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An Epidemiological Study of Non-specific Low Back Pain in Non-professional Female Greek Classic Ballet Dancers

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Aim: Epidemiological study of the incidence of mechanical low back pain (LBP) in non-professional female Greek classic ballet dancers over a year and therapeutic interventions required to address symptoms.

Materials and methods: Forty-six female classic ballet dancers members of pre-professional schools, aged 16-37 years (mean 28.8 ±5.44 yrs) practicing and training in classic dance for 6-40 hours/week (mean 10.8±6.68) and 2-27 years experience (mean 11.9±4.20 yrs) participated in an epidemiological study concerning the incidence of LBP episodes within the last year, the treatment they received, as well as the period of absence of training and performance due to LBP. A self-administered questionnaire was employed. Information regarding incidence, duration, and intensity of mechanical low back pain was gathered as well as length of time away from practice or performance. A secondary aim was to investigate the type of conservative treatment that participants in this study received.

Results: Thirty-one (67.4%) participants in the study experienced 1-10 (mean 3.26±1.7) episodes of mechanical LBP in the previous 12 months. They had to refrain from dancing activities from 2 to 90 days (mean 16.9±16.22). Twenty one of the participants received some kind of conservative treatment.

Conclusion: The incidence of LBP was found to be high among Greek amateur classic ballet dancers resulting in absence from dancing activities for a considerable length of time and raising the need for therapeutic intervention for a considerable percentage of the studied population. Effective prevention strategies of LBP are of vital importance, particularly in younger dancers.

BACKGROUND

Dance is a physically and technically demanding activity which causes a significant number of injuries¹⁻⁷ primarily focused on the lower limbs and lower spinal column^{4,8}. In ballet, these injuries of the musculoskeletal system are classified into two injury patterns according to their pathophysiology. Traumatic injuries present with an acute onset of pain following a defined trauma and a well-defined macrotraumatic factor whilst the most frequent among professional and amateur dancers overuse injuries

are attributed to a chronic non-traumatic processes which are not linked to a specific traumatic event.^{3,9,10}

Overuse injuries are microtraumatic damages of the soft tissues which sustain repetitive stress forces without having the appropriate healing time. According to Meeuwisse et al., trauma reoccurs due to the inability of a tissue to absorb properly the loads and adapt to them.¹¹ The classic ballet is a particularly challenging type of dance with increased technical requirements.^{10,12} During both dance and training activities dancers submit their bodies to

excessive strain and their joints to extreme range of motion (ROM).¹²

Mechanical low back pain is a common overuse manifestation affecting dancers.^{3-6,13} Back injuries account for 10% to 23% of the injuries occurring in the back.¹⁴ The low back is the third or fourth most common site of injury in pre-professional and professional dance.¹² In a cohort of chronic injuries in a sample of professional dancers, 86% of whom were less than 30 years old, spine represented the injury location of 34% of these lesions.¹⁵ In another study including preprofessional theatrical dance students the incidence of spinal injuries was as high as 18%.¹⁶

In Greece, although dealing with dance is a popular recreational activity, the existing evidence about incidence of non-specific low back pain in female non-professional classic ballet dancers is sparse.²⁰ In this survey we studied the incidence of LBP in a group of young Greek female ballet dancers over a year. To the best of our knowledge, this is the first study conducted with the purpose of investigating incidence and duration of LBP manifestations, degree of pain that led to abstaining from training and performance and need for medical consulting as well as the type of conservative treatment necessary in this certain ethnic group within the last year.

MATERIALS AND METHODS

EXPERIENCE OF LOW BACK PAIN

Forty-six young female Greek classic ballet dancers, aged 16-37 years (mean age 28.8 ± 5.44 yrs), were recruited from amateur dance schools offering ballet dance programs. These subjects that were dealing with the classic dancing for 6-40 hours/week (mean 10.8 ± 6.68) and had 2-27 years of dancing experience (mean 11.9 ± 4.20) participated in an epidemiological study regarding the incidence of low back pain over the last twelve months (**Table 1**).

For the evaluation of such problems a questionnaire, described elsewhere previously, recording

similar problems has been utilised.¹⁵ The questionnaire included questions regarding hours per week training and years of experience. Number of attacks of non-specific low back pain was also recorded within the year, intensity of pain and days of absence from training. The intensity of low back pain episodes was recorded and whether participants seek medical consultation and if so the selected intervention. All the ballet dancers were informed about the procedure prior to the completion of the questionnaires and gave their written consent for inclusion in the study. The questionnaire was completed by the participants in this study after signing a written consent form in order to make an evaluation of the dancers' LBP problems.

Dancers were considered to participate in this survey if they devoted a minimum of six hours per week to dance.¹⁵

Exclusion criteria were acute spinal trauma as well as any spinal surgery over the last 12 months. Moreover, subjects with depression and/or other psychiatric conditions under medical treatment, addictions, and litigation issues considered to affect judgment of the participants were excluded from the study.

Date regarding whether participants in this study received any treatment, the kind of this treatment, refraining from dancing activities due to LBP and the duration of drop out were recorded.

RESULTS

Thirty-one (67.4%) participants in the study experienced 1-10 (mean 3.26) episodes of low back pain during the last twelve months and were forced due to this pathology to avoid their participation in dance from 2-90 days (mean 16.84). The dancers reported that the intensity of the pain ranged from 20-90 in accordance with the sliding scale evaluation of pain¹⁷ with mean value as high as 63.

Medical consulting was sought out by a total of 24 dancers (52.2%) while 21 (45.7%) of them received conservative treatment. Specifically, 16

Table 1. Demographics - experience of LBP

n	Gender	Age \pm 5.44 (yrs)	Mean Age (yrs)	Dancing Training	Dancing Experience
46	F:46	16-37	28.8	6-40 hours/week (mean 10.8 ± 6.68)	2-27 yrs (mean 11.9 ± 4.20)

n = number of participants; F = female

(76.2%) of them received medication for 5-15 days with anti-inflammatory or muscle relaxants. The remaining 5 (23.8%) dancers were advised only to rest and were prescribed no medication. Twelve (57.2%) subjects submitted additionally to other treatments except medication. Five (41.6%) of them more specifically received physiotherapy, 3 (25%) - acupuncture, 2 (16.7%) - manual therapy and 2 (16.7%) participants were given 1 or 2 lumbar epidural corticoid injections (**Table 2**).

Table 2. Treatment (medication not included)

Physiotherapy	5 (41.6%)
Acupuncture	3 (25.0%)
Manual therapy	2 (16.7%)
Lumbar epidural corticoid injections	2 (16.7%)
Total	12 (100%)

It is noteworthy that 10 (66.7%) of the remaining 15 dancers who had not experienced low back pain in the previous year, reported one or more episodes of pain arising from the spine in the past years.

DISCUSSION

A proportion of non-professional classic ballet dancers as high as 67% presents to have one or more incidents of mechanical back pain within one year. This finding confirms previously published studies showing that those practising the art of dance had a significantly high frequency of non-specific lower-back pain which is reported mostly in pre-professional and professional dancers contrary to this study where the selected sample consisted of non-professional classic ballet dancers.^{3-5,12,14,15,18,19} In a recent study including 31 Greek professional ballet dancers, 20 of whom were female, and in which the prevalence of musculoskeletal disorders was recorded, over the year, low back pain was shown to be the most frequent area of pain or discomfort in female participants²⁰ up to 70%). In another study including 110 pre-professional and professional dancers, by Swain et al.¹², high percentages in low back pain were reported. The authors of this study recorded a 74% lifetime prevalence of LBP while point and 12 month prevalence were 24 and 64%, respectively. In two studies regarding professional dancers in Sweden the proportion of dancers reporting LBP in the past 12 months was 7%¹⁸ and 82%¹⁹, respectively. On the contrary, in

the study by McMeeken et al., which included a population similar to that participating in our study, the incidence of low back pain in young male and female Australian students over a year was lower than the one reported in this study (3% in female and 47% in male dancers).¹⁵

A concept providing a rationale for these results may be that static repeating cyclic motion of spine flexion and extension as well as the associated repeated stretch of the various viscoelastic tissues such as ligaments and other anatomic structures contribute to establishing cumulative lumbar disorder, which is regarded as one of several types of nonspecific low back pain.²¹ Dancers participate in repeated activities while it has been postulated that dancers are characterized by frequently underestimated anatomic variations which potentially predispose to the appearance overuse such as non specific low back pain.²²

A large number of dancers shows also increased lumbar lordosis which is attributed to extreme ranges of motion required during dancing.²³ This deformation has been associated with increased incidence of spondylolysis and lower-back pain.²⁴

Ballet dancers, as well as people involved in other sports which require repetitive hyperextension of the spine, show greater frequency of spondylolysis.²⁵ Female ballet dancer proved to be more prone to lumbar spondylolysis in comparison with the typical non-athletic population.^{13,22}

Turnout is another factor that is implicated in the appearance of LBP in classical dance. Ballet turnout refers to the outward rotation of the lower limbs which is a crucial component in all 5 basic ballet cellar of the feet.²⁶ Despite the fact that lower extremities should seem as independent kinetic entities as regards pelvic and core movement, it has been clarified that the aforementioned anatomical areas are interrelated.²⁷ Turnout as a position causes great load imbalances in sagittal plane of the thoracic and the lumbar spine that cumulatively cause LBP as an end result. Regarding turnout and its result in pelvic alignment through biokinetic chains, it is reported that anterior pelvic tilt and concomitant decreased tension on the Y ligament are associated with technically incorrect turnout due to poor muscle coordination.²⁸

Another important finding in this study is the fact that LBP problems kept the participants in the study far from dancing activities, training or performance for a significant number of days during the time of a year. The present study confirms

that low back problems are the major causes of activity restriction.⁵

Virtually half of the dancers sought medical consultation and a similar percentage approximately equal with half of the dancers who participated in the study received several types of conservative treatment. The majority of them underwent a physiotherapy program for the rehabilitation of these injuries. As noted in the literature from the Ramel et al. dancers as a population sustain the privilege to train while suffering traumatic pathologies, without being in quest of medical help.¹⁸ The reduced rate at which the dancers sought medical assistance is consistent with findings from previous studies which suggest that in general the soft tissue lesions are not often taken seriously by dancers and their trainees, a fact that can prove harmful in the long run as regards a dancer's career.²⁹

For a period of time the participants in the study were obliged to refrain from dance activities because of problems from their vertebral column and particularly their low back. This percentage could be even greater if it was taken into consideration that often they consider their trauma healed, a fact that does not correspond with the real rehabilitation parameters.³⁰

According to the results of this study, it is obvious that not all dancers received some kind of treatment. The largest percentage of patients submitted to treatment followed a physical therapy program, a fact entirely in accordance with the generally accepted practice that propose conservative approach as the preferable one for non-specific LBP.¹⁴

This study has several limitations. Mechanical low back pain is an extremely common problem which affects general population and is most probable to affect anyone within his/her lifetime.³¹⁻³³ It is reported that one year incidence of any episode of low back pain range between 1.5% and 36%.³¹ This study took place with a relatively small sample, quite heterogenous in age. Furthermore, there was no control group and no comparison to other ethnic groups took place. Additional double blind studies including ethnic groups are required so as to reach more general and safe conclusions on mechanical low back pain (LBP) incidence in non-professional female Greek classic ballet dancers. In the present study, nutritional factors and energy expenditure during training were not taken into account, which may have affected low back pain prevalence. According to a study that investigated Greek ballet, jazz, and contemporary dance student

dancers, exercise expenditure differs across types of dance and inadequate energy intake is another variable.³⁴ Additional research that will record and investigate the role of nutrition and type of exercise within Greek dancers and other ethnic groups may lead to further information regarding incidence of low back pain in amateur ballet dancers.

CONCLUSION

Dance is a technically and physically demanding recreational art associated with high levels of loads applied to the vertebral column and increased incidence of non specific low back pain.^{1,4,15,20} The present study confirmed that mechanical low back pain is a frequent overuse injury which stresses the dancer's general health status and leads to absence from the dance activities in young non-professional Greek ballet dancers. Young dancers experience growth-related overuse injuries which may be the cause of long lasting chronic musculoskeletal disorders.^{2,6,12} As young dancers and especially women are a population group with an increased risk of non specific LBP as well as other musculoskeletal injuries during their training they deserve special attention for the early detection of this ailment and the prevention of future hazardous career consequences for them.^{3,35}

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Эпидемиологическое исследование неспецифической боли в пояснице у непрофессиональных балерин греческого происхождения

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Цель: Эпидемиологическое исследование частоты проявления механических болей в пояснице (БП) у непрофессиональных балерин греческого происхождения в течение более одного года и методов лечения, применяемых для устранения симптомов.

Материалы и методы: Сорок шесть балерин из непрофессиональных школ классического балета в возрасте 16-37 лет (в среднем $28,8 \pm 5,44$ года), занимающихся и обучающихся в области классического танца в течение 6-40 часов в неделю (в среднем $10,8 \pm 6,68$) и на протяжении 2 - 27-лет (в среднем $11,9 \pm 4,20$ лет) участвовали в эпидемиологическом исследовании относительно проявления приступов БП в течение последнего года, проведенного лечения, а также продолжительности перерыва в тренировках и участиях из-за БП. Была использована анкета с самостоятельным заполнением. Была собрана информация о частоте, продолжительности и интенсивности механических болей в пояснице, а также о продолжительности времени перерывов в тренировках и участиях. Вторая цель заключалась в том, чтобы исследовать тип консервативного лечения, которое участники этого исследования получили.

Результаты: Тридцать один (67,4%) участник исследования испытал 1-10 (в среднем $3,26 \pm 1,7$) приступов механической БП за последние 12 месяцев. Им пришлось воздерживаться от танцевальной деятельности в течение периода от 2 до 90 дней (в среднем $16,9 \pm 16,22$). Двадцать один из участников получил ту или иную форму консервативного лечения.

Заключение: Частота БП оказалась высокой среди непрофессиональных балерин классического балета греческого происхождения, что приводит к перерыву в танцевальной деятельности на длительный период времени и к необходимости терапевтического вмешательства для большей части исследованной группы. Эффективные стратегии профилактики БП имеют жизненно важное значение, особенно среди молодых танцовщиц.