International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Effect of Pelvic Floor Strengthening in the Case of Fecal Incontinence: A Case Study

Dr. Farha Shah

MPT (Ortho), Physiotherapist, Icare Multi-Speciality Clinics- Emirates Healthcare Company, Dubai- UAE

ABSTRACT:

Background: The patient was 42 years old postpartum female with complaint of leaky stool and loss of stool with functional limitations and pelvic floor muscle weakness was advised for physiotherapy

METHODS AND MEASURES: Patient received 12 sessions over a period of 8 weeks. FIS scale was used to measure the outcomes. Pre and post session values were noted.

STUDY: Case Study

OBJECTIVE: This article provides an update on different key aspects on obstetrical fecal incontinence and what type of management is best for this condition.

INTERVENTION: Intervention included PF muscle strengthening exercises to stabilize and strengthen the weakened anal muscles and to improve the functional ability.

RESULTS: The patient demonstrated in an increase in functional ability and resolution of functional limitations. Statistical analysis of the data showed significant difference from pre to post intervention from session 1 to session 12. There was clinical and statistical significance found in PFMS.

CONCLUSION: Findings suggest that PFMT and BM are more effective in improving strength of PFM and improving the functional ability.

KEYWORDS: Pelvic floor muscle training(PFMT), Pelvic floor muscle strength (PFMS), fecal incontinence (FI), anal incontinence (AI),Bowel management(BM),Cesarean section (CS), Fecal Incontinence score (FIS)

Stool leakage is a symptom of faecal incontinence. The International Consultation onIncontinence (ICI) distinguishes between anal and faecal incontinence. Anal incontinenceis defined as “the involuntary loss of flatus, liquid or solid stool that is a social or hygienicproblem”, and this can be seen as a definition of faecal incontinence that can be treated.[3]

On the other hand, faecal incontinence is also defined as “the involuntary loss of liquidor solid stool that is a social or hygienic problem” or as anal incontinence minus gasincontinence.[3]

Vaginal Delivery is considered a risk factor for injuries to the pelvic floor including the tearing of the anal spincter and impaired pudendal nerve function.[14]

This damage may have short-term and Long-term consequences such as anal incontinence (AI), including leakage of gas or the unintentional loss of solid or liquid stool. Whether an electric cesarean section can prevent the potential impact of delivery on women’s future health remains unknown. However the belief that CS may prevent the development of AI may be one of the reasons for increased requests for CS.[14]

Fecal incontinence (FI) and AI are defined as involuntary loss of solid or liquid stool and loss of stool or gas, respectively.[21] Fecal Urgency is defined as having difficulty deferring a sudden or compelling desire to defecate. Previous studies have reported that a disturbance in bowel habits and pelvic floor disorders such as AI, Fecal urgency, constipation and pelvic organ prolapsed often co-occur and the quality of life of women experiencing more than one pelvic floor disorder is affected.

Furthermore, other studies have shown that AI, in particular, may have a devastating impact on women's social-emotional and physical activity as well as their quality of life. FI is associated with increasing age, obesity,pregnancy, instrumental vaginal delivery and obstetric and sphincter injury. Prevalence has been reported at 2 to 24% of the adult population, with 1 to 2% experiencing significant impact on daily activities.[21] Faecal incontinence has a negative impact on quality of life, makes it difficult forindividuals to be independent, and leads to isolation from society.[3]

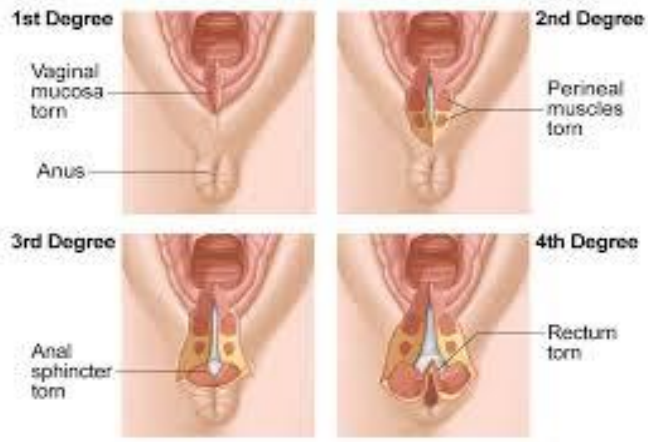
Classification of Perineal Tears:

The classification of perineal tears caused during delivery is based on the injured anatomical layers in the mid and posterior compartments (skin, mucosa and musculature) It is based on the elements involved or damaged by the tear. The laceration generally initiates in the vaginal mucosa and can progress, depending on the intensity, and injure (from front to back) the perineal musculature, the external anal sphincter, internal anal sphincter, and, finally, the anal mucosa. This latter case would result in complete anovaginal contact; if it is not repaired, or done so incorrectly, a rectovaginal fistula could develop. When in doubt about which anatomical planes are affected during a tear, it should be classified as the higher grade. Grade 3 and 4 injuries are those that affect the anal sphincter apparatus and can cause fecal incontinence.[17]

The following table describes classification of Obstetrical Tears:

1st degree	Laceration of vaginal epithelium or perineal skin only	
2nd degree	Involvement of the perineal muscles but not the anal sphincter	
3rd degree	Disruption of the anal sphincter muscles	3a: <50% thickness of external sphincter torn 3b: >50% thickness of external sphincter torn 3c: internal sphincter torn
4th degree	Third degree tear with disruption of the anal epithelium as well	

Source, sultan et al.[31]



Treatments include conservative measures such as dietary modifications, medications, and pelvicfloor rehabilitation, as well as more invasive approachessuch as the use of perianal injectable bulking agents, sacralnerve stimulation, or surgery. Many patients prefer toavoid the risk of interventions, and a stepwise approachto treatment has been advocated to minimize injury topatients.[21]

Pelvic floor rehabilitation has been used successfully in the treatment of FI, and can produce significant functional and quality of life benefits for patients. Most of the reported literature in this area have been in the form of case reports and nonrandomized prospective trials. In fact, more than 70 such uncontrolled studies have been published, with a great range of treatment protocols. Almost all these studies show a significant benefit to the use of a rehabilitative approach—the majority reports a response range of 50 to 80%. There has only been one published nonrandomized study which reported no benefit to treatment. The patients in that study uniformly had FI due to a neurogenic etiology, which might contribute to the lack of demonstrated benefit from pelvic rehabilitation.[21] Understandably, there can be a publication bias toward studies with positive results when no randomization has occurred, and it is important to therefore expand research into the area of randomized controlled trials (RCTs) to demonstrate true efficacy. There have been a small number of RCTs on pelvic floor rehabilitation for FI, less than 30 in total of high quality, according to two recently published Cochrane reviews on the topic. These RCTs vary widely in terms of treatment protocols and typically had small sample sizes, but for the most part also showed clear benefit for rehabilitative treatments. There have been no significant risks reported to the patient beyond that of time investiture and financial expense. The goal of this review is to summarize the current research and describe the different options available for rehabilitative treatment of the pelvic floor in the management of FI.[21]

Objective of the study:

The main aim of this study was to explore whether women who only had delivery vaginally were at greater risk of developing FI than women who had undergone only cesarean sections or women who had never experienced childbirth.It was also aimed in improving the quality of life of patients with FI by improving their pelvic floor muscle strength.

The main objective of this article was to provide an update on different key aspects in obstetrical fecal incontinence by reviewing the literature, the author also provided the experience in order to determine what type of management is best for this condition.

Outcome measures: FIS was taken as outcome measure, pre and post session values were noted. Fecal incontinence score according to Vaizey and Wexner is used as functional scale which measures the qual-

ity of life of the patient.[24]

Intervention:

The incorporation of lifestyle education into the therapeutic treatment program is of vital importance for patients with FI. Such training can certainly be done apart from or instead of the other pelvic floor rehabilitation approaches described below, but it is thought that the best results occur when both are undertaken simultaneously. The patients in many of the published studies on FI and rehabilitation are typically, therefore, instructed in basic behavioral and bowel retraining principles alongside undergoing pelvic rehabilitation methods.[21]

Bowel Management:

Bowel education and retraining can include many different aspects. A focus on lifestyle modifications including instruction as to optimal fluid intake and dietary adjustments can be important in certain patient populations. Patients with irritable bowel syndrome and FI, for example, often find that regulating dairy, gluten, and fiber can be an important component of controlling their stool leakage. It is generally recommended that all patients with FI increase their fiber intake, as Bliss et al were able to demonstrate that fiber supplementation significantly reduced the rate of FI. Behavior modification can also be explored with patients, including training on the establishment of a predictable pattern of bowel evacuation, timing of defecation relative to activities to limit incontinent episodes, techniques to reduce straining, proper defecation posture when sitting on the toilet, and fecal urge suppression techniques. Weight reduction is typically encouraged, as obesity is a well-documented risk factor for the development of FI.[21]

Pelvic Floor Muscle Training (PFMT):

PFMT describes any number of different approaches for increasing strength, endurance, and coordination of the pelvic floor and anal sphincters. Thoracoabdominopelvic muscle training has also been advocated, as it has been theorized that training all core muscles to work in tandem would be more effective than a narrow focus on the pelvic floor muscles alone. Particular attention is often paid to the transversus abdominus in such expanded approaches. PFMT typically consists of verbally guided instruction in pelvic floor and sphincter contractions (Kegel contractions). Patients can be taught to contract in a variety of ways—some examples include maximal voluntary sustained sphincter contractions, submaximal sustained contractions, and fast-twitch or “quick-flick” contractions. A commonly reported PFMT technique is to compare the pelvic floor to an elevator, able to stop at different floors as it ascends and descends. Other reported methods include working on coordination of anal sphincter activity and working to isolate a contraction of the anal sphincter. Some practitioners use their hand placed externally, or a digit placed vaginally or rectally to help instruct the patient in the correct exercise techniques, but most would argue that this constitutes a form of low-tech biofeedback training.[21] Only one clinical trial, by Norton et al in 2003, compared pelvic rehabilitation to a bowel education and retraining program. This study demonstrated comparable benefit in all treatment groups, and the authors concluded that no added benefit was seen with pelvic rehabilitation compared with education alone. However, the education treatment group received instruction in a “bowel urge resistance program” which included training to hold stool in the rectal vault while sitting on the toilet for increasing amounts of time.[21]

Only one RCT has been done to evaluate the difference between varied types of pelvic floor exercises. Bartlett et al in 2011 found no difference in outcomes between two separate PFMT techniques, both trained with biofeedback guidance (sustained submaximal anal and pelvic floor exercises vs. rapid squeeze plus sustained submaximal exercises).[21]

Abdominal exercises: Abdominal hollowing (Core exercise) Your abdominal muscles form a natural corset supporting your back and internal organs. Start to exercise and strengthen them as soon as possible. These exercises will prevent or relieve backache. The deep abdominal muscles often work at the same time as the pelvic floor muscles.

Activation of the transversus abdominis (TrA) has been shown to facilitate pelvic floor muscle activation and vice versa.TrA activation also leads to increased pelvic floor muscle activity without directly training the pelvic floor musculature.

Case description:

Consent of patient:

Consent of the patient was taken in the presence of witnesses before starting the study, signed and save.

Background:

Postpartum patient was 42 years old female with gravida three had primary complaint of loss of stools and weakness of pelvic floor muscles, she was examined and evaluated by gynecologist and Anorectal surgeon and referred to the physical therapist

Assessment:

Patient was 42 years old female who was presented to the Physiotherapist with chief complaint of loss of sensation of stools and leaky stool which was constant post-delivery from 6 weeks.

She was facing difficulty in her activities of daily living specially during walking and standing, lifting her baby and while doing household chores. She was unbale to control her stool, she complained about the difficulty in contracting her anal muscles.

History:

On taking history, she revealed that during her 3rd delivery, episiotomy was performed on her and stitches were given which got extended till anal region.

Post delivery she waited for 6 weeks so that she can get back her sensation of stools but she could not.

She also said that her stitches which were given for episiotomy were healed completely at 4 weeks but there is no strength to hold or stop her faeces. She visited her Gynecologist and anorectal surgeon to get examined, it was diagnosed as Fecal Incontinence and advised for physiotherapy.

Intervention:

Course of treatment:

12 sessions in 8 weeks Patient received 12 sessions in the span of 8 weeks, each session was provided for 40mins.

The patient informed that the designated intervention has been shown to improve her condition. The patient had received the following structured exercise program.

All the exercises were supervised during the session and exercise parameters were adjusted as requested but without any modifications in the type of exercises.

The following exercises were performed:

First 8 sessions were provided weekly twice for 4weeks, after then 1 session per week for 4 weeks.

The following exercises were followed under her physiotherapy treatment:

Long squeezes: Tighten your pelvic floor muscles, hold them as tightly as you can for 5 seconds, then release and let them fully relax for 5 seconds. Repeat this squeeze and relax sequence between 3-10 times until she felt the muscles tire. Over the next 3-6 months try to gradually increase to a 10 second hold.

Short squeezes: Pull up the pelvic floor muscles quickly and tightly, then immediately let go fully. Aimed for 10 repetitions in a row if she can but this was too much then just the therapist started with 2 or 3 for session and gradually build up from there and 5 repetitions on second session and 10 repetitions from third session.

Following these steps were advised in her activities of daily living:

During a cough, sneeze or during lifting activities, always tighten your pelvic floor to support the pelvic organs. If she experience any abdominal or pelvic pain during or after exercising these muscles asked to discuss this with treating pelvic health physiotherapist or general practitioner.

Abdominal Exercises: To exercise her deep abdominal muscles, she was asked to lie on her back with her knees bent. Asked to take an in breath and as she breathe out gently draw in her lower abdominal muscles (she was asked to imagine that sheis drawing her belly button towards her spine). This should be a small movement. Asked to repeat a few times and as she felt more confident with this exercise then she was aimed to hold the contraction for up to 10 seconds and aim to repeat up to 10 times, three times a day. She was asked to do this exercise lying on her side or sitting up. She was asked to gradually start using this hollowing movement with her normal daily activities such as lifting, bending or walking. Pelvic tilting,Lying on her back with her knees bent, draw in her lower abdominal muscles and gently tilt her pelvis backwards flattening her lower back into the bed and curling her tailbone upwards. She was asked to repeat a few times and as she felt more confident and comfortable with this exercise, it was aimed to repeat up to 10 times, three times a day. This was helpful to reduce back ache.

Knee rolling: she was asked to lie back with her knees bent. Draw in her lower abdominal muscles and gently rock her knees left to right within a range of comfort. Repeat a few times and as she felt more confident and comfortable with this exercise, she was aimed to repeat up to 10 times, three times a day. This is an exercise to clear wind and ease lower back ache.

The Kegel exercise is probably the most widely known pelvic floor exercise. It consists of an isometric contraction of the pelvic floor muscles.

To do a Kegel exercise, these steps were followed:

- She was asked start by holding her pelvic floor muscles in for 5 seconds. It is important to keeping breathing during this contraction.
- •After holding for 5 seconds, slowly and completely relax your muscles for 5 seconds.
- •Repeat this process 10 times, at least 3 times every day.

The pelvic floor muscles may get fatigued during this exercise. If this happens, stop and do the exercise at a later time. Don't recruit the abdominal, adductors or buttock muscles when doing this exercise.

Exercises can be progressed by increasing the time you hold and rest your pelvic floor muscles. Start with 5 seconds, and slowly build up the time each week until she holded in and resting for 10 seconds.

Reverse Kegel:

Fatigued pelvic floor muscles and imbalanced intra-abdominal pressures can lead to hypertonic pelvic floor muscles.

The Reverse Kegel is a technique to mindfully relax pelvic floor muscles. The patient focuses their mental attention to the pelvic floor muscles and then voluntarily tries to relax them. The feeling of dropping the pelvic floor is similar to the moment of relief when you have reached the bathroom; when you urinate or have a bowel movement, you first drop your pelvic floor, and let the pelvic floor muscles (PFM) go.

To perform a Reverse Kegel, these steps were followed:

- She was asked start by gently contracting the pelvic floor to feel what tightening the muscles feels like.
- Relax, and release the tension to feel the difference between tension and relaxation.
- Then, try to visualize that the muscles between the pubic bone and tailbone lengthen by gently moving the pubic bone towards the ceiling (As if she was lying on her back), and gently move her tailbone towards the surface she was lying on. Asked to Imagine that the pelvic floor muscles are getting longer as this happens creating more space in her pelvic floor.
- During the above action, be sure to breath normally. When she performed a Reverse Kegel, the physiotherapist made her sure that shekeepher pelvis and spine still. These performed in sitting and standing as well.

Activation of the transversus abdominis(TrA)

Transverse abdominis activation can be progressed based on body position, increasing hold times, and increasing sets. Activation can first begin in low-load body positions, including supine, quadruped, sitting, or standing.

Contract–Relax: she was asked tighten the pelvic floor as if attempting to stop urine flow or hold back gas. Hold for 3 to 5 seconds and relax for at least the same length of time. Repeated up to 10 times.

Quick Contractions: she was asked to perform quick, repeated contractions of the pelvic floor muscles while maintaining a normal breathing rate and keeping accessory muscles relaxed. Tried for 15 to 20 repetitions per set.

“Elevator” Exercise: she was asked to imagine riding in an elevator. As it goes up from one floor to the next contracts the pelvic floor muscles a little more. As strength and awareness improve, add more “floors” to the sequence of the contraction. Another way to increase difficulty is to relax the muscles gradually, as if the elevator were descending one floor at a time. This component requires an eccentric contraction and is very challenging.

Home exercise program: Patient was advised to complete one set (long squeezes and short squeezes) of pelvic floor exercises whenever she feeded her baby. At six months post-delivery, aim to continue her pelvic floor exercises at a maintenance level of one set daily in the morning and evening. Work in a comfortable position and try different positions (lying, sitting and standing).

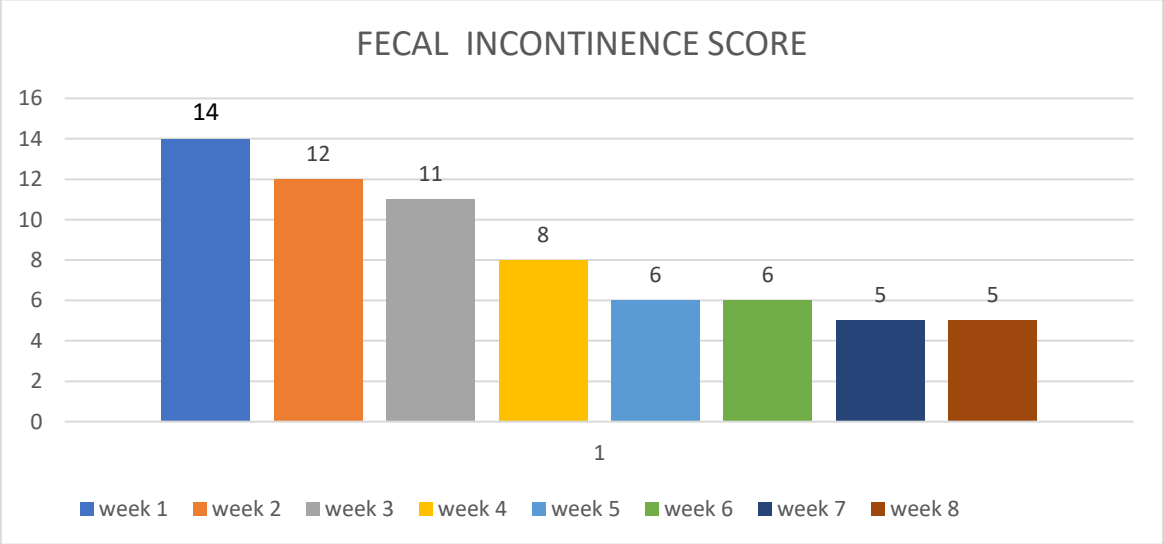
When she attended the further sessions, the hold time and number of sets gradually increased from one set of 10 repetitions on first session to 3 sets of 10 repetition on her last session.

STATISTICS:

The below statistical values shows the statiscal values of weekly post session 1 to post session 12

FECAL INCONTINENCE Score according to vaizy

FIS	week 1	week 2	week 3	week 4	week 5	week 6	week 7	week 8
Solid stool	0	0	2	1	2	3	3	4
Liquid stool	4	4	2	3	1	1	1	0
Gas	4	3	3	3	2	2	1	1
Alteration in lifestyle	4	3	2	1	1	0	0	0
Never need to wear a pad or plug	2	2	2	2	0	0	0	0
Taking constipating medication	0	0	0	0	0	0	0	0
Lack of ability to infer defecation for 15 minutes	0	0	0	0	0	0	0	0
Total score	14	12	11	8	6	6	5	5
Minimum score=0(perfect continence)								
Maximum score=24 (totally incontinent)								



The statistical analysis in this was done using SPSS ver.16.0. The general characteristics of the participant were expected in terms of mean and standard deviation by using descriptive analysis. To compare the Pre and Post session results, paired t-Test was performed. This statistical significance level was set at equal to or less than (p value- 0.05) for both measures.

Results:

There was significant difference between the pre and post session. There was clinical and statistical significance difference exists weekly post session.

The p value of each outcome measure was less than 0.05.

Conclusion:

This study concluded that, when analyzed before and after the treatment, PFMT exercises had shown statistical significant effects on FIS, improvement in functional ability in patient with FI.

Bowel education and retraining and PFMT exercises found to be clinically and statistically more effective with greater percent of improvement, further on comparison we found that there is statistical significance difference and better improvement of outcome measures from session 1 to session 12.

In conclusion, the present study provides evidence to support the use of physical therapy regimen in the form of adding Bowel education and retraining and PFMT strengthening exercises for the better improvement in functional ability.

Clinical Implications:

The non-surgical treatment used for FI is somewhat different from the standardized Rehabilitation treatment we designed.

The current research plan adopts a combination of various exercises which is more convenient to master, apply and promote. Our research provides simple and effective standardized method to effectively treat patients with FI.

There was statistical and clinical difference found before and after the physiotherapy sessions.

In fact, the analysis of the study showed that the quality of life o f postpartum was obviously improved after early treatment of standardized rehabilitation. The FIS scale was used as self reported health measurement tool.

Early treatment and lifestyle management is the key to improve the symptoms of the patients.

This is also essential for improving the quality of life of postpartum women as presented in the study.

Concurrently, our study may also help other medical staff and rehabilitation physical therapists engaged in postpartum rehabilitation in other clinical hospitals alleviate FI symptoms and improve quality of life of patients.

Previously, surgery has been considered on effective treatment for FI while depending on the understanding of FI, non-surgical treatment and early active intervention methods are another effective way to treat FI.

We hope to promote this standardized rehabilitation treatment to obtain further improvements and enhancements.

REFERENCES:

1. Ming Yan Pun,Pak Ho Leung,Tsz Ching Chan,ChunnPang,KinHei Chen &Priya Kannan.The Effectiveness of physiotherapy interventions on Fecal Incontinence and quality of life following colorectal surgery: a systematic review and meta –analysis of randomized controlled trials. Supportive Care in cancer(2024)32:103
2. Eloise Dexter, Josephine Walshaw,Hannah Wynn, SafaaDimashki,AlexLeo,Ian Lindsey and Marina Yiasemidou.Faecal Incontinence-a comprehensive review.Frontiers in surgery,2024
3. Yohei Okawa, Effectiveness of Pelvic Floor Muscle Training for Treating Faecal Incontinence, Gastrointest. Disord.2024,6,774-783
4. Sabine Vesting, AnnelieGutke, Monika FagevikOslen,GunRembeck,Maria E H Larsson,Impact of Exercising on pelvic symptom severity,pelvic floor muscle strength and Diastasis Recti Abdominis after pregnancy: A Longitudinal Prospective Cohort Study, Physical Therapy,Volume 104,Issue 4,April 2024 pzad171.
5. Kisner C, Colby L, Borstad J. eds. Principles of Exercise for the Obstetric Patient Therapeutic Exercise: Foundations and Techniques, 7e. McGraw Hill; 2018. Accessed August 01, 2023.

6. Mayanna Machado Freitas, Lara Elma Franco Moura, Denise Saquetto Lane Castro Rodrigues,ValeriaConceicaoPassos de Carvalho, Silvana Maria Macedo Uchoa, Physiotherapeutic Approaches to treat Anal Incontinence in women after obstetric Trauma, J Coloprotocal 2022;42(1):77-84
7. Shefali M. Christopher, Alessandra N. Garcia, Suzanne J. Snodgrass and Chad cook, Common musculoskeletal impairments in postpartum runners: an international Delphi study,Christopher et.al. Archives of physiotherapy (2020) 10:19
8. David Baud,Joannasichitiu, Valeria LombardiMaud De Rham, Sylvain Meyer,Yvan vial & ChahinAchtani,Comparison of pelvic floor dysfunction 6 years after uncomplicated vaginal versus elective cesarean deliveries: a cross-sectional study. ScentificReports.Dec 2020
9. Agnieszka Irena Mazur-Bialy,DariaKolomanska-Bogucka,MarcinOplawski,Sabine Tim. Physiotherapy for prevention and treatment of Feacal Incontinence in women- systematic review of methods, Journal of clinical medicine.2020 Oct 12;9(10):3255
10. Musa M.K., Saga S., Biekken L.E., Harris R., Goodman C., Norton C. The Prevalence, Incidence, and Correlates of Fecal IncontinenceAmong Older People Residing in Care Homes: A Systematic Review. J. Am. Med. Dir. Assoc. 2019;20:956–962. doi: 10.1016/j.jamda.2019.03.033
11. Shannon L. Wallace, Lucia D. Miller, and Kavita Mishra, Pelvic floor physiotherapy in the treatment of pelvic floor dysfunction in women, CurrOpinObstetGynecol 2019;31:000-000
12. Ahmen Hussein Subki,MagedMazen Fakeeh, Muhab Mohammed Hindi,Ali Mohammed Nasr,AdelDakhelAmaymuni,Hassan S Abdul jabbar. Fecal and Urinary Incontinence Associated with pregnancy and childbirth. Mater sociomed.2019 sep;31(3):202-206
13. Wallace SL, Miller LD, Mishra K. Pelvic floor physical therapy in the treatment of pelvic floor dysfunction in women. CurrOpinObstet Gynecol. 2019 Dec;31(6):485-493. doi: 10.1097/GCO.0000000000000584
14. Berit Schei,HegeHolmo Johannessen, Astrid Rydning,AbdulSultan,SivMorkved.Anal Incontinence after vaginal delivery or cesarean section.Actaobstretrician et GynecologicaScandinavica/volume 98, Issue 1/p 51-60.2018
15. Stephanie J Woodley,RhianonBoyle,June D cody, Siv morkved, E Jean C Hay-Smith.Pelvic Floor Muscle Training for prevention and treatment of urinary and faecal incontinence & antenatal and postnatal women.National Library of medicine 2017
16. Freeman A., Menees S. Fecal Incontinence and Pelvic Floor Dysfunction in Women. Gastroenterol. Clin. N. Am. 2016;45:217–237. doi: 10.1016/j.gtc.2016.02.002
17. Rodolfo Rodriguez,RafaelAlos,M.soledadcarceller, Amparo Solana, Andres Frangi, M. Dolores Ruiz, Roberto Lozoya. Postpartum Incontinence, Narrative Review. CIRUGIA ESPANOLA,2015;93(6):359-367
18. Miller JM, Low LK, Zielinski R, Smith AR, DeLancey JOL, Brandon C. Evaluating maternal recovery from labor and delivery: bone and levator ani injuries. Am J Obstet Gynecol. 2015;213:188.e1–188.e11.
19. Marie-Andree Harvey,Marianne Pierce, Obstetrical Anal Sphincter Injuries (OASIS): Prevention, Recognition, and Repair, J ObstetGynaecol Can 2015;37(12):1131-1148
20. Rodolfo Rodriguez, Rafael Alos, M. Soledad Carceller, Amparo Solana, Andres Frangi, M.Dolores Ruiz, Roberto Lozoya, Postpartum Incontinence. Narrative Review. Vol.93.Issue 6. Pages 359-367 (June-July 2015), ELSEVIER

21. Kelly M. Scott, Pelvic Floor Rehabilitation in the treatment of Fecal Incontinence, Clin Colo Rectal Surg 2014;27:99-105.
22. SeyedehSanamLadiSeyedian, Lida Sharifi- Rad, Maryam Ebadi, Abdol-Mohammed Kajbafzadeh. Combined functional pelvic floor muscle exercises with Swiss Ball and urotherapy for management of dysfunctional voiding in children: a randomized clinical trial. Eur J Pediatr.2014 Oct.
23. Stedenfeldt M, Pirhonen J, Blix E, Wilsgaard T, VonenB,Øian P. Episiotomy characteristics and risks for obstetricanal sphincter injuries: a case-control study. BJOG. 2012;119:724–30
24. Esther Bols, Erik JM Hendriks, LCM Berghmans, CGMI Baeten, Responsiveness and Interpretability of incontinence severity scores and FIQL in patients with fecal incontinence: A secondary analysis from a randomized controlled trial. International Urogynecology Journal 21(3), July 2012.
25. Assis LC, Dias A, Barbosa AMP, Santini ACM, Sousa VO, Vianna LS, Contribution of early intensive prolonged pelvic floor exercises. American Journal of Epidemiology 2011;173(Suppl 11): S196.
26. Nelson RL, Furner SE, Westercamp M, Farquhar C. Cesareandelivery for the prevention of anal incontinence. CochraneDatabase Syst Rev.2010;CD006756
27. Pretlove SJ, Thompson PJ, Toozs-Hobson PM, Radley S,Khan KS. Does the mode of delivery predispose womento anal incontinence in the first year postpartum?A comparative systematic review. BJOG. 2008;115:421–34.
28. Murphy DJ, Macleod M, Bahl R, Goyder K, HowarthL,Strachan B. A randomised controlled trial of routine versusrestrictive use of episiotomy at operative vaginal delivery:amulticentre pilot study. BJOG. 2008;115:1695–702
29. Esther MJ Bols, Bary CM Berghmans, Erik JM Hendriks Rob A de Bie, JarnoMelenhorst,Wim G Van Gemert& Cor GMI Baeten. A Randomized Physiotherapy Trial in patients with Fecal Incontinence: design of the physioFIT-study.BMC public Health 7, Article nymber:355(2007)
30. Mantle J, Haslam J, Barton S, Polden M. Physiotherapy in obstetrics and gynaecology. Butterworth-Heinemann,; 2004.
31. Marie-Andree Harvey, Pelvic floor exercises during and after pregnancy: a systematic review of their role in preventing pelvic floor dysfunction. J ObstetGynaecol Can. 2003Jun
32. Abdul H Sultan, Clinical Focus: Obstetric perineal injury and Fecal Incontinence after Child Birth, Editorial: Obstetrical Perinal injury and Anal Incontinence, CLINICAL RISK (1995)5,193-196
33. Polden, M. and Mantle, J., 1990. Physiotherapy in obstetrics and gynaecology. Elsevier Health Sciences
34. BA, SRN, MTD Jennifer sleep, AM Adrian Grant, Pelvic floor exercises in postnatal care,Midwifery,Volume 3, Issue 4, December 1987, Pages 158-164.
35. 35.Melodie Mathe, Guy Valancogne, Anthony ATALLAH, Clementine Sciard, Early Pelvic floor muscle training after obstetrical anal sphincter injuries for the reduction of anal incontinence, European Journal of Obstetrics & Gynecology and Reproductive Biology. 1799(4):201-206
36. Berit Schei,HegeHolmo Johannessen, Astrid Rydning, Abdul Sultan, Siv Morkved,Anal incontinence after vaginal delivery or cesarean section, Acta Obstetricia et GynecologicaScandinavica/ Volume 98, Issue 1 /p.51-60.
37. https://pelvichealthsolutions.ca/for-the-patient/what-is-pelvic-floor-muscle-tightness/reverse-kegels/

38. Kegels Exercises for Women - Complete BEGINNERS Guide.Availablefrom:https://www.youtube.com/watch?Wjb20SXIvA4
39. 39.https://revistamexicanadeurologia.org.mx/index.php/rmu/article/view/144/1066
40. https://obgyn.onlinelibrary.wiley.com/doi/10.1111/aogs.13463