



Meta-analysis of Impact of Pelvic Floor Exercises on Physiology of Defecation, Urination, and Sexual Life among Women

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Abstract

Aim: The aim of this study is; With the knowledge of pelvic floor anatomy, the aim is to “metanalyze the researches on pelvic floor muscle exercises on urination, defecation, sexual life and birth physiology”. In addition, it will contribute to the correction of muscle damage, changes occurring during pregnancy and childbirth, and sexual life with accurate anatomical information in women.

Materials and Methods: After the introduction about the pelvic floor muscle anatomy; from 24 scientific publications in total; We benefited from two doctoral theses and one master’s thesis. Meta analysis has been studied in 17 works. It has benefited from the results of the related publications as a summary. Areas of interest were as follows; Nursing services, obstetrics clinic patients, physical therapy clinic findings were examined. General meta-analysis working conditions were examined in these publications. The results of studies in many different fields were presented in the discussion section.

Results: It is a meta-analysis evaluation of the results of studies screened on pelvic floor muscle training.

Conclusion: In the light of all the researches about pelvic floor muscle training, which were meta-analyzed; It is important that the pelvic floor muscle training given to the subjects be given under the direction of an experienced anatomist. It is possible for people to live a comfortable and happy life by mastering their bodies. Living in comfort and happiness is possible by learning the right anatomical information at the right time. Learning the correct anatomical information at the right time provides comfortable defecation, comfortable urination and happy sexual life. Researchers state that choosing and accepting appropriate sexual behavior and sexual function is difficult due to low sexual self-efficacy in the postpartum period. For this situation, researchers report that an 8-week pelvic floor muscle exercise program has positive effects on the loss of sexual self-efficacy in women after childbirth [24].

Keyword: Pelvic Floor Muscles; Human Body; Defecation; Urination; Sexual Life; Meta Analysis; In Women

Introduction

We believe that pelvic floor anatomy should be learned well before starting exercises to strengthen the pelvic floor muscles and these muscles.

The pelvis is the bony structure located at the caudal end of the vertebral column. It is formed by two hip bones joined anteriorly at the pubic symphysis and posteriorly to the sacral bone, by coccyx bone and by the 4th and the 5th lumbar vertebrae.

The bones of the pelvis bound the pelvic cavity - *cavitas pelvis* - what is one of the human body cavities. The pelvic cavity is of two parts: the lesser pelvis (or "true pelvis") includes only structures inferior to the pelvic brim and the greater pelvis (or "false pelvis") is the expanded portion of the cavity situated above and in front of the pelvic brim.

The pelvic brim goes along a *linea terminalis* - *linea terminalis*; the line passes through the promontorium, the sacroiliac joint, the arcuate line, the iliopubic eminence and the superior part of the pubic symphysis. The greater pelvis - *pelvis major* - lateral and posterior bony walls are formed by the ala of the ilium and by two lower lumbar vertebrae. The anterior wall of the greater pelvis is incomplete, presenting a wide interval between the ilium; it contains the structures of the abdominal wall and supports the intestines (specifically, the ileum and sigmoid colon). The lesser pelvis - *pelvis minor* - is below and behind the pelvic brim. Its bony walls are more complete than those of the greater pelvis. It is formed by the hip bones below the pelvic brim, by the sacral bone and the coccyx bone. The lesser pelvis contains reproductive organs, the urinary bladder and the rectum. For convenience of description, it is divided into the pelvic inlet, pelvic outlet and the cavity of the lesser pelvis. The pelvic inlet runs along the *linea terminalis*. The pelvic outlet goes along the coccyx bone, the sacrotuberous ligament, the ischial tuberosity, the ramus of the ischium, the inferior ramus of the pubis and inferior part of the pubic symphysis. The cavity of the lesser pelvis has four walls. The posterior wall is formed by the sacral and coccyx bones. The lateral walls contain parts of the hip bone below the pelvic brim, the sacrotuberous and the sacrospinous ligaments. The anterior wall is formed by the pubic symphysis, the inferior ramus of the pubis and the ramus of the ischium. There are sex differences in the lesser pelvis. The female pelvis is larger because both ala of the ilium are wider-projected and sacral bone is more triangular and shorter. The pelvic inlet in males is more heart-shaped (because the promontorium is placed more forward), while in females it is more rounded or oval. The distance between the inferior ramus of the pubis below the symphysis in females is greater than 90° (pubic arch) and less than 90° in males (subpubic angle). We use several measurements for characteristics of the pelvis, which are important for child delivery. The greater pelvis measurements are the interspinous distance and the intercrystal distance. The interspinous distance - *distantia interspinosa* - is the distance between the anterior superior iliac spines. The intercrystal distance - *distantia intercrystalis* - is the distance between the

further lateral points of the iliac crests. The main measurements of the lesser pelvis are for the pelvic inlet and the pelvic cavity; there are three measurements: transverse, oblique and straight diameters. The transverse diameter - *diameter transversa* - is between the extreme lateral points of the pelvic inlet (about 13 cm). The oblique diameter - *diameter obliqua* - is between the sacroiliac joint and the iliopubic eminence (about 12 cm). The antero-posterior diameter is the distance between the promontorium and the pubic symphysis; it contains three conjugates: anatomical conjugate, true conjugate and diagonal conjugate. The anatomical conjugate - *conjugata anatomica* - is the distance between the promontorium and the upper border of the pubic symphysis (about 11 cm). The true (obstetric) conjugate - *conjugata vera* - is the distance between the promontorium and the most bulging point on the back of pubic symphysis (10,5 cm).

The diagonal conjugate - *conjugata diagonalis* - is the distance between the promontorium and the lower border of the pubic symphysis (12,5 cm); it could be measured per vaginam.

There is also the straight conjugata - *conjugata recta* - the distance between the tip of the coccyx and the lower border of the pubic symphysis (9,5 - 10 cm). The muscles that stick to the pelvic outlet are called pelvic floor muscles. The pelvic outlet also limits the perineum [1,2]. In women, the perineum is the area between the vulva and the anus. The muscles and membranes of the pelvic floor are two layers:

- Upper layer (*Diaphragma pelvis*),
- Membranes with the lower layer (*Diaphragma urogenitale*) and *M. sphincter externus*.

Diaphragma pelvis is the structure that closes both triangles except the hole through which the genital organs, urethra and rectum pass. In the posterior triangle, apart from the diaphragmatic pelvis, there is only *M. sphincter abrupt externus*. In the middle of the perineum, there is a formation called *centrum tendineum perinei* extending from front to back. *Centrum tendineum perinei*; close to the bulbus penis, the 1.25 cm. It is a fibromuscular node located in the midline in front of it. It was formed as a result of crossing and joining of the beams of the pelvic floor muscles. Towards this point, *M. sphincter ani externus*, *M. sphincter urethrae*, *M. bulbospongiosus*, *M. transversus perinei superficialis*, *m. levator prostatae* (*m. pubovaginalis*) and *m. transversus perinei profundus* and they come by mixing. Also, the *centrum tendineum perinei* receives

smooth muscle fibers from the ampulla recti. Since it is connected to the pelvis organs with muscles and ligaments, it provides a solid support to these organs. Diaphragmatic Pelvis; the upper layer of the pelvic floor consists of the m. levator ani and m.coccygeus and the underlying fascia pelvis covering these muscles.

M. levator ani

Narrows the lower end of the rectum and the vagina. Supports the pelvic organs with M. coccygeus. M. coccygeus: Supports the pelvic organs. M. sphincter ani externus: It surrounds the lowest part of the Canalis analis. Diaphragma Urogenitale; Makes the anterior part of the second layer of the pelvic floor. In both sexes; It is made of m.bulbospongiosus, m. ischocavernosus, m. transversus perinei superficialis and m.transversus perinei profundus and m. sphincter urethrae and fascia covering these muscles. These muscles support the pelvic organs and are involved in copulation and micturition. M. transversus perine superficialis: When working bilaterally, it helps to detect the centrum tendineum perinei.

M. bulbospongiosus

It helps the Urethrae to ejaculate. It gets involved at the end of the Mixion. It is an important muscle that contracts repeatedly during ejaculation.

M. ischocavernosus

Penis ensures the continuation of erection.M.transversus perinei profundus: Provides general support to the pelvic floor. M. sphincter urethrae: During the mixion they relax like bulbospongiosus. They contract at the end of the mixion and during ejaculation to expel the last drops of urine Diaphragma Urogenitale in women; M. transversus perinei superficialis: It is a narrow muscle in women. and constricts the vaginal hole. It helps the clitoris erection by making pressure on the clitoris. M. ischocavernosus: Helps the clitoris erection. M. transversus perinei profundus: clings to the vaginal wall. M. sphincter urethrae: It is the constricting muscle of the Urethrae [1-4]. It is suggested by researchers that damage to the pelvic floor can lead to a decrease in strength, causing pelvic floor dysfunctions such as pelvic organ prolapse, stool and urinary incontinence [5,6].

Especially in the birth intervention, tears and wear occur in the pelvic floor muscles in women. In these cases, changes may occur in the woman's pelvic floor muscle anatomy. To direct these changes that occur in women during and after birth to the correct exercises in the light of correct anatomical information.

The aim of this study is; With the knowledge of pelvic floor anatomy, the aim is to "meta-nalize the researches on pelvic floor muscle exercises on urination, defecation, sexual life and birth physiology". In addition, it will contribute to the correction of muscle damage, changes occurring during pregnancy and childbirth, and sexual life with accurate anatomical information in women.

Materials and Methods

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Discussion

The researchers reported the results of the kegel exercises applied to the patients hospitalized with the complaint of urinary incontinence in various gynecology hospitals in Iran to exercise the pelvic floor muscles. Researchers state that pelvic floor muscle training and kegel exercises given to women with urinary incontinence are effective in improving complaints of urinary incontinence [5]. Some researchers state that the Pilates, Paula method and hypopressive exercises are ineffective in strengthening the pelvic floor muscles. These researchers express the importance of pelvic floor muscle anatomy training to strengthen the pelvic floor muscles. The purpose and opinions of our research are consistent with the results of this research [6]. Some researchers state that it would be more appropriate to give pelvic floor muscle anatomy training without surgery for pelvic organ disorders. These researchers also state that Kegel exercises correct pelvic organ disorders. Our views put forward in our research are consistent with the views of these researchers.

According to three world studies such as IQOL (Incontinence Quality of Life), IIQ (Incontinence Effect Questionnaire), UDI (Urogenital Distress Inventory), strength of pelvic floor muscles, ability to participate in social activities and quality of life, the score was applied to two groups 1 and 3 months later. Paired t test was performed in both groups according to IQOL score (P = 0.000), UDI score (P = 0.000), IIQ score (P = 0.000), pelvic floor muscle strength

($P = 0.000$), social activities 1 and 3. Months after the intervention. ability to participate ($P = 0.000$), the severity of urinary incontinence ($P = 0.000$) and the number of involuntary urinary tract ($P = 0.000$) were determined.

Researchers report that there is no difference between Kegel exercises and pelvic floor muscle training. They reported that both methods prevent urinary incontinence in women.

Researchers; They state that kegel exercises and pelvic muscle training are beneficial to prevent urinary incontinence [5].

In the method followed by the researchers; PEDro, Tridatabase, Cochrane, and PubMed have systematically reviewed research on non-specific exercises such as Pilates, Paula's method, and hypopressive exercises in strengthening pelvic floor muscles in adults, with the exception of underlying neurological disorders. Seven studies with or without pelvic floor dysfunction were analyzed by the investigators. In the results examined by the researchers; It has been reported that Pilates, Paula's method and hypopressive exercises are ineffective in increasing pelvic muscle strength unless combined with pelvic floor muscle training. Researchers; Pilates concluded that the Paula method and hypopressive exercises performed alone did not increase pelvic floor muscle strength. Researchers report the importance of pelvic floor muscle training in increasing pelvic muscle strength. Researchers; Pilates states that the Paula method and their hypopressive exercises are ineffective in increasing pelvic muscle strength unless they are combined with pelvic floor muscle training. The importance of pelvic floor anatomy education emphasized in the purpose of our study supports the results of the researchers [6].

They reviewed 1194 studies by researchers. They included 11 studies from these studies. When the researchers used the perineometer measuring instrument; They claimed that there was no difference between BF and PFMT in terms of muscle strength.

In the results of the researchers; They noted that PFMTs with BF did not provide therapeutic benefit in the treatment of female SUI compared to alternative interventions.

Researchers report that SUI treatment, BF and PFMT do not provide therapeutic benefit over vaginal electrical stimulation alone. The importance of pelvic floor muscle training emphasized in our study seems to be supported by these researchers [11].

Researchers; They studied 13 studies with 2,340 patients. In the findings of the researchers; The women who received PFMT reported a prolapse symptom score [mean difference (MD) 3.07, 95% confidence interval (CI) 3.91 – area 2.23] and POP phases [hazard ratio (RR) 1.70, 95% CI 1.19-2.44]. The researchers noted that most women included in the study had prevented organ prolapse (RR 5.48, 95% CI 2.19-13.72) and other distress syndromes such as vaginal, bladder, and rectum were lower in the PFMT groups than in controls. Researchers reported greater improvements in muscle strength and endurance in women after PFMT. According to the Meta-analysis made by the researchers; They reported that women using PFMT improved organ prolapse and POP severity. According to the results of this research; Women taking PFMT reported a more subjective improvement in organ prolapse and an objective improvement in COC severity.

The statement by the researchers that pelvic floor muscle training prevents pelvic organ prolapse is in parallel with the emphasis of our research [12].

In the results of the researchers; They observed that women taking PFMT decreased the POP-Q stage (OR: 1.76, 95% CI: 1.24-2.48) compared to the control group. The researchers found that there was no statistical difference in the addition of the POP-Q stage (OR: 0.98, 95% CI: 0.74-1.29), no change in the POP-Q stage (OR: 0.97, 95% CI: 0, 77-1.23) Q phase change (OR: 1.11, 95% CI: 0.95-1.30), PFDI-20 (SMD: 0.13, 95% CI: -0.14-0, 40), POPDI-6 (SMD: 0.14, 95% CI: -0.15-0.42), CRADI-8 (SMD: 0.03, 95% CI: -0.11-0.16), UDI-6 (SMD: 0.17, 95% CI: -0.10-0.43), PFIQ7 (SMD: 0.05, 95% CI: -0.09-0.18) After PFMT treatment compared to the control group, women who received PFMT emphasized that they had an advantage in reducing the POP-Q phase. Researchers; They reported that higher quality RCTs are still essential to confirm that PFMT is a better treatment for COC. In parallel, they emphasize that higher quality RCTs are still needed to confirm that PFMT is a better treatment for COC.

The researchers' emphasis on the importance of pelvic floor muscle training in preventing pelvic organ prolapse makes the pelvic floor muscle anatomy important in our study [13]. Researchers took 12 articles out of 347 studies. In their study, pooled standard differences in mean sexual function (SMD) in both pelvic floor exercise and control groups were 0.462 [0.117 to 0.806], $p = 0.009$. The combined SMD 1.294 [0.926 to 1.663], $p < 0001$ expressed the qu-

ality of sexual life. They emphasized that the combined SMD was 0.232 [0.038-0.426], $p = 0.019$ for overall quality of life. Researchers state that pelvic floor muscle training improves postpartum sexual function and quality of life in polygamous women. According to the results of numerous studies, the researchers conducted their meta-analysis; They emphasize that sexual function in both the pelvic floor exercise and the control group increases the postpartum sexual function and quality of life in polygamous women. The emphasis put forward by the researchers; makes our research even more powerful [14].

Researchers

They state that pelvic floor exercises support the bladder neck and develop the vagina muscles. Kegel exercises increase the strength and functionality of weak and worn pelvic floor muscle groups. Kegel exercises prevent pelvic organ prolapse, hemorrhoids and urinary incontinence. Kegel exercises reduce sexual problems. Pelvic floor muscle exercises are also reported to be beneficial for women in the peripartum period. The results of this research; supports the importance of pelvic floor muscle anatomy [15]. The reason why different pelvic floor therapy strategies are adopted by researchers is due to the inability to obtain the correct anatomical information at the right time. The difference in the emphasis of this research confirms that accurate and permanent anatomy education is essential [16]. Researchers have presented reliable information in their articles by scanning a large number of researches with Meta-analysis method, synthesizing their data by reaching a large number of data. Researchers ; With meta-analysis, they have presented an important contribution to reach more reliable information about the sought subject, which is a synthesis of many studies to reach a large number of data [17].

Researchers report that with this behavioral treatment option, pelvic floor exercises are highly effective in increasing muscle strength and preventing urinary incontinence. In addition to increasing muscle strength, the researchers state that the exercises reduce genital sagging, increase orgasm and bowel control, and reduce sexual problems. They stated that these exercises are effective in the treatment of overactive bladder and stress urinary incontinence during pregnancy and postpartum period. To teach women to tighten their muscles at the right frequency and time under the direction of an experienced anatomist, with a multidisciplinary team, and encourage them to continue exercising. In this team, the nurse

who will apply the knowledge to women should be equipped with knowledge and practical application [18]. Evaluation parameters by researchers; The subjective perception of recovery was determined as incontinence severity, quality of life, urinary parameters, pelvic floor muscle strength (PFMS) and pelvic floor muscle endurance (PFME). All outcome measures except subjective perception of improvement were evaluated at baseline, at the 4th week, at the 8th week and at the 12th week. A standard 12-week treatment protocol was applied to the PFMT + VTT and PFMT groups. According to the results of the study, there was no statistically significant difference between the groups in terms of self-reported improvement at all time points ($p > 0.05$). In the analysis between groups, there was no statistically significant difference in all quality of life scores at all time points, except for the severity of incontinence, symptom distress score, PFMS, PFME, urinary parameters, and social limitations ($p > 0.05$). However, between baseline and week 12, the increase in PFMS and PFME was significantly higher in the PFMT + VTT group compared to the PFMT group. By the researchers; A standard 12-week treatment protocol was applied to the PFMT + VTT and PFMT groups. The researchers emphasized that there was no statistically significant difference between the groups in terms of improvement in research results. However, according to the researchers; They reported that the increase in PFMS and PFME between the beginning and the 12th week in the PFMT + VTT group was significantly higher than in the PFMT group [19]. Researchers; investigated the effect of pelvic floor muscle training on sexual function and quality of life in women. By the researchers; Pelvic floor muscle functions of women were measured by digital palpation and perineometer. Women included in the study; Sexual function and quality of life were evaluated using the Female Sexual Function Index (FSFI) and the 36-item Health (SF-36) form. By the researchers; After 6 weeks, it was reported that there was a significant improvement in the FSFI score in the treatment group and a significant decrease in the control group score. The results of the meta-analysis review of this research highlight the importance of pelvic floor muscle training [20].

Researchers; They achieved significant results for both the exercise and control groups. Although there was no significant difference between the groups in terms of age, birth weight and body mass index; They reported that there was a significant difference between urethral rotation angle, pelvic floor muscle strength, PISQ-12, UDI-6 and IIQ-7 scores both in trimester and postpartum periods.

They stated that although pelvic floor muscle strength increased and UDI-6 scores decreased in both groups, the urethral rotation angle, which was an important parameter in the control group, did not change. The decrease in urethral rotation angle in the postpartum period and between trimesters was significant in the exercise group. Researchers; Another important difference between the two groups was that there was an increase in pelvic floor muscle strength and a decrease in UDI-6 scores in different trimesters of the control group. The results highlighted by the studies support the hypothesis that exercises during pregnancy are very important for lower urinary tract lesions. We believe that to achieve more objective data similar studies on larger populations should be held. The researchers emphasized in their results that exercises during pregnancy are very important for lower urinary tract lesions. They acknowledge that similar studies need to be done on larger populations by researchers to arrive at objective data [21].

Researchers state that approximately one third of women experience urinary incontinence (UI) problem in the first stage of pregnancy and in the first 3 months after birth. It is stated by the researchers that during pregnancy and after birth, the strength of the pelvic floor muscles, hormonal and anatomical changes can facilitate musculoskeletal changes that can lead to UI. Researchers report that pelvic floor muscle training (PFMT), the formation of muscle volume with one or more voluntary contractions of the pelvic muscles, raise the pelvic floor and pelvic organs upward. They state that the upward elevation of the pelvic organs decreases the pubovisceral length and increases the resting position of the bladder. Researchers; They suggest that a PFMT program that follows general strength training principles during both pregnancy and the postpartum period can be beneficial to women [22,23].

Conclusion

In the light of all the researches about pelvic floor muscle training, which were meta-analyzed; It is important that the pelvic floor muscle training given to the subjects be given under the direction of an experienced anatomist. It is possible for people to live a comfortable and happy life by mastering their bodies. Living in comfort and happiness is possible by learning the right anatomical information at the right time. Learning the correct anatomical information at the right time provides comfortable defecation, comfortable urination and happy sexual life. Researchers state that choosing and accepting appropriate sexual behavior and sexual

function is difficult due to low sexual self-efficacy in the postpartum period. For this situation, researchers report that an 8-week pelvic floor muscle exercise program has positive effects on the loss of sexual self-efficacy in women after childbirth [24].

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