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Original Article

Association of Urinary Incontinency with COPD Severity: An Analytical Cross-sectional Study

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ABSTRACT

Large number of patients suffers from urinary incontinence (UI) with COPD leading to urine leakage and affecting their quality of life. **Objective:** To determine the prevalence and association of UI among with the severity of COPD patients. **Methods:** The cross sectional study was conducted from February 2023 to June 2023 in Ghurki Teaching Trust Hospital, Shalimar Hospital and Gangaram Hospital. 230 male patients of age 45-65 years suffering with COPD were selected by using convenient sampling technique. The demographic data and International Consultation on Incontinence Questionnaire- Urinary Incontinence Short Form (ICIQ-UI SF) were used collected. SPSS version 26.0 along with Chi-square was used for analysis with p-value <0.05. **Results:** The results showed that 36 (15.7%) suffering with mild COPD, 142 (61.7%) had moderate COPD and 52 (22.6%) had severe COPD in which 33 (14.3%) experience have no urine incontinency, 25 (10.9%) had urge Incontinence, 154 (67%) had stress Incontinence and 18 (7.8%) had mixed Incontinence. Additionally; moderate COPD had shown significant association with stress incontinency with Chi-square value of 188.58 and p-value =0.00 and with the leakage of urine on coughing/ sneezing, during any physical activity/ exercise and all the time with value of 143.37, p-value = 0.00. **Conclusions:** The study concluded that UI is highly prevalent in COPD patients as stress and urge incontinency is highly prevalent among moderate and severe patients respectively, associated with coughing/ sneezing and physical activity/ exercises.

INTRODUCTION

Chronic Obstructive pulmonary disorder (COPD) is a common heterogeneous respiratory disorder leads to development of airway restriction, airflow limitation with alveolar abnormalities [1]. It is becoming the major global prevalent disease among older population of 30-80 years especially in male. It is further depending upon multiple risk factors including smoking, having BMI < 18.5 kg/m2, chronic exposure to biomass, dust and smoke [2]. Respiratory failure, pulmonary hypertension, weight loss, infection, cor pulmoanle, urinary incontinency and acute exacerbation are major complications of COPD [3]. Urinary incontinency (UI) is one of the major problem that affecting millions of population at global level on their personal and social life [4]. Urinary incontinency is the inability of controlling bladder leading to involuntary leakage of urine affecting quality of life[5]. UI is divided into five types including stress UI, urge UI, mixed UI, overflow and functional UI [4]. Stress UI is urine leakage due to increased abdominal pressure like sneezing and coughing. Urge UI caused sudden urine leakage due to some urgency. UI is the major

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complication of COPD having 34.9% prevalent among COPD patients according to National Health and Nutrition's Examination Survey. Similarly, UI is 49.6% prevalent among women while 30.3% among men in which stress UI is highly prevalent among female and urge UI is highly prevalent among male related to dyspnea [6]. Study showed that Urinary incontinency especially stress incontinence is the most common unexplored comorbidity linked with COPD [7]. Similarly, Zhu et al., concluded that prevalence of stress urinary incontinence is strongly associated with COPD. The chronic coughing episodes in COPD patients enhance the intra-abdominal pressure that increase the incidence of stress incontinency [8]. Parker et al., supported that UI is highly prevalent in COPD patients especially in women that require immediate treatment protocol. He also supported that using pelvic floor muscle training and cough suppression played an important role in managing the incidence of UI in COPD patients [9]. Similarly, Salman et al., concluded that UI is common among the male COPD patients up to 78.8% in which 41.9% male COPD patients suffered with typical stress incontinency [10]. Castillo et al., reported that COPD is a complicated pathology that affects the normal physical activity of life along with development of multiple comorbidities. The most common comorbidities are low back pain, asthma, neck pain, arthrosis, urinary incontinency, constipation, cataracts and chronic anxiety. Among all comorbidities; urinary incontinent and low back and neck pain highly affect their physical activities and quality of life [11]. Previous studies supported that COPD is the major respiratory disorder that lead to the development of the major social complication i.e., Urinary Incontinency. Multiple studies focused on the determination of the prevalence and type of urinary urgency among COPD patients. However, the association of COPD severity with the type of urinary incontinency and the effect on the daily life is still unclear.

Therefore, the current study was designed with an aim to analyze as is there any association exists between the COPD severity and urinary incontinency along with its effects on daily functional activities according to COPD severity. Furthermore, this study would be helpful for physiotherapists and other medical practitioners to analyze the severity of incontinency and designed a treatment protocol that helpful for improving the prognosis rate in COPD patients.

METHODS

The cross-sectional study was conducted from February 2023 to June 2023 by getting a permission from the Ethical Committee of Lahore College of Physical Therapy, LMDC with Reference number LCPT/DPT/22/943. The sample of 230 male patients was calculated by using WHO calculator, $n= Z21 + [\alpha/2 . P(1-P) / d2]$ from three major hospitals including Ghurki Teaching Trust Hospital, Shalamar Hospital and Ganga Ram Hospital. Male participants of age 45-65 years suffering with COPD having FEV1/FVC value <70 were included in the study . Additionally, patients suffering with acute exacerbation of COPD, Kidney disease, having lower and upper urinary tract infection were excluded from the study [7, 12]. The patients were enrolled in the study by using non-probability convenient sampling technique. After selection, a proper written and verbal consent was taken from each patient and the protocol of study was describing in detail to each patient. The data were collected by using questionnaire focusing on obtaining demographic variables including age, severity of COPD and types of urine incontinency. Furthermore, International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form (ICIQ-UI SF) was used for the assessment of impact of urinary incontinency on the quality of life of patients. ICIQ-UI SF is a questionnaire having four items assessing frequency of incontinency (0-5), amount of incontinency (0-6), impact on quality of life (0-10) and last is self-diagnostic item about most common cause of incontinency [13]. ICIQ-UI SF is a highly reliable and valid questionnaire having Cronbach's alpha of 0.87 with ICC value of 0.73 [14]. The data were analyzed by using SPSS version 26.0 in which quantitative variables including age was described through mean ± SD and categorical variables were described through frequency and percentage. Furthermore, the association of COPD severity with urinary incontinency and perceived cause of incontinency were analyzed by using Chi-square with value <0.05.

RESULTS

The results of prevalence of urinary incontinency along with its association with COPD patients were provided in tabulated form. The demographic values were described in table 1 as patients having mean age of 55.14±5.906. Furthermore, table 1 described the severity of COPD and type of urinary incontinency. Among 230 patients; 36 (15.7%) suffering with mild COPD, 142 (61.7%) had moderate COPD and 52 (22.6%) had severe COPD. Similarly, 33 (14.3%) experience have no urine incontinency, 25 (10.9%) had urge Incontinence, 154 (67%) had stress Incontinence and 18 (7.8%) had mixed incontinence.

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Table 1: Demographic Characteristics of Patients

Variables		Results
Age		55.14±5.906
COPD Severity	Mild	36 (15.7%)
	Moderate	142 (61.7%)
	Severe	52 (22.6%)
Types of Urine Incontinency	None	33 (14.3%)
	Urge Incontinence	25 (10.9%)
	Stress Incontinence	154 (67%)
	Mixed Incontinence	18 (7.8%)

The results about ICIQ-UI-SF were described in table 2 in which among 230 patients, 48 (20.9%) had ever experience frequent incontinence, 18 (7.8%) had incontinency about once a week, 20 (8.7%) had two to three times incontinency in week, 99 (43.0%) had incontinency once a day, 42 (18.3%) had several times a day and 3 (1.3%) had frequent incontinency all the time. Similarly, 48 (20.9%) never have any amount of leakage, 122 (53%) experienced small amount of leakage, 52 (22.6%) experienced moderate amount of leakage and 8 (3.5%) experienced large amount of leakage. The overall impact of incontinency on quality of life was described as 49 (21.3%) had no impact marking as 0, 16 (7.0%) had moderate impact marked as 5 while 18 (7.8%) had a severe impact marked as 10. Furthermore, among 230 patients; 48 (20.9%) described that they never (urine does not leak) had any perceived cause of leakage, 2 (0.9%) had leakage before getting to the toilet, 46 (20%) had leakage during coughing or sneezing, 1 (0.4%) had leakage during sleep, 47 (20.4%) had leakage during any physical activity/ exercise, 3 (1.3%) had leakage after urination, 5 (2.2%) had leakage with no obvious reason and 78 (33.9%) had leakage all the time.

Table 2: ICIQ-UI-SF Questionnaire

Variables		Frequency (%)
Frequency or urinary incontinence	Never	48 (20.9%)
	About once a week	18 (7.8%)
	Two to three times	20 (8.7%)
	About once a day	99 (43.0%)
	Several times a day	42 (18.3%)
	All the time	3 (1.3%)
Amount of leakage	None	48 (20.9%)
	A small amount	122 (53%)
	A moderate amount	52 (22.6%)
	A large amount	8 (3.5%)
Overall impact of urinary incontinence	0	49 (21.3%)
	1	4 (1.7%)
	2	10 (4.3%)
	3	10 (4.3%)
	4	17 (7.4%)
	5	16 (7.0%)
	6	20 (8.7%)
	7	24 (10.4%)
	8	27 (11.7%)
	9	35 (15.2%)
	10	18 (7.8%)
Self-diagnostic item	Never - urine does not leak	48 (20.9%)
	Leaks before you can get to the toilet	2 (0.9%)
	Leaks when you cough or sneeze	46 (20%)
	Leaks when are asleep	1 (0.4%)
	Leaks when you are physically active/exercising	47 (20.4%)
	Leaks when you have finished urinating and are dressed	3 (1.3%)
	Leaks for no obvious reason	5 (2.2%)
	Leaks all the time	78 (33.9%)

The association of severity of COPD with type of Urinary incontinency was described in table 3 with p-value <0.05. The results showed among 36 patients of mild COPD, 31 experienced no incontinency, 3 had urge incontinency, 1 had stress incontinency and 1 had mixed incontinency. There was 142 patients of moderate COPD in which 1 experienced no incontinency, 17 had urge Incontinence, 116 had stress incontinency and 8 had mixed incontinency. Similarly, among 52 severe COPD patients, 1 experienced no incontinency, 5 had urge Incontinence, 37 had stress incontinency and 9 had mixed incontinency. The results reported that stress incontinency is highly prevalent in 125 patients that associated with moderate and severe COPD with Chi-square value of 188.58. Additionally, 25 patients experience urge incontinency among moderate and severe COPD. Table 3 described the association perceived cause of urinary incontinency with COPD patients. The results showed among 36 patients of mild COPD, 33 never experienced leakage, 2 had leakage on coughing/ sneezing and 1 had leakage for no obvious reason. Among 142 patients of moderate COPD, 3 never experienced leakage, 34 had leakage on coughing/ sneezing, 36 had leakage during any physical activity/ exercise, 60 had leakage all the time, 3 had leakage after urination and with no reason while 2 had leakage before toileting and 1 during sleep. Furthermore, among 52 severe COPD patients, 12 never experienced leakage, 10 had leakage on coughing/ sneezing, 11 had leakage during any physical activity/ exercise, 18 had leakage all the time and 1 had leakage with no reason. The results reported that leakage at all the time (78), physical activity (47) and coughing/ sneezing (46) were the major perceived causes of urinary incontinency among COPD patients with Chi-square value of 143.37, p-value = 0.00.

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Table 3: Association of COPD severity with type of Urinary incontinency and Perceived cause of incontinency

Parameters		Types of Urine incontinency				Total	Pearson value	p-value
		None	Urge Incontinence	Stress Incontinence	Mixed Incontinence			
Severity of COPD	Mild	31	3	1	1	36	188.587	0.00
	Moderate	1	17	116	8	142		
	Severe	1	5	37	9	52		
Total		1	25	125	18	230		
Perceived cause of incontinency								
Parameters		**Severity of COPD**				**Total**	**Pearson value**	**p-value**
		Mild	**Moderate**	**Severe**				
When urine leak	Never - urine does not leak	33	3	12		48	143.371	0.00
	Leaks before you can get to the toilet	0	2	0		2		
	Leaks when you cough or sneeze	2	34	10		46		
	Leaks when are asleep	0	1	0		1		
	Leaks when you are physically active/exercising	0	36	11		47		
	Leaks when you have finished urinating and are dressed	0	3	0		3		
	Leaks for no obvious reason	1	3	1		5		
	Leaks all the time	0	60	18		78		
Total	-	36	142	52		230	-	-

DISCUSSION

The study was conducted with the aim of determining the prevalence and association of urinary incontinency with COPD severity. The study reported that UI especially stress incontinency is highly prevalent among moderate COPD patients that caused leakage on coughing/ sneezing, on physical activity and all the time. The study showed that 53% male patients showed leakage of small amount of urine in which 43% experience leakage once a day. The UI showed 20% had leakage at coughing/ sneezing, 20.4% had leakage on physical activity and 33.9% had leakage all the time. Hirayama et al., supported that 75% male COPD patient's experienced small amount of leakage within once week [15]. However, the study concluded that male experienced urge incontinency while coughing in COPD caused stress incontinency. This was in contrast with the current study as patients showed 67% prevalence of stress incontinency while 10% showed urge incontinency. There was significant COPD association with stress incontinency with value of 188.58 having p-value =0.00 caused by coughing. The coughing leads to sudden increase in the abdominal pressure that increase pressure on the urinary bladder [16]. Burge et al.., concluded that UI is 39% prevalent in men suffering with COPD while 17% showed UI without COPD. The prevalence is highly associated with severity of COPD patients as it decreased the forced expiratory volume in one second value (FEV1) [17]. This supported current study results as moderate to severe COPD patient's showed marked prevalence of UI. However, Burge et al., reported the UI is associated with the dyspnea that is in contrast as patients showed association of UI with coughing/ sneezing and physical activity. There is strong association of UI on the quality of life of patients with 143.37 having p-value =0.00. Hrisanfow et al., supported that UI caused poor quality of life in men and women suffering with COPD. This is highly associated with the prevalence of cough and sputum in patients [18]. Young et al., supported that among all COPD patients, moderate COPD patients cause severe coughing and its frequency affected their quality of life and worsened of ICIQ-UI-SF scoring [19]. Emilsson et al., also supported that chronic cough showed negative impact on the quality of life of COPD patients [20]. This again confirm the current study as patients showed severe UI at coughing/ sneezing. Castillo et al., concluded that urinary incontinency is highly prevalent in affecting the physical activity and quality of life of COPD patients. This prevalence is associated with the specific activities especially walking, coughing and sneezing [11]. This again supported current study results as patients reported significant leakage of urine during coughing/ sneezing and exercise. Furthermore, Battaglia et al., concluded that UI is

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highly neglected in COPD patients as its complication. These patients faced uncontrolled stress incontinency related to the presence of major symptoms cough which affected their quality of life on daily basis [6]. This study supported current study results as patients having moderate COPD faced major issue of stress incontinency especially on coughing and sneezing. Despite of having strengths, the study had some limitations that needed to be concerned. Firstly, the study was designed to rule out the association of UI and COPD severity among male patients. Therefore, it is recommended to conduct study a future study included both male and female patients as it might help to determine which UI type is more common in which COPD severity and what is the major cause of the presence of type. Secondly, the study did not find consider the COPD medications the patients were taking during the study. The medications might be affecting their UI and COPD symptoms. Therefore, it is recommended to conduct a study in which the association of CODP medications with UI in such patients.

CONCLUSIONS

Urinary incontinency is major complication of COPD patients highly associated with COPD severity. The study concluded UI is more common among patients suffering with moderate COPD, highly associated with stress incontinency. Furthermore, urge incontinency is also prevalent among sever COPD patients. Additionally, it also affects their quality of life as patients experience the incontinency during coughing/ sneezing and during any physical activity.

Authors Contribution

Conceptualization: AL, UI, MNT
Methodology: AL, KH, ZM
Formal analysis: RM, SS
Writing-review and editing: UI, KH, RM, MNT, SS, ZM, AK

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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