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MEDICAL
INNOVATION

Low back pain occurrences and gynecological disorders in female equestrians and strengthening of core stability muscles lumbar spine

Występowanie dolegliwości bólowych w odcinku lędźwiowym kręgosłupa i zaburzenia ginekologiczne u kobiet jeżdżących konno a wzmacnianie mięśni stabilizujących odcinek lędźwiowy kręgosłupa

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Abstract

Introduction. Women involved in amateur equestrian activities may encounter spine pain and discomfort in the lower pelvic region.

Aim of the Study. A research hypothesis was established, suggesting that training the muscles responsible for stabilising the lumbar spine may have a positive impact on reducing both lumbar spine pain sensations and gynaecological disorders among female horse riders. The study aimed to validate the hypothesis and compare the Revised Oswestry Low Back Pain Disability Scale Questionnaire in the Polish version and the author's questionnaire on gynaecological complaints between the study and the control group.

Material and methodology. The study involved women ($n = 23$) engaged in equestrian activities with an age range of 22.23 ± 2.78 years, research group $n = 11$ and $n = 12$ control group. Questionnaires used: Revised Oswestry Low Back Pain Disability Scale and the author's on gynaecological ailments. Questionnaires were completed before and after a training session focused on exercising the stabilising muscles. Daily exercise training was conducted in the afternoon for six weeks (30 repetitions for each exercise).

Results. The results were presented in the form of graphs.

Conclusions. The six-week training of the stabilising muscles has a positive impact on reducing lumbar back pain and a slight effect on gynaecological complaints.

Key words:

horse riding, pain, stabilising muscles, gynaecological dysfunctions

Streszczenie

Wprowadzenie. Kobiety uprawiające amatorsko jeździectwo mogą odczuwać dolegliwości bólowe kręgosłupa i ból w obszarze miednicy mniejszej.

Cel pracy. Określono hipotezę badawczą, że trening mięśni stabilizujących odcinek lędźwiowy kręgosłupa ma wpływ na zmniejszenie odczuć bólowych odcinka lędźwiowego kręgosłupa oraz zaburzeń ginekologicznych u kobiet jeżdżących konno. Celem pracy było zweryfikowanie postawionej hipotezy oraz porównanie Kwestionariusza Revised Oswestry Low Back Pain Disability Scale w wersji polskiej oraz autorskiego kwestionariusza dotyczącego dolegliwości ginekologicznych pomiędzy grupą badaną i kontrolną.

Materiał i metodyka. W badaniu uczestniczyły kobiety ($n = 23$) uprawiające jeździectwo w wieku $22,23 \pm 2,78$ lat, grupa badawcza $n = 11$ i $n = 12$ grupa kontrolna. Zastosowano kwestionariusze: Revised Oswestry Low Back Pain Disability Scale oraz autorski na temat dolegliwości ginekologicznych. Kwestionariusze wypełniono przed i po treningu ćwiczeń mięśni stabilizujących. Trening ćwiczeń był prowadzony przez 6 tygodni codziennie w godzinach popołudniowych (30 powtórzeń dla każdego ćwiczenia).

Wyniki. Pozyskane wyniki zostały przedstawione w formie wykresów.

Wnioski. Sześciotygodniowy trening mięśni stabilizujących wpływa na zmniejszenie dolegliwości bólowych odcinka lędźwiowego kręgosłupa oraz nieznacznie wpływa na odczuwanie bólu w dolegliwościach ginekologicznych.

Słowa kluczowe:

jazda konna, ból, mięśnie stabilizujące, dysfunkcje ginekologiczne

Introduction

Physical activity is a vital element of human existence to sustain health and promote mental and social well-being [1]. Horse riding is an increasingly popular sport and, combined with interaction with nature, it can offer people many benefits, such as stress reduction, recovery from illness and increased positive emotions [2, 3]. It is also a high-risk activity, combining speed, height and difficulty with supervision [4].

Sources of spinal discomfort in riders across various equestrian disciplines may stem from the repetitive nature of riding, acute injuries, postural defects, asymmetry, insufficient recovery period after a fall and monotonous training routines [5-8]. Seventy-two per cent of professional riders have increased lumbar spine lordosis in the standing position and hyperkyphosis in the sitting position. This is due to the horse's repetitive and multifaceted propulsive forces, which are absorbed by the rider's body [9]. During horse riding, the lumbar lordosis curvature is lost, and the pelvis is tilted backwards, resulting in compression in the anterior part of the intervertebral discs, with the fibre ring and nucleus pulposus moving to a posterior position. Such alignment of structures causes damage to the intervertebral discs and increases tension in the posterior lumbar spine [9]. The correct posture of a rider begins with a line starting from the ear and running through the centre of the shoulder, hip joint and heel. The head should be in a neutral position, with the gaze directed ahead. The torso should be slightly tensed to follow the horse's movement appropriately. The key to achieving a stable and comfortable ride is an appropriate seat. The rider should sit in the deepest part of the saddle, with the pelvis gently tucked up. This will allow the hips to swing freely to the rhythm of the horse's gait. The thighs and knees should be adjacent to the horse. The knee joints should be gently bent so the calf rests comfortably on the horse's side, positioned behind the edge of the girth. The foot should be placed in the



Figure 1. Correct rider posture. Head facing forward, defined by a line passing through the ear, the centre of the shoulder and hip joint, up to the heel (own source)

stirrup with the broadest part pressing against the foot of the stirrup and the heel at the lowest point of the rider's body. The Achilles tendon should spring back slightly, cushioning the movements made by the rider [10].

Equestrianism is considered one of the most injury-prone sports, resulting from falls and systematic structure overloading during riding [12]. The greatest cushioning during riding occurs in the thoracic and lumbar spine [2, 6]. The muscles stabilising the thoracic and lumbar spine are the multifidus, transverse abdominis and pelvic floor [12]. Additionally, the oblique abdominal muscles and the rectus abdominis muscle work in coordination [12].

Injuries in equestrianism are categorised into systematic and accidental. Systematic injuries occur due to prolonged forces on the rider's body from the horse's back and the unnatural position of the rider's body during training. Accidental injuries occur randomly, such as falling from a horse or being trampled. The average horse's back is 1.6 metres above the ground, and the rider's geometric centre of gravity is about 2 metres above the ground. A fall from a horse can, therefore, be equivalent to a fall from a height [11], causing severe injury [13]. The most common site of injury is the head [14]. Lower back pain is the most common musculoskeletal ailment related to overload experienced by riders [15]. Back pain causes reduced trunk mobility range, balance, and asymmetrical posture [16].

Dysmenorrhea is defined as the presence of painful uterine cramps that occur during menstruation. This disorder is one of the most common causes of pelvic pain [17]. In some women, the pain is so severe that they cannot work for up to 1-3 days each menstrual cycle. Dysmenorrhea substantially affects women's lives, leading to decreased daily activities, diminished sleep quality, and adverse changes in mood, such as anxiety and depression [18]. Most women experience pain during menstruation, particularly on the first day of bleeding. The pain tends to be continuous and radiates to the sacral region [19]. A similar type of pain occurs in women with endometriosis [20].

Therapeutic riding has been found to improve muscle strength, coordination, range of motion, posture, trunk control, and manual control while reducing spasticity and increasing pelvic mobility and tissue flexibility [21]. When walking, the horse's movements cause the pelvis to shift forwards, backwards, upwards, downwards, and sideways, akin to the movements of the human pelvis during gait [21]. Riders excessively tense the adductor muscles to maintain balance. Tension of these muscles affects the synergistic contraction of the striated muscle of the urethral wall and the pelvic floor muscles [22].

Aim of the study

Before the study, the following research hypothesis was established: training the lumbar spine stabilising muscles reduces lumbar spine and gynaecological pain sensations in female horse riders. The study aimed to validate the hypothesis and compare the Revised Oswestry Low Back Pain Disability Scale Questionnaire in the Polish version and the author's questionnaire on gynaecological complaints between the study and the control group.

Material and methodology

Twenty-three female equestrians aged between 18 and 28 years (22.23 ± 2.78) participated in the study, 11 of whom were in the study group and 12 in the control group. Participants in the study were provided with the Revised Oswestry Low Back Pain Disability Scale questionnaire to fill out [23]. The study participants were also requested to complete the author's questionnaire regarding the gynaecological complaints they experience daily. The questionnaire consisted of 7 questions. Questions were asked regarding menstrual pain in the lower abdomen and lumbosacral region, spotting between menstrual cycles, dyspareunia, discharge, headaches during menstruation, and mastodynia. Both groups completed both questionnaires before and after the study. After completing the questionnaires, the women in the study group were instructed on how to exercise the transversus abdominis, multifidus, oblique abdominis and rectus abdominis muscles and the diaphragm [24].

Graphs were created in Microsoft Excel 2010, and statistical calculations were performed using Statistica 13.3 software. The study was conducted after obtaining approval number 305/23 from the Bioethics Committee of the Medical University and the written consent of the respondents. Inclusion criterion: amateur equestrian pursuits. Exclusion criterion: no amateur equestrian pursuits and no consent to participate in the study.

Results

The results of the Oswestry scale are presented as descriptive statistics (Table 1). In the study group, the average score obtained by participants before the 6-week exercise programme was 11 ± 6.8 . After the stabilising muscle exercise training, the average score decreased to 7.5 ± 7.9 .

Table 1. Oswestry Revised Low Back Pain Disability Scale questionnaire scores before and after the study for the control and study groups

	Minimum	Maximum	Median	Mean	SD	Q1	Q3
Study group							
Score before	2	29	10	11	6.8	7	12
Score after	1	29	6	7.5	7.9	1	11
Control group							
Score before	1	18	10.5	9.2	4.6	3	12
Score after	1	18	11.5	10	4.7	3	13

In contrast, the control group's average score on the first test was 9.2 ± 4.6 ; however, it increased to 10 ± 4.7 after 6 weeks without exercise.

After 6 weeks of training, the study group achieved a cumulative score of 83 on the Oswestry Revised Low Back Pain Disability Scale Questionnaire, which was 37 points

lower than the pre-exercise score. The control group scored 120 after 6 weeks, 10 points higher than the first study.

The next step in the statistical analysis was to perform a Spearman rank correlation to determine whether muscle stabilisation training improves Oswestry Revised Low Back Pain Disability Scale Questionnaire values. The obtained value of $r = -3.9$ suggests a moderate negative correlation between exercise performance and questionnaire scores.

In the questionnaire on gynaecological complaints, subjects in the study group obtained a cumulative score of 16, while those in the control group obtained 19 points (Figure 2).

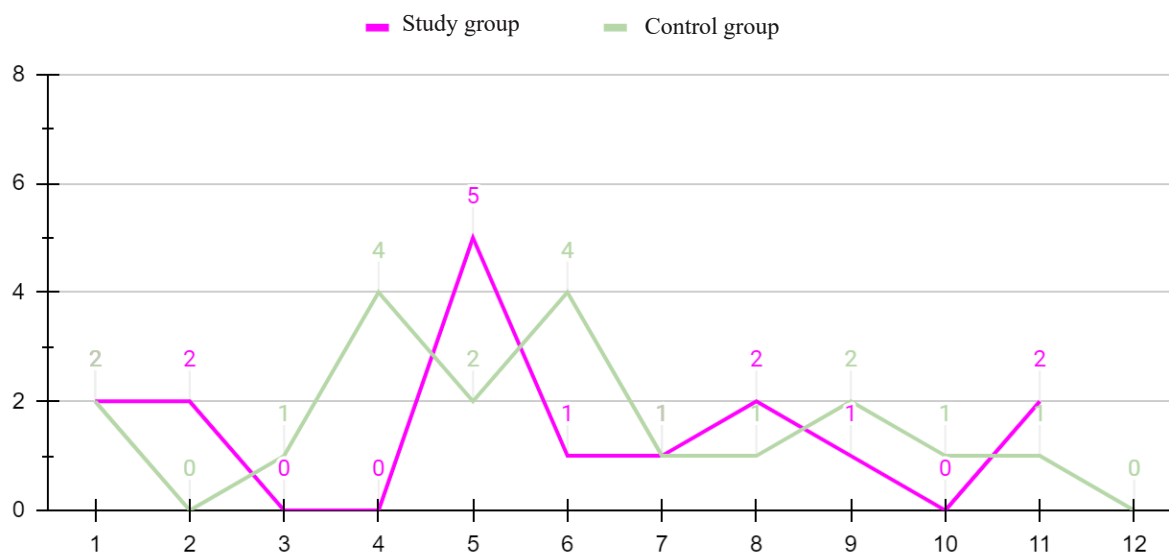


Figure 2. The score value of the obtained results of the questionnaire on gynaecological complaints in female riders before the commencement of the study

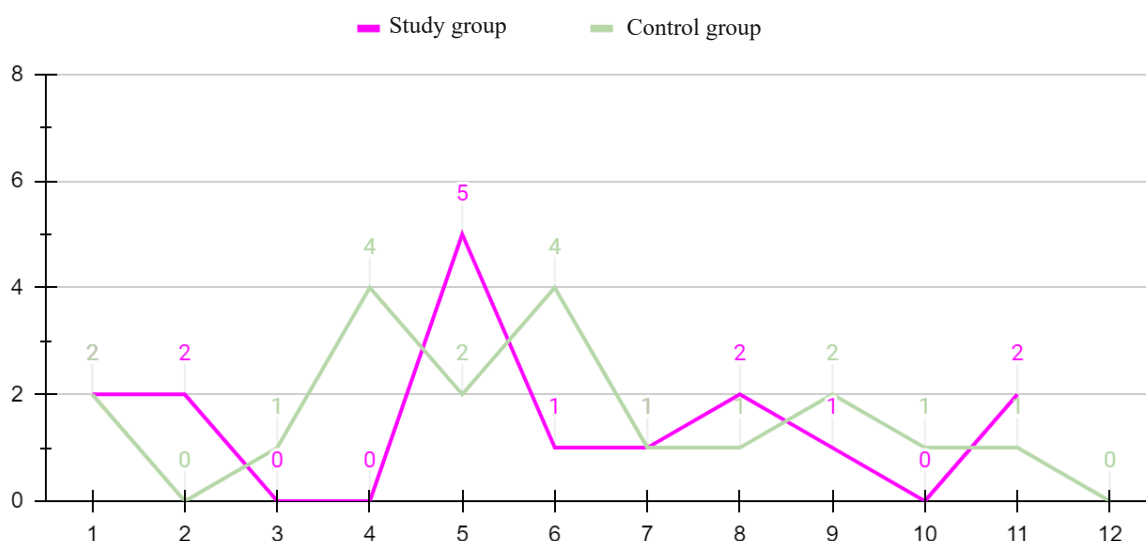


Figure 3. The score value of the obtained questionnaire results on gynaecological complaints in female horse riders after 6 weeks of training

In the study group, two participants reported a slight decrease in perceived gynaecological complaints, while no change was observed in the other subjects. In total, the subjects scored 14 points. The gynaecological complaints in the control group remained unchanged before training and after 6 weeks. The score value remained at 19 points (Figure 3).

Discussion

The complete elimination of susceptibility to injuries in equestrianism is unattainable due to the unpredictable nature of interactions with the animal. The study results indicate that training the lumbar spine stabilising muscles can reduce pain in this region in female horse riders. A reduction in lumbar back pain sensations was observed in the study group, with two women having an unchanged Oswestry Revised Low Back Pain Disability Scale score value. Similar results were observed among a group of hockey players, where three months of training reduced lumbar back pain [24]. Some sports, such as rowing, cross-country skiing, and basketball, are associated with a heightened risk of back pain [25]. Incorrect riding technique (where the horse and its rider move in a circle) leads to heightened tension on the rider's body along the inside of the trajectory [2]. According to current equestrian knowledge, the muscle tension on both sides should be the same [2]. Spinal injuries commonly involve injuries to the lumbar and thoracic regions, whereas cervical injuries are less prevalent [14]. Equestrianism poses the risk of degenerative changes in the spine due to repetitive overloading. This prompts consideration of whether physiotherapeutic treatments should be introduced as a permanent component to enhance riders' health [26]. Incorporating physiotherapy and balneoclimatology plays a vital role in managing pelvic pain in women [27, 28].

Studies have demonstrated that rider injuries can arise from structural damage and overload, potentially leading to chronic diseases. Early detection and treatment of rider injuries may contribute to alleviating bodily pain sensations [15]. Head and limb injuries are equally prevalent in equestrianism, alongside spinal injuries, and typically arise from falls while riding. Soft tissue injuries and fractures are the most prevalent injuries of the group mentioned above. Conversely, kicks and crushes most often result in injuries to the chest and abdomen. Falling from a horse is usually the primary cause of facial injury, whereas being kicked by a horse is the prevailing cause of facial fractures [14]. To effectively mitigate the risk of falling during horse riding, it is crucial to wear appropriate footwear and ensure proper saddle position while acknowledging that this sport inherently entails some unavoidable danger [13].

Unlike the correlation between stabilising muscle exercises and lumbar back pain, no significant changes were noted regarding gynaecological complaints in female horse riders. This could be attributed to the fact that, during riding, women engage the adductor muscles of the hips to maintain balance, leading to synergistic tension of the striated muscles of the urethral wall and the pelvic floor muscles [22]. As a result, horse riding can strengthen the pelvic floor muscles, thus reducing the risk of urinary incontinence in women [22].

Conclusions

The six-week training regimen targeting the stabilising muscles yields a favourable impact on alleviating lumbar spine pain. However, it exhibits a minimal effect on addressing gynaecological complaints experienced by female riders. This study is limited by the small sample size of the subjects and the short exercise time for the spinal stabilising muscles.

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