

Factors influencing postpartum stress urinary incontinence in women

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Abstract: Postpartum stress urinary incontinence (PSUI) is one of the common symptoms in women after pregnancy and delivery. With the development of society and the increasing age of pregnant women, the incidence of PSUI has been rising due to an increase in the number of older mothers. PSUI seriously affects the quality of life of postpartum women and can lead to postpartum anxiety and depression. Therefore, understanding the influencing factors of PSUI and early effective intervention and treatment are of great significance. This article provides a review of the influencing factors and prevention of PSUI, aiming to provide reference for reducing the incidence of PSUI.

Keywords: Stress urinary incontinence; Influencing factors; Prevention

1. Introduction

Urinary Incontinence (UI) is the involuntary flow of urine from the urethra, i.e., when it is unwanted or uncontrollable^[1]. It is common not only in the elderly but also in women. UI consists of three main types: Stress urinary incontinence (SUI), Urge urinary incontinence (UUI), and Mixed urinary incontinence. Of these, SUI is the most common type, in which the urethral closure muscles are compressed and lose control due to increased abdominal pressure caused by increased stress, ultimately leading to urinary incontinence. UUI, on the other hand, is a sudden urge to urinate accompanied by incontinence in which the patient has no control over the timing and amount of the urine flow, sometimes without advance warning. Mixed incontinence is when there are symptoms of both stress incontinence and urge incontinence.

There are many reasons for SUI, including pregnancy, childbirth, age, menopause, obesity, chronic cough, constipation, high blood pressure, diabetes, a history of pelvic surgery, and more. Among them, pregnancy and childbirth are the primary risk factors^[2]. Postpartum urinary incontinence refers to urinary incontinence symptoms in women related to pregnancy and childbirth, with stress urinary incontinence (SUI) being the primary type. Postpartum urinary incontinence, if not treated or recovered in time, may increase the prevalence of urinary incontinence in middle-aged and elderly women, affecting the patients' social, psychological, work, and sexual function^[3], and it has become one of the five common chronic diseases threatening women's health^[4].

Therefore, by studying the epidemiology and risk factors of postpartum urinary incontinence (SUI) in women, it can provide a theoretical basis for the early prevention and treatment of this disease. This review will discuss the risk factors of postpartum SUI and provide some ways to prevent and treat UI to help women reduce the risk of postpartum SUI and improve their quality of life.

2. Influencing factors

PSUI is one of the most common complications after childbirth, with a prevalence of between 9% and 45%. Although most symptoms typically improve within the first year after childbirth, women who experience urinary incontinence during pregnancy face an increased risk of postpartum urinary incontinence as well as persistent urinary incontinence^[5]. Studies have shown^[6] that the prevalence of urinary incontinence 8 weeks after delivery is as high as 38%. In a large-scale epidemiologic survey in China^[7], researchers found that the prevalence of SUI in late pregnancy was 18.6%, while the prevalence at 6 weeks and 6 months postpartum was 9.5% and 6.8%, respectively. However, the discrepancy in findings regarding the prevalence of SUI in the postpartum period may be related to the methodology and design of the study. In addition, factors such as evaluation questionnaires may also influence the study results^[8]. Therefore, when studying the prevalence of PSUI, it is necessary to

carefully design the study protocol and use accurate assessment methods in order to obtain reliable findings.

2.1. Pregnancy

Physiologic weight gain during pregnancy may lead to increased pressure on the pelvic floor muscles and bladder, which in turn leads to increased urethral mobility. An increase in the pre-pregnancy BMI of pregnant women is associated with an elevated risk of urinary incontinence (OR = 1.037)^[7]. The increased weight of the uterus and fetus as the months of gestation increase can put pressure on the pelvic floor muscles, which can lead to pelvic floor muscle weakness^[9]. Pelvic floor muscle weakness leads to movement of the bladder neck and urethra, which in turn leads to dysfunction of the urethral sphincter. Additionally, the stretching and decreased amount of collagen during pregnancy may contribute to postpartum urinary incontinence. Collagen levels in the tissues of primiparous women with urinary incontinence were significantly lower than those of pregnant women without incontinence, and the etiology of urinary incontinence in these pregnant women appeared to be due to quantitative and qualitative reductions in collagen^[10]. In addition, changes in relaxin and progesterone levels during pregnancy may play an important role in the development and progression of urinary incontinence. Relaxin plays an important role in controlling urinary incontinence during pregnancy by stimulating tissue growth in the lower urinary tract and increasing urethral pressure^[11]. Decreased secretion of relaxin during pregnancy may lead to a slowing down of urethral epithelial growth, which may result in a decrease in urethral pressure, leading to urinary incontinence. Decreased concentrations of relaxin during late pregnancy have been associated with a high prevalence of urinary incontinence. Increased progesterone may relax urinary smooth muscle, leading to decreased ureteral, bladder and urethral tone^[12]. Therefore, changes in hormone levels during pregnancy may contribute to the development of urinary incontinence.

With the enlargement of the uterus and changes in hormone levels during pregnancy may lead to alterations in the biomechanics of maternal collaterals, resulting in changes in the pressure distribution and tone of the pelvic floor muscles, which can lead to weakening and impaired function of the pelvic floor muscles, which is one of the main causes of postpartum SUI. As the fetus develops, the uterus and cervix gradually increase in size, thereby increasing the pressure on the pelvis. At the same time, changes in hormone levels may cause the soft tissues around the pelvis to relax and the ligaments to become softer, which can also increase changes in pelvic mobility and stability. A study^[13] found that changes in pelvic floor muscle pressure distribution and tone during pregnancy were among the predictors of postpartum SUI. In addition, another systematic review found that pelvic floor muscle weakness during pregnancy is one of the risk factors for postpartum SUI.

In addition, factors in other pregnancies may influence the incidence of postpartum SUI. For example, factors such as advanced gestational age, multiple pregnancies, and macrosomia may increase the risk of postpartum SUI.

2.2. Childbirth

Vaginal delivery is considered to be the leading cause of pelvic floor injury. During vaginal delivery, pelvic floor muscles, connective tissues and nerves are stretched and thus may suffer damage^[14]. The use of forceps, anal sphincter tears and episiotomy have been found to be risk factors associated with vaginal delivery^[15]. Although elective cesarean section reduces the risk of postpartum stress urinary incontinence from 16% to 9.8% (OR = 0.56, 95% CI= 0.45-0.68), cesarean section does not significantly reduce the incidence of severe urinary incontinence when compared to vaginal delivery^[16], and therefore cesarean section is not recommended as a means of preventing postpartum SUI.

Several studies have shown a positive correlation between the number of deliveries and the incidence of PSUI. For example, one study found that the incidence of PSUI was 16% for women who had never given birth, compared to 27% for women who had given birth once, and even higher at 35% for women who had given birth two or more times^[17]. This trend is particularly pronounced in women who have delivered vaginally, as the stress of labor can lead to damage to the pelvic floor muscles and tissues, causing them to lose their ability to support and control urine.

Epidural analgesia, as a widely used method for relieving labor pain in parturients, has long been a subject of concern regarding its impact on the risk of PSUI. Early studies suggested that epidural analgesia might increase the risk of postpartum urinary incontinence, but recent research results have been inconsistent. A retrospective study found that women who received epidural anesthesia had a risk

of postpartum urinary incontinence approximately 50% higher than those who did not receive epidural anesthesia^[18]. In a retrospective cohort study^[19] with long-term follow-up of 4,000 parturient women, it was discovered that epidural analgesia did not increase the risk of postpartum urinary incontinence. The study proposed that epidural analgesia did not contribute to pelvic floor muscle damage or dilation, and therefore did not adversely affect the occurrence of urinary incontinence. Currently, research results on the relationship between epidural analgesia and PSUI are inconclusive. Some studies suggest that epidural analgesia may increase the risk of postpartum urinary incontinence, while others do not find such a relationship. Nevertheless, women should consider these research findings, especially those with pre-existing pelvic floor issues, when deciding whether to opt for epidural analgesia during labor. Further research is needed to better understand the relationship between epidural analgesia and postpartum urinary incontinence.

2.3. Age

Studies have shown that there is a relationship between a woman's age at delivery and urinary incontinence. Some studies have shown^[20] that the older a woman is at the time of delivery, the more likely she is to suffer from urinary incontinence. This is because as women age, their pelvic floor muscles and ligaments become lax, allowing the function of the urethral sphincter to be compromised. In addition, ageing also affects a woman's hormone levels, which further affects the function of the urethral sphincter. Therefore, age is an important factor in female urinary incontinence.

However, other studies have shown that a woman's age at delivery does not have a significant effect on urinary incontinence. One study found no significant correlation between a woman's age at delivery and urinary incontinence when controlling for other factors. This study suggests that other factors, such as obesity, number of pregnancies and birth canal injuries, may be more important than age at delivery.

In addition, several studies have shown that prenatal and postpartum pelvic floor muscle training reduces the risk of urinary incontinence, regardless of a woman's age at delivery. This training increases the strength and stability of the pelvic floor muscles and improves the function of the urethral sphincter, thereby reducing the incidence of urinary incontinence.

The relationship between a woman's age at delivery and urinary incontinence is not very clear. Although some studies have shown that the older the age at delivery, the higher the risk of incontinence, other factors may also have an impact on the development of incontinence. Therefore, it is recommended that women perform pelvic floor muscle training before and after childbirth to reduce the risk of urinary incontinence.

3. Weight and abdominal circumference

Being overweight or obese is a major factor in women suffering from postpartum incontinence. Obesity can lead to excessive laxity of the pelvic floor muscles and ligaments, which decreases the function of the urethral sphincter, thus increasing the risk of urinary incontinence. In addition, obesity also increases abdominal pressure, which puts more pressure on the urethra and further increases the incidence of urinary incontinence. Several studies have shown^[20] that obesity and overweight are risk factors for postpartum urinary incontinence (OR=1.04, 95% CI=1.03-1.06). Several studies have shown that weight loss can reduce the risk of PSUI in women. One study found that women who underwent weight loss training in the postpartum period had improved urinary incontinence symptoms^[21], and among patients who developed urinary incontinence during pregnancy, the relative risk of UI was reduced by 2.1% for every 1 kg of postpartum weight loss. Research^[22] indicates that, through a 6-month behavioral intervention for weight loss, obese women who lost 8 kg of weight, compared to those who lost 1.5 kg, had the incidence of urinary incontinence was significantly reduced. This suggests that weight loss is helpful in improving urinary incontinence and also confirms that obesity is a manageable risk factor. Therefore, obese individuals should take effective weight loss measures as early as possible to prevent and ameliorate SUI. Therefore, the incidence of PSUI can be reduced by controlling pre-pregnancy weight and by weight management after delivery.

In addition to BMI, body fat distribution may also influence a woman's risk of postpartum urinary incontinence. One study^[23] found a positive correlation between abdominal fat accumulation and urinary incontinence. This may be due to the fact that abdominal fat increases the stress on pelvic floor muscles and pelvic tissues, which can lead to urinary incontinence.

3.1. Chronic increase in abdominal pressure

Chronic increased abdominal pressure is a persistent increase in intra-abdominal pressure. Increased intra-abdominal pressure may lead to damage to the pelvic floor muscles and the urethral sphincter, which can lead to urinary incontinence. Some studies have shown that many factors can contribute to chronic increased abdominal pressure, such as obesity, chronic constipation, chronic coughing, and prolonged standing.

Chronic coughing is one of the main causes of constant pressure on the pelvic floor muscles and sphincter. Chronic coughing increases pressure in the abdomen, which can lead to increased pressure on the pelvic floor muscles and sphincter, which in turn leads to urinary incontinence. Constipation is also a cause of constant pressure on the pelvic floor muscles and sphincter. Chronic constipation can lead to increased pressure in the colon, which can be transmitted to the pelvic floor muscles and sphincter, increasing the pressure on them, which can lead to urinary incontinence. Therefore, preventing and treating constipation is very important in managing postpartum incontinence. Dietary changes and exercise can help improve constipation symptoms. Treatments such as medication or warm water enemas may also be considered.

3.2. Other factors

Current research suggests that ethnic genetic factors may be associated with postpartum incontinence, but the exact mechanisms remain unclear. Some studies have found that women of African and Asian descent are more likely to suffer from postpartum incontinence than women of European descent. This may be related to genetic factors such as their pelvic shape, urethral length and muscle organization. In addition, a number of genes may affect the function of women's pelvic floor muscles and nervous system, thereby increasing their risk of developing postpartum incontinence. However, these genes and the specific mechanisms still require more in-depth research.

4. Preventive measures

4.1. Lifestyle Adjustment

Prevention and treatment of postpartum urinary incontinence should be comprehensive and not limited to medication, with many guidelines recommending lifestyle and behavioral therapies as first-line treatments [24]. For example, dietary management is very important, fluid management improves symptoms, and reducing daily caffeine intake and decreasing intake of sugary beverages can also help improve symptoms of stress incontinence [25]. In addition, some behaviors increase abdominal pressure, such as constipation and chronic coughing, which may cause damage to the nerves of the pubic area and further lead to damage to the muscles that support the pelvic floor, so it is important to avoid these behaviors, treat constipation and chronic coughing, ensure adequate daily water intake, and consume foods that are rich in crude fiber to promote bowel movements. Additionally, appropriate exercise during pregnancy is also beneficial in preventing postpartum urinary incontinence, and although it does not necessarily reduce the incidence of postpartum SUI, moderate physical activity during pregnancy is still recommended because of its benefits on other important outcomes associated with pregnancy [26]. However, it is important to note that these treatments may work differently for different populations and therefore need to be individualized on a case-by-case basis. Also, some specialized doctors may recommend some other treatments for different conditions.

4.2. Focus on the education and management of people with high-risk factors

Studies have shown that women with a pre-pregnancy body mass index (BMI) of more than 30 kg/m² or a body mass of more than 75 kg in a full-term pregnancy have twice the risk of developing stress urinary incontinence compared to the normal population. Therefore, overweight women are advised to lose weight before pregnancy.

If symptoms of incontinence were already present before pregnancy, and with the damage from this pregnancy, the tensile strength of the pelvic floor muscles will be lower than before, and weak pelvic floor muscles can increase the risk of developing the condition by removing the support mechanisms for the urethra and bladder neck. In addition, age at the time of pregnancy is an independent risk factor for stress urinary incontinence, with the risk increasing with age. Therefore, the risk of PSUI is higher

in second pregnancies than in first pregnancies. It is recommended that specific pelvic floor rehabilitation programs be offered to mothers who are not first-time mothers, taking into account the high risk of the disease and the older age, with targeted assessment and supervision to promote pelvic floor rehabilitation in the postpartum period.

Studies have shown that pelvic floor muscle training during pregnancy can reduce the prevalence of postpartum SUI. Pelvic floor muscle training during pregnancy is not only conducive to natural delivery, but also helps to reduce the probability of difficult labor and SUI, such as vaginal assisted delivery and cesarean section, which in turn ensures the physical and mental health of the mother and the safety of her life. Therefore, pregnant women without contraindications can carry out scientific and standardized pelvic floor muscle training during pregnancy under the supervision of doctors, which can reduce the occurrence of SUI during pregnancy and the early postpartum period.

4.3. Pelvic floor rehabilitation

4.3.1. Pelvic floor muscle training

Pelvic floor muscle training is one of the common methods used to treat pelvic floor muscle dysfunction. The goal of pelvic floor muscle training is to strengthen the tone of the pelvic floor muscles and improve muscle coordination, thereby reducing or eliminating the symptoms caused by pelvic floor dysfunction. Studies have shown that pelvic floor muscle training can significantly improve symptoms of urinary incontinence and quality of life. Pelvic floor muscle training should be individualized according to the individual's situation to develop a training program, including training intensity, training time and training frequency, etc., in order to obtain the best results.

4.3.2. Electrical stimulation combined with biofeedback therapy

Electrical stimulation combined with biofeedback therapy is a common pelvic floor rehabilitation treatment. Electrical stimulation refers to the stimulation of the pelvic floor muscles by means of an electrical stimulation device, which enhances muscle contraction strength and muscle tone, in order to improve the mobility and coordination of the pelvic floor muscles. Biofeedback, on the other hand, involves monitoring the movement status of the pelvic floor muscles through a specialized instrument and transmitting the feedback signals to the patient or therapist to help the patient better control and regulate the contraction and relaxation of the pelvic floor muscles. This treatment method can help patients better understand the function and movement status of the pelvic floor muscles and guide them to carry out the correct exercises, so as to achieve the purpose of rehabilitating the pelvic floor muscles and treating urinary incontinence. Studies have shown that electrical stimulation combined with biofeedback therapy can significantly improve the symptoms of urinary incontinence and increase the contraction strength and tone of pelvic floor muscles, making it a safe and effective treatment.

5. Summary

In summary, pregnancy and childbirth have a significant negative impact on female pelvic floor function. Due to the vaginal dilation and pressure required for childbirth, as well as the changes in hormone levels during pregnancy, women's pelvic floor muscles and other tissues may be damaged to varying degrees. Once this damage exceeds the body's own ability to regulate and repair it, it can lead to uncomfortable symptoms such as urinary incontinence. These symptoms not only affect women's physical and mental health, but also have a serious impact on their quality of life. Pelvic floor muscle training during pregnancy and postpartum has been shown to be an effective method to improve the strength and functional status of the pelvic floor muscles and to reduce the risk of women experiencing uncomfortable symptoms such as urinary incontinence after childbirth. Therefore, it is essential to widely promote and apply this method to improve women's quality of life and physical and mental health.

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