

# The Application of Three-level Standardized Process Management in the Rehabilitation of Pelvic Floor Function in Primiparous Women

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**Abstract:** Pelvic floor dysfunction is a group of diseases related to weak pelvic floor supporting tissue, which seriously endangers women's health. In order to explore new treatment approaches for pelvic floor dysfunction caused by pregnancy and childbirth in women, we applied a standardized three-level management process to the rehabilitation of pelvic floor function in primiparous women, to observe the impact and effect on pelvic floor function in primiparous women, and provide certain reference basis for the clinical treatment of this disease.

**Keywords:** Pelvic floor dysfunction disease; Third level standardization; Process management; Pelvic floor function; effect

## 1. Introduction

The pelvic floor is composed of the pelvic bones, muscles, and connective tissue that support the pelvic organs and are crucial for their normal function[1]. These tissues, especially for the bladder, urethra, rectum, and reproductive system, are of great significance. Pelvic floor dysfunction (PFD) is a group of diseases related to weak pelvic floor support tissue, mainly causing defecation and urination disorders, pelvic organ prolapse, sexual dysfunction, and pelvic pain[2]. In China, the incidence rate of female PFD is as high as 58.7%, of which pelvic organ prolapse is the most common (48.73%), followed by stress urinary incontinence (8.7%) [3]. The incidence rate of PFD among women over 60 years old abroad is 50%, and the prevalence of female urinary incontinence is about 38% -49.2%. Pregnancy and childbirth are important factors in the onset of pelvic floor dysfunction, and pregnancy and postpartum period are particularly favorable opportunities for preventing and treating pelvic floor dysfunction. With the opening up of the national fertility policy, how to strengthen the management of pelvic floor rehabilitation for pregnant and postpartum women, prevent and treat PFD has become a major issue of social concern. Research has confirmed that prior to the onset of symptoms of pelvic floor dysfunction such as stress urinary incontinence and pelvic organ prolapse, abnormalities in the basic electrophysiological indicators of the pelvic floor have already occurred. Therefore, early detection, diagnosis, and intervention are particularly important to avoid the long-term occurrence of pelvic floor dysfunction diseases[4,5]. To reduce the incidence of pelvic floor dysfunction in postpartum women, starting from February 2023, we will apply a standardized three-level management process to the rehabilitation of pelvic floor function in women after first delivery, achieving satisfactory results[6].

## 2. Materials and Methods

### 2.1 Research data

A total of 62 pregnant women who met the inclusion criteria and were registered and delivered in the obstetrics department of our hospital from February 2023 to August 2023 were selected as the study subjects. They were randomly divided into a study group and a control group, with 31 cases in each group. Inclusion criteria: primiparous women undergoing vaginal delivery; Single live birth; Those who did not undergo pelvic floor training before this intervention; The mother and her family members agree to participate in the enrollment. Exclusion criteria: Patients with pelvic floor disorders already present; Individuals with a history of pelvic related surgery in the past; Taboos in this research method; Those with poor compliance. There was no statistically significant difference ( $p \geq 0.05$ ) in baseline

data such as age, family conditions, education level, occupation, income, and family care between the two groups of postpartum women, indicating comparability.

## **2.2 Research Methods**

The control group received routine postpartum pelvic floor muscle rehabilitation methods, with a 42 day postpartum check-up and pelvic floor muscle function testing and electrobiofeedback therapy for those with pelvic floor dysfunction symptoms[7]. The observation group adopts standardized three-level preventive intervention, achieving early detection, diagnosis, and intervention. Early health education for primary prevention intervention. Starting from the filing of maternal pregnancy, health education was carried out in the whole pregnancy period by organizing health lectures in the maternity school and issuing popular science education knowledge on the official account. The contents included physiological and pathological changes during pregnancy, knowledge of pelvic floor dysfunctional diseases, and evaluation of pelvic floor function[8]. At the same time, nutrition management, weight management, posture management, education to avoid increased abdominal pressure, exercise guidance, pelvic floor muscle exercise guidance, prenatal education management, preparation before delivery, and how to easily deliver were carried out, and health education and demonstration were carried out to guide pregnant women to learn deep breathing and Kegel exercise[9]. Achieve health education such as prenatal promotion, prenatal exercise, and prenatal assessment. Secondary prevention intervention is to evaluate and test the pelvic floor muscle function of the parturient 42 days after delivery. Assess whether the parturient has symptoms related to pelvic floor dysfunction, such as urinary leakage, urgency or urgent urinary incontinence, organ prolapse, pelvic pain, etc, and check the wound healing during delivery; By using specialized pelvic floor muscle assessment instruments, the muscle strength and electromyographic signals of the pelvic floor muscles are measured and evaluated to determine whether the tension, contraction, endurance, and other indicators of the pelvic floor muscles are normal[10]. Personalized rehabilitation plans are developed for postpartum women, and guidance is provided for the recovery of postpartum urethra and digestive tract function, as well as targeted care for postpartum pelvic floor dysfunction symptoms[11]. Gradually, adaptive pelvic floor muscle exercise is initiated. The third level of prevention intervention is within 42 days to 12 weeks postpartum. Pregnant women who have not found any symptoms or signs of pelvic floor disorders should receive preventive pelvic floor rehabilitation plans, while those who have symptoms or signs should receive targeted treatment and preventive pelvic floor rehabilitation plans[12]. Choose a reasonable treatment plan, including biofeedback training, electrical stimulation, etc, to restore pelvic floor function, promote pelvic floor rehabilitation, improve quality of life, and prevent the deterioration of pelvic floor dysfunction[13]. Both groups of parturients were evaluated for effectiveness at 12 weeks postpartum.

## **2.3 Observation indicators**

(1) Pelvic floor muscle strength measurement: Two methods, manual measurement and instrument detection, are used for pelvic floor muscle strength measurement [14]. Hand measurement method: The perineal muscle strength test (GRRUG) was used to complete. According to the strength and duration of vaginal muscle contraction in parturients, it is graded from weak to strong and divided into 0-5 levels. Instrument detection method: MLD A2 (Nanjing Mailande Medical Technology Co., Ltd.) was used for Glazer pelvic floor surface electromyography evaluation (referred to as Glazer evaluation). Evaluate the fast and slow muscle function of the entire pelvic floor muscle. Compare the physiological indicators of pelvic floor nerve electromyography between two groups of parturients to determine the recovery effect indicators of pelvic floor muscle electromyography activity[15].

(2) Observe the incidence of pelvic dysfunction diseases such as stress urinary incontinence, pelvic organ prolapse (uterine prolapse, vaginal wall prolapse), and defecation dysfunction in two groups of postpartum women.

## **2.4 Statistical methods**

SPSS 26.0 statistical software was used for data processing. The count data was expressed as [n (%)] and tested with  $\chi^2$ ; Quantitative data is represented by (mean  $\pm$  standard) and t-test, with  $P < 0.05$  indicating statistical significance [16].

### 3. Results

#### 3.1 Comparison of hand measured pelvic floor muscle strength grading between two groups of postpartum women after pelvic floor rehabilitation

Compared with the control group, the pelvic floor muscle strength grading of the observation group was significantly improved ( $P < 0.01$ ), as shown in Table 1.

Table 1: Comparison of hand measured pelvic floor muscle strength grading between two groups of parturients.

	Level 0-1	Level 1-2	Level 2-3	Level 3-4	Level 4-5
Experimental group	12	12	3	2	2
Control group	2	2	3	8	16

#### 3.2 Evaluation of Glazer pelvic floor surface electromyography in two groups of parturients

Compared with the control group, the average potential values of the rapid contraction, tense contraction, and endurance contraction stages of the pelvic floor muscles in the observation group were significantly increased ( $P < 0.05$ ), as shown in Table 2.

Table 2: Evaluation of Glazer pelvic floor surface electromyography in two groups of postpartum women

	Fast muscle (type II fibers)	Slow muscle (type I fibers)
Experimental group	65.7±19.50	46.1±25.13
Control group	87.9±7.50	70.2±16.34
T	3.36	2.54
P	0.003	0.02

#### 3.3 The incidence of pelvic dysfunction in two groups of postpartum women

The incidence of postpartum pelvic dysfunction in the observation group and the control group was 14.71% and 38.23%, respectively, with the observation group being lower than the control group (chi square  $2=3.971$ ,  $P < 0.05$ ).

### 4. Discussion

With the development of social and economic levels, the post-90s and even post-00s have gradually become the main force in pregnancy and childbirth[17]. On the one hand, the awareness of postpartum rehabilitation among mothers is gradually increasing, and the demand for actively seeking the best postpartum rehabilitation measures is gradually increasing[18]. On the other hand, with the relaxation of the birth policy, the birth rate has remained stable at a relatively high level. In 2019, 14.6 million new births were born nationwide, and the number of maternal families reached about 280 million[19,20]. With the continuous development of China's economic and social level, the per capita disposable income continues to grow, coupled with the increasing awareness of women's health, families are paying more attention to women's health, and the recognition and investment of postpartum rehabilitation by mothers and families are also increasing year by year[21]. The total investment of society in postpartum rehabilitation services will also steadily increase. Especially after the widespread "three child" birth policy, the number of mothers giving birth again has increased, and the number of elderly and high-risk pregnant women has correspondingly increased, which has put forward higher requirements for postpartum rehabilitation technology and means[22].

Postpartum rehabilitation is a holistic concept that horizontally encompasses the comprehensive collaborative rehabilitation of multiple systems in women[23]. In terms of time, it includes eliminating or reducing pregnancy, childbirth, postpartum abnormalities, as well as physical and mental abnormalities and organ dysfunction caused by aging in women[24,25]. Postpartum pelvic floor rehabilitation refers to the comprehensive application of relevant rehabilitation treatment techniques under the guidance of scientific health concepts, aimed at providing active and systematic rehabilitation guidance and training for women during the relatively special period of postpartum delivery, restoring,

improving or rebuilding pelvic floor related functions that women have suffered from different degrees of damage during pregnancy and childbirth, and preventing and treating pelvic floor dysfunction related diseases.

During pregnancy, there are changes in the structure and function of the pelvic floor, with the uterus gradually increasing and abdominal pressure increasing[26]. Collagen fibers in the pelvic floor decrease, muscle strength decreases, and fibrous tissue is weak. At the same time, inadequate weight management during pregnancy and childbirth increases the compression of pelvic floor tissue, making postpartum women prone to pelvic floor dysfunction diseases such as urinary incontinence and pelvic organ prolapse[27]. Numerous literature studies have shown that obesity can also exacerbate the compression of pelvic floor tissue, weakening the muscles, nerves, and other structures in the pelvic floor under long-term stress and tension. So weight management during pregnancy and childbirth is very important. In addition to reducing complications for the mother and fetus, it is also of great significance in reducing damage to the pelvic floor muscles[28]. Estrogen is one of the important factors necessary for maintaining the tissue structure, tension, collagen content, blood supply, and nerve regeneration of the pelvic floor. Low estrogen status further reduces collagen fibers, reduces support for the urethra and bladder, affects urinary control, and increases the risk of pelvic organ prolapse[29]. At the same time, during pregnancy, due to changes in body shape, the spine protrudes forward, which is not conducive to the contraction and relaxation of the levator ani muscle. At the same time, the volume and weight of the uterus increase by nearly 20 times compared to before pregnancy, causing the pelvic floor muscles to be under continuous pressure and gradually relax[30]. During delivery, the pelvic floor tissue is damaged, causing damage to the supporting tissue of the urinary and reproductive tract.

As can be seen from the above, the female pelvic floor is an organic whole that supports each other[31]. Any tissue damage or lesion can disrupt this overall balance, leading to the occurrence of pelvic floor dysfunction diseases. So it is very important to do a good job in the recovery of pelvic floor muscles during pregnancy and childbirth[32].

Research has shown that early postpartum pelvic floor training is of great significance in preventing pelvic floor disorders [33]. The overall principle of our standardized three-level management process is to prioritize prevention, combine prevention and treatment, and implement a strategy of early education, early screening, early intervention, and early rehabilitation. On the basis of comprehensive evaluation, individualized rehabilitation plans are carried out to promote the pelvic floor health of pregnant and postpartum women, and to avoid the development of moderate to severe pelvic floor dysfunction diseases due to delayed diagnosis and treatment[34].

(1) Application of standardized three-level preventive interventions to enhance the strength of pelvic floor muscles in postpartum women and ensure the stability of pelvic floor structure.

In 1990, Petros and Ulmsten first proposed the holistic theory, which states that different chambers and levels of the vagina form a complete anatomical and functional whole. The complete pelvic floor function is achieved through the coordination of pelvic floor muscles, connective tissue, pelvic organs, and nerves, and is the coordinated unity of the supporting and contracting systems. When the vagina and supporting tissues are damaged, the balance is disrupted, and dysfunction occurs. Female pelvic floor dysfunction diseases must adhere to the policy of prevention first and combining prevention and treatment[35]. If the mother cannot receive timely diagnosis and treatment, it often progresses to moderate to severe pelvic floor dysfunction. The overall principle of standardized three-level prevention intervention is early education, early screening, early intervention, early rehabilitation, and the implementation of a combined intervention plan of overall rehabilitation and individualized rehabilitation under comprehensive evaluation. Early education is an important foundational work for the prevention and treatment of postpartum pelvic floor rehabilitation. The first level of standardized three-level management focuses on removing factors that may lead to decreased pelvic floor muscle function and emphasizes pelvic floor muscle exercise. From pregnancy to postpartum, the entire process of pelvic floor rehabilitation health education, from promoting theoretical knowledge of pelvic floor rehabilitation to self training of pelvic floor muscles, enables primiparous women to learn active control of pelvic floor muscle contraction and relaxation, master correct coordination of pelvic floor muscle movements, improve pelvic floor muscle self movement and control ability, and maintain good pelvic floor function[36].

The pelvic floor muscle strength of the group of parturients was higher than that of the control group. Mastering the correct pelvic floor muscle exercise methods before childbirth, such as Kegel exercises, has a significant effect on enhancing the tension of pelvic floor muscles and preventing

pelvic organ prolapse [37]. This early exercise can effectively enhance the elasticity and strength of pelvic floor muscles, laying a solid foundation for childbirth and postpartum recovery. The application of standardized three-level prevention processes enhances the strength of pelvic floor muscles in parturients, while reducing the incidence of complications such as urinary incontinence, organ prolapse, and uterine wall prolapse.

(2) Standardized pelvic floor rehabilitation prevention intervention can improve the motor ability of pelvic floor muscle fibers and reduce the incidence of pelvic floor disorders.

The pelvic floor muscle of the human body is the striated muscle, and its muscle fibers are divided into Class I muscle fibers and Class II muscle fibers. Class I muscle fibers are slow muscle fibers, mainly used to maintain the pelvic organs in their normal anatomical position. Their characteristics are long and persistent contraction time, less prone to fatigue, and static tension is formed in the pelvic floor Class I muscle fibers and surrounding ligaments and connective tissue in a weightless state. Their main function is to maintain the pelvic organs in their normal anatomical position. Once damaged, pelvic organ prolapse may occur. Type II pelvic floor muscle fibers are fast muscle fibers that undergo reflexive contractions to form dynamic tension. Their characteristics are periodic contractions, rapid and transient, and are prone to fatigue. They are mainly composed of superficial pelvic floor muscles, and their main function is to control urine and feces, maintain vaginal contractions, increase sexual pleasure, and develop corresponding symptoms such as urinary incontinence, fecal incontinence, sexual dysfunction, etc[38]. Standardized secondary and tertiary prevention plans involve early screening and intervention. 42 days to 3 months postpartum is a critical period for pelvic floor tissue and muscle rehabilitation. On the basis of doing a good job in self rehabilitation training and health education, based on biofeedback testing, the plan of biofeedback treatment is determined based on the physical and electrical conditions of the parturient during exercise, rest, fast and slow muscles. Individualized electrical stimulation and combined biofeedback treatment are carried out according to the test results to exercise and consolidate the strength of type I and type II muscles, strengthen the autonomous contraction of muscles, improve the strength and tension of pelvic floor muscles, and thus reduce the incidence of pelvic floor disorders[39]. Previous studies have shown that combining Kegel exercise with biofeedback electrical stimulation can effectively promote early postpartum pelvic floor muscle recovery compared to using Kegel exercise alone. The results of this study are similar to those of previous studies.

(3) Standardized postpartum pelvic floor rehabilitation health education guidance can help maximize the recovery of pelvic floor function and have a significant impact on the quality of life of postpartum women.

Effective health education and guidance should be provided starting from pregnancy to guide postpartum women in choosing a healthy lifestyle, eating a reasonable diet, consuming sufficient water, and consuming fiber rich foods to prevent increased abdominal pressure caused by constipation; Develop correct bowel and urination habits and avoid incorrect use of abdominal pressure; Avoid excessive load and force; Actively treat various chronic diseases that can cause increased abdominal pressure, such as diabetes, cough and asthma, constipation, etc. [40] to reduce the impact on body function; Weight control is the key to preventing postpartum pelvic floor dysfunction, and body mass index and gestational weight gain are closely related to the occurrence of this disease. Weight gain during pregnancy increases the subsequent risk of the disease; Control the weight of newborns between 2500-4000g to avoid the occurrence of macrosomia; During pregnancy, pregnant women should receive publicity and education on pelvic floor knowledge, change their mindset, and engage in pelvic floor muscle exercises in a timely manner; Pelvic floor muscle exercise in the middle and late stages of pregnancy can improve pelvic floor muscle strength and vaginal delivery rate in primiparous women, shorten the delivery process, and promote postpartum pelvic floor muscle recovery.

Since the 20th century, advances in biology have also brought better prospects for future postpartum rehabilitation. By applying the preventive, predictive, personalized, and participatory concepts of modern medicine to postpartum rehabilitation services, this multi-dimensional and precise postpartum rehabilitation can better protect the fertility of mothers, improve their reproductive health levels, and provide technical support for the latest national "three child" fertility policy. The progress of modern medicine and biology, the continuous development of postpartum rehabilitation technology, and the constant updating of postpartum concepts will serve more and more mothers to ensure the health of mother and baby, truly safeguarding the prevention of female reproductive health diseases, maintaining reproductive health, and protecting women's reproductive ability[41]. With the transformation of modern medical models and the increasing demand for quality of life, postpartum pelvic floor rehabilitation has received increasing attention from mothers and medical workers.

## 5. Conclusion

In summary, the standardized three-level management process, as a scientific and systematic rehabilitation method, provides new ideas and means for postpartum pelvic floor rehabilitation. In the future, we will continue to explore the specific application of standardized three-level prevention processes in postpartum pelvic floor rehabilitation, in order to provide more high-quality and efficient rehabilitation services for mothers.

## Author contributions

All authors have designed the study, developed the methodology, performed the analysis, and written the manuscript. All authors have read and agreed to the published version of the manuscript.

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