



# **ASSESSMENT OF PREVALENCE OF STRESS URINARY INCONTINENCE DURING PREGNANCY**

*Thesis* □

Submitted for Partial Fulfillment of  
Master Degree in Obstetrics and Gynecology

*By* □

**Mohammed Nour Allah Abdel Monem Ibrahim**

*M.B, B.Ch (2009); Cairo University  
Resident at Damnhour teaching hospital*

*Under Supervision of* □

**Prof. Hazem Mohamed Sammour**

*Professor of Obstetrics & Gynecology  
Faculty of Medicine, Ain Shams University*

**Prof. Amgad Al Said Abou-Gamrah**

*Professor of Obstetrics and Gynecology  
Faculty of Medicine, Ain Shams University*

**Assist. Prof. Haitham Mohamed Sabaa**

*Assistant professor of Obstetrics and Gynecology  
Faculty of Medicine, Ain Shams University*

**Faculty of Medicine  
Ain Shams University  
2017**



Before all, Thanks to **ALLAH**

I would like to express my profound gratitude to **Prof. Hazem Mohamed Sammour**, Professor of Obstetrics and Gynecology, Faculty of Medicine, Ain Shams University, for his valuable advises and support all through the whole work and for dedicating much of his precious time to accomplish this work.

I AM VERY THANKFUL TO **Prof. Amgad Al Said Abou-Gamrah**, Professor of Obstetrics and Gynecology, Faculty of Medicine, Ain Shams University for his meticulous supervision and patience.

I am also grateful to **Assist. Prof. Haitham Mohamed Sabaa**, Assistant professor of Obstetrics and Gynecology, Faculty of Medicine, Ain Shams University, for his continuous encouragement and supervision and kind care.

Finally I want to thank all the **Members in My Family**, for supporting and pushing me forward all the time and all thanks and gratitude are to the **Staff Members in Obstetrics and Gynecology Department** in Ain Shams University Hospitals.

*Mohammed Nourallah Abdelmonem*

## List of Contents

<i>Title</i>	<i>Page</i>
<b>Protocol of thesis.....</b>	<b>I</b>
<b>Introduction .....</b>	<b>1</b>
<b>Aim of the work .....</b>	<b>5</b>
<b>Review of Literature</b>	
❖ <b>CHAPTER 1; ANATOMIC CONSIDERATIONS.....</b>	<b>6</b>
❖ <b>CHAPTER 2; PHYSIOLOGICAL CONSIDERATIONS ..</b>	<b>20</b>
• Neurophysiology of female lower urinary tract	
• Aetiology and pathophysiology of urinary incontinence	
• Aetiology and risk factors of stress urinary incontinence during pregnancy	
<b>Subjects and Methods .....</b>	<b>71</b>
<b>Results .....</b>	<b>82</b>
<b>Discussion .....</b>	<b>102</b>
<b>Conclusion and recommendations.....</b>	<b>112</b>
<b>Summary .....</b>	<b>113</b>
<b>References .....</b>	<b>117</b>
<b>Arabic Summary .....</b>	<b>_____</b>

## List of Figures

<i>Fig. No.</i>	<i>Title</i>	<i>Page</i>
<b><u>Fig. (1):</u></b>	Anatomy of the urethra shown in longitudinal section.....	11
<b><u>Fig. (2):</u></b>	Vaginal view of the periurethral fascia.....	14
<b><u>Fig. (3):</u></b>	Lateral view of the components of the urethral support system..	15
<b><u>Fig. (4):</u></b>	Lateral view of urethral and pelvic floor muscular anatomy.....	17
<b><u>Fig. (5):</u></b>	Levator ani muscles seen from below the edge of the perineal membrane .....	19
<b><u>Fig. (6):</u></b>	The Functional Anatomy of the Female Pelvic Floor and Stress Continence Control System .....	30
<b><u>Fig. (7):</u></b>	How abdominal pressure can compress the urethra against the underlying fascia .....	31
<b><u>Fig. (8):</u></b>	The peripheral innervation of the lower urinary tract.....	34
<b><u>Fig. (9):</u></b>	The proposed neuronal pathways responsible for the voiding reflex.....	37
<b><u>Fig. (10):</u></b>	Horizontal section of female urethra showing internal & extrinsic urethral sphincter mechanisms .....	39
<b><u>Fig. (11):</u></b>	Past medical history in both study groups .....	85
<b><u>Fig. (12):</u></b>	Incidence of SUI in both study groups.....	87
<b><u>Fig. (13):</u></b>	Box plot showing the incontinence severity index in patients developing SUI.....	89
<b><u>Fig. (14):</u></b>	Box plot showing the gestational age in patients with or without SUI .....	92
<b><u>Fig. (15):</u></b>	Gestational stage of pregnancy in patients with or without SUI .....	93
<b><u>Fig. (16):</u></b>	Past medical history in patients with or without SUI.....	94

### List of Figures (Cont....)

<i>Fig. No.</i>	<i>Title</i>	<i>Page</i>
<b>Fig. (17):</b>	Frequency of previous vaginal deliveries in patients with or without SUI.....	96
<b>Fig. (18):</b>	Frequency of previous cesarean deliveries in patients with or without SUI.....	97
<b>Fig. (19):</b>	Parity in patients with or without SUI.....	98
<b>Fig. (20):</b>	History of vacuum/instrumental delivery in patients with or without SUI .....	99

## *List of Tables*

<i>Table No.</i>	<i>Title</i>	<i>Page No.</i>
<b><u>Table (1):</u></b>	Transient Causes of Incontinence .....	49
<b><u>Table (2):</u></b>	Demographic characteristics of patients in both study groups .....	82
<b><u>Table (3):</u></b>	Obstetric history in both study groups .....	83
<b><u>Table (4):</u></b>	Medical history in both study groups .....	84
<b><u>Table (5):</u></b>	Incidence of SUI in both study groups .....	86
<b><u>Table (6):</u></b>	Severity of SUI and QoL score in patients developing SUI in either study group .....	88
<b><u>Table (7):</u></b>	Characteristics of patients with or without SUI.....	90
<b><u>Table (8):</u></b>	Details of obstetric history in patients with or without SUI .....	95
<b><u>Table (9):</u></b>	Multivariable binary logistic regression analysis for risk factors of SUI based on trimester of pregnancy...	100
<b><u>Table (10):</u></b>	Multivariable binary logistic regression analysis for risk factors of SUI based on gestational age .....	101

## List of Abbreviations

---

### *List of Abbreviations*

<b>ATFP</b>	Arcus Tendinous Fascia Pelvis
<b>AUS</b>	Artificial Urinary Sphincter
<b>BC</b>	Bulbo Cavernosus
<b>BMI</b>	Body Mass Index
<b>CS</b>	Cesarean Section
<b>CU</b>	Compressor Urethrae
<b>DI</b>	Detrusor Instability
<b>DM</b>	Diabetes Mellitus
<b>ECM</b>	Extracellular Matrix
<b>EMG</b>	Electromyogram
<b>EUS</b>	External Urethral Sphincter
<b>GDM</b>	Gestational Diabetes Mellitus
<b>GSI</b>	Genuine Stress Incontinence
<b>ICIQ–UI-SF</b>	International Calculation of Incontinence Questionnaire– Urinary Incontinence-Short Form.
<b>ICS</b>	International Continence Society
<b>ISD</b>	Intrinsic Sphincter Deficiency
<b>ISF</b>	Incontinence Severity Index
<b>IUS</b>	Internal Urethral Sphincter
<b>LA</b>	Levator Ani
<b>LUT</b>	Lower Urinary Tract
<b>LUTS</b>	Lower Urinary Tract Symptoms

## List of Abbreviations

---

### *List of Abbreviations (Cont...)*

<b>MDSCs</b>	Muscle Derived Stem Cells
<b>MMK</b>	Marshall-Marchetti Krantz
<b>MMPs</b>	Matrix Metalloproteinases
<b>MRI</b>	Magnetic Resonance Imaging
<b>OR</b>	Odd's Ratio
<b>PFM</b>	Pelvic Floor Muscle
<b>PFME</b>	Pelvic Floor Muscle Exercise
<b>PM</b>	Perineal Membrane
<b>QOL</b>	Quality Of Life
<b>RGS2</b>	Regulator of G-protein Signaling 2
<b>SNPs</b>	Single Nucleotide Polymorphisms
<b>SUI</b>	Stress Urinary Incontinence
<b>TOT</b>	Trans Obturator Tape.
<b>TVT</b>	Tension-free Vaginal Tape.
<b>TVT-S system</b>	Tension Free Vaginal Tape-secure system
<b>US</b>	Urethral Sphincter
<b>UTI</b>	Urinary Tract Infection
<b>UII</b>	Urge Urinary Incontinence
<b>UVS</b>	Urethrovaginal Sphincter



## **Abstract**

The aim of the study was to investigate the prevalence of stress urinary incontinence during pregnancy and associated risk factors.

**Methods:** a cross sectional study of 498 women half of them in the first trimester and the other in the third trimester.

**Results:** the prevalence of stress urinary incontinence was 12.4% in the first trimester and increased to 20.4% in the third trimester.

Previous history of incontinence during childhood, number of deliveries and method of delivery are the risk factors to develop stress urinary incontinence.

**Conclusion and Recommendations:** The most common type of UI in pregnant women is SUI. According to the results obtained, the prevalence of SUI in our population of pregnant women was 12.4 to 20.5%, which means that more than a fifth of the population of pregnant women is affected, and that this disorder is more common during the third trimester of pregnancy than during the first trimester.

---

**Key words:** Stress urinary incontinence, risk factor, trimester, pregnancy.

**ASSESSMENT OF PREVALENCE OF  
STRESS URINARY INCONTINENCE  
DURING PREGNANCY**

*Protocol for Thesis*

Submitted for partial fulfillment of  
Master degree in obstetrics and gynecology

*By*

**Mohammed Nour Allah Abdel Monem Ibrahim**

M.B, B.Ch. (2009)

Cairo university

Resident at Damnhour teaching hospital

*Under supervision of*

**Prof. Hazem Mohamed Sammour**

*Professor of Obstetrics & Gynecology*

*Faculty of medicine, Ain Shams University*

**Assist.Prof. Amgad Al Said Abou-  
Gamrah**

*Assistant Professor of Obstetrics and Gynecology*

*Faculty of Medicine, Ain Shams University*

**DR.Haitham Mohamed Sabaa**

*Lecturer of Obstetrics and Gynecology*

*Faculty of Medicine, Ain Shams University*

**Faculty of Medicine  
Ain Shams University  
2014**

## ***Introduction***

Stress urinary incontinence (SUI), the most common type of urinary incontinence (UI) in pregnant women, is defined by the International Continence Society (ICS) as the complaint of involuntary loss of urine on effort or physical exertion, or on sneezing or coughing. **(Haylen, *et al.*, 2010).**

The published data on UI during pregnancy are heterogeneous and there are few studies about prevalence of urinary incontinence during pregnancy. **(Sangsawang, *et al.*, 2013).**

In addition, there are few comparative data to determine whether there are any differences between the beginning and end of gestation. This information would be highly useful because the factors that favor the development of urinary incontinence during pregnancy are still scarcely known. **(Shek and Kruger, 2012).**

It's well known that pregnancy may associate with the reduction of pelvic floor muscle PFM strength which can develop the SUI. However, the exact mechanism of the development of SUI during pregnancy is remained unclear. **(Viktrup, 2002).**

It has been proposed that SUI is caused by both mechanical and hormonal changes that accompany pregnancy. (**Hvidman, et al., 2002**).

The prevalence of SUI has been found in the range from 10% to 19% (**Franco, et al., 2014**) increases with gestational age (**Liang, et al., 2012**) and is typically worst in the third trimester followed by second and first trimester respectively ( **Fritel, et al., 2010**).

There are many risk factors associated with SUI during pregnancy. Advanced maternal age increases the risk of USI (**Wesnes, et al., 2013**).

This finding was supported by **Hvidman, et al., 2002**. They found out that pregnant women aged 30 years and older to be at significantly greater risk for SUI than younger women.

Obesity is a major risk factor that contributes to SUI in women. One of the explanations is that obesity chronically strains and creates tension on the pelvic floor due to increased intra-abdominal pressure. (**Leijonhufvud, et al., 2012**). And may impair blood flow and innervation to the bladder and urethra (**Jain and Parsons, 2011**).

Also women with diabetes mellitus (*DM*) are at greater risk of developing urinary incontinence than those without DM. In addition, risk is increased with the duration of DM with greater risk for those having DM for five years or more (**lifford,et al.,2005**).

Another risk factor is prior leakage of urine before pregnancy or during previous pregnancies which may be a sign of weak connective tissue of PFM and this increases the risk of urinary incontinence with a rate higher than women who were previously continent. The weakness in PFM disturbs the supportive mechanism of urethra and bladder neck leading to increased risk of SUI (**Fritel,et al.,2004**).

### **RATIONALE OF THE STUDY (HYPOTHESIS):**

Factors that favor the development of SUI during pregnancy are scarcely known, particularly in Egyptian women.

Also the prevalence of SUI during pregnancy is not known.

### **RESEARCH QUESTION:**

What are the prevalence of SUI during first and last trimesters of pregnancy and the factors that favor its development in Egyptian women?

### **AIM OF WORK:**

The aim of this study is to assess the prevalence and associated risk factors of SUI during first and third trimesters of pregnancy in Egyptian women.

## **Subjects and Methods**

The study was registered at [www.clinicaltrials.gov](http://www.clinicaltrials.gov) with ID NCT03117504.

### **A) SUBJECTS:**

A cross-sectional study of two groups of women was conducted.

Each group consists of 249 patients with a total number of 498 patients:

\*Group 1: women during first trimester(less than 14 weeks of pregnancy).

\*Group 2: women during third trimester (more than 28 weeks of pregnancy).

### **INCLUSION CRITERIA**

- Women during first trimester; (less than 14 weeks of pregnancy).
- Women during third trimester; (more than 28 weeks of pregnancy).

### **EXCLUSION CRITERIA**

- Women during the second trimester of pregnancy; (14-28 weeks of pregnancy).
- Women with symptoms of UI and anal incontinence before pregnancy (reported by themselves).
- current treatment with drugs (benzodiazepines, diuretics)
- Patients with communication problems, cognitive disorders & mental disturbances.
- Patients who underwent any previous surgery for incontinence.