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# EFFECT OF KEGEL EXERCISE ON WOUND HEALING INDEX AFTER COLORECTAL SURGERY

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**Abstract**

The most important complications after colorectal surgery is delayed wound healing which use of nonpharmacologic methods to reduce the complications has been considered by researchers. This study was conducted aiming at study on effect of Pelvic-floor muscle (PFM) exercises on Wound Healing Index after colorectal surgery.Materials and methods: this study is a randomized clinical trial; the statistical population under study consisted of all the women patients suffered from benign colorectal diseases referred to Shahid Rajaee Hospital (Gachsaran) and hospital Yasuj Shahid Beheshti. 96 patients were selected via Non-probability sampling, then were considered in two experimental and control groups in random allocation way. The patients in the intervention group before surgery were trained with pelvic floor muscle exercises. Wound healing data at 3, 7 and 14 days after surgery were collected using REEDA Wound Healing Scale. The collected data were analyze via software SPSS-version 22 using descriptive statistics and inferential tests (T-test, chi-square, Fisher, Kolmogorov-Smirnov, Mann-Whitney) and considering the confidence interval (95%).findings of study indicated that mean of overall score of wound healing in test group at 3, 7 and 14 days after surgery has been 5.2±2.5, 1.7±2.6, 0.2±1.3 which a significant difference was not observed between two groups($p>0.05$).with regard to the findings of the present research, Pelvic-floor muscle (PFM) exercise has no effect on wound healing indices after colorectal surgery, thus it requires conducting further research in this context.

**Key words: *Kegel* exercise, wound healing, *colorectal surgery*, *infection***

## INTRODUCTION

Anorectal disorders refer to common diseases that millions of people around the world experience one of its kinds in a lifetime. These disorders include both internal and external hemorrhoids, anal fistula, rectal prolapse, anal fissure, etc.[1]The causes of these disorders can be pointed to factors such as dietary habits. Meat and dairy foods with high fat, low fiber and lack of vegetables which increases the period of digestion and constipation in people include the aforementioned cause.[2] Further machine and sedentary life today, long-term sitting on the toilet, long constipation and excessive straining, inflammatory bowel disease, pelvic floor muscle disorders, multiple births and sphincter damage, colon cancer and neurological or mental disorders are the contributed factors.[3] So far, the exact number of benign diseases of the colon and rectum has not been published in Iran, although the results of different studies have published the statistics in different areas of the city. With regard to the results from a study in US, hemorrhoid disease prevalence has been between 4.4-86 percent, and anal fissure has been 1/1 per 1,000 people per year and 235,000 new cases of anal fissure is reported annually.[4] Further, rectal prolapse has been estimated 5.2 per 100,000 people

and anal fistula prevalence has been estimated 8.6-10 percent per 100,000 people per year which ratio of man to women is 8 to 1.[5,6] Due to the prevalence of colorectal diseases, surgical procedures is on the rise. One of the important aspects of nursing care after surgery is wound healing. Postoperative infection has been as the major complications that need to be considered by the medical staff. In a study by Konishi and colleagues (2006), in 556 colorectal surgery, the incidence of infection in the colon and rectum has been reported 9.4% 18.0% .[7] Kegel exercise refers to one non-drug treatment that may affect wound healing and prevention from recurrence of disease with effect on pelvic floor muscle strength and tone.[8] Pelvic floor muscle exercise which is called Kegel exercise is the most popular way to strengthen non-invasive treatment and the pelvic floor muscles and is first described in 1948 by Arnold Kegel. This exercise includes repeated isometric pelvic floor muscle exercises in the maximum pressure and the contraction of certain muscles of the pelvic floor that are responsible for control urine flow.[9]These exercises affect strengthening the sex organs, urinary tract, bladder and anal have the benefits such as increased blood flow in the genital area, increased power of ejaculation control, reduced involuntary passing of urine when sneezing and laughing.[10] By searching various sources, a study on effect of pelvic floor muscle exercise on wound healing indices was not found and most of the studies have been in the field of kegel exercise on stress urinary incontinence, sexual dysfunction after prostatectomy or after childbirth and pelvic floor problems related to organ prolapse.[11,12] With regard to what mentioned above, the present research was conducted aiming at examining effect of Pelvic floor muscle exercise on markers of wound healing after colorectal surgery.

***PROCEDURE***

This study was conducted a Single-blind randomized clinical trial. The samples in the present research consist of 96 women patients suffered from one of colorectal diseases including hemorrhoids, anal fissure, anal fistula, Anal abscesses including perirectal abscess and perianal abscess, who were undergo Colorectal Surgery in surgery ward at Shahid Beheshti hospital- Yasouj and surgery ward at Besat and Shahid Rajai hospitals- Gachsaran in Kohgiluyeh and Boyer-Ahmad Province in 2016. All qualified patients have been selected consecutively for sampling and then the patients were divided randomly into two groups. The study inclusion criteria include the factors such as informed desire to participate in the study, no history of inflammatory disease and cancer, ability to read and write, no history of drug addiction, lack of well-known mental disorder, lack of use of immunosuppressive drugs. Further, if the patient does not continue cooperation at every step of the intervention or diagnosis of inflammatory diseases and cancer have been observed during treatment or the patient's general condition was worsen and required hospitalization, he was excluded from the study. Allocation of groups was made via blocking; by considering confidence level(95%), Power of Test(80%), minimum significant difference in mean of scores of outcome variable(0.8 score), the sample group was consisted of 48 persons in intervention group and 48 persons in control group. Data collection instruments include demographic data questionnaire and wound edges (REEDA) scale for assessment of wound healing. Demographic data questionnaire (age, education level, marital status, employment status, disease diagnosis, body mass index, history of surgery) and REEDA wound healing scale includes five factors (redness, swelling, bruising, secretion, the distance between the two edges of the wound), a score between 0 to 3 were considered for each variable. Total scores close to 0 indicate better wound healing and total scores close to 15 indicate more wound trauma. In both groups, wound healing scale on days 3, 7, 14 after surgery by the researcher was used to examine the wound at surgery area. Further, in the intervention group, self-reporting checklist of pelvic floor muscle exercises after days of surgery was used. To collect information, the researcher referred to the research units after getting permission from the University officials and the ethics committee and they were explained about goals and how to conduct the research and the written consent form was received from them after satisfying them. Further, emphasis was put on confidentiality of information and the possibility to access to the results and they were asked to fill the questionnaires. The patients were explained about anatomy of the pelvis and how to identify pelvic muscles before surgery. In addition, the patients were trained to stop the flow of urine when they urinate and do not repeat this more than two or three times and in this way diagnose the considered muscles. How to do Kegel exercises are reviewed and practiced with patients and they were advised to do 10 contractions in lying, sitting and standing twice a day. Further, samples also were trained to contract the pelvic floor muscles for 5 to 10 seconds and then relax them for 10 seconds so as to reach the contractions to 60-100 and this has to be continued till 14 days in the day. The collected data were analyzed via software SPSS-version 22 via descriptive and inferential statistics including t-test, chi-square, fisher, kolmogorov smirnov test, Mann–Whitney.

# RESULTS

In this clinical trial, 96 patients undergoing colorectal surgery in both groups (48 intervention and 48 control) were studied. Average age of samples has been 38.3± 10.3 years (range of 60-20 years) and significant difference was not observed in the average age of both groups. In terms of education, the highest percentage of intervention group (37.5%) and most of the control group (33.3%) had education at the secondary level and significant difference on education was not observed between the intervention and control groups. In terms of job, most of the samples (64.6%) were housewives. On body mass index, mean has been 25.8±3.7 and 25.9±3.8 in intervention and control groups, which a significant difference was not observed between two groups. Other information on samples including total information on demographic, history of surgery, BMI, and disease diagnosis has been presented in table 1. Further, mean of total score for wound healing at 3 days after surgery in intervention and control groups equaled to 5.2±2.5 and 6.3±2.6 which no significant difference was observed between two groups(p=0.05). mean of total score for wound healing at 7 days after surgery in intervention and control groups equaled to 1.7±2.6 and 2.8±3.2 which no significant difference was observed between two groups(p=0.05). mean of total score for wound healing at 14 days after surgery in intervention and control groups equaled to 0.2±1.3 and 0.4±1.8 which no significant difference was observed between two groups(p=0.05). mean and mean of rank of wound healing indices(Redness, swelling, bruising, secretion, the distance between the two edges of the wound) at 3, 7 and 14 days after surgery have been presented in table 2, indicated that there is no significant difference between two groups at these times.

**Table 1**
***statistical indices of research variables before inclusion to study***

| Statistical index | | Test group | Control group | p-value |
|---|---|---|---|---|
| mean±sd age | | 36±9/7 | 40/4±10/3 | 0/05 |
| Education level | Elementary | 18/8 | 14/6 | 0/4 |
| | Secondary | 18/8 | 33/3 | |
| | High school and diploma | 37/5 | 33/3 | |
| | Bachelor and above | 25 | 18/8 | |
| Job | housewife | 60/4 | 68/8 | 0/6 |
| | Staff | 16/7 | 12/5 | |
| | Etc | 22/9 | 18/8 | |
| History of surgery | Yes | 14/3 | 9/5 | 0/3 |
| | No | 61/9 | 52/4 | |
| Marital status | Single | 37/5 | 37/5 | 0/5 |
| | Married | 62/5 | 62/5 | |
| Disease diagnosis | Hemorrhoids | 29/2 | 37/5 | 0/5 |
| | Anal fissure | 43/8 | 39/6 | |
| | Rectal prolapse | 22/9 | 14/6 | |
| | Perianal abscess and fistula | 4/2 | 8/2 | |
| Body mass index mean±sd | | 25/8±3/7 | 25/9±3/8 | 0/8 |

**Table 2**

***Inter-group comparison of parameters of wound healing indices in two test and control groups at three various times after surgery***

| Parameters | Time | Test group | | Control group | | Difference of mean | Test | |
|---|---|---|---|---|---|---|---|---|
| | | Mean±standard deviation | Mean of rank | Mean±standard deviation | Mean of rank | | Statics | p-value |
| Redness | 3 days after surgery | 1/5±0/71 | 43/98 | 1/8±0/79 | 53/02 | 0/3 | 3/1 | 0/08 |
| | 7 days after surgery | 0/4±0/61 | 42/5 | 0/8±0/84 | 54/50 | 0/4 | 5/6 | 0/05 |
| | 14 days after surgery | 0/04±0/2 | 47/98 | /08±0/340 | 49/02 | 0/04 | 0/3 | 0/1 |
| swelling | 3 days after surgery | 1/2±0/81 | 45/35 | 1/4±0/83 | 51/65 | 0/2 | 1/5 | 0/3 |
| | 7 days after surgery | 0/4±0/6 | 45/97 | 0/5±0/71 | 51/03 | 0/1 | 1/2 | 0/3 |
| | 14 days after surgery | 0/04±0/2 | 47/98 | /08±0/340 | 49/02 | 0/04 | 0/3 | 0/7 |
| bruising | 3 days after surgery | 0/5±0/71 | 46/46 | 0/6±0/72 | 50/54 | 0/1 | 0/7 | 0/5 |
| | 7 days after surgery | 0/1±0/46 | 46/95 | 0/3±0/77 | 50/05 | 0/2 | 0/9 | 0/4 |
| | 14 days after surgery | 0/04±0/2 | 47/98 | /08±0/340 | 49/02 | 0/04 | 0/3 | 0/7 |
| secretion | 3 days after surgery | 1/7±0/47 | 43/83 | 1/9±0/46 | 53/17 | 0/2 | 4/8 | 0/08 |
| | 7 days after surgery | 0/6±0/73 | 4/22 | 0/9±0/72 | 55/78 | 0/3 | 8/4 | 0/07 |
| | 14 days after surgery | 0/1±0/4 | 47/04 | 0/2±0/51 | 49/96 | 0/1 | 1/3 | 0/3 |
| the distance between the two edges of the wound | 3 days after surgery | 0/4±0/53 | 42/44 | 0/6±0/55 | 54/56 | 0/2 | 5/9 | 0/015 |
| | 7 days after surgery | 0/1±0/42 | 47/51 | 0/2±0/51 | 49/49 | 0/1 | 0/6 | 0/5 |
| | 14 days after surgery | /04±0/200 | 48/00 | /06±0/240 | 49/00 | 0/02 | 0/3 | 0/7 |
| Total score of wound healing | 3 days after surgery | 5/2±2/5 | 42/14 | 6/3±2/6 | 54/86 | 1/1 | 5/2 | 0/05 |
| | 7 days after surgery | 1/7±2/6 | 40/8 | 2/8±3/2 | 56/20 | 1/1 | 7/7 | 0/05 |
| | 14 days after surgery | 0/2±1/3 | 47/5 | 0/4±1/8 | 49/50 | 0/2 | 0/8 | 0/5 |

# DISCUSSION

Findings of research indicated that Pelvic-floor muscle exercise had not effect on wound healing indices(Redness, swelling, bruising, secretion, the distance between the two edges of the wound) at 3, 7 and 14 days after colorectal surgery. With research on various sources, a study consistent with the present research on effect of Pelvic-floor muscle exercise on wound healing after colorectal surgery was not obtained. Most of studies in which Pelvic-floor muscle exercise has been used are used to treat and solve orthopedic, neuromuscular, plastic surgery, rehabilitation and restorative problems.[13] Further this exercise has been used in vaginal, urinary tract and rectal incontinence surgeries and the results from research have indicated that post surgery can help to improve texture, tone and function of the muscles of the perineum[14]. In study by oladokun et al.(2000), effect of seat warm bath by adding salt to water in the episiotomy wound healing in women was examined and the results indicated that wound healing has not been significant, but the infection rate has been more in the control group.[15] The results of single blind randomized clinical trial by Mobaraki and colleagues (2014) who have examined the effect of Kegel exercises to reduce perineal pain after episiotomy in nulliparous women, have indicated that pain, the average consumption of oral analgesics and the average number of drug consumption in the experimental group was significantly lower compared with the control group($p>0.05$).[16]Further, in the study by Lafoy & Geden (1989) who the effect of warm and cold baths to reduce pain, swelling and hematoma in patients after episiotomy, findings showed reduced pain and hematoma but no significant difference was observed between the two groups. Further reduced perineal edema was observed when using seat cold bath, which vasoconstriction and decreased local blood circulation as physiological mechanism are likely to reduce perineal edema.[17] However, the study was designed with the idea that kegel exercise can improve blood circulation and this led to increase in tissue nutrition, resulted in faster wound healing due to surgery. The possible reasons for the lack of impact of this intervention can be lack of enough time before surgery to train patients. Since access to samples was possible only the night before surgery, at this little time the possibility for power and tone affecting tissue perfusion and healing has not existed and on the other hand the impossibility of the researcher's involvement to control the exercise by the patient after discharge may had influenced the results of intervention. Thus, it is suggested to train this exercise as a prevention method to people and aforementioned factors are considered in next studies.

# CONCLUSION

With regard to the findings from this research, there is no significant difference between test and control groups, i.e. intervention of pelvic floor muscles exercise has had no effect on wound healing indices (redness, swelling, bruising, secretion, the distance between the two edges of the wound) in women after colorectal surgery, thus the nurses can recommend use of this exercise for other disorders at genital and urinary tract area.

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