

IMPACT OF PILATES ON THE INTENSITY OF PAIN IN THE SPINE OF WOMEN OF THE FIRST MATURE AGE

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Accepted for Publication: March 20, 2020

Published: March 25, 2020

DOI:10.17309/tmfv.2020.1.02

Abstract

Introduction. The insufficient development of the muscular system of women negatively affect the condition of their backs. Women of the first mature age complain of pain in different parts of the spine. Pilates is an effective system of fitness and fitness, which has a positive effect on the musculoskeletal system of those involved. No studies have been found to quantify women's pain in the back area.

Materials and methods. 64 women took part in research. The women were divided into two groups, each of which included 32 people. The study was carried out at the Sokol sports club and the Olimp fitness club in Kiev. We used the questionnaire "Visual analogue scale of pain".

Results. We measured the level of pain in the cervical, thoracic and lumbar spine of women of the first mature age. It was found that only 4.69 % of women do not have pain. It was found that women of the first mature age the most often feel pain in the cervical region. The women of the control group were engaged in a typical Pilates program. The women of the experimental group were engaged in the author's program, a feature of which was the use of large equipment during classes. In addition, women who could not attend classes were offered the Pilates computer program. For the experiment, no statistically significant difference between the level of pain in different parts of the spine of women was established. After the experiment, a statistically significant decrease in the level of pain in the lumbar section of women in the experimental group was recorded compared with women in the control group.

Conclusions. The results indicate the effectiveness of large equipment to reduce the level of pain in the back of a woman.

Keywords: pilates, women, disorders, pain, level, dynamics.

Introduction

In the world there is a significant spread of diseases of the musculoskeletal system. A negative factor is the decrease in the level of motor activity of all groups of the population (Mykhaylova, Grygus, 2013; Pelech, & Grygus, 2016). Indeed, modern production does not involve significant physical exertion. In addition, young people increasingly prefer passive recreation. The spread of information technology has forced humanity for a long time to be in a "sitting at the computer" position, to remain "chained to monitors" (Byshevets, 2017). Long stay in the static posture of the

user of a personal computer negatively affects the state of a person's posture, causing discomfort in various parts of the spine (Brewer, Van Eerd, Amick, Irvin, Daum, Gerr, Moore, Cullen, & Rempel, 2006; Mykhaylova, Grygus, Prusik, K., & Prusik, K., 2014). Chronic lumbar pains are particularly common (Natour, Cazotti, Ribeiro, Baptista, & Jones, 2015).

Posture disorders are recorded in a significant number of women of mature age (Kashuba, & Bibik, 2012). Often during pregnancy, women feel pain in the lumbar (Maćzka, & Sass, 2017). Occupational diseases of the spine are common (Nakonechna, 2012). Scientists explain this phenomenon by the development of a muscular system, a sedentary lifestyle and hormonal disorders (Maćzka, Sass, 2017).

Specialists are trying to solve the problem of preventing occupational diseases of workers who are in a static sitting position for a long time (Levanon, Gefen, Lerman,

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Givon, & Ratzon, 2012; Nesterchuk, Grygus, Prusik, Zulkow, 2019). According to Hoe (2010), effective measures to prevent diseases of the upper limbs and neck are ergonomic equipment, additional breaks during work. Prevention of disorders of the musculoskeletal system of students during classes at the computer occurs through the introduction of complexes of physical exercises and after them (Byshevets, 2018).

Healthy life style contributes to the improvement of the quality of life in women of the first mature age (Moshynsky, Mykhaylova, & Grygus, 2013). Researcher Bibik (2013) suggests using health fitness tools for correction posture disturbance in women.

Pilates is an effective health fitness system (Marionda, & Dzhuhan, 2007). From the first Joseph Pilates developed his own system as a system for the recovery of patients after spinal injury (Dan, 2007). And now the main tasks of pilates are the correction of posture and, increase of joint mobility, normalization of body weight, achievement of internal rest, improvement of well-being intraining participants (Burkova, 2005). Byrnes, Wu, & Whillier (2018) proved the feasibility of pilates for rehabilitation programs. Rukavishnikova (2010) suggested using pilates for correction of posture disturbance and painfulness in different parts of the student's spine. Miyamoto, Franco, van Dongen, Franco, de Oliveira, Amaral, Branco, da Silva, van Tulder, and Cabral (2018) believes that an effective measure for chronic pain in the lumbar spine is the therapy based on pilates. C. Wells is also convinced of the efficacy of Pilates Therapy (Wells, Kolt, Marshall, & Bialocerkowski, 2014). For therapeutic purposes, the author (Wells, Kolt, Marshall, & Bialocerkowski, 2014b) offered pilates classes for 30-60 minutes twice a week and received positive feedback from physiotherapists. Marionda, and Dzhuhan emphasizes (2007) that pilates can be used after spinal injury.

Pilates is a popular type of motor activity and healing of women of the first mature age. According to Burkova (2005), there is correction of disturbance of the musculoskeletal system of women as a result of pilates exercise. According to Dan (2007), pilates' means are effective in preventing pain in the thoracic and lumbar spine. Sologubova (2012) offers pilates for taking spine muscle tensing off.

According to the researchers, the classes are particularly effective at the exerciser Reformer (Dos Santos, Raimundo, da Silva, Souza, Ferreira, Borges Santo Urbano, Gasparini, & Bertoncello, 2017). According to experts, the use of large pilates equipment helped to strengthen the body muscles (Wells et al, 2014). In addition, such exercises have a positive effect on the coordination of women's movements and their state of equilibrium (Lee, Hyun, Kim, 2014; Kashuba, Kolos, Rudnytskyi, Yaremenko, Shandrygos, Dudko, & Andriieva, 2017).

Consequently, the pain in the spine of women can be reduced by fitness tools. However, we did not find data on the dynamics of pain intensity in different parts of the spine in women of the first mature age under the influence of pilates. At present, the positive effect of large equipment on the condition of the spine in women of the first mature age has not been proven.

The hypothesis of the study suggested that the use of large equipment during pilates training reduces pain in the spine of women in the first period of mature age.

The purpose of the study is to determine the dynamics of pain intensity in different parts of the spine in women of the first mature age under the influence of pilates.

Materials and methods

Participants of the research

The study involved 64 women of the first mature age who are engaged in Pilates.

Organization of the study

The study was carried out at the sports club "Sokol" and the fitness club "Olimp" in Kiev. We applied such research methods as the study, analysis and systematization of scientific sources. To determine the indices of the level of pain in different parts of the spine, we used the standard questionnaire "Four component Visual Analogue Scale of Pain" (Moses, Tishelman, Stekas, Jevotovskiy, Vasquez-Montes, Karia, Errico, Buckland, & Protopsaltis, 2018). This scale allows us to characterize the "scope" of the subjective painful sensations of the experiment participants under the influence of Pilates (Kharchenko, 2014). We measured the pain in the cervical, thoracic and lumbar spine of women of the first mature age on a 10-point scale. The level of pain could range from 0 to 10 points. It should be noticed that we measured the level of pain at the moment, the typical pain level and the pain level in the best and worst periods.

Statistical analysis

The obtained results were processed using the methods of mathematical statistics. For this we used the computer program STATISTICA. We used the indicators of asymmetry and kurtosis and verified that the findings were not subject to the normal distribution. Therefore, we described the average indicators using median values. In the study, the indicators are presented in the form (Me, 25 %; 75 %; S), where Me is the median of the indicators, 25 %; 75 % – 25 th and 75 th percentile, S – standard deviation. We also took into account the recommendations of specialists in the analysis of personal data (Denysova et al, 2011). Comparative data analysis was performed on the basis of the non-parametric Mann-Whitney test for independent sample data. The significance level we took $p < 0.05$.

Results

For effective use of pilates products you must have information about the localization of pain and its level among those, who involved. Unfortunately, among the women surveyed, only 4.69 % ($n = 3$) noted that they practically have no pain in different parts of the spine. The rest feel pain from time to time. There are 37.5 % ($n = 24$) of women who have no pain in the cervical spine. It was determined that 43.8 % ($n = 28$) of the respondents practically had not pain sensations in the thoracic spine, and 39.1 % ($n = 25$) did not feel pain in the lumbar spine.

The study found that most women of this category complain of pain in the cervical spine. We found out that the level of pain during the survey ranged from 0 to 5 and was (0, 0, 2,

1.23 points). Then the average statistical typical pain level in this area was (2.0; 0; 4; 2.0 points). During the interview pain level in the cervical spine ranged from 0 to 3 and was (0, 0, 1, 0.84), and in a worst period was (2.5; 0, 5, 2.76 points). Such results are disappointing for practically healthy women of the first mature age.

We have proposed a fitness program, which is based on Pilates resources. A feature of this program is the use of large equipment during the class – simulator Reformer (Tomilina, 2016). In addition, we proposed computer program, which is called the Pilates. It was developed in accordance with specialists' proposals (Tsaitler, Fylatova, Arefeva, Arefeva, 2014). Women were encouraged to use this program on their own if they could not attend the training.

We developed methodology and checked its effectiveness for two women's groups. The control group (CG) included women who were engaged in the traditional Pilates program of the Sokol fitness club. According to the traditional program, classes are held without equipment or with small equipment in accordance with the level of women's physical condition. The experimental group (EG) consisted of women who were engaged in the program of health fitness. We developed it for women of the first mature age.

To evaluate the effectiveness of the author's program, we studied the dynamics of the women's pain level of the first mature age under the influence of recreational exercises. There were no noticeable differences between the indicators of pain localization in different parts of the spine among the participants of the control and experimental groups before experiment.

After the experiment, the level of pain decreased in the representatives of the experimental group more noticeably than in the participants of the control group (Table 1).

The analysis of empirical data allows to indicate the absence of statistically significant differences between the level of typical pain in the cervical spine in participants of the control and experimental groups before the experiment ($U = 395.5 > U_{kp} = 389$) for $n_1 = 32, n_2 = 32, p > 0.05$).

There were no statistically significant ($p < 0.05$) differences between the pain level in the cervical spine in women of the control and experimental groups in the worst period ($U = 492 > U_{kp} = 389$) before experiment.

Similar results were obtained in the analysis of indicators of the thoracic spine. There were no statistically significant ($p < 0.05$) differences in the level of typical pain ($U = 433 > U_{kp} = 389$) and the level of pain in the worst period ($U = 492 > U_{kp} = 389$).

An analysis of the pain level in the women's lumbar spine gave the same results. There were no statistically significant ($p < 0.05$) differences between the typical pain level ($U = 433 > U_{kp} = 389$) and pain level in the worst period ($U = 453 > U_{kp} = 389$).

After experiment women of experimental group had the following changes in pain level. In the cervical spine, the typical pain level decreased from (2, 0, 3, 1.72 points) to (1, 0, 2, 1.35 points), in the thoracic spine decreased from (1, 0, 3, 1.59 points) to (0.5, 0, 2, 1.36 points), in the lumbar spine – from (0.5; 0; 3; 1.66 points) to (0; 0; 1; 0.8 points) (Table 2).

After the experiment, we studied the differences between pain level in different parts of spine in participant of experiment.

We identified the following differences in cervical spine of women of control and experimental groups. After the experiment, the typical pain level of women in the experimental group was statistically significantly lower than in women in the control group ($U = 372.5 < U_{kp} = 389$) (for $n_1 = 32, n_2 = 32, p < 0.05$). However, the pain level in the worst period had not statistically significant ($p < 0.05$) differences ($U = 437.5 > U_{kp} = 389$).

The typical pain level in the thoracic spine of women had not statistically significant differences ($p < 0.05$) ($U = 410.5 > U_{kp} = 389$), as the pain level in the worst period ($U = 400.5 > U_{kp} = 389$).

There are such differences for pain level in lumbar spine of women. The typical pain level was statistically significantly ($p < 0.05$) lower in women of the experimental group, compared with women in the control group ($U = 304.5 < U_{kp} = 389$). The same result was fixed for the pain level in the worst period ($U = 355 < U_{kp} = 389$).

Additional calculations showed that at the end of the experiment, the participants in the experimental group had an average pain level in the cervical spine lower by 43.6 %, in the thoracic spine by 42.3 %, and in the lumbar spine by 56.2 %. It was found that, pain level in the lumbar spine was statistically

Table 1. Evaluation of the pain level of participants in the control group before and after the experiment (point)

Pain localization, spine	Before experiment								After experiment							
	typical pain level				pain level in the worst period				typical pain level				pain level in the worst period			
	Me	25%	75%	S	Me	25%	75%	S	Me	25%	75%	S	Me	25%	75%	S
Cervical	3	0	5	2.19	3.5	0	5.5	2.97	3	0	4	2.0	3	0	4.5	2.63
Thoracic	2	0	4	2.04	4	0	5.5	2.74	2	0	3.5	1.87	3.5	0	5	2.44
Lumbar	2	0	3	1.57	2.5	0	4	2.33	2	0	3	1.58	2	0	4	1.96

Table 2. Evaluation of the pain level of the participants in the experimental group before and after the experiment (point)

Pain localization, spine	Before experiment								After experiment							
	typical pain level				pain level in the worst period				typical pain level				pain level in the worst period			
	Me	25%	75%	S	Me	25%	75%	S	Me	25%	75%	S	Me	25%	75%	S
Cervical	2	0	3	1.72	2	0	5	2.55	1	0	2	1.35	1	0	2.5	1.78
Thoracic	1	0	3	1.59	2.5	0	4	2.2	0.5	0	2	1.36	1.5	0	4	1.99
Lumbar	0.5	0	3	1.66	2	0	4	2.4	0	0	1	0.8	0	0	2	1.26

significant ($p < 0.05$) lower in women of the experimental group than the average pain level in women of the control group.

The use of the author's program of fitness training had a positive effect and contributed to a significant reduction of pain level in women of the first mature age in various parts of the spine. We are convinced that the obtained results are directly related to the systematic use of the simulator Reformer in fitness process of the participants of the experimental group. This indicates the effectiveness of the use of large equipment during classes among women 21–35 years. We have proven that pilates products are necessary to maintain the health of the back of mature women.

Discussion

Some specialists consider that quantitative evaluation of pain level in order to adequately measure rehabilitation or therapeutic activities is necessary (Kharchenko, 2014). We agree with opinion of these authors. Subjective assessment of pain level, especially in dynamics, is accessible and simple for statistical processing. The obtained information helps to establish a complete picture of pain and to develop effective methods for reducing it.

Unfortunately, we have not found available literary sources covering the issues of determining the type and localization of pain in different parts of the spine in women of the first mature age.

However, we compared the findings with Nakonechna (2012) results and noticed that the prevalent majority of women of mature age, namely 67.3%, complained of pain in the lumbar spine. These results, the author explains that the lumbar spine is more subject to injury. This situation is associated with insufficient mobility of the spine, weak muscles of spine and sedentary work. As a result of our research, it was found that 62.5% of participants in the experiment felt pain in the cervical spine. We believe, the shift of pain from the cervical to the lumbar spine in women of different age groups can be explained by the professional activities of women. The work of a significant part of modern women is computerized and is associated with a long static position "sitting at the computer". In addition, among women of different age categories, the structure of leisure differs. Women of the first mature age prefer computer entertainment and social networking. We received differences in localization of pain sensations in different parts of the spine. We can explain it as a change in values when choosing a hobby and planning leisure time.

Our results match up with the literature data. According to them it is expected a reduction of the pain level in the spine due to pilates. Pilates products should be used to reduce pain in the cervical spine of women. In this case, as confirmed by our study results, the most effective means of Pilates to reduce pain in the lumbar spine. Other researchers also reveal this pattern (Byrnes et al, 2018).

So, Pilates products, are necessary to recommend for the implementation into the system of health fitness of women of mature age. In this case, women in this category, it is advisable to do Pilates with the use of large equipment.

Conclusions

Modern society is characterized by a decrease in the level of motor activity. Such results lead to the spread of disorders of the musculoskeletal system among the population.

We found out that women of the first mature age complain of pain in different parts of the spine.

Pilates is an effective means of preventing postural disorders and spine diseases.

Pilates classes with the use of large equipment contributed to a noticeable reduction of the back pain in women of the first of mature age. The Pilates resources led to a reduction of pain in the cervical spine of the participants in the experiment. However, the most effective means of Pilates was to reduce the pain level in the lumbar spine.

Acknowledgements

The study was carried out with the plan of scientific work of the National University of Physical Education and Sport of Ukraine for 2016-2020 on the topic 3.15 "Theoretical and methodological foundations of recreational and physical activity of various groups of the population" (state registration number 0116U001630).

Conflict of interest

The author declares about absence of conflict of interest.

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ВПЛИВ ПІЛАТЕСУ НА ІНТЕНСИВНІСТЬ БОЛЮ В ХРЕБТІ У ЖІНОК ПЕРШОГО ЗРІЛОГО ВІКУ

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Реферат. Стаття: 6 с., 2 табл., 28 джерел.

Мета дослідження – визначити динаміку інтенсивності болю в різних відділах хребта у жінок першого зрілого віку під впливом пілатесу.

Матеріали та методи. У дослідженні взяли участь 64 жінки. Жінок розділили на дві групи, кожна з яких включала 32 особи. Дослідження проводилося у спортивному клубі «Сокіл» та фітнес-клубі «Олімп» у Києві. Використовували анкету «Візуальна аналогова шкала болю».

Результати. Вимірювався рівень болю в шийному, грудному та поперековому відділах хребта у жінок першого зрілого віку. Встановлено, що лише 4,69% жінок не відчувають болю. Жінки першого зрілого віку найчастіше відчувають біль в області шийки матки. Жінки контрольної групи займалися типовою програмою пілатесу. Жінки експериментальної групи займалися

авторською програмою, особливістю якої було використання обладнання під час занять. Крім того, жінкам, які не могли відвідувати заняття, пропонували комп'ютерну програму «Пілатес». До експерименту не було встановлено статистично значущої різниці між рівнем болю в різних відділах хребта у жінок. Після експерименту було зафіксовано статистично значуще зниження рівня болю в поперековому відділі у жінок експериментальної групи порівняно з жінками контрольної групи.

Висновки. Результати вказують на ефективність використання засобів пілатесу на зниження рівня болю в поперековому відділі хребта у жінок першого зрілого віку.

Ключові слова: пілатес, жінки, розлади, біль, рівень, динаміка.

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Cite this article as: Kashuba, V., Tomilina, Yu., Byshevets, N., Khrypko, I., Stepanenko, O., Grygus, I., Smoleńska, O., & Savliuk, S. (2020). Impact of Pilates on the Intensity of Pain in the Spine of Women of the First Mature age. *Teoriâ ta Metodika Fizičnogo Vihovannâ*, 20(1), 12–17. <https://doi.org/10.17309/tmfv.2020.1.02>

Received: 26.01.2020. Accepted: 20.03.2020. Published: 25.03.2020

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