

Prevalence of Urinary Incontinence among Females with Vaginal Delivery, Lower Segmental Cesarean Section, Diabetic and Hypothyroidism and Its Impact on Quality of Life

V RAJALAXMI¹, P SUTHARSIKA², C.V SENTHILNATHAN³, G YUVARANI⁴, SS SUBRAMANIAN⁵

ABSTRACT

Introduction: Urinary incontinence is defined as involuntary loss of urine that represents both hygienic and social problem to the individual. Prevalence of urinary incontinence in women is nearly 30 to 40% in middle aged and 50% in older women. There are some risk factors associated with urinary incontinence such as age, childbirth, pregnancy, surgery, lifestyle habits, neurological problem, menopause, obesity, pelvic organ prolapsed etc. Some studies suggested that urinary incontinence has been related with BMI, races, age, smoking, alcohol intake, physical activity.

Aim: The study aimed to find out the prevalence of urinary incontinence among different aged women with vaginal delivery, lower segmental caesarean section, diabetic and hypothyroidism and its impact on quality of life.

Materials and Methods: A total of 240 women were selected from 300 volunteers based on the inclusion criteria of six months after delivery either a vaginal delivery or lower segmental caesarean section and females taking medication for hypothyroidism and diabetes for maximum of five years. Exclusion criteria were patients who underwent recent abdominal surgeries, any recent fracture, long standing disease, uncooperative patient

and neurological or psychological problems. They were divided into four groups, 60 in each group. After getting the consent from the patients, assessment form and questionnaires were given and to be filled by the sample and asked to answer the entire question ensuring confidentiality. The materials used were Questionnaires for Urinary Incontinence Diagnosis (QUID), Incontinence Impact Questionnaire short form (IIQ-7) and Incontinence Severity Index (ISI).

Results: The study showed that the prevalence of urinary incontinence was higher among women with Group C (Diabetic) followed by Group A (Vaginal delivery), Group B (Lower segmental caesarean section) and Group D (Hypothyroidism). It showed invariable effect on the quality of life of the women.

Conclusion: The study concluded that the prevalence of urinary incontinence among the four groups of women is higher in Group C (diabetic) followed by Group A (vaginal delivery), Group B (lower segmental caesarean section), and Group D (hypothyroidism). The urge incontinence was more prevalent than the stress incontinence. However, it also showed that there is an impact on the quality of life of the affected women. Thus, the null hypothesis is rejected and alternate hypothesis is accepted.

Keywords: Incontinence severity index, Questionnaires for urinary incontinence diagnosis, Thyroid

INTRODUCTION

Urinary incontinence or urinary frequency is defined by the International Incontinence Society as the involuntary loss of urine that represents a hygienic or social problem to the individual. It is the point of issue that will create physiological, psychological stress to both genders. But it is a most disputed point that causes discomfort, shame and loss of self-confidence especially in women [1]. The prevalence of incontinence is much lower in men than women, which accounts for 3% to 11% overall with urge incontinence in 40% to 80% of all male patients. Stress incontinence accounts for less than 10% of cases and is explicable to surgical procedure in prostate, trauma, or neurological injury [2].

Prevalence of urinary incontinence in women is nearly 30 to 40% in middle aged and 50% in older women [3]. According to the statistical data from the National Association for Incontinence 200 million people were affected with urinary incontinence worldwide. The prevalence rate varies greatly in various countries which also depend on various factors. The prevalence rate for female urinary incontinence in various countries were France (44%), Germany (41%), Spain (23%), UK is (42%), Senegal (30.9%), Sweden (29.5%), Italy (9.3%), Canada (13%) etc., [4]. The prevalence of urinary incontinence in

India ranges from 11.6 to 25.5% in rural tribal region [5]. According to the data from National Institute of Diabetes and Digestive and Kidney Disease (NIDDK) there are various factors associated with urinary incontinence such as age, childbirth, pregnancy, surgery, lifestyle habits, neurological problem, menopause, obesity, pelvic organ prolapsed etc., [6]. The child bearing is established as major risk which leads to urinary incontinence due to damage of important structures of urinary tract [7]. Some studies suggest that urinary incontinence has significant relation between BMI, races, age, smoking, alcohol intake and physical activities [7].

Incontinence was categorized as stress incontinence, urge incontinence, mixed incontinence, functional incontinence, and transient incontinence and overflow incontinence [8]. Stress incontinence is more prevalent among women resulting in loss urine in-voluntarily during physical activities that puts pressure on abdomen. Urge incontinence leads to sudden involuntary loss of urine when women has a strong desire or urgency to urinate [8].

Mixed urinary incontinence is the combination of stress and urges incontinence. Any factor which keeps a person from reaching toilet in time such as physical debility, external obstacle, or problem in thinking or communicating leads to functional incontinence. For

example, a woman in a wheelchair may have trouble reaching a toilet in time. Transient incontinence is urinary incontinence that persists for a short time which is generally caused by a medication or conditions such as mental impairment and limited mobility. Overflow incontinence occurs when the bladder doesn't empty properly and it leads to spill over [9]. Weak bladder or blocked urethra can cause this type of incontinence which is an atonic bladder [10]. Though the prevalence rate of urinary incontinence is higher in women the diagnosis and treatment is not easy as other conditions. Women with urinary incontinence often refuse to talk openly about it [11]. Embarrassment and depression are common among the middle aged and young women. The affected individual may experience a decrease in social interactions, excursions out of the home, and sexual activity [12].

Urinary incontinence also occurs as a result of any changes or problem with transfer of signals to the bladder from the brain or due to problem with the sphincters, detrusors response or as a result of combination of all the problems. The bladder muscles contract too much or not enough in case of any problem with the muscle or the nerves which controls the functions of the muscles. The sphincter muscles function becomes poor in case of direct damage or in relation to the damage of the nervous system. Urinary incontinence is not a disease it is a symptom that results from various conditions. It may be a birth defect in the urinary tract development; genetic factor also contributes to the urinary incontinence [13]

During pregnancy the foetus push down the bladder, urethra and the pelvic floor muscles which cause weakness in pelvic floor muscles resulting in urinary incontinence. During childbirth even in vaginal delivery also increases the risk of developing urinary incontinence causing damage to the pelvic floor structures or the nerves that control the bladder function. In endocrine disorders it is due to variation in the hormonal secretion. This study was done to find the prevalence of urinary incontinence among female with vaginal delivery, lower segmental caesarean, diabetic and hypothyroidism and its impact on quality of life based on questionnaire method. The questionnaires used as the outcome scales were QUID [14], IIQ-7 and ISI.

MATERIALS AND METHODS

This was an experimental study conducted in outpatient department of ACS Medical College and Hospital and took nearly three months (Jan 2017- Mar 2017) to complete the study. A total of 240 females from 300 volunteers were selected among the population with vaginal delivery, lower segment caesarean section, diabetics and hypothyroidism from the outpatient department of ACS medical college and hospital (from the same hospital where the authors are working and were stratified into four respective categories). The four categories were GROUP A (normal delivery), GROUP B (lower segmental caesarean section), GROUP C (diabetics), GROUP D (hypothyroidism). Each group contains 60 samples allocated by convenient sampling with the Inclusion criteria of subjects with six months after vaginal delivery or lower segment caesarean section delivery, those females who were on medication for diabetics and hypothyroidism for the past five years excluded those within six months of vaginal delivery and lower segment Caesarean section delivery, recent abdominal surgeries, any recent fracture, long standing disease, Non co-operative patients, Neurological or psychological problem and those on medication for renal problems. The patients were fully explained about the study and asked to fill the consent form in acceptance with participation of the study which was duly signed by the participant and the researcher. They were also given a detailed explanation about the questionnaire and benefits of answering them. Initial assessment was done after obtaining basic demographic data's like Age, Sex, Height and Weight prior to the testing. The outcome measures used were QUID, IIQ-7 and ISI. After receiving the consent form they were asked to answer the entire Questionnaires ensuring confidentiality. The study was approved by

the institutional review (Ref no: 043/PHYSIO/IRB/2016) board. (The manuscript is approved by the Institutional Review board of faculty of physiotherapy). All the procedures were performed in accordance with the ethical standards of the responsible ethics committee both (Institutional and national) on human experimentation and the Helsinki Declaration of 1964 (as revised in 2008)]. By analysing the data's given by samples from each group, the prevalence of urinary incontinence and its impact in their quality of life were evaluated.

STATISTICAL ANALYSIS

The collected data were tabulated and analysed using both descriptive and inferential statistics. All the parameters were assessed using Statistical Package for Social Science (SPSS) version 24. One-Way ANOVA includes of following tests (Test of Homogeneity of Variance, ANOVA, Robust Equality of Means, Post Hoc test Tukey HSD) (multiple comparison) was adopted to find statistical difference between four groups.

RESULTS

A total sample of 240 with the mean age of 36 years participated in the study with minimum age of 20 years and maximum age of 50 years. Data analysis were carried out after collecting data for the three outcome measures (QUID, ISI, and IIQ-7) in all the four groups.

On comparing the mean values obtained from the females groups of Vaginal delivery (Group A), Lower segmental caesarean section (Group B), Diabetics (Group C) and Hypothyroidism (Group D) based on the three outcome measures (QUID, IIQ, ISI), the mean values of QUID-SUI Group C (mean 3.30) [Table/Fig-1], shows higher significant difference followed by Group A (mean 2.63), Group B (mean 1.20) and Group D (mean 1.13). On comparing the mean values obtain from QUID-UUI Group C (mean 4.53) [Table/Fig-2] shows higher significant difference followed by Group A (mean 3.46), Group B (mean 2.60) and Group D (mean 2.20). This study shows that the urge incontinence was more prevalent among all the four groups compared to stress incontinence based on QUID.

Test	Groups	Mean	S.D	Df1	Df2	F-Value	Significance
QUID SUI	GROUP-A	2.6333	4.1562	3	116	4.478	.005**
	GROUP-B	1.2000	1.6484	3	116		
	GROUP-C	3.3000	2.9378	3	116		
	GROUP-D	1.1333	1.5252	3	116		

[Table/Fig-1]: Comparison of QUID-SUI score using test of homogeneity of variance & one-way ANOVA between Group A, Group B, Group C & Group D. (**-p<0.05); QUID-SUI: Questionnaire for Urinary Incontinence Diagnosis-Stress Urinary Incontinence

Test	Groups	Mean	S.D	Df1	Df2	F-Value	Significance
QUID UUI	GROUP-A	3.4667	4.2809	3	116	3.60	.016**
	GROUP-B	2.6000	2.2065	3	116		
	GROUP-C	4.5333	2.9911	3	116		
	GROUP-D	2.2000	1.8643	3	116		

[Table/Fig-2]: Comparison of QUID-UUI score using Test of Homogeneity of Variance & One-way Anova Test between Group A, Group B, Group C & Group D. (**-p<0.05); QUID-UUI: Questionnaire for Urinary Incontinence Diagnosis-Urge Urinary Incontinence

Based on the mean values IIQ-7 impact of urinary incontinence in assessing the quality of life was significantly higher in Group C (mean 6.36) [Table/Fig-3] followed by Group A (mean 4.55), Group B (mean 1.62) and Group D (mean 1.25). Based on mean values obtain from ISI the severity of incontinence was more in Group C (mean 1.86) followed by Group A (mean 1.30), Group B (mean 0.86) and Group D (mean 0.60) [Table/Fig-4].

As per the above data incontinence was more prevalent among the women with diabetic. Among the two commonest types of incontinence, urge incontinence (mean 4.53) was more prevalent than stress incontinence (mean 3.30) in the women's with diabetic. The women's who had either vaginal delivery, caesarean section

Test	Groups	Mean	S.D	df1	df2	F-Value	Significance
IIQ	Group-A	4.5533	9.5258	3	116	4.98	.003**
	Group-B	1.6223	2.6873	3	116		
	Group-C	6.3640	6.1765	3	116		
	Group-D	1.2563	2.6859	3	116		

[Table/Fig-3]: Comparison of IIQ score using Test of Homogeneity of Variance & One-way Anova Test between Group A, Group B, Group C & Group D (** $p < 0.05$); IIQ: Incontinence Impact Questionnaire short form

Test	Groups	Mean	S.D	df1	df2	F-Value	Significance
ISI	Group-A	1.3000	2.2916	3	116	2.97	.035**
	Group-B	.8667	1.1366	3	116		
	Group-C	1.8667	2.1453	3	116		
	Group-D	.6000	1.1017	3	116		

[Table/Fig-4]: Comparison of ISI score using Test of Homogeneity of Variance & One-way Anova Test between Group A, Group B, Group C & Group D (** $p < 0.05$); ISI: Incontinence Severity Index

and also on medication for diabetic may have an increased risk which may be the reason behind the higher prevalence of urinary incontinence in women with diabetic.

DISCUSSION

In this study urinary incontinence was self-reported and diagnosed based on the answers by the patients about the symptoms of incontinence. There are various studies on prevalence of urinary incontinence but on separated groups however this study provides an opportunity to analyse the prevalence and determinants of different types of incontinence in women belonging to vaginal delivery, lower segmental caesarean section and also among women with diabetic and hypothyroid for more than five years of medication.

Large numbers of samples were selected to find out the exact prevalence of incontinence in case of an insufficient sample size it would be difficult to demonstrate the desired difference. It is proven that QUID, IIQ-7 and ISI have their own validity and reliability. The QUID is a valid diagnostic tool used for measuring stress and urge UI before and after treatment [15]. The ISI is simple, reliable, valid, short, and sensitive measure of urinary incontinence in women [16]. The IIQ-7 appears to be a valid and reliable measure to assess males and females with Lower Urinary Tract Symptoms (LUTS). The IIQ-7 is more sensitive to detect difference between groups than generic health related quality of life measures [17].

Results showed that the prevalence of urinary incontinence is higher among women with Group C (Diabetic) and followed by Group A (Vaginal delivery), Group B (Lower segmental caesarean section) and Group D (Hypothyroidism). Also, it shows invariable effects on the quality of life of women.

Lifford KL et al., concluded that diabetic mellitus increases the risk of urinary incontinence in women. As incontinence is associated with diabetic mellitus if present for longer duration, even delaying onset of diabetic mellitus could have important public health implications [18]. Izci Y et al., concluded that diabetic is the most important independent determinant of urinary incontinence [19].

Conservative management of stress urinary incontinence, including behavioral therapy, bladder training, pelvic floor muscle training has been proved and evaluated in various high quality non-systematic reviews like trying to stop or slow down the flow of urine midway through emptying the bladder. The strength of the pelvic floor muscles can be identified by oneself on his own by Stopping or holding the flow of urine while urinating, on doing it repeatedly will also serve as an exercise; possibly you can squeeze in and hold the muscles inside the pelvis while you breathe normally. Other management includes lifestyle changes, mechanical devices, vaginal cones, and electrical stimulation [20]. Urinary incontinence can have a severe impact on our healthcare system and patients' quality of life [21]. Probably 20%

of community dwelling older adults have incontinence to limit their daily life activities. Affected individuals often deny and hide urinary incontinence, which results in physical and psychosocial restrictions to the enjoyment in life [22]. Incontinence can be associated with major neurological damage which can be functional or iatrogenic [23]. Depression and decreased quality of life have been found to re-occur in persons struggling with incontinence [24].

Fultz N et al., have discussed the principles of self-management, the behavioral treatments and self-managing skills the patients' needs to acquire. They become poised with the self-management approaches that can be unified within the framework to control urinary, fecal, or dual incontinence [25].

Even rural residents can effectively manage transient and structural urinary incontinence. Symptoms can be effectively improved by behavioural management, including effective interprofessional evaluation of incontinence, timed and prompted voiding [26]. Of the 234 chart-reviewed, 5% were found to have physician-documented urinary incontinence [27].

Thus, based on all the data, the study shows that urinary incontinence is more prevalent in females with diabetics. According to national institute on aging the possible way that diabetic contributes to incontinence are obesity that puts pressure on bladder, nerve damage which affects the nerve that control the bowel and bladder, compromised immune system that increases the risk of urinary tract infections, and medications for the diabetic. High level of blood glucose increases thirst leading to frequent urination which results in incontinence. Women with type 2 diabetes suggest that micro vascular complications further increase both the prevalence and incidence of urinary incontinence [18,28]. Physiological, micro vascular and neurological complications of diabetes result in changes that may impair the function of continence mechanisms, including damage to the innervation of the bladder, altered detrusor muscle function or urothelial dysfunction [29]. At the same time though there is increase in urinary incontinence in pre-diabetic women who generally lack these severe diabetic complications suggests that other unknown processes may also underlie the development of incontinence in women with impaired glucose. Autonomic nervous functions were selectively damaged, leaving motor function intact but impairing the sensation of bladder fullness, which decreases urinary frequency. As neuropathy progresses, autonomic efferent nerves become involved, leading to incomplete bladder emptying, urinary dribbling, and overflow incontinence [9].

In order to create awareness among the group of female in disputed or at risk, and include urinary incontinence protocol in earlier days. To include the urinary incontinence preventive exercise in the postoperative treatment protocol after lower section caesarean section, and also to create awareness among those who are on medication for thyroid and diabetics have to include urinary incontinence exercise in their daily routine. Pelvic muscle exercises are strongly recommended to prevent or decrease the incidence of urinary incontinence. These exercises are strongly recommended as a management strategy for stress incontinence, and are recommended as treatment for urge incontinence which may benefit men who develop urinary incontinence following prostatectomy. Individuals are taught to "draw in" or "lift up" the perivaginal muscles and the anal sphincter as if to control urination or defecation with minimal contraction of abdominal, buttock, or inner thigh muscles. Individuals should attempt to hold the "draw in" for at least five seconds (preferably 10 seconds) with an equal time of relaxation [9]. Treatment of urinary incontinence using Biofeedback therapy uses electronic or mechanical instruments to give information to a person about their physiological activity and bladder control. Biofeedback for urinary incontinence is also used as a measure of pelvic and detrusor muscle activity. Biofeedback verifies accurate muscle activity and gives immediate feedback which provides a visual cue for the patients and therapist [9]. The obvious

suspects include large babies and “difficult deliveries”, lengthy pushing phases with or without instrumentation. Postpartum urinary incontinence arises from a multifactorial physiological insult resulting in urinary incontinence. Pelvic organ prolapse (cystocele, rectocele, and uterine prolapse) and anal incontinence and also troublesome sequel of vaginal delivery. These prevalent pelvic problems receive even less than the scant attention paid to postpartum urinary incontinence [30,31].

LIMITATION

- Difficulty in identifying samples under specific Inclusion criteria.
- Various other groups have not been included (e.g., hysterectomy, hypertension, nulliparous women).
- Treatment protocol has not been included in the study.

CONCLUSION

The study concluded that the prevalence of urinary incontinence among the four groups of females was higher in patients with diabetic followed by vaginal delivery than lower segmental caesarean section and finally in hypothyroidism. The urge incontinence was more prevalent than the stress incontinence and it shows that it has an impact in the quality of life. Clinicians should be aware of the secondary complication after normal or caesarean delivery and patients on medication for thyroid and diabetic and advise them to perform urinary incontinence exercise in daily routine.

DECLARATION OF PATIENT CONSENT

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patient's understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

REFERENCES

- [1] Singh U, Agarwal P, Verma ML, Dalela D, Singh N, Shankwar P. Prevalence and risk factor of urinary incontinence in Indian women. A hospital based survey. *Indian J Urol.* 2013;29(1):31-36.
- [2] Nitti VW. The prevalence of urinary incontinence. *Rev Urol.* 2001;3(Suppl 1): S2-S6.
- [3] Danforth KN, Townsend MK, Lifford K, Curhan GC, Resnick NM, Grodstein F. Risk factors for urinary incontinence among middle-aged women. *Am J Obstet Gynecol.* 2006;194(2):339-45.
- [4] Kılıç M. Incidence and risk factors of urinary incontinence in women visiting Family Health Centers. *Springerplus.* 2016;5(1):1331. Published online 2016 Aug 11.
- [5] Kumari S, Jain V, Mandal AK, Singh A. Behavioral therapy for urinary incontinence in India. *Int J Gynaecol Obstet.* 2008;103(2):125-30.
- [6] Bharucha AE, Dunivan G, Goode PS. Epidemiology, pathophysiology, and classification of fecal incontinence: State of the Science Summary for the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) Workshop. *Am J Gastroenterol.* 2015;110(1):127-36.
- [7] Rortveit G, Daltveit AK, Hannestad YS, Hunskaar S; Norwegian EPINCONT Study. Urinary incontinence after vaginal delivery or cesarean section. *N Engl J Med.* 2013;348:900-07.
- [8] Burgio KL, Matthews KA, Engel BT. Prevalence, incidence and correlates of urinary incontinence in healthy, middle-aged women. *J Urol.* 1991;146:1255-59.
- [9] Yerkes AM. Urinary incontinence in individuals with diabetes mellitus. *Diabetes Spectrum.* 1998;11(4):241-47.
- [10] Cefalu CA. Urinary Incontinence. in *Primary Care Geriatrics* (5th ed), 2007.
- [11] Sangsawang B, Sangsawang N. Stress urinary incontinence in pregnant women: a review of prevalence, pathophysiology, and treatment. *Inturogynecol J.* 2013;24(6):901-12.
- [12] Yarnell JWG, Voyle GJ, Richards CJ, Stephenson TP. The prevalence and severity of urinary incontinence in women. *J Epidemiol Community Health.* 1981;35:71-74.
- [13] Hill WG. Control of urinary drainage and voiding. *Clin J Am Soc Nephrol.* 2015;10(3):480-92. Published online 2014 Apr 17.
- [14] Fowler CJ, Griffiths D, de Groat WC. The neural control of micturition. *Nat Rev Neurosci.* 2008;9(6):453-66.
- [15] Bradley CS, Rahn DD, Nygaard IE, Barber MD, Nager CW, Kenton KS, et al. The questionnaire for urinary incontinence diagnosis (QUID) validity and responsiveness to change in women undergoing non-surgical therapies for treatment of stress predominant urinary incontinence. *Neurourology.* 2010;29(5):727-34.
- [16] Hanley J, Capewell A, Hagen S. Validity study of the severity index, a simple measure of urinary incontinence in women. *BMJ.* 2001;322(7294):1096-97.
- [17] Cam C, Sakalli M, Ay P, Cam M, Karateke A., Validation of the short forms of the incontinence impact questionnaire (IIQ-7) and the urogenital distress inventory (UDI-6) in a Turkish population. *NeuroUrol Urodyn.* 2007;26(1):129-33.
- [18] Lifford KL, Curhan GC, Hu FB, Barbieri RL, Grodstein F. Type 2 diabetes mellitus and risk of developing urinary incontinence. *Am Geriatr Soc.* 2005;53L1851-57.
- [19] Izci Y, Topsever P, Filiz TM, Çınar ND, Uludağ C, Lagro-Janssen T. The association between diabetes mellitus and urinary incontinence in adult women. *Int Urogynecol J.* 2009;20(8):947-52.
- [20] Ghaderi F, Oskouei AE. Physiotherapy for women with stress urinary incontinence: a review article. *J Phys Ther Sci.* 2014;26(9):1493-99.
- [21] Faiena I, Patel N, Parihar JS, Calabrese M, Tunuguntla H. Conservative management of urinary incontinence in women. *Rev Urol.* 2015;17(3):129-39.
- [22] Vogel SL. Urinary incontinence in the elderly. *Ochsner J.* 2001;3(4):214-18.
- [23] Broome BAS. The impact of urinary incontinence on self-efficacy and quality of life. *Health and Quality of Life Outcomes.* 2003;1:35.
- [24] Wilde MH, Bliss DZ, Booth J, Cheater FM, Tannenbaum C. Self-management of urinary and fecal incontinence. *AJN The American Journal of Nursing.* 2014;114(1):38-45.
- [25] Fultz N, Girts T, Kinchen K, Nygaard I, Pohl G, Sternfeld B. Prevalence, management and impact of urinary incontinence in the workplace. *Occup Med (Lond).* 2005;55(7):552-57.
- [26] Kow JK, Carr M, Whytock S. Diagnosis and management of urinary incontinence in residential care. *BCM J.* 2013;55(2):96-100.
- [27] Wallner LP, Porten S, Meenan RT, O'Keefe Rosetti MC, Calhoun EA, Sarma AV, et al. Prevalence and severity of undiagnosed urinary incontinence in women. *The American journal of Medicine.* 2009;122(11):1037-42.
- [28] Brown JS, Vittinghoff E, Lin F, Nyberg LM, Kusek JW, Kanaya AM. Prevalence and risk factors for urinary incontinence in women with type 2 diabetes and impaired fasting glucose: findings from the National Health and Nutrition Examination Survey (NHANES) 2001-2002. *Diabetes Care.* 2006;29(6):1307-12.
- [29] Starer P, Libow L. Cystometric evaluation of bladder dysfunction in elderly diabetic patients. *Arch Intern Med.* 1990;150(4):810-13.
- [30] Chaliha C, Sultan AH, Bland JM, Monga AK, Stanton SL. Anal function: effect of pregnancy and delivery. *Am J Obstet Gynecol.* 2001;185:427-32.
- [31] Donnelly V, Fynes M, Campbell D, Johnson H, O'Connell PR, O'Herlihy C. Obstetric events leading to anal sphincter damage. *Obstet Gynecol.* 1998;92:955-61.

PARTICULARS OF CONTRIBUTORS:

1. Associate Professor, Department of Physiotherapy, Dr. MGR Educational and Research Institute University, Chennai, Tamil Nadu, India.
2. BPT Internee, Department of Physiotherapy, Dr. MGR Educational and Research Institute University, Chennai, Tamil Nadu, India.
3. Professor, Department of Physiotherapy, Dr. MGR Educational and Research Institute University, Chennai, Tamil Nadu, India.
4. Assistant Professor, Department of Physiotherapy, Dr. MGR Educational and Research Institute University, Chennai, Tamil Nadu, India.
5. Professor, Department of Physiotherapy, Bharat University, Chennai, Tamil Nadu, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. V Rajalaxmi,
Faculty of Physiotherapy, ACS Medical College and Hospital, Velappanchavadi, Ponamallae High Road,
Chennai-77, Tamil Nadu, India.
E-mail: rajalaxmigopalakrishnan@gmail.com

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