



EFFECT OF LUMBAR LORDOSIS ON URINARY INCONTINENCE IN DIABETIC OBESE PATIENTS

RIMSHA Z^{1*}, RIKZA N¹, MUNAZA A¹, SAMUEL R², HABIB H³

1: Physiotherapy Department, Rashid Latif Medical College

2: University of Health Sciences, Department of Physiotherapy, Lahore

3: School of Physiotherapy, Johar Institute of Professional Studies, Lahore, Pakistan

*Corresponding Author: Dr. Rimsha Z: E Mail: waqaskhanijps@gmail.com

Received 26th Feb. 2022; Revised 25th March 2022; Accepted 12th April 2022; Available online 1st Dec. 2022

<https://doi.org/10.31032/IJBPAS/2022/11.12.6628>

ABSTRACT

Urinary Incontinence (UI) is a common problem in obese women affected by different parameters such as weight, Body Mass Index (BMI), type of delivery, etc. High prevalence of urinary incontinence in obese women and role of changes in lumbar lordosis, pelvic tilt and the type and number of delivery may result in a number of dysfunctions. The objective of this study was to investigate the effect of lumbar lordosis on urinary incontinence in diabetic obese patients. A cross sectional study was conducted with 213 diabetic patients having BMI greater than 30 from three different settings. International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form (ICIQ-UI SF) and 50cm flexible ruler were used in this study. Non convenient probability sampling technique was used. Consent was obtained from each participant. Lordotic angle was measured by hart and rose method. SPSS 25 was used for data analysis. Moderate linear relationship was found between incontinence (ICIQ) and lumbar lordosis (r 0.738). Similarly with BMI (r 0.701) the angle of Lumbar Lordosis was directly related to urinary incontinence. Among diabetic patients, unit increase in Lumbar lordosis angle increases incontinence 0.212 times, unit increase in BMI increases incontinence 0.366 times. The study concluded that lumbar lordosis increases urinary incontinence in diabetic obese patients.

Keywords: Urinary Incontinence (UI), Body Mass Index (BMI), Diabetes Mellitus (DM), Lumbar Lordosis (LL), Incontinence Questionnaire-Urinary Incontinence Short Form (ICIQ-UI SF)

INTRODUCTION:

Up to 50% of adult women report UI worldwide [1]. It has a major impact on quality of life, equivalent to diabetes or rheumatoid arthritis as the prevalence of obesity now exceeds 25% of the adult population in Europe, Australia and the United States [2]. Obesity is also an increasing worldwide epidemic with pervasive associations with arthritis, hypertension, DM, cancer and cardiovascular diseases [3]. Aging, childbirth and obesity are identified as the major risk factors for incontinence [4]. Age and parity are not modifiable, but being overweight or obesity is potentially highly modifiable [5].

A study shows the prevalence of UI ranges from 15% to 69%, it is necessary to distinguish the different types of UI because they have different etiologies [6]. Evidence suggests that urge incontinence can be caused by micro vascular damage due to DM leading to alterations in detrusor muscle function, innervation, and function of the neuronal component [7], whereas stress UI is due to dysfunction of the striated muscle of the urethral sphincter and pelvic floor muscles and their innervation. Causes of stress UI are pregnancy, delivery type and being overweight [8]. Mixed UI is a combination of both health conditions

together [9]. According to the etiological factors, DM does not seem to contribute much to the development of stress UI. Many studies support the idea that DM plays particularly a role in Urge UI due to glycosuria, detrusor over-activity, recurrent urinary tract infections, and diabetic cystopathy [7, 10]. But, a recent hypothesis states that DM and obesity are linked with each other and that this combination leads to higher stress UI rates due to increased intra abdominal and pelvic pressure. Hence it is a serious issue under discussion these days [11, 12].

According to a study Urge UI, stress UI, and mixed UI were seen in (5.2%), (6.7%), and (15.9%), respectively in diabetic patients [13]. There is major role of pelvic floor muscles in providing trunk stability, urinary and stool continence. There is a relationship present between pelvic floor muscles and abdominal muscles, according to a study maximum contraction of pelvic floor muscle will help in activation of abdominal muscles [14]. A close relationship is also seen between lumbopelvic disorders and urinary incontinence in women [10]. If there is any disorder of lumbopelvic region there is increase urinary incontinence. Pelvic muscle activity is also dependent on lumbopelvic

posture [15]. If there is increase in curve of lumbar spine it is called as lumbar lordosis [16]. The lumbopelvic posture can affect pelvic floor muscle activity. The coordination of these muscles with trunk muscles is considered an essential factor in treating women with UI [15].

One of the most important components of the lumbopelvic posture is the lumbar lordosis angle, the lumbar lordosis angle might indirectly affect the pelvic floor muscles. But the question is whether these results can be extended to obese people with a BMI > 40 kg/m². This study hypothesized that obesity changes the lumbar lordosis and may relate to the conditions that will lead to UI [17]. As UI has adverse effects on physical, social, and emotional functioning, it affects the general quality of life of women [18]. UI is a common symptom of overactive bladder (OAB) syndrome. Based on the current ICS definition of OAB, all patients with UI have OAB, whereas not all patients with OAB have UI as it is a chronic condition and OAB patients reported with higher anxiety symptoms [19]. OAB patients with anxiety reported more severe symptoms, worse quality of life, and more psychosocial difficulties compared to OAB patients without anxiety. There is positive correlation between the severity of anxiety symptoms

and OAB and incontinence symptoms [20]. With the best of researcher's knowledge there are no published studies on the relationship between diabetic obese patients with lumbar lordosis on urinary incontinence. Current study will improve the focus on assessment of lumbar lordosis with urinary incontinence which will be helpful for both clinicians as well as patients for better treatment strategies. It will also spread awareness about the condition and its treatment.

METHODOLOGY:

Study design: It was a cross sectional study conducted at the diabetic center Lahore, Dilawar Hussain Foundation Clinic & Diabetes Management Centre and Diabetic's Institute of Pakistan.

Sample size: The formula provided by the T .Yamane (1967) was used to determine the sample size for the data which is calculated to be 213. Table 1 shows the frequency of age of patients included in the study.

Sampling technique: Non-probability convenient sampling technique was used to collect the data.

Sample selection:

Inclusion criteria:

- Females having a BMI ≥ 30 kg/m²
- age > 40
- chronic stage diabetes

- Patients diagnosed with lumbar lordosis

Exclusion criteria:

- Neurological impairments
- Other musculoskeletal problems
- History of fracture
- Paralysis
- Acute stage diabetes
- Psychological Issues

Data collection:

Written consent was obtained from every participant. Women having BMI > 30 were considered to fill International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form [ICIQ-UI SF], which is a simple, reliable and valid tool to evaluate patient with UI. It is considered to be the gold standard diagnostic test [23]. Lordosis angle was measured by using hart and rose method by using flexible ruler [24].

Data analysis:

The data was analyzed by SPSS 25. The quantitative variables were presented as mean and standard deviation while qualitative variables were evaluated as proportions %. The normality of the data was assessed by Shapiro-Wilks test of normality and uniformity, based on which parametric or non-parametric test was applied to determine within the group and across the group difference in two groups. Independent

sample T test / Mann Whitney U test was applied to determine any significant difference across the two groups. Paired sample T test / Wilcoxon T test was used to determine any significant difference with in each treatment group. A difference with p value less than 0.05 was considered as significant

RESULT:

The purpose of this study was to find correlation between increased lumbar lordosis and BMI with urinary incontinence. Among subjects 18% were obese (BMI 30 - 35) and 81% were Morbid obese (BMI 35 or above). **Figure 1** shows frequency of obesity among subjects. **Figure 2** shows the Frequency of urine leakage among subjects. Increased angle of lumbar lordosis impose more pressure on bladder and hence results in UI. **Figure 3** shows the frequency of obese subjects suffering from lumbar lordosis. A moderate linear relationship was seen between incontinency (ICIQ) and lumbar lordosis (r 0.738) similarly with BMI (r 0.701) as shown in **Table 2**. Among diabetic patients Unit increase in Lumbar lordosis angle increase incontinence 0.212 times, unit increase in BMI increases 0.366 time, in age group 61-70 chances of incontinence increases by 1.658 times whereas in age group 71-80 complaint of incontinence

increases by 3.837 times, as shown in **Table 3**. Importance of this research is physiotherapy management to treat lumbar

lordosis could help in reduction of UI in diabetic obese women.

Table 1: Shows frequency of age of subjects included in the study.

Age	Frequency	Percent
40-50	95	44.6
51-60	78	36.6
61-70	37	17.4
71-80	3	1.4
Total	213	100.0

Table 2: Correlation of UI and LL in obese Diabetic Patients

		Lumbar angle lordosis	BMI
ICIQ	Pearson correlation	.738	.701
	Sig. (2-tailed)	.000	.000
	N	213	213

Table 3: Association of LL and UI in diabetic obese patients

	Unstandardized Coefficients	Std. Error	Sig.
Lumbar lordosis angle	.212	.022	.000
BMI	.366	.049	.000
Age 61-70	1.658	.431	.000
Age 71-80	3.837	1.388	.006

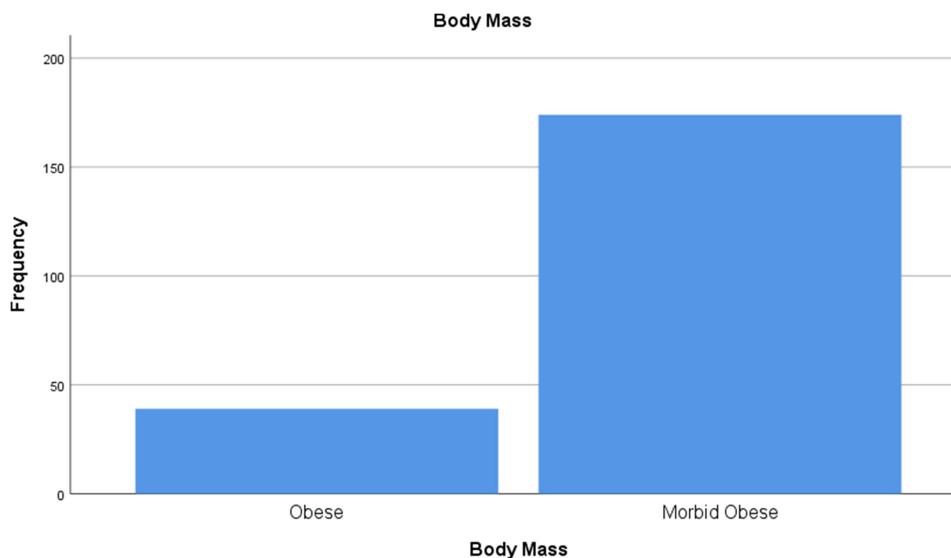


Figure 1: Shows frequency of obesity among subjects included in study

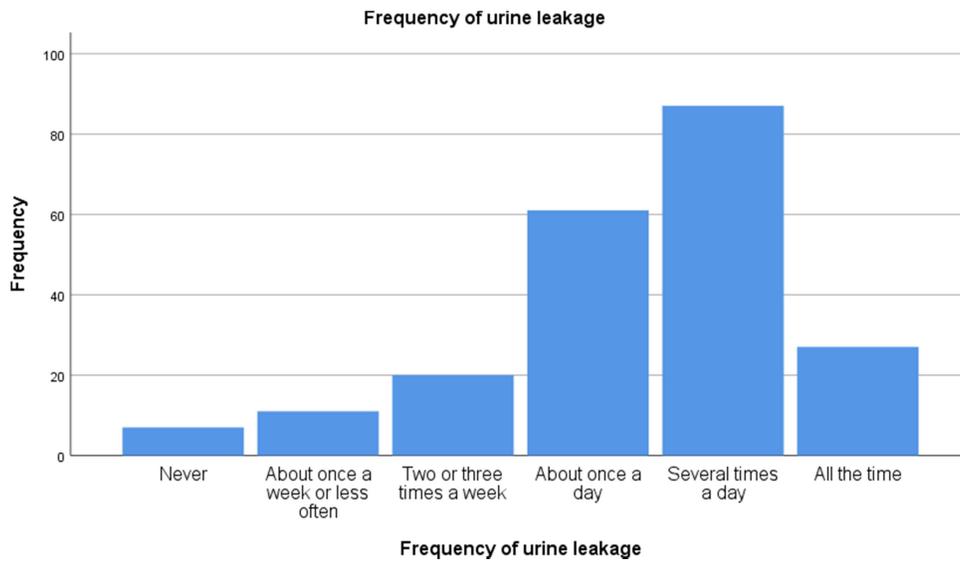


Figure 2: shows the Frequency of urine leakage among subjects

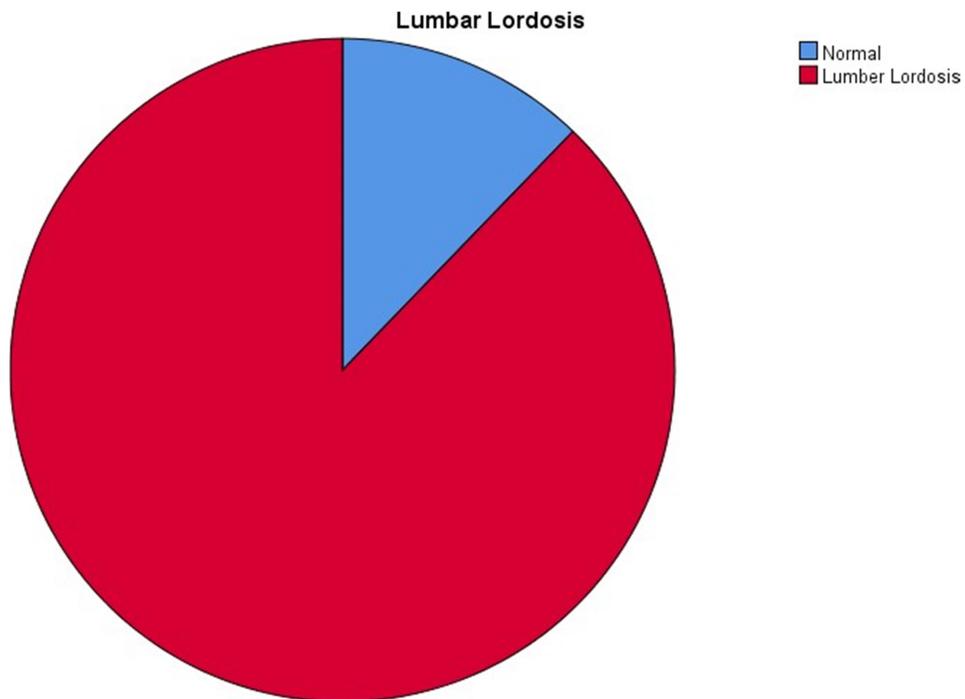


Figure 3: shows frequency of subjects suffering from LL

DISCUSSION:

Results of this study were consistent with prior studies that BMI is associated with high risk of Urinary incontinence, a study was conducted in 2014 on the relationship between BMI and urinary incontinence subgroups. According to the results of this study 10,070 men and 13,178 women were included, Logistic regressions of each UI subgroup showed that $BMI \geq 30$ (obese) was associated with UI in general [21]. A study was conducted on Obesity and Urinary Incontinence: Epidemiology and Clinical Research Update, Epidemiological studies showed that obesity is a strong independent risk factor for prevalent and incident urinary incontinence. Weight loss by surgical and more conservative approaches is effective to decrease urinary incontinence symptoms and should be strongly considered a first line treatment in this patient population [22].

The major finding of this study was that, Urinary incontinence is directly related to body mass index and hence also directly related to lumbar lordosis in diabetic obese women in diabetic women weight loss can be effective treatment of urinary incontinence. As we know that obesity is the main symptom in type 2 diabetic women and due to obesity in chronic stage there is increase in lumbar lordosis angle that may cause urinary

incontinence weight reduction interventions in these situations are very effective and also physical therapy interventions that normalize the lumbar lordosis could reduce the urinary incontinence.

REFERENCES

- [1] Hannestad YS, Rortveit G, Sandvik H, Hunskaar S; Norwegian EPINCONT study. Epidemiology of Incontinence in the County of Nord-Trøndelag. A community-based epidemiological survey of female urinary incontinence: the Norwegian EPINCONT study. Epidemiology of Incontinence in the County of Nord-Trøndelag. *Journal of Clinical Epidemiology*. (2000); 53(11): 1150-1157.
- [2] Ng M, Fleming T, Robinson M, Thomson B, Graetz N, Margono C, Mullany EC, Biryukov S, Abbafati C, Abera SF. Global, regional, and national prevalence of overweight and obesity in children and adults during 1980-2013: a systematic analysis for the Global Burden of Disease Study 2013. *The Lancet*. (2014); 384(9945): 766-781
- [3] Wang YC, McPherson K, Marsh T, Gortmaker SL, Brown M. Health and economic burden of the projected

- obesity trends in the USA and the UK. *The Lancet*. (2011); 378(9793):815-825.
- [4] Hunskaar S, Arnold EP, Burgio K, Diokno AC, Herzog AR, Mallett VT. Epidemiology and natural history of urinary incontinence. *International Urogynecology Journal Pelvic Floor Dysfunction*. (2000); 11(5): 301-319.
- [5] Khong S-Y, Jackson S. Obesity and urinary incontinence. *Menopause International*. (2008); 14(2): 53-56.
- [6] Markland AD, Richter HE, Fwu CW, Eggers P, Kusek JW. Prevalence and trends of urinary incontinence in adults in the United States, 2001 to 2008. *The Journal of Urology*. (2011); 186(2): 589-593.
- [7] Kebapci N, Yenilmez A, Efe B, Entok E, Demirustu C. Bladder dysfunction in type 2 diabetic patients. *Neurourology and Urodynamics*. (2007); 26(6): 814-819.
- [8] Subak LL, Whitcomb E, Shen H, Saxton J, Vittinghoff E, Brown JS. Weight loss: a novel and effective treatment for urinary incontinence. *The Journal of Urology*. (2005); 174(1): 190-195.
- [9] Haslam J. Stress urinary incontinence, whose problem is it? *Journal of Community Nursing*. (2006); 20: 17-20.
- [10] Smith DB. Urinary incontinence and diabetes: a review. *Journal of Wound Ostomy Continence Nursing*. (2006); 33(6): 619-623.
- [11] Jackson SL, Scholes D, Boyko EJ, Abraham L, Fihn SD. Urinary incontinence and diabetes in postmenopausal women. *Diabetes Care*. (2005); 28(7): 1730-1738.
- [12] Lewis CM, Schrader R, Many A, Mackay M, Rogers RG. Diabetes and urinary incontinence in 50- to 90-year-old women: a cross-sectional population-based study. *American Journal of Obstetrics and Gynecology*. (2005); 193(6): 2154-2158.
- [13] Izci, Y., Topsever, P., Filiz, T. M., Cinar, N. D., Uludağ, C., & Lagro-Janssen, T. The association between diabetes mellitus and urinary incontinence in adult women. *International urogynecology journal and pelvic floor dysfunction*. (2009); 20(8); 947-952.
- [14] Sapsford R. Rehabilitation of pelvic floor muscles utilizing trunk

- stabilization. *Manual Therapy*. (2004); 9(1): 3-12.
- [15] Capson AC, Nashed J, Mclean L. The role of lumbopelvic posture in pelvic floor muscle activation in continent women. *Journal of Electromyography and Kinesiology*. (2011); 21(1): 166-177.
- [16] Abdollahi S, Manshadi F.D. Relationship between lumbar lordosis, pelvic tilt and ultra sonic thickness of abdominal wall muscles in healthy young women. *Journal of Rehabilitation Medicine*. (2015); 4(3); 65-73.
- [17] Fernández RA, García-Hermoso A, Solera-Martínez M, Correa MT, Morales AF, Martínez-Vizcaíno V. Improvement of continence rate with pelvic floor muscle training post-prostatectomy: a meta-analysis of randomized controlled trials. *Urologia International*. (2015); 94(2): 125-32.
- [18] Vatandust S, Vasaghi- Gharamaleki B, Attar bashi Moghadam B. The effect of lumbar lordosis, pelvic tilt, type and number of labor in volley ball players suffering from stress urinary incontinence. *Journal of Modern Rehabilitation*. (2015); 9(2): 25-34.
- [19] Coyne KS, Wein A, Nicholson S, Kvasz M, Chen CI, Milsom I. Economic burden of urgency urinary incontinence in the United States: a systematic review. *Journal of Managed Care Pharmacy*. (2014); 20(2): 130-40.
- [20] Lai HH, Rawal A, Shen B, Vetter J. The Relationship Between Anxiety and Overactive Bladder or Urinary Incontinence Symptoms in the Clinical Population. *Urology*. (2016); 98: 50-57.
- [21] D'Ancona C, Haylen B, Oelke M, Abranches-Monteiro L, Arnold E, Goldman H, Hamid R, Homma Y, Marcelissen T, Rademakers K, Schizas A, Singla A, Soto I, Tse V, de Wachter S, Herschorn S; Standardisation Steering Committee ICS and the ICS Working Group on Terminology for Male Lower Urinary Tract & Pelvic Floor Symptoms and Dysfunction. The International Continence Society (ICS) report on the terminology for adult male lower urinary tract and pelvic floor symptoms and dysfunction. *Neurourology and*

- Urodynamics. (2019); 38(2): 433-477.
- [22] Subak LL, Wing R, West DS, Franklin F, Vittinghoff E, Creasman JM, Richter HE, Myers D, Burgio KL, Gorin AA, Macer J, Kusek JW, Grady D; PRIDE Investigators. Weight loss to treat urinary incontinence in overweight and obese women. *The New England Journal of Medicine*. (2009); 360(5): 481-490.
- [23] Hajebrahimi S, Nourizadeh D, Hamedani R, Pezeshki MZ. Validity and reliability of the International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form and its correlation with urodynamic findings. *The journal of Urology*. (2012); 9(4): 685-690.
- [24] Hart DL, Rose SJ. Reliability of a noninvasive method for measuring the lumbar curve. *Journal of Orthopaedic & Sports Physical Therapy*. (1986); 8(4): 180-184.