

# A Case Study on the Exercise Participation Process of Pilates Participants: Focused on Reformers

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## Abstract

**Purpose:** The purpose of this study is to understand the participation process and their value and of participants who participated in Reformer Pilates.

**Method:** For this purpose, 10 Person who attended Reformer Pilates at Deajeon were selected as study participants based on Purposeful Sampling. The results of data analysis according to the method suggested by Stake(2005) by collecting data through in-depth interviews, observations and note are as follows.

**Results:** First 'Meet the Reformer', including 'Clumsy Reformer movement' and 'confusion Period' were derived. Second the aspects of 'Proficient of Instrument operation' including 'Unity of Reformer and I' and 'adaptation Period' were revealed. Last 'Level-up with the help of Reformer' and 'fall in Reformer movements' including 'dependence period' were confirmed.

**Conclusion:** This result of this study will be a good reference for the Pilates workout to promote their positive interest in Pilates Studio and to develop effective systems and programs that will contribute to the development of Pilates workout.

**Keywords:** Pilates, Reformer, Exercise, Participation Process, Case Study.

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## INTRODUCTION

### 1. Necessity and purpose of research

Recently, many celebrities have been envious of their solid bodies through broadcasts and Instagram. Female celebrities such as Son Ye-jin, Jenny, and Clara, as well as male celebrities and athletes such as Bang Sung-hoon, Kang Ji-hoon, and Kim Tae-kyun, have become known as effective exercises such as diet, posture correction, and core strengthening through Pilates exercise. Pilates creates a balanced body by integrating the mind with a healthy body and leads the body harmoniously and beautifully to face a healthy life (Seo Soo-jin, 2018; Choi Mi-young, 2020). It is also excellent for correcting body shape by improving muscle strength around core stability (Pilates & Miller, 1945). In addition, repeated exercise of strong muscle contraction is known to have various effects such as improved static and dynamic balance, lumbar pain relief, physical flexibility, core strengthening, and spinal muscles stabilization (Kim Hyo-jin, Kim Ji-yeon, Kim Chang-sun 2021; Lee Hyun-jung, Hong Mi-sung, 2018; Geweniger, 2002; Herrington & Davies, 2005). Pilates exercise is

divided into mat pilates on a mat and instrument pilates that can perform full-body muscle exercises using the resistance of the instrument (Anderson & Spector, 2005). Although the number of participants of instrument pilates is limited compared to mat pilates using Cadillac, Springboard, Reformer, Chair, Ladder Barrel, etc., in the case of instrument pilates, there is a difference in effect with mat pilates because they perform exercises that counteract various resistance. Among them, Reformer, which is the most widely distributed to the public, is a bed-shaped device that can push and pull springs and straps using hands and feet, and is known to correct posture faster than mat pilates because it can make inner muscles as well as high-density muscles. In addition, it has the advantage of having a greater sense of accomplishment than mat Pilates by holding the body in a more stable state as it can support the body in a reformer mechanism. In particular, even if flexibility, muscle strength, and balance are insufficient, it is argued that the reformer mechanism exercise is very effective (Kang Jung-kyung, Park Jin-hee, 2015; Ahn Sang-kyun, Seo Young-hwan, 2021; Han Mi-jin, 2021). However, most of the studies on reamer mechanism exercise are in the field of

exercise physiology such as body composition and health fitness (Kang Jung-kyung, 2016; Ahn Sang-kyun, Seo Young-hwan, 2021), muscle function and muscle mass analysis (Kang Jung-kyung, Park Jin-hee, 2015; Kim Hyo-yeon, Kim Chang-sun, 2021), and many studies are lacking in social psychology (Han Mi-jin, Kim Bo-min, 2010).

In particular, when Instrumentpilates is widely known through celebrities and media outlets, the demand for Instrumentpilates movement in Korea has increased, raising concerns about the safety of Instrumentpilates participants. At this point in time, there is a need for research to pay more attention to the process of participating in the exercise participation of participants in Instrument Pilates movement. Therefore, the purpose of this study is to discover its meaning and value by examining the participation process of Pilates participants in the reformer instrument. Therefore, this study aims to provide useful data on programs and teaching methods that increase positive interest in participating in Instrumentpilates and strengthen the safe and developmental measures of Instrumentpilates movement.

## RESEARCH METHODS

### 1. Research participants

A total of 10 participants in this study were selected by intentional sampling, including 8 participants with more than 1 year of participation experience and 2 Pilates leaders with more than 5 years of Pilates guidance experience at Daejeon Y Pilates Studio. Since they have participation experience with this researcher, they can form rapport with participants and leaders they have known, enabling open communication and active observation.

### 2. Data collection and analysis

#### 1) Data collection

This study was conducted to understand the empirical meaning and value through the example of the participation process of participants in Instrument Pilates. Data collection was collected from September to November 2021, including in-depth interviews, participatory observation, and notes (Morgan, 1998). In-depth interviews were divided into two groups and conducted twice each in an empty class space or study cafe at the academy. Based on the ARCS Motivation Strategy Component (Keller, 1983), the interview was applied with a revised and supplemented semi-structured question to suit the environment and situation of participation in Instrument Pilates. The question was asked in context and timing (Schreiber & Noager, 2001) what environment and situation did you focus on when participating in Instrument pilates, what environment and situation did you connect to increase confidence and satisfaction, and what your own strategy and method. Participatory observation (Dobert, 1982) naturally observed

studyparticipants from October to November when the Instrument pilates class was conducted, and observed and recorded the language and behavior of the study participants in class.

Table 1. Characteristics of study participants

participant	name	Age	Participation experience	Gender
Instrument Pilates Participants	A	43	1 year and a half	woman
	B	35	1 year 9 months	woman
	C	23	1 year 8 months	woman
	D	24	2 years 6 months	woman
	E	27	2 years 4 months	woman
	F	33	2 years 6 months	woman
	G	36	3 years 4 months	woman
	H	32	1 year 3 months	Man
Pilates instructor	I	34	5 years 8 months	woman
	J	46	8 years 6 months	woman

#### 2) Data analysis

The data analysis of this study was performed by applying the research method of Stake (2005), and the data collection and analysis were continuous and repeated several times at the same time. The collected data of in-depth interviews, participatory observations, and notes were repeatedly worked to extract the meaning of the data as coding was carried out through text work that went through the transcription process. The coding obtained in step 1 was intended to integrate the categories again, and the central aspects that seemed timely were compared and analyzed, and the process of re-analysis was performed. The timing classification was divided into confusion, adaptation, and dependence by analyzing the experience process of participating in instrumental pilates by experts and researchers, and the participants were checked for the phenomena that appeared during this period.

#### 3) The integrity and ethics of the data

Data from in-depth interviews, participation observations, and notes were confirmed to study participants, and a triangulation was conducted using two or more methods

(Guca& Lincoln, 1985), including one doctor of sports education and two doctors of sports sociology. The ethics of the study began recording interviews with explanations on the purpose of the study and the use of the research results after obtaining consent from the study participants, and also explained that the study participants could stop or reject the interview. In order to protect personal information and interview content, the names of the participants were written in alphabetical letters.

## RESULTS AND DISCUSSIONS

### Confusion period: Movement with unfamiliar instruments

#### 1) Meeting the Reformer

Reformer is a bed-shaped instrument that can be pushed and pulled using hands and feet such as springs, straps, and carriage, and is known to correct posture faster than mat Pilates because it can make inner muscles as well as high-density muscles. In particular, unlike mat pilates, it complements the balance of the body's left and right balance and pelvis distortion, and has the advantage of individual effect by adjusting spring strength according to individual flexibility or muscle strength (Kim Bo-min, 2010; Anderson & Spector, 2005).

When I first saw the reformers that I only saw on TV, it was fascinating, but how can I work out with that? That's what I thought. If someone helped me, I wouldn't know(Research participant G).

For about a month, I was flustered with the name and manipulation of the reformer. "Please lower the foot bar angle by 15 degrees" I didn't know what a foot bar was or a carriage was (Research participant E).

I wasn't good at hanging the reformer spring. I had to pull the spring halfway, pull it, hang it, and pull it, but if I was whining because I didn't know it, the person next to me would help me or the instructor would do it(Research participant A).

As described above, when participating in reformer pilates, this study participants first encountered the reformer mechanism and experienced unfamiliarity and confusion about the structure and name of the reformer or how to use it. The Reformer instrument consists of a spring that adjusts the intensity of movement in the form of a bed, a footbar that raises or holds hands according to movement, a carriage called a main plate, a shoulder rest that supports the shoulder, a headrest that holds the head, a hand strap, and a leg strap. Knowing the various structures and names of these reformer instruments and using the instrument can be interpreted as some confusion in how to use the instrument Pilates before encountering the advantages of participating in the reformer exercise.

#### 2) Inexperienced use of the reformer pilates instrument

Reformer, which is the most popular among the public, is known for their flexibility as well as core strengthening exercises, effective exercises for musculoskeletal, spinal, and osteoporosis patients.

Above all, the reformer is known as a popular instrument that can be done on a sophisticated bed-shaped instrument, a key instrument in the instrument Pilates, capable of more than 100 movements and various exercises from beginners to seniors (Herrington & Davies, 2005; Pilates all in one. 2020).

While stretching, it was a move that loosened the shoulders and scapula. I don't know the spring strength that fits me, and when I push the shoulder rest toward the tower, my left hand is pushed and my right hand is pulled to release the scapula, but I didn't understand how to push and pull(Research participant, B)

I learn hundred moves, but when I do it on a mat, I can raise my legs on the mat, stretch my arms, and flap my upper body, but when I do it on a reformer, I have a lot of work to do I hung a strap on my hand, but I hung it on my leg (Research participant H).

The lower body movements are similar, but one is called hamstring exercise, and the other is hip exercise, which starts with the same position on the reformer. I didn't know what the difference was, so I was busy just doing the movements and filling in the number of times(Research participant C).

As such, participants in this study found that they were not good at finding the connection and stability of the reformer mechanism and their own movements in effective mechanism movements such as spring strength, resistance of the mechanism, starting point and action. The human body consists of 680 muscles and 230 skeletons. It is the driving force behind our body's support and protection, exercise, and exercise and activity. In order for Pilates exercise to become a more effective exercise, we will learn the correct posture and exercise programs through the movements of many musculoskeletal systems of our bodies and increase the ability to move the body functionally (Kim Hyo-jin, Kim Ji-yeon, Kim Chang-sun, 2021; Pilates all in one. 2020).

In this respect, it was found that it takes some time for the participants of this study to feel their correct functional movement and connection and stability with the reformer mechanism in the Pilates function movement when participating in reformer pilates.

### Period of adaptation: stability of instrument and movement

#### 1) Skillful in handling instruments

Joseph Pilates, the founder of Pilates exercise therapy, created an exercise machine to apply his exercise method.

Exercise machines using beds and chairs were invented to correct the body. As Joseph's motor machine, Universal Reformer, or Reformer, is now the beginning of the Pilates all in one. 2020 (Han Mi-jin, 2021; Pilates all in one.). The reformer motion is differently affected by the strength of the spring resistance depending on the type of motion. Senior or skilled participants in instrumental pilates can effectively adjust the spring resistance intensity to increase or lower their own momentum, allowing customized exercises to fit their body conditions (Bo Min Kim, 2010).

I think I was more satisfied when I was able to manipulate reformers because the exercise I do became more natural. The spring strength should be different for each move, but I usually do it with yellow and blue It's hard to it when I too much use that. (Research participant D).

Once, I almost fell forward while doing squats on the carriage, and then when I do that, I have to pay attention to the posture, spring, and strap length, or I can get hurt. (Research participant E).

When the first move is played, the instructor will explain the posture and tell you the reformer spring, the posture on the carriage, the direction and how to hold the strap, the order and method of pushing or pulling the carriage, etcAt some point, I heard some explanations. (Research participant A).

It changes how much you know and how much you deal with the reformer mechanism that you're exercising in a reformer. If I explain it once or twice, the time comes when I understand it, And I start exercising in earnest from then on.(Research participant J).

As such, the study participants felt confident and satisfied in the movement performed by the reformer at a time when they knew how to use the reformer's spring, carriage, footbar, and strap without inconvenience, and felt stable in the instrument Pilates movement. In a study by Kim Joo-bin (2021), the reformer pilates class showed positive results in psychological rehabilitation factors such as enhancing participants' psychological stability, confidence, and achievement, and lowering tension and depression. Participants in this study are understood that the manipulation proficient in the reformer mechanism provided the basis for their confidence and stability in participating in the reformer pilates.

## 2) A sense of unity between the instrument and me

The initial form of human body movement begins mainly with reflexes. After that, as it grows, various body movements become possible and the ability to control exercise is developed. The ability to control movement in Pilates refers to the mobility of exercise, the stability to maintain the posture muscles against gravity or external forces, the controlled mobility to add movement to a stationary position, and the ability to control dynamic stability required for movement. Participants in this study were found to feel integrated with the reformer mechanism

and their own movements, develop their motor control skills, and adapt to the reformer pilates movement.

I was doing hip stretching, and I had to push one leg to stretch my knees, but at some point, I felt like my legs and carriage were connected I thought that's what pilates is all about. (Research participant D).

It's a lower body exercise, and it's a movement that goes up on the carriage and gathers both legs apart. It didn't move well, but it seemed like my legs were attached to the carriage when I aligned my body and focused on breathing. (Research participant F).

After knowing what to do first when the movements change, I focused on this exercise (reformer pilates), and I was very interested in it. (Research participant A).

As such, when participating in reformer pilates, participants in this study attempted to align, breathe, and concentrate, which are the basic principles of pilates, and felt as if their movement movements were connected as one, adding interest and fun to the reformer pilates movement. This is to be interpreted as exercise immersion experienced when participating in reformer pilates. Exercise immersion refers to a phenomenon in which the body and mind become one together by being highly immersed in exercise performance as an optimal psychological state that occurs when fully concentrating on exercise or leisure activities (Kwon Kyung-ju, 2020; Lee Kyung-hee, 2020; Kim Yeo-kyung, 2020). Therefore, the experience of exercise immersion gives the fun, enjoyment, and interest of exercise, leading to continuous participation in exercise (Song Ki-hyun, HeoJin-young, 2010; Sachs, 1981). Therefore, it is understood that the immersion experienced by the participants of this study through the reformer pilates movement had a positive effect on their continued participation.

## Dependency: to entrust oneself to a reformer

### 1) Level-Up with aid to the instrument

Pilates' exercise therapy is called 'contrology,' which begins with 'corrective exercise.' Regulatory science defines it as 'an exercise that can move the body correctly as one thinks'. Control when moving the body means the quality of movement, and it is not only possible with physical muscle training, but also when the body moves by the mind. Therefore, in order to become a quality of Pilates movement, that is, a movement to which the basic principles of Pilates are applied is required (Kim Bo-min, 2010; Han Mi-jin, 2021; Pilates all in one. 2020).

I think the reformer exercise works well when I'm helped with the exercise by handling the reformer's. No matter how good I am, I can't exercise and my skills don't improve if I move separately from the reformer. (Research participant F).

I wanted to post a picture of me doing reformers on Kakao Talk, but I didn't like it. But, now It's been almost 2 years since my posture and body shape. I'm proud that. I realized

that my skills have improved a lot. At first, there were many difficult and difficult movements that I couldn't follow, but now I can take classes with my superiors. (Research participant C).

Reformer movements sometimes seem difficult, but they're not difficult when you try them, but they're really hard when you try them, and there are some moves that you can't figure out. The important thing is that you have to practice and repeat with the help of the reformer. If you do that, your skills will improve. (Research participant E).

As described above, it was found that the participants of this study continued the reformer pilates movement through a process in which the instrument pilates exercise ability gradually improved while being assisted and resisted by the reformer mechanism. Pilates are exercises that improve correct posture, core area enhancement, and functional movement through repeated muscular endurance exercises and flexibility improve motor coordination (Hwang, Park & Lim; 2016) by increasing the range of diagonal movement. It is also characterized by the continuous use and stimulation of core muscles, the central part of the body, by pilates breathing (Modern filates, 2001; Lee Jung-won, Kim Dae-yeol, 2021). Accordingly, it is understood that the exercise performance ability of Pilates was improved with the help of the reformer's instrument.

## 2) An addiction to instrument movement

The reformer mechanism pilates exercise is an effective exercise to improve balance by improving flexibility, strengthening muscle strength, and balancing the body by supporting the body to the reformer mechanism. Above all, helping to perform exercise by using a reformer instrument to avoid strain on the body is an advantage of the reformer instrument exercise method (Kang Jung-kyung, Park Jin-hee, 2015; Ahn Sang-kyun, Seo Young-hwan, 2021). Participants in this study left themselves to the advantages of this reformer mechanism exercise method, and it was found that a positive addiction phenomenon appeared beyond the immersion experience of reformer mechanism movement.

At first, I thought it was more difficult because it was done by a reformer, but even if I did the same move over the years, it felt cooler and more athletic if I did it in a reformer. I realized that I'm becoming more dependent on reformers.(Research participant D).

Now, I have to do reformer pilates at least three times a week to do what I have to do. I like living with a little muscle pain. Rather, I feel uneasy without muscle pain. (Research participant G).

When I compared the people who did the mat exercise and the reformer exercise, I felt that the people who participated in the reformer exercise for a long time were not absent and participated in the class very passionately. I think there is more fascination with the reformer movement. (Research

participant I).

As such, the participants of this study were addicted to the reformer pilates exercise to the extent that they were attracted to the instrument pilates exercise by relying on the reformer mechanism as the time and period increased. This can be interpreted in conjunction with the research results (Oh Hyun-ok, 2010), which showed that the higher the exercise experience, the higher the exercise motivation, social problems, and withdrawal symptoms compared to the lower group with the exercise experience. Exercise addiction is identified as a positive addiction that affects improving individual well-being and functional conditions by increasing individual physical, psychological, and social activities, unlike negative ones such as drug addiction and alcoholism (Yeongbeom Kim, 2005; Kostrupala, 1976).

## CONCLUSIONS AND SUGGESTIONS

In this study, a total of 10 people, including 8 Pilates participants and 2 leaders of the Y Pilates Studio Reformer Organization Pilates in Daejeon, were selected according to intentional sampling and analysis of data presented by Stake (2005) to derive the level of addiction and manipulation of the Instrument. Therefore, I would like to present the conclusions and suggestions as follows. In this study, the process of participating in the exercise participation of Pilates participants in the reformer mechanism was confused by the reformer mechanism at the beginning of participation, and gradually, as time passed, the dependence of being fascinated by the reformer mechanism and movement appeared. In addition, in order to perform safe exercise in the reformer apparatus in this process, it was found that familiarity with the reformer mechanism, proper posture and breathing, stability of posture through concentration, and exercise performance ability to feel consistent with the reformer should be prioritized. In particular, to beginners of reformer pilates need to present a manual for manipulating reformer instruments and Instructor carefully observe and coach for beginners for safety, given that fear and anxiety are found in movement of reformer instruments as well as movement.

## REFERENCES

- Kim Hyo-jin, Kim Ji-yeon and Kim Chang-sun (2021). Effects of 12-week instrument pilates on muscle function and body composition. Korea Institute of Sports Policy Research, Physical Education Science Research, 32(3), 363-372.
- Jeong Chang-il (2022). It's effective when you understand the characteristics of pilates equipment and start exercising. FT Sports (2022.03.16)
- Lee Woo-joo (2022). "Pilgu" Kim Kang Hoon, "Address" to YooByung-jae, who is doing Pilates to grow taller. Sports Chosun Dotcom (2022.04.13)
- Seo Soo-jin (2018). Development of a Pilates leader's professionalism scale. Journal of the Korean Sports Association, 57(5), 351-362.
- Choi Mi-young (2020). A Qualitative Case Study of Yoga and Pilates Liberal Arts Classes. Journal of the Korean Sports Association, 59(3),

73-84.

- Kim Hyo-jin, Kim Ji-yeon and Kim Chang-sun (2021). Effects of 12-week instrumental pilates on muscle function and body composition. Korea Institute of Sports Policy and Research, Physical Education Science. 32(3), 363-372.
- Kang Jung-kyung and Park Jin-hee (2015). Analysis of muscle mass before and after implementation of Pilates Reformer Instrument Exercise Program in Dance Major Students. Journal of the Korean Dance Society, Korean Dance Society, 73(6), 1-15.
- Han Mi-jin (2021). Effect of the Instrument Pilates Reformer Core Exercise on the Physical Perception and Self-efficacy of Dance majors. an unpublished master's thesis Kyung Hee University Graduate School.
- Ahn Sang-gyun and Seo Young-hwan (2021). Effect of Instrumental Pilates Exercise on Physical Composition and Health Physical Fitness of Middle-aged Women. Korean Sports Association, Journal of Aerobic Exercise Science, 19(1), 65-70.
- Kang Jung-kyung (2016). Analysis of physical composition before and after implementation of Pilates Reformer Instrument Exercise Program in dance majors. Journal of the Korean Dance Society, Korean Dance Society, 74(2), 16-31.
- Kim Bo-min (2010). A qualitative approach to the effectiveness of Pilates Instrument exercise. Unpublished Master's thesis, Graduate School of Yongin University.
- Shin Yoon-hee (2022). Pilates equipment durability and stability are important. Daily Safety Newspaper (2022.04.15).
- Lee Hyun-jung and Hong Mi-sung (2018). The effect of yoga and Pilates liberal arts classes on college students' sports values, physical self-concept, and willingness to participate in daily sports. Journal of the Korean Sports Association, 57(1), 421-433.
- Han Mi-jin (2021). Effect of the Instrument Pilates Reformer Core Exercise on the Physical Perception and Self-efficacy of Dance majors. Unpublished Master's thesis, Graduate School of Kyung Hee University.
- Kim Joo-bin (2021). A case study on the alleviation of back pain and psychological rehabilitation caused by the participation of working women in Pilates Reformer classes. an unpublished master's thesis a graduate school at Hanshin University
- Kwon Kyung-ju (2020) Effects of Pilates participants' physical appearance on exercise immersion and exercise continuity. Unpublished Master's thesis, PajjaeUniversity General School.
- Lee Kyung-hee (2020). An analysis of exercise commitment and participation satisfaction according to the participation motivation of adult women's reformer Pilates participants. Unpublished Master's thesis, Graduate School of Sports Korea.
- Song Ki-hyun and HeoJin-young (2010). Relationship between Awakening and Exercise Immersion and Leisure Satisfaction of Participants in Daily Sports. Journal of the Korean Leisure and Recreation Society, 24(1), 93-102.
- Lee Jung-won and Kim Dae-yeol (2021). Effects of the 12-week mat Pilates program on exercise performance and muscle function in middle-aged women. Journal of the Korean Society of Arthology, 22(11), 41-49.
- Oh Hyun-ok (2010). Effects of Pilates and Yoga Participants' Exercise Ability on Exercise Immersion and Exercise Addiction. Journal of the Korean Sports Association, 49(6), 139-148.
- Kim Young-beom (2005). Relationship between the dependence on exercise and social stress and quality of life according to housewives' participation in sports activities. Unpublished Ph.D. thesis, Graduate School of Gangneung University.
- Kim Hye-jin, Kim Hyo-joong, Park Sung-mi, Park Ji-yoon, Sun Hye-ji, Ahn Won-kyung, Won Hee-young, Wi Mi-sun, Lee Tae-hyun, Jang Young-jin, and Jung Kyung-hwa (2020). PILATES ALL IN ONE. DH Media.
- Morgan, D. L.(1998). The Focus Group Guidebook (Focus group Kit 1). CA: Sage.
- Sachs, M. (1981). Running addiction. In M. H. Sachs and M. L. Sachs (Eds.). Psychology of running. 116-121. Champaign, IL: Human Kinetics.
- Keller, John M. (1983). The use of the ARCS model of motivation in teacher training. Aspects of educational technology, 17, 140-145.
- Schreiber. R. S. &Noerager, S. P.(2001). Using grounded theory in nursing. New Youk: Springer Publishing Co.
- Dobbert, M.(1982). Ethnographers sans ethnography: The evaluation compromise. InFetterman, D. M.(Ed), Ethnography in educational evaluation. Beverly Hills, CA: Sage Publication.
- Stake, R. E.(2005). Qualitative case studies. In N. K. Denzin & Y. S. Lincoln (Eds.), The Sage handbook of qualitative research (3rd ed., pp. 443-466). Thousand Oaks, CA: Sage.
- Pilates, J. H., & Miller, W. J, (1945). Return to life through contrology. Ravenio Books.
- Geweniger, V. (2002). Prevention of back pain with Pilates training:[Finding a Healthy Balance]. Pflge Z, 55(10), 747-749.
- Herrington, L., & Davies, R. (2005). The influence of Pilates training on the ability to contract the transversus abdominis muscle in asymptomatic individuals. Journal of Bodywork and Movement Therapies, 9(1), 52-57.
- Anderson, B. D., & Spector, A. (2005). Introduction to Pilates-Based Rehabilitation. Orthopaedic Physical Therapy Clinics of North America, 9(3), 395-410.
- Oliveira, L. C., Oliveira, R. G., Oliveira, D. A. (2015). Effects of Pilates on muscle strength, postural balance and quality of life of older adults: a randomized, controlled, clinical trial. J Phys Ther Sci, 27(3), 871-876
- Guca, E. & Lincoln, Y. S.(1985). Fourth generation evaluation. New bury Park, CA: Sage.
- Anderson, B. D., & Spector, A. (2005). Introduction to Pilates-Based Rehabilitation. Orthopaedic Physical Therapy Clinics of North America, 9(3), 395-410.
- Herrington, L., & Davies, R. (2005). The influence of Pilates training on the ability to contract the transversus abdominis muscle in asymptomatic individuals. Journal of Bodywork and Movement Therapies, 9(1), 52-57.
- Hwang, J. H. Park, K. W. Lim(2016). The effect of 12weeks of pilates exercise elastic band on maximum muscle strength and balance of female university students. The Korean Society of Sports Science. 25(1), 1235-1244.
- Latey. P. Modern Pilates(2001). the step by step, at home guide to a stronger body Blake Education.
- Kostrubala, T. (1976). The joy of running. Philadelphia. J. B. Lippincott.