT score and the number of respiratory and non-respiratory medications did not differ in those with and those without UI. The reason for this might lie in the fact that COPD features by themselves did not cause UI, but exaggerate the influence of non-respiratory risk factors such social isolation, cognitive impairment and frailty and immobility. The rate of hospitalisation due to acute exacerbations did not reach statistical significance, but was not far off. This probably was because of the small number of patients with UI in our study group. .

When comparing individual factors, we found that UI was more prominent in older age, in those with reduced MMT, those with reduced mobility and patients who suffer from social isolation.

In applying multiple regression analysis, age was found to be the only independent factor for increasing risk of UI. The reason for this was that other factors such as impaired of MMT and lack of mobility were commoner in older people and therefore were found by themselves not to affect UI independently.

In the UK, the National Service Framework for older people [18] advocated that continence service should be an integrated service in primary and secondary care. Our study would suggest that, given the high rate of UI in COPD patients, continence questionnaire and continence management should be part of COPD service in primary care clinics and during the pulmonary rehabilitation programme.

UI was shown to be the second reason after dementia for admission to long term care [5]. This is probably because UI was part of general physical frailty. This was confirmed in a study that showed UI to be associated with increased likelihood of decline in physical functions and increased rate of admission to nursing homes but was not an independent predictor of death [20]. This, and the increased burden of COPD in old age that is manifested by increasing rate of hospitalisation, length of stay and worsening of frailty [19] adds to the call by many physicians for multidimensional assessment and multimodality intervention in older COPD patients.

Our study had several limitations. The number of patients is modest and the number of patients reporting UI was small. The sample size was a convenience size. Factors such as obesity, child birth and previous gynaecological operation were not included in the analyses.

Nevertheless, this study draws the attention to the common prevalence of UI in COPD patients. It also suggests that, in future, direct questioning to the presence and impact of UI should be routinely undertaking in the COPD population. If present, attempts to introduce methodical steps to investigate and treat UI should be made. Methods of pharmacological and non-pharmacological steps need to be implemented. Duloxetine, a serotonin noradrenalin reuptake inhibitor is licensed form moderate to severe stress UI, which is the commonest form of UI in COPD patients. Life style modifications may help too. This would include management of obesity, constipation, modifying fluid intake and adjusting the timing for diuretic use. Specific treatment for UI such as pelvic floor training is anecdotally being reported to reduce UI in particular in women.

Future work should include evaluation of these interventions in patients with COPD.

Conflict of interest: None

Author's contribution:

Dr Nabil Jarad: Designed the study, performed data monitoring, made the analysis, wrote the manuscript.

Prachi Patel: Issued the questionnaires, Interviewed the patients, tabulated the results, read and corrected the manuscript.

Jane Buswell: Contributed to the design of the study for assessing cognitive status for COPD patients, contributed to data monitoring, read and amended the manuscript.

REFERENCES:

1. Abrams P, Cardozo L, Fall M. The standardisation of terminology of lower urinary tract function: report from the Standardisation Sub-committee of the International Continence Society. Neurourol Urodyn 2002; 21: 167-178
2. Thirugnanasothy S. Managing urinary incontinence in older people. BMJ 2010; 341:339-343.
3. Collerton J, Davies K, Jagger C. Health and disease in 85 year olds; baseline findings from Newcastle 85+ cohort study. BMJ 2009; 339:b4904.
4. Norton PA, McDonald LD, Sedgwick PM, Stanton SL. Distress and delay associated with urinary incontinence, frequency and urgency in women. BMJ 1988; 297:1187-1189.
5. Thom DH, Haan MN, van den Eeden SK. Medically recognised urinary incontinence and risks of hospitalisation, nursing home admissions and mortality. Age and Aging 1997; 26: 367-374.
6. van Gerwen M, Schellevis F, Lagro-Janessen T. Co morbidities associated with urinary incontinence: A case-control study from the second Dutch national survey of general practice. J Am Board Fam Med 2007; 20: 608-610.
7. Maggi S, Minicuci N, Langlois J, Paven M, Enzi J, Crepaldi G. Prevalence rate of urinary incontinence in community-dwelling elderly individuals- The Vento study. J Gerontol A Bio Sci 2001; 56: M14-M18.
8. Hrisanfow E, Hagglund D. The prevalence of urinary incontinence among women and men with chronic obstructive pulmonary disease in Sweden. J Clin Nurs 2011; 13: 1895-1905.
9. Hirayama F, Binns CW, Lee AH, Senjyu H. Urinary incontinence in Japanese women with chronic obstructive pulmonary disease – review. J Phys Ther Sci 2005: 17: 119-124.
10. British Thoracic Society and the Association of Respiratory Technicians and Physiologists. Guidelines for the Measurement of Respiratory Function. Respiratory Medicine 1994; 88: 165-194.
11. Quanjer PH, Tammeling GJ, Coates JE et al. Lung volumes and forced ventilator flows. Report of the Working Party on Standardization of Lung Function Tests, European Community of Steel and Coal. Official Statement of the European Respiratory Society. Eur Respir J Suppl 1993; 16: 5-40.
12. Donaldson GC, Seemungal TAR, Bhomik A, Wedzicha JA. Relationship between exacerbation frequency and lung function decline in chronic obstructive pulmonary disease. Thorax 2002;57:847–852.
13. Soler-Cataluna JJ, Martinez-Garcia MA, Roman Sanchez P, Salcedo E, Navarro M, Ochando R. Severe acute exacerbations and mortality in patients with chronic obstructive pulmonary disease. Thorax 2005;60:925–931.
14. Hurst JR, Vestbo J, Anzueto A, et al. Susceptibility to exacerbation in chronic obstructive pulmonary disease. New Engl J Med. 2010;363:1128–3.
15. Jones PW, Harding G, Berry P, Wiklund I, Chen W.H, Kline Leidy N. Development and first validation of the COPD assessment test. Eur Respir J 2009; 34:648-654.
16. Folstein MF, Folstein SE, McHugh PR (1975). ""Mini-mental state". A practical method for grading the cognitive state of patients for the clinician". Journal of psychiatric research 12 (3): 189–98
17. Hampel C, Wienhold D, benken N et al: Definition of overactive bladder and epidemiology of urinary incontinence. Urology 1997; 50: 4-14.
18. Department of Health. The national service framework for older people. Department of Health, 2001. www.dh.gov.uk/en/publicationsandstatstics/Publications/PublicationsPolicyand Guidance DH_4003066.
19. Holroyd-Leduc JM, Mehta KM, Covinsky KE. Urinary incontinence and its association with death, nursing home admission and functional decline. J Am Geriatric Soc 2004; 5: 712-718.
20. Jarad N. Chronic Obstructive Pulmonary Disease (COPD) and old age. Chronic Respiratory Disease 2011; 8(2): 143-151.