

9-3-2007

Prevalence of Stress, Urge, and Mixed Urinary Incontinence in Women

Chaandini Jayachandran
Eastern Michigan University

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Prevalence of Stress, Urge, and Mixed Urinary Incontinence in Women

by

Chaandini Jayachandran

Thesis

Submitted to the Department of Health Sciences

Eastern Michigan University

in partial fulfillment of the requirements

for the degree of

MASTER OF SCIENCE

in

Clinical Research Administration

Thesis Committee:

Prof. Stephen Sonstein, Chair

Dr. Salil Khandwala, MD

September 3, 2007

Ypsilanti, Michigan

DEDICATION

This document is dedicated to my family.

ABSTRACT

Urinary Incontinence is a common affliction that impairs quality of life and restricts social activity in adult women. Based on etiology and pathophysiology, urinary incontinence is classified into Stress, Urge, and Mixed urinary incontinence. Knowledge of the specific type of incontinence helps in determining course of treatment. A retrospective, descriptive, observational study was designed to determine the percentage of new patients seeking treatment for bladder complaints, who were identified by Medical, Epidemiological, and Social aspects of Aging (MESA) questionnaire to reflect Stress, Urge, or Mixed urinary incontinence. The secondary aim was to investigate any trends other variables studied that showed an association with any particular type of incontinence. Results indicated that 43% of the study population had Stress, 24% had Urge, 25% had Mixed urinary incontinence, and 8% had no incontinence. Stress urinary incontinence was found to be twice as prevalent as Urge and Mixed urinary incontinence in the study population.

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INTRODUCTION

Urinary Incontinence is defined as the involuntary leakage of urine. This condition is more common in women than in men. Urinary incontinence can significantly impair quality of life, restricting social activity in women and usually accompanied by medical complications. Though urinary incontinence is not life-threatening, it is a very debilitating condition. “Incontinence is a condition that will not kill me, but it took my life away,” is an emotional quote that aptly describes the impact of urinary incontinence on the patient. One woman was so tortured by urinary incontinence that she founded the Simon Foundation for Continence and became a spokesperson, appearing on television and radio programs throughout the world (Gartley, 2006).

The Continence Foundation has reported that one in four women and one in nine men will experience urinary incontinence at some stage in their lives. It is important to explore all the aspects of urinary incontinence now because life expectancy is higher, and it is estimated that as the baby boomer generation ages, there is going to be an increased demand for improved quality of life in the elderly population. Urinary incontinence affects over half of nursing home residents and is one of the main contributing factors in deciding if an elderly person needs to be admitted into a nursing home.

The burden of urinary incontinence is high, not only in terms of cost of incontinence products and nursing home costs but also in terms of loss of quality of life and decreased productivity. A Gallup poll result in 1994 indicated that almost 70% of urinary incontinence sufferers failed to seek medical treatment, and the majority of those who eventually sought medical help had waited at least four years before talking to their physicians about this problem. There appears to be a stigma attached to urinary

incontinence that causes one to suffer in silence. Those women afflicted by urinary incontinence do not discuss this condition even with their partner or closest relative. Their main fear appears to be that they would be perceived as being “dirty” or “unclean.” They are reluctant to bring it up even when the primary care physician specifically asks about continence problems during a physical exam. There is general misconception that urinary incontinence is an inevitable consequence of aging and that they will have to live with it for the rest of their lives. Patients fear that they are losing control over their bodily functions and there is nothing they can do about it. This feeling of helplessness leads to significant levels of depression, especially in women with urinary incontinence.

Urinary incontinence is not an area that primary care physicians or other healthcare providers focus upon because it is not an acute condition. It is, however, an area that needs to be addressed especially with elderly patients. Healthcare providers need to be aware that urinary incontinence needs to be treated in order to be able to prevent falls in the bathroom, skin conditions due to wetness, and depression due to incontinence. Therefore, efforts to educate the healthcare providers must be undertaken. Patients must be educated and informed of the treatment options available (Margalith, Gillon, & Gordon, 2004). Care must be taken to address this sensitive issue in the appropriate manner and to make the patients comfortable enough to talk to their physicians about incontinence. Direct-to-consumer advertising has played a great role in increasing awareness among incontinence sufferers, but they still are reluctant to discuss this embarrassing condition, which they have hidden for years even from their family members.

Continence in women is usually effected by the pelvic floor muscles that basically help to hold and, when required, help to release urine from the urinary bladder. The body stores urine in the bladder, a balloon-like organ, that expands as the bladder fills with urine. The bladder wall muscles contract in response to stimuli, forcing urine out into the urethra, the tube through which urine leaves the body. The sphincter muscles surrounding the urethra relax and let the urine pass out of the body. This is the normal process of urination.

Urine leakage occurs when the pressure in the bladder, the expulsive force is greater than the pressure within the urethra, the closure force. At this point the woman loses urine involuntarily. Incontinence also occurs if the bladder muscles suddenly contract, the urethral muscles suddenly relax, or if there is a malfunction of the urethral sphincter. When there is a weakness in the pelvic floor muscles that support the bladder and other pelvic organs, these organs could prolapse and cause additional pressure on the bladder, leading to leakage of urine.

TYPES OF URINARY INCONTINENCE

Based on etiology and pathophysiology, urinary incontinence is classified into three types – Stress Urinary Incontinence, Urge Urinary Incontinence, and Mixed Urinary Incontinence.

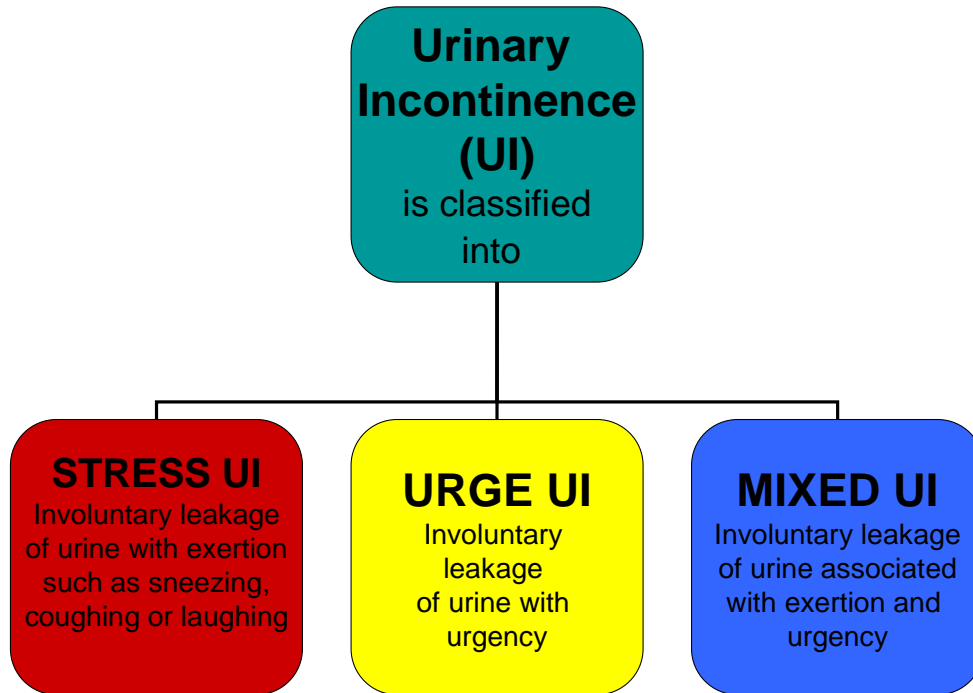


Figure 1: Types of Urinary Incontinence

Stress Urinary Incontinence:

According to the International Continence Society, Stress Urinary Incontinence is defined as the involuntary leakage of urine with exertion such as coughing, sneezing, and laughing. An increase in abdominal pressure due to physical exertion places stress on the bladder, causing urine to leak. The basic mechanisms of failure of the urethra to maintain a water-tight seal are poor urethral support by the pelvic floor muscles and intrinsic sphincter deficiency.

Some of the main etiologic factors for Stress Urinary Incontinence include anatomic and neurological injury to the pelvic floor during childbirth. Genetic susceptibility or predisposition to having poor tissue strength can be considered a contributing factor. Individual behavioral aspects such as smoking, obesity, alcohol consumption, excessive liquid intake, caffeine consumption, and rigorous exercise can be factors leading to Stress Urinary Incontinence. Medical conditions such as chronic obstructive pulmonary disease, estrogen deficiency, and aging may be considered confounding factors for Stress Urinary Incontinence.

Urge Urinary Incontinence:

Urge Urinary Incontinence is the involuntary leakage of urine accompanied by or immediately preceded by a strong sudden urge to urinate. Commonly referred to as “Overactive Bladder,” this incontinence is usually caused by involuntary contractions of the detrusor muscles of the bladder wall at inappropriate times. There is no gradual build-up of desire to urinate in this type of incontinence and a large amount of urine is lost during each incontinence episode. Urge Urinary Incontinence may be triggered by simple everyday occurrences such as the sound of running water, exposure to cold temperatures, or drinking cold beverages. A classic example of a trigger is the notorious “Key in the lock” syndrome. Women are able to hold their urine until they get home, but when they insert the key in their door the urine just pours out beyond their control.

Idiopathic etiologic factors include myogenic, neurogenic, and urethrogenic manifestations. Anatomical factors such as bladder outlet obstruction, pelvic masses, urethral diverticulum, or pregnancy play a key role. Bladder inflammation, urinary tract infections, urinary stones, bladder cancer, or benign urothelial growths could cause Urge

Urinary Incontinence. Behavioral factors like excess fluid and caffeine intake, habitual increased voiding frequency, and obsessive anxiety about urinary problems have a significant effect. Chronic medical conditions like diabetes, multiple sclerosis, Parkinson's disease, brain tumors, other neurological diseases, and spinal cord injury also contribute to Urge Urinary Incontinence.

Mixed Urinary Incontinence:

Mixed Urinary Incontinence is the involuntary leakage of urine associated with exertion and urgency. It is a mixture of Stress and Urge Urinary Incontinence. Basically the bladder is overactive and the urethra and urethral sphincter muscles are underactive or deficient. In some cases the Stress symptoms are more defined than the Urge symptoms, and the patients are categorized as Stress predominant-Mixed Urinary Incontinence sufferers. If it is the other way around and Urge symptoms are the primary complaint, then they are categorized as Urge predominant-Mixed Urinary Incontinence sufferers.

Etiologic factors for Mixed Urinary Incontinence are a combination of the factors described for Stress and Urge Urinary Incontinence.

RISK FACTORS ASSOCIATED WITH URINARY INCONTINENCE

As a result of clinical and epidemiological studies conducted in various populations, a number of variables have been identified as being possible risk factors for urinary incontinence. Risk factors for urinary incontinence among middle-aged women were studied (Danforth et al., 2006). Risk factors associated with urinary incontinence can be classified into three main categories: predisposing factors, promoting factors, and obstetric or gynecological factors.

Predisposing factors:

- i) Race - Recent studies conducted in America have concluded that Caucasian women are more susceptible to Stress urinary incontinence than African-American women or women of Asian origin.
- ii) Family predisposition - Hereditary factors were found to play a role in the prevalence of urinary incontinence. Women with family history of the disease had increased risk of developing incontinence and higher risk of increased severity of symptoms.
- iii) Anatomical abnormalities – Increased risk of urinary incontinence was observed in women with congenital defects of the ureters or the urethra. Presence of urinary fistula also increases chances of developing urinary incontinence.
- iv) Neurological abnormalities - Neurological problems due to congenital defects like spina bifida, due to injury because of accidents and hemorrhages, or due to degenerative diseases like Parkinson's increase risk of developing urinary incontinence.

Promoting Factors:

- i) Age – Conditions associated with advanced age, changes in bladder capacity, and pelvic floor muscle strength are considered factors that promote urinary incontinence.
- ii) Comorbidities - Decreased mobility and heart, lung, and other health problems contribute to development of urinary incontinence.

- iii) Obesity – Obesity is an established risk factor especially for Stress Urinary Incontinence. The increase in intra-abdominal pressure due to the excess weight causes straining and weakening of pelvic floor muscles that support the bladder and urethra (Mommensen & Foldspang 1994).
- iv) Constipation – Severe constipation weakens the pelvic floor muscles and causes outflow obstruction by the rectum causing a physical barrier to complete bladder emptying. Chronic constipation with repeated and prolonged straining can cause pudendal nerve damage and neuropathy leading to urinary incontinence.
- v) Occupational and recreational activities – physically intensive activities that cause repeated and prolonged increase in abdominal pressure are known to worsen existing urinary incontinence. Higher impact activities tend to increase severity of symptoms of urinary incontinence.
- vi) Lung disease and smoking – Lung diseases like chronic bronchitis and emphysema increase intra-abdominal pressure, causing risk of urinary incontinence to become more pronounced. Smokers tend to cough a lot more than non-smokers, and this could account for the fact that many women urinary incontinence sufferers are also smokers.
- vii) Urinary tract infection – Recurrent urinary tract infections are reported to be associated with development of urinary incontinence.
- viii) Cognitive impairment and disability – Dementia may interfere with ability to control urination. Impairment of physical dexterity prevents the elderly from getting to the toilet on time.

- ix) Menopause – The lower urinary tract tissue is sensitive to estrogen but the exact role of estrogen in the control of urinary incontinence is not yet clear.
- x) Medications – Drug-to-drug interactions and even the effect of some drugs themselves affect urinary incontinence. For example, diuretics contribute to urinary incontinence by increasing the urinary volume, frequency, and urgency.

Obstetric and gynecological factors:

- i) Pregnancy – Urinary incontinence commonly occurs during pregnancy and disappears after delivery. Women who are incontinent during pregnancy are at increased risk for developing incontinence later on in life.
- ii) Childbirth – Vaginal delivery predisposes a woman for urinary incontinence more than a Caesarean section. Episiotomy and instrument-aided vaginal deliveries increase risk of urinary incontinence when compared to spontaneous vaginal deliveries
- iii) Parity – Parity or the number of deliveries is strongly associated with urinary incontinence in younger women, but the association was not as evident in older women (Tubaro, 2001).
- iv) Pelvic surgery and radiation – Certain pelvic surgeries and radiation therapy in the pelvic area are known to be risk factors for urinary incontinence.
- v) Pelvic organ prolapse – Prolapsed organs push on the bladder, causing more pressure leading to development of urinary incontinence. In some cases, though, the incontinence may have been masked by the prolapse and when the

prolapse is reduced either by surgery or pessary insertion, the urinary incontinence is revealed (Borstad & Torkel, 1989).

TREATMENT OPTIONS

There are specific treatment options available for each type of urinary incontinence. Accurate diagnosis of type of urinary incontinence is essential for successful treatment of urinary incontinence.

Treatment options for Stress urinary incontinence:

Conservative treatments for Stress Urinary Incontinence include behavior modifications such as weight loss, smoking cessation, timed voiding, and watching caffeine and excess fluid intake. Pelvic floor muscle training in order to strengthen the pelvic floor muscles that provide support to the urethra is only successful if the patient is compliant and is motivated and performs the exercises with diligence and in a manner that is consistent with the physiotherapy instructions (Williams, 2004). Pharmacological treatments for Stress Urinary Incontinence include drugs that inhibit bladder wall muscle contractions and tighten bladder neck and urethral muscles. The role of hormone replacement therapy in the treatment of Stress Urinary Incontinence is a controversial subject. The use of devices such as urethral inserts and pessaries is not very common due to patient discomfort related issues. Implants such as collagen are injected into the tissue surrounding the urethra in order to bulk up the tissue and help close the urethra. Surgical treatment for Stress Urinary Incontinence has been performed for a long time (Urinary Incontinence Treatment Network, 2005). The most popular ones at present are the minimally invasive mid-urethral sling procedures, where there is a synthetic mesh inserted vaginally in order to provide support to the urethra.

Treatment options for Urge Urinary Incontinence:

Behavioral modification, Pelvic floor muscle therapy, and bladder training exercises play a significant role in treatment and management of Urge Urinary Incontinence. Electrical and magnetic stimulation of pelvic floor muscles have been used with limited success. Pharmacological therapy seems to be the most preferred form of treatment for Urge Urinary Incontinence. Anti-muscarinic drugs are widely used in the management of urgency. Surgical procedures aimed at treating Urge Urinary Incontinence include Augmentation cystoplasty, Autoaugmentation, and Sacral nerve stimulation. Augmentation cystoplasty is the surgical expansion of the bladder using graft materials. Autoaugmentation is the procedure whereby the detrusor muscle is removed over the top part of the bladder so that the underlying urothelium bulges out to create a larger storage capacity. Stimulating the sacral nerve root by implanting an electrical neuromodulator helps relieve urgency symptoms.

Treatment options for Mixed Urinary Incontinence:

Treatment for Mixed Urinary Incontinence needs to be undertaken in two steps. First, the most bothersome component of urinary incontinence must be identified and treated satisfactorily, and then the second component may be addressed. For instance, if a patient is diagnosed with Stress predominant-Mixed Urinary Incontinence, typically the Stress part of the problem would be addressed first and then the Urge component will be taken care of.

Given the fact that correct diagnosis of the type of urinary incontinence is critical in the management and treatment of the incontinence, specific tools need to be used to help the health-care providers in their assessment. In order to identify symptoms specific

to each type of urinary incontinence, the Medical Epidemiological and Social aspects of Aging (MESA) questionnaire has been traditionally used. The MESA questionnaire is a validated and reliable tool that is simple and is filled out by the patients themselves. The MESA score is used as a preliminary screening tool in trying to plan the future course of action regarding the patient's treatment.

OBJECTIVE OF THE STUDY

Prevalence of urinary incontinence has been studied previously. Due to lack of consensus on exact definition of different types of urinary incontinence until recently, these estimates produced widely varied results. In large epidemiologic studies, the study designs were so varied that it was difficult to compare one study with another. The primary objective of this study is to determine the prevalence of the different types of urinary incontinence based upon the new International Continence Society definitions. The secondary objective of this study is to ascertain if there is an association between any type of urinary incontinence with the established predisposing or risk factors for urinary incontinence. The tertiary objective of this study is to raise social awareness of this condition, to establish that urinary incontinence is definitely treatable, and to encourage people suffering from urinary incontinence to seek treatment.

SIGNIFICANCE OF THE STUDY

Given the fact that urinary incontinence occurs in one in four women, it is of utmost importance that this condition be diagnosed and treated appropriately. Urinary incontinence plays an important role in deciding if a patient is admitted into a nursing home. The huge economic impact of this condition on society as a whole, especially with the aging population in our country, needs to be addressed. There is considerable

evidence of a link between depression and urinary incontinence. There has been some indication of an increase in the number of falls while elderly incontinent patients were rushing to reach the toilet. The results obtained from this study will give healthcare providers a better idea as to the prevalence of urinary incontinence. The providers will be able to allot resources and establish standard operating procedures designed to suit the needs of their patients with urinary incontinence. Any association with a particular risk factor or predisposing condition could be used to educate or counsel patients in an attempt to decrease the impact of this distressing condition. The trends of association with risk factors that might become obvious as a result of this study could form the basis for new research studies to be conducted to further explore these associations with urinary incontinence. This study might increase the social awareness of this devastating condition, inform patients of the newer treatment options, and encourage them to seek medical help instead of suffering in silence.

REVIEW OF LITERATURE

There is a huge body of published literature on the subject of urinary incontinence. A select few works that are most relevant to this study are discussed in this section.

Urinary incontinence has always been treated more as a social problem than as a medical condition. Historically, not much credence was given to this problem. There were some remedies suggested that were not very effective. Social and cultural influences placed strict limits on recognizing and treating this disease. In modern times, though, there are several treatments available. In spite of tremendous improvements in treatment options, the social and cultural attitudes still remain the same as they did decades ago

(Adedokun & Wilson, 2004). Efforts have been made to upgrade urinary incontinence from an “ill-defined condition” to a disease in the World Health Organization’s International Classification of Disease (WHO-ICD) and to try to remove the “taboo” and social stigma attached to this condition (Voelker, 1998)

Contrary to popular belief, urinary incontinence does not occur exclusively in elderly women. The perception of loss of control over bodily function as part and parcel of being a woman was studied in Australia (Peake, Manderson, & Potts 1999). Due to emphasis on younger women and on gendered meanings of urinary incontinence, this paper offers a unique perspective on this subject. This acceptance by women of urinary incontinence being a consequence of aging and being a woman may be the primary reason that prevents women from seeking treatment. Embarrassment, lack of awareness, having no access to medical care, and cultural or religious beliefs could also contribute to delay in seeking help. This very involved study brought the feelings and lived body experiences of incontinent women to the forefront.

An interesting study found that women with Urge Urinary Incontinence or overactive bladder had significantly more detailed knowledge about locations of toilets in their neighborhoods (Kuhn, Vits, Kuhn, & Monga, in press). Incontinent women were found to be less likely to have performed routine housekeeping chores, shopping, and were less likely to participate in social events than women with no urinary incontinence (Fultz, Fisher, & Jenkins, 2004). The deleterious effects of urinary incontinence on women were showcased in a large nationally representative sample of middle-aged and older women, studying a comprehensive inventory of daily activities.

Earlier prevalence estimates in large epidemiological studies varied widely mainly due to lack of consensus regarding definitions of the different types of urinary incontinence. It was also difficult to compare the results from these studies because there was no standardization of the study designs (Minassin, Drutz, & Al-Badr, 2003). This variation in the estimates of prevalence of urinary incontinence was studied by Thom in 1998. Upon review of 21 population-based studies, it was concluded that specifying the definition of incontinence and the age and gender of the population of interest would provide a more accurate estimate of prevalence of urinary incontinence.

In an attempt to try to investigate the reason for the variation in prevalence estimates, it was found that most of these studies were conducted as mail-out surveys, wherein there were differences in response rates. Some studies used telephone interviews while others used mail or personal interviews. There could have been variation in the responses in person due to social desirability bias, where the subject might not want to admit to being incontinent in front of the researcher. There was also great variation due to variables such as age and community dwelling versus institutionalized women (Sandvik, 1996).

In 2006, Thom et al. compared the prevalence of urinary incontinence among Caucasian, African-American, Hispanic, and Asian-American women. Hispanic women were more likely to have daily urinary incontinence with higher intensity than African-American women. Urge Urinary Incontinence was found to be more prevalent in African-American women. Nygaard and Heit in 2004 discussed the possibility of race and ethnicity of the study population creating a variation in prevalence estimates. The contribution of anatomic differences in different racial and ethnic groups to variation in

prevalence estimates was studied by Graham and Mallett in 2001. They found that Caucasian women had lower urethral closure pressures than African-American women.

A comprehensive review on urinary incontinence explained pathophysiology, reviewed epidemiology, and suggested a practical approach to diagnosis and treatment. Accurate diagnosis of the type of urinary incontinence was considered essential for successful treatment. Direct-to-consumer advertising by the pharmaceutical companies was considered to be beneficial in that they were instrumental in increasing awareness of this condition. It was also suggested that the recent innovations in surgical devices be viewed with caution due to lack of long-term data to support the efficiency of these devices (Norton & Brubaker, 2006).

In a summary review of prevalence of types of urinary incontinence, impact on medical cost and patient's quality of life and the treatment options available were discussed. It was concluded that accurate diagnosis of type of urinary incontinence was key to treatment. It was also estimated that the economic burden due to urinary incontinence in the United States in the year 2000 was 19.5 billion year-2000 US dollars (Dmochowski, 2005).

The emotional impact on the sufferers of urinary incontinence is extremely important. It affects their overall quality of life, placing limitations on their social activity, the way they dress, the distance they are willing travel, sexual activity, and several other factors of day-to-day life that continent women would not worry about (Fultz & Herzog, 2001). Questionnaires that were specifically designed to address urinary incontinence would give a better idea of the impact of the condition on quality of

life of women (Kelleher, 2000). Nygaard et al. in 2005 concluded that women with severe urinary incontinence felt that their condition prevented them from exercising.

RESEARCH METHODS

Study Design:

This study was designed to be a retrospective, descriptive, observational study. Informed consent was not required to be obtained in a retrospective chart review. This design was best suited for this study as all the information that had to be collected was already present in the patient's clinic chart.

Inclusion Criteria:

- All new female patients
- 18 to 89 years of age
- Treated in a Urogynecology office in Dearborn, Michigan, between 6-1-2005 and 8-31-2005
- Presenting with a bladder complaint

Exclusion Criteria:

- Active urinary tract infection
- 90 years of age or older, vulnerable population. There are very few people above the age of 90 and there is a higher risk of loss of confidentiality for these patients, so they were excluded from this study.

Instrument/Tool:

The MESA Urinary Incontinence Questionnaire (attached as Appendix A) was the research tool used in this study. This is a simple, reliable, validated, self-administered questionnaire that includes nine Stress Urinary Incontinence questions and six Urge Urinary Incontinence questions. Each question has a score ranging from 0 to 3. The stress question scores were added and the stress index calculated as (sum of stress scores/27) %. The urge question scores were added and the urge index was calculated as (sum of urge scores/18) %. Scores that were similar in both stress and urge categories indicated Mixed Urinary Incontinence.

Data Collection:

A list of all new patients was obtained from the appointment log in the urogynecologist's office at Dearborn, Michigan. Each patient meeting the inclusion criteria was assigned a unique identifying number. The name of the patient and identifier number was recorded in an enrollment log and kept in a secure location. Data were extracted from the MESA questionnaire, medical history form, and physical examination form in the patient's clinic chart. Patient's unique identifier number, date of initial visit, age, height, weight, body mass index, parity, weight of heaviest baby, type of delivery, period of onset, stress and urge indices, prior hysterectomy status, prior anti-incontinence surgery, and physician's diagnoses were entered on a data collection form on an Excel spreadsheet, in a password-protected account on a hospital computer, to ensure confidentiality of patient protected health information (PHI).

RESULTS AND DISCUSSION

Analysis of the results of this study showed that 43% of the women in the study population had Stress Urinary Incontinence, 24% of the women had Urge UI, 25% of the women had Mixed UI, and 8% of the women had no urinary incontinence.

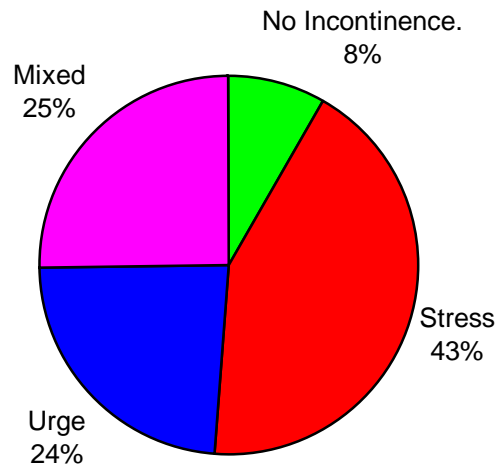


Figure 2: Percentage of Stress, Urge, and Mixed Urinary Incontinence

Table 1: Percentage of Patients with Stress, Urge, and Mixed Urinary Incontinence

Type of urinary incontinence	Number of patients	Percentage of study population
No incontinence	11	8%
Stress urinary incontinence	56	43%
Urge urinary incontinence	31	24%
Mixed urinary incontinence	33	25%

The results of analyses of secondary variables studied are presented as individual tables, and each is discussed separately.

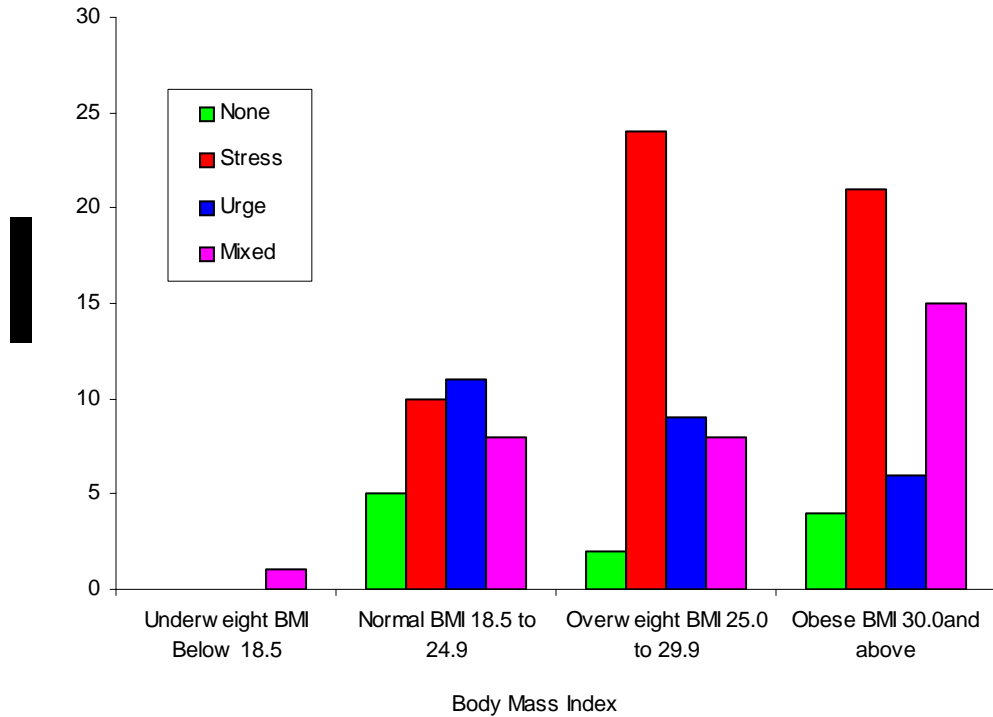


Figure 3: Body Mass Index

Table 2: *Body Mass Index*

The categories reflect CDC criteria for BMI.

	Underweight BMI Below 18.5	Normal BMI 18.5 to 24.9	Overweight BMI 25.0 to 29.9	Obese BMI 30.0 and above	
None	0	5	2	4	
Stress	0	10	24	21	
Urge	0	11	9	6	
Mixed	1	8	8	15	
Total	1	34	43	46	124

No. of subjects whose BMI could not be calculated due to missing height or weight information in their clinic chart = 7

Body Mass Index has been associated with urinary incontinence in our study and also in numerous previous studies. The table titled “Body Mass Index” shows that the greatest number of women in the overweight and obese categories had stress urinary incontinence. A higher Body Mass Index causes increased pressure on the abdomen with strenuous activity, accounting for increased occurrence of Stress Urinary Incontinence in obese women. The excess weight weakens the pelvic floor muscles that support the bladder and urethra, causing urine to leak. Women with higher Body Mass Indices tend to have a higher incidence of comorbidities such as diabetes and high blood pressure, which might also play a contributing role in prevalence of urinary incontinence. The medications they may be taking for the other medical conditions might tend to make the symptoms of urinary incontinence worse.

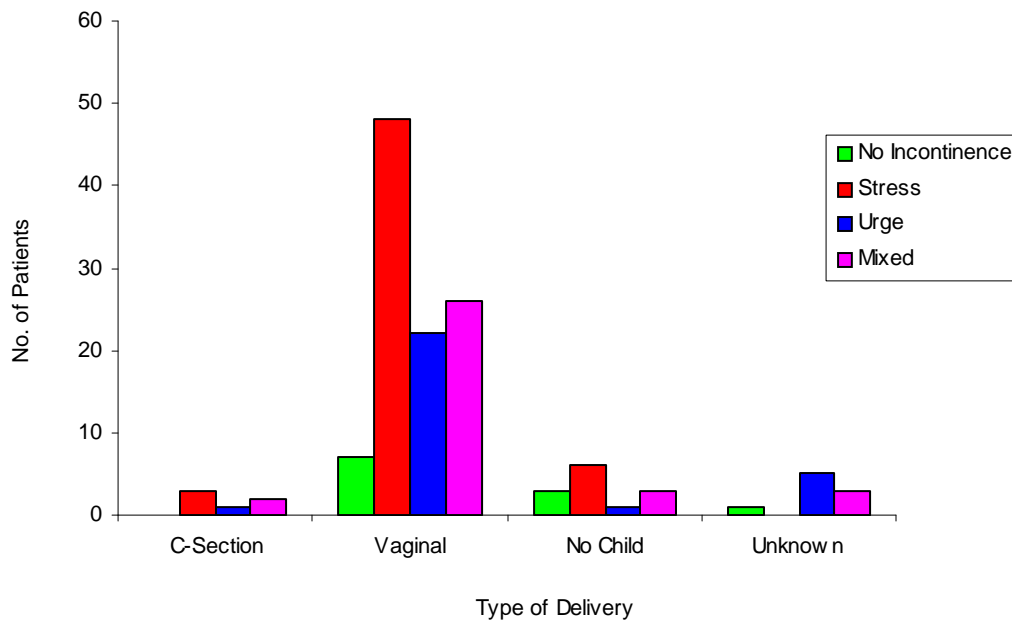


Figure 4: Mode of Delivery of Baby

Table 3: *Mode of Delivery of Baby*

Type of urinary incontinence	Caesarean Section	Vaginal	No Child	Unknown	
No Incontinence	0	7	3	1	
Stress	3	48	6	0	
Urge	1	22	1	5	
Mixed	2	26	3	3	
Total	6	103	13	9	131

The category Unknown represents the subjects with the information about type of delivery of baby missing in their clinic charts.

Women who have had vaginal deliveries were found to have a higher association with all three types of urinary incontinence studied. As shown in the table titled “Mode of Delivery of Baby,” the women who had vaginal deliveries were twice as likely to develop Stress Urinary Incontinence than Urge or Mixed Urinary Incontinence. This finding must be viewed with caution because this may be a biased finding as a majority of the women in our study population had vaginal deliveries. Unless a study is designed and conducted with equal numbers of women with vaginal deliveries and with Cesarean sections, this association cannot be considered a true association.

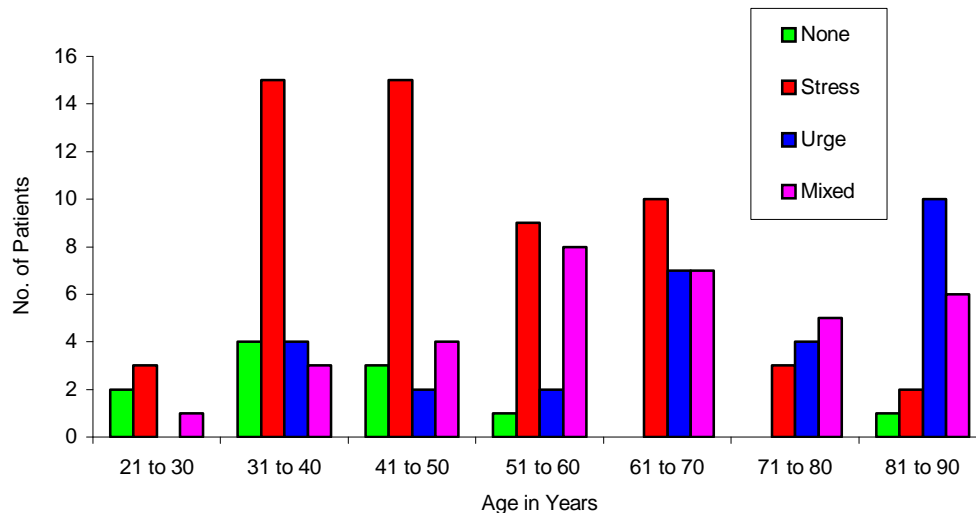


Figure 5: Age in Years

Table 4: *Age in Years*

Type of urinary incontinence	21 to 30	31 to 40	41 to 50	51 to 60	61 to 70	71 to 80	81 to 90	
None	2	4	3	1	0	0	1	
Stress	3	15	15	9	10	3	2	
Urge	0	4	2	2	7	4	10	
Mixed	1	3	4	8	7	5	6	
Total	6	26	24	20	24	12	19	131

Stress Urinary Incontinence was more prevalent in younger women in our study, which is similar to the results of other studies. This may be attributed to the higher level of physical activity seen in younger women than that of older women. Urge Urinary Incontinence seemed to be more prevalent in the older age groups. The elderly were probably not as agile as the younger populations, resulting in a greater prevalence of urge incontinence because they were not able to make it to the bathroom in time.

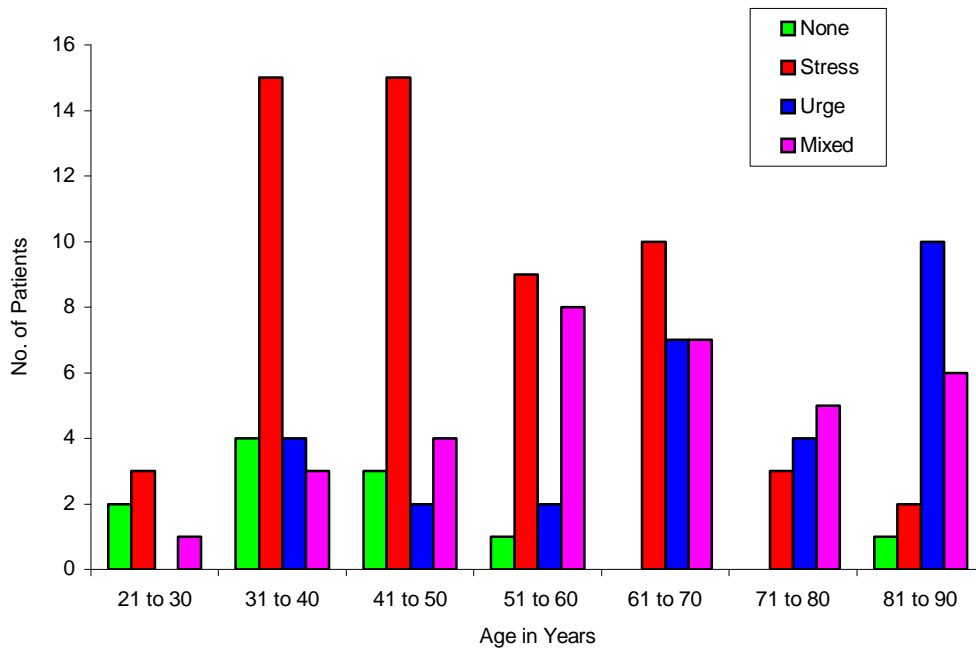


Figure 6: Period of Onset of Symptoms

Table 5: *Period of Onset of Symptoms*

Type of incontinence	Less than 1 year	1 to 5 years	6 to 10 years	11+ years	Unknown	
Stress	6	16	12	7	16	
Urge	5	9	0	0	15	
Mixed	2	17	2	2	11	
No Incontinence	2	2	0	0	7	
Total	15	44	14	9	49	131

Latency from onset of symptoms to help-seeking does not indicate an association with any type of urinary incontinence. From the data gathered, it appears that most people tended to seek treatment between one and five years from the onset of their symptoms. There could be several reasons as to why people wait and as to why some people wait longer than others, ranging from personal to economical to logistical issues.

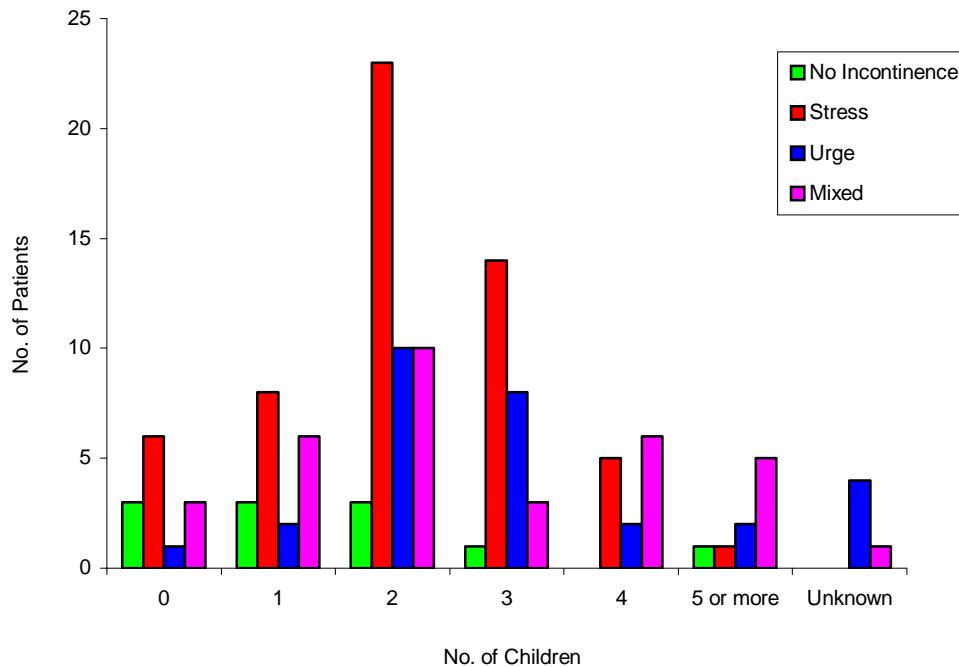


Figure 7: Parity

Table 6: Parity

	0	1	2	3	4	5 or more	Unknown	
No Incontinence	3	3	3	1	0	1	0	
Stress	6	8	23	14	5	1	0	
Urge	1	2	10	8	2	2	4	
Mixed	3	6	10	3	6	5	1	
Total	13	19	46	26	13	9	5	131

The category Unknown represents the subjects with the information about their parity missing in their clinic charts.

Parity, the number of children the women had, did not show any real association with any type of urinary incontinence. The data collected indicated that the women with 2 children had more Stress Urinary Incontinence, but the fact that almost a third of the study population had only two children must be taken into consideration.

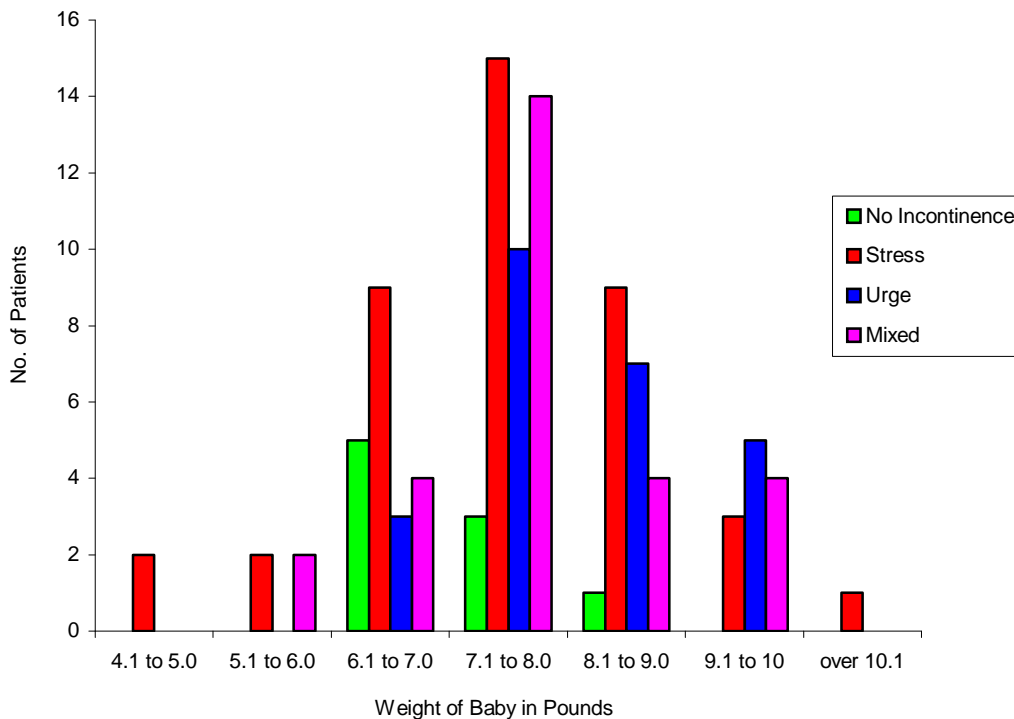


Figure 8: Weight of Heaviest Baby

Table 7: *Weight of Heaviest Baby in Pounds*

	4.1 to 5.0	5.1 to 6.0	6.1 to 7.0	7.1 to 8.0	8.1 to 9.0	9.1 to 10	over 10.1	
No Incontinence	0	0	5	3	1	0	0	
Stress	2	2	9	15	9	3	1	
Urge	0	0	3	10	7	5	0	
Mixed	0	2	4	14	4	4	0	
Total	2	4	21	42	21	12	1	103

The number of subjects with the information about weight of heaviest baby missing in their clinic chart = 28

Weight of heaviest baby delivered by the women does not seem to have any association with any type of urinary incontinence. The median range of 7.1 to 8.0 pounds had almost equal numbers of women with stress and mixed types of urinary incontinence. The majority of women in the study population had delivered children weighing between 6.1 and 9.0 pounds.

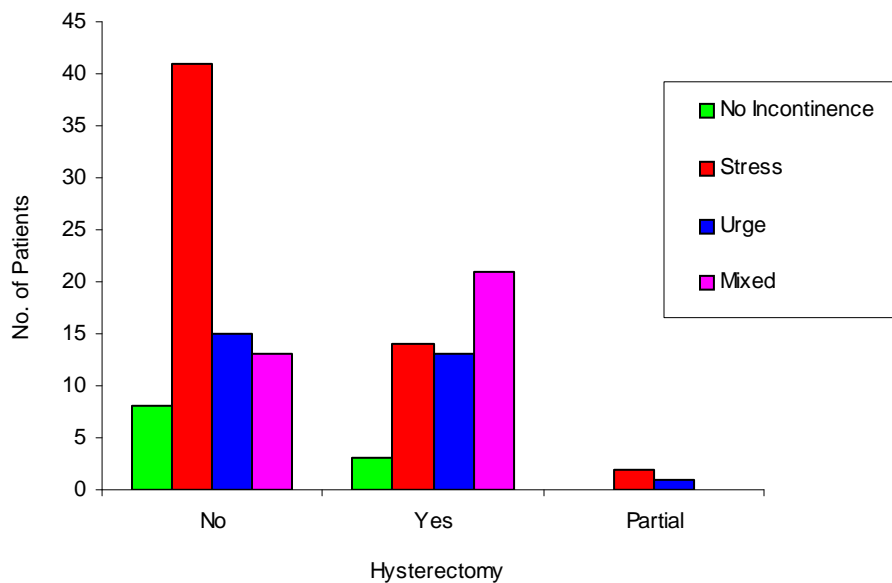


Figure 9: Prior Hysterectomy

Table 8: *Prior Hysterectomy*

	No	Yes	Partial	
No Incontinence	8	3	0	
Stress	41	14	2	
Urge	15	13	1	
Mixed	13	21	0	
Total	77	51	3	131

Stress Urinary Incontinence appears to be more prevalent in women without a history of hysterectomy and Mixed Urinary Incontinence in those who had hysterectomy.

CONCLUSION

As people are living longer and the number of elderly keeps increasing, urinary incontinence becomes a very significant problem. Urinary incontinence has an impact on the quality of life and affects productivity and decreases activity levels in women.

The results of this study have led us to conclude that Stress Urinary Incontinence is almost twice as prevalent as Urge urinary incontinence and Mixed Urinary Incontinence in the study population. Eight percent of the study population had other issues with regard to urination but did not have any urinary incontinence. The prevalence of urinary incontinence among women is of concern and needs to be addressed appropriately.

It is imperative that more fundamental research to study the etiology and to try to optimize management options is performed on urinary incontinence because certain aspects of this condition have not been explored as of today. The results of this study indicate that twenty-five percent of the study population has Mixed Urinary Incontinence,

but no standard treatment plan has been established to define how the two components Stress and Urge Urinary Incontinence are to be treated. Studies could be designed to evaluate the best course of action to treat Mixed Urinary Incontinence and to find out if it would be beneficial to treat the stress component before treating the urge component or vice versa.

Future studies need to be designed to explore the associations between the various risk factors for urinary incontinence. Our results point out the clear association between higher BMI and urinary incontinence. The effect of reduction in BMI on the symptoms of urinary incontinence must be further studied. It has been demonstrated by this study that most women typically wait at least one to five years before seeking treatment for urinary incontinence. Steps should be taken to increase social awareness about this condition. Educational programs to emphasize the fact that it is treatable will make it easier for more people to seek treatment for urinary incontinence. The different types of treatments currently available need to be highlighted and made readily available to the public. Protocols could be designed to determine whether reducing the length of time from onset of symptoms to seeking treatment would have an impact on the treatment of urinary incontinence.

The results of this study do not indicate any correlation between parity, mode of delivery of baby, weight of heaviest baby, or prior hysterectomy status and any particular type of urinary incontinence.

This study demonstrates the prevalence of urinary incontinence, and it is important that awareness about this problem amongst the public and healthcare providers

be encouraged. Treating urinary incontinence appropriately would greatly improve the quality of life of people suffering from this problem.

Limitation of this study: Missing information is an unavoidable shortcoming in retrospective studies. Due to information missing from many clinic charts, the association between type of urinary incontinence and weight of heaviest baby could not be studied.

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APPENDIX A

MESA URINARY INCONTINENCE QUESTIONNAIRE (UIQ)

NAME: _____ DATE: _____

LAST, FIRST MI

Please check (☐) the appropriate box.

1. Over the past 12 months, have you had urine loss beyond your control? ___ Yes ___ No
2. How long ago did your urine loss start? ___ years ___ months ___ days
3. When does the urine loss usually occur?
___ Day time only ___ Night time only ___ Both day time and night time
4. How often? _____
5. Do you use anything for protection against leaked urine? ___ Yes ___ No

On average, how many of each of these do you use for protection? (please write the number used and check each day or each week)

	Number Used	EachDay/Each week
Sanitary napkins	___	___/___
Pads like those placed on furniture (ex. blue pads)	___	___/___
Adult wetness control garments (ex. Attends, Depends)	___	___/___
Toilet paper or facial tissues	___	___/___
Something else (please list)		

6. While awake, when you are having urine loss problems, how much urine would you say you lose without control EACH TIME?
___ A few drops to less than 1/2 teaspoon
___ 1/2 teaspoon to less than 2 tablespoons
___ 2 tablespoons to 1/2 cup
___ 1/2 cup or more
7. When you lose urine, does it usually:
___ Just create some moisture
___ Wet your underwear
___ Trickle down your thigh
___ Wet the floor

8. Generally, how many times do you usually urinate from the time you wake up to the time before you go to bed? ___ times.
9. Generally, how many times do you usually urinate after you have gone to sleep at night? ___ times

Urge Incontinence Questions

1. Some people receive very little warning and suddenly find that they are losing, or about to lose, urine beyond their control. How often does this happen to you?

_____ Often (3) _____ Sometimes (2) _____ Rarely (1) Never (0)_____

2. If you can't find a toilet or find a toilet that is occupied and you have an urge to urinate, how often do you end up losing urine and wetting yourself?

_____ Often (3) _____ Sometimes (2) _____ Rarely (1) Never (0)_____

3. Do you lose urine when you suddenly have the feeling that your bladder is full?

_____ Often (3) _____ Sometimes (2) _____ Rarely (1) Never (0)_____

4. Does washing your hands cause you to lose urine?

_____ Often (3) _____ Sometimes (2) _____ Rarely (1) Never (0)_____

5. Does cold weather cause you to lose urine?

_____ Often (3) _____ Sometimes (2) _____ Rarely (1) Never (0)_____

6. Does drinking cold beverages cause you to lose urine?

_____ Often (3) _____ Sometimes (2) _____ Rarely (1) Never (0)_____

URGE SCORE = ___/18

Stress Incontinence Questions

1. Does coughing gently cause you to lose urine?

_____ Often (3) _____ Sometimes (2) _____ Rarely (1) Never (0)_____

2. Does coughing hard cause you to lose urine?

_____Often (3) ____Sometimes (2) _____Rarely (1) Never (0)_____

3. Does sneezing cause you to lose urine?

_____Often (3) ____Sometimes (2) _____Rarely (1) Never (0)_____

4. Does lifting things cause you to lose urine?

_____Often (3) ____Sometimes (2) _____Rarely (1) Never (0)_____

5. Does bending over cause you to lose urine?

_____Often (3) ____Sometimes (2) _____Rarely (1) Never (0)_____

6. Does laughing cause you to lose urine?

_____Often (3) ____Sometimes (2) _____Rarely (1) Never (0)_____

7. Does walking briskly cause you to lose urine?

_____Often (3) ____Sometimes (2) _____Rarely (1) Never (0)_____

8. Does straining, if you are constipated, cause you to lose urine?

_____Often (3) ____Sometimes (2) _____Rarely (1) Never (0)_____

9. Does getting up from a sitting to a standing position cause you to lose urine?

_____Often (3) ____Sometimes (2) _____Rarely (1) Never (0)_____

STRESS SCORE=___/27