Painful symptoms and associated factors in professional dancers*

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ABSTRACT

Painful symptoms in sports and dancing have been object of increasing research over the last years. Professional dancers as well as sports professionals present high pain and tolerance thresholds, being common to find dancers with several injuries derived from excessive effort. The aim of this study was to investigate the prevalence and factors associated with painful symptoms in professional dancers. An analytical study of transversal cut was conducted in 141 professional dancers performing in the main capitals of the Brazilian northeast. For evaluation of the painful symptoms, versions validated for Portuguese of the McGill Protocol and the Pain Inventory of Wisconsin were used. For the statistical analysis of results, a descriptive analysis followed by the t-Student and Pearson correlation tests was used, being considered a value of $p < 0.05$. High levels of pain tolerance were observed in 70.2% of the subjects, where the intensity varied from moderate to severe. Pain in the lumbar region was present in 85.8% of the interviewees. Positive correlations were observed between the degree of pain intensity with daily life activities, sleep, mood and personal relationship. The present study found high prevalence of pain in professional dancers performing in the main northeastern capitals, where the region most recurrent was the lumbar, observing great interference of painful symptoms in several activities of personal life as well as work of this population.

INTRODUCTION

Pain is a word with the Latin origin, ôrem, defined by Baez, Corona and Estañol[1] as an intangible, invisible and immeasurable phenomenon. According to Teixeira[2] it is a response which alerts individuals about the occurrence of alterations in the body's integrity or functionality, allowing hence that defense or escapism mechanisms are adopted. In 1986, the *International Association for Study of Pain* (IASP) proposed the following definition for pain: "It is an unpleasant sensory and emotional experience we associate to tissue lesion or describe in terms of such lesion"[3-4].

Painful experience in sport and dance has been object of growing research lately. Sports professionals and dancers as well present high pain and pain thresholds[5], being common to find this kind of athlete with several injuries derived from excessive exertion[6].

Many factors are related to the appearance and frequency of trauma in dance or dance-related physical activity. However, muscular fatigue caused by excessive physical activity, especially at

seasons close to shows and competitions added to classes and rehearsals, seems to be one of the main triggering factors and many times, what makes injury even more serious functionally speaking[7].

The use of tests and scales which can enable the quantification of perceived pain in professional dancers may be extremely useful in the evaluation of the impact of analgesic process in their performance. The data collected through these instruments, besides characterizing the frequency of pain, also enables us to estimate the consequences derived from painful symptomatology in daily routine as well as the development of labor activities of this population.

Deeper knowledge about the prevalence of pain among dance professionals, about factors associated to the analgesic panorama, as well as its development in daily life will allow the planning of new ways of prevention and treatment, where within a multi-disciplinary focus, physical therapy would play an important role. Thus, this study had as aim to investigate the prevalence and factors associated to painful symptomatology in professional ballet dancers.

METHODS

The research's population consisted of professional ballet dancers, being the sample consisted of 141 professional dancers acting in the cities of Natal-RN, Recife-PE and Salvador-BA; being members of professional dance companies present in each region. Dancers who were not in the investigated city during data collection period were excluded from the research.

This work's proposal was approved by the Commission on Bioethics of the Federal University of Rio Grande do Norte (UFRN). All procedures were performed and after approval and authorization from the dance companies' responsible staff (directors) as well as analyzed dancers, the data collection was initiated.

An interview was used as research technique based on the application of a structured questionnaire. The questionnaire consisted of open and closed questions based on material found and questions which were more relevant to the considered object. Data concerning specific personal, clinical and labor aspects of the dancers were argued, including a protocol and a pain inventory respectively proposed by McGill[8] and Wisconsin[9], which were adapted by the investigators.

In the first part of the questionnaire the identification data of the interviewee is found, followed by aspects related to dancing and practice of extra-labor activities.

The third part consists of the McGill's protocol[8] which consists of a table with body regions distribution and these related to pain degree scales. The scales range from zero to 10, where "zero" means lack of pain; "one, two or three", a visible painful sensation; "four, five and six", moderate pain; "seven and eight", severe pain and "nine and ten", the worst pain ever. In this phase of the questionnaire, the interviewees were told to check in each

scale the pain intensity present in each corresponding body region. The answers were considered as continuous data in a zero to ten scale for analysis. Moreover, the McGill's protocol had the drawing of a human figure facing front and back, so that the individuals could better identify the site of their pain.

The other two following parts used the Wisconsin pain inventory[9], in which number scales from 0 to 10 are also found (where zero means lack of pain and 10 the worst pain ever), which evaluated the general pain intensity and its consequences in labor life and extra-labor life of the interviewees. Concerning this aspect, the dancers were firstly asked about general intensity of their pain and later oriented to check in each corresponding scale how this pain would interfere in their daily tasks such as; "general activities", which include the basic activities of daily life (get dressed, eat, personal care and hygiene); "dancing" (labor activity which they do as dance professionals), "sleeping" (sleep quality), "mood" (emotional well-being), "gait" (walking ability) and "relationships with other people" (personal relationships). The answers were also considered as continuous data in a zero to 10 scale for the analysis.

Still in this part, aspects concerning painful symptomatology such as periods of dance-related activities in which pain was more present as well as concerning pain treatment were observed. The last part was related to data concerning injuries, such as type, site and number of times they are recurrent.

The results were then analyzed through the SPSS (version 10.0) statistical program and Statistica 5.0 (Stat Soft Inc). Initially, a descriptive analysis of the distribution of absolute and relative frequencies was performed. Later, the Kolmogorov-Smirnov (K-S), Lilliefors and Shapiro-Wilks tests (W) were conducted for data analysis in order to observe whether the variables pain in lumbar region; knees; neck; hips and feet were normally distributed in the sample. Afterwards, the t-Student test was used with the purpose to compare the means of the continuous variables. Finally, the Person Correlation test was conducted in order to analyze possible existing correlations between pain and the remaining variables considered independent. All statistical analysis was conducted having a $p < 0.05$ value.

RESULTS

The sample consisted of 141 professional dancers; 56.7% female and 43.3% male, age range of 26.1 years (± 6.1). The age mean of dancing beginning, dancing time, professional life time as well as weekly time dedicated to dance were respectively: 13.2 years (± 5.8); 12.9 years (± 7.6); 6.8 years (± 5.7) and 21.8 hours (± 8.8). It was also observed that 58.1% of professionals performed other physical activity and dedicated an average of 3.6 weekly hours (± 4.5) to this practice.

It was possible to detect through the pain evaluation protocol[8], the most affected sites through painful symptomatology in professional ballet dancers. According to the findings, the lumbar region was the most mentioned, being present in 121 (85.8%) of the interviewees, followed by the knees, neck, hips and feet (board 1).

BOARD 1
Frequency distribution of the sample according to pain site

Pain occurrence	Absolute frequency	Relative frequency
Lumbar	121	85,8
Right knee	84	59,6
Left knee	84	59,6
Neck	78	53,3
Right hip	52	36,9
Left hip	58	41,1
Right foot	57	40,4
Left foot	52	36,9

Through the Pain Inventory proposed by Wisconsin[9], it was possible to evaluate pain general intensity as well as how such pain would interfere in the daily and labor tasks of the dancers. According to the findings, it was observed: remarkably high levels of pain; moderate to severe intensity in 70.2% of the sample's individuals and pain presence with significant intensity in some ballet dancers daily tasks, especially in their own labor practice, in which 60.3% mentioned moderate to severe pain (graph 1).
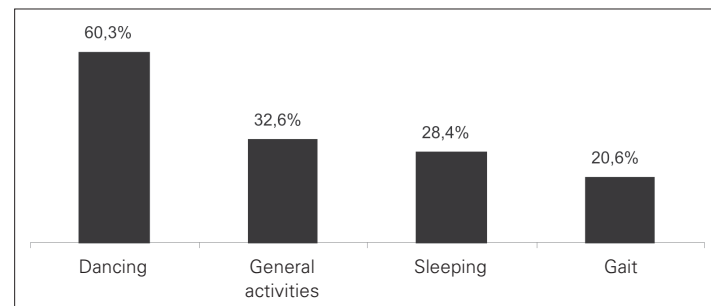
Graph 1 – *Distribution of frequencies according to presence of pain of significant intensity in daily tasks of ballet dancers*

The Pearson Correlation test enabled us to observe positive correlations ($p < 0.05$) between neck pain and age at dancing beginning ($r = 0,16$); lumbar pain and the dancing ($r = 0.23$); sleep ($r = 0.32$); mood ($r = 0.19$) and personal relationships variables ($r = 0.18$); knee pain and dancing ($r = 0.23$); neck pain and sleep ($r = 0.25$) and mood variables ($r = 0.17$) and feet pain and dancing ($r = 0.20$) and mood variables ($r = 0.27$) (tables 1 and 2).

TABLE 1
Correlation between pain intensity variables and routine labor variables

Variables	Age at dancing beginning	Dancing time	Professionalization time	Weekly time dedicated to dance
Lumbar pain	r = 0.06 p = 0.47	r = −0.04 p = 0.62	r = 0.01 p = 0.85	r = −0.14 p = 0.09
Knees pain	r = 0.07 p = 0.40	r = −0.08 p = 0.33	r = 0.01 p = 0.85	r = −0.10 p = 0.20
Neck pain	r = 0.16* p = 0.04	r = −0.06 p = 0.47	r = 0.06 p = 0.45	r = 0.07 p = 0.38
Hips pain	r = 0.02 p = 0.81	r = −0.09 p = 0.28	r = 0.04 p = 0.59	r = −0.04 p = 0.60
Feet pain	r = 0.05 p = 0.55	r = −0.01 p = 0.82	r = 0.008 p = 0.92	r = −0.02 p = 0.78

* $p < 0.05$.

TABLE 2
Correlation (r and p values) between pain intensity variables and labor and extra-labor variables of the interviewees

Variables	Dancing	General activities	Sleeping	Mood	Gait	Personal relationships
Lumbar pain	r = 0.23* p = 0.005	r = 0.07 p = 0.36	r = 0.32* p = 0.001	r = 0.19* p = 0.02	r = 0.02 p = 0.81	r = 0.18* p = 0.02
Knee pain	r = 0.23* p = 0.005	r = 0.13 p = 0.12	r = 0.16 p = 0.05	r = 0.04 p = 0.59	r = 0.01 p = 0.83	r = −0.14 p = 0.09
Neck pain	r = 0.06 p = 0.48	r = 0.06 p = 0.48	r = 0.25* p = 0.02	r = 0.17* p = 0.04	r = −0.05 p = 0.54	r = 0.10 p = 0.22
Hips pain	r = 0.12 p = 0.12	r = 0.10 p = 0.23	r = 0.09 p = 0.25	r = 0.02 p = 0.79	r = 0.08 p = 0.31	r = −0.004 p = 0.96
Feet pain	r = 0.20* p = 0.01	r = 0.06 p = 0.43	r = 0.15 p = 0.06	r = 0.27* p = 0.001	r = 0.10 p = 0.20	r = 0.09 p = 0.26

* $p < 0.05$.

DISCUSSION

The justification for the choice of a transversal study of analytical character in the studied population of professional ballet dancers is initially based on the need for an evaluation of variables concerning pain in this sample. Such choice would also favor the analysis of the associated factors to it in this population.

Professional dance companies existing in the cities of Natal-RN, Recife-PE and Salvador-BA were chosen for the sample's selection. Dancers who were not in their respective city during the data collection period did, did not have permanent link with the dance company and the ones who had any physical or mental disability which could mask the results were excluded.

The interview was used as research technique for the data collection of the study, based on the application of a structured questionnaire. Despite the systematization in the structure and application of the questionnaire, the data collection is exposed to systematic errors or vices. These systematic errors move together in any direction, moving the differences observed in the real systematic study closer or further, either in the sample population or not. In the present study, we can consider that the possibility of occurrence of diversion of selection was minimized once all the professional ballet dancers of the selected companies were interviewed, which enabled a deeper analysis of the prevalence of painful symptomatology in this group.

The interview technique may be affected by possible data vices derived from the subjects of the study, as well as in the control of the interrogation of the interviewers to avoid influence in the interviewees answer. Therefore, a previous training for the questionnaire application was conducted, followed by a pilot study with a small amount of the sample, which guaranteed the reliability of the collected data.

According to the presented results, it was observed that from the 141 professional dancers included in the sample, 56.7% were female. This almost balanced proportion between men and women is reflected in the current tendency of higher interest and participation of the male sex in dancing. Currently, more men and at lower ages start dancing, due to greater stimuli and lower prejudice from supporting institutions and general population.

The studied subjects present mean age of 26.1 years, not being observed difference between sexes. They also dedicate an average of 21.8 weekly hours (± 8.8) to dancing practice. Since dancing is an activity which involves a great deal of physical exertion, its excess is directly related to pain and injury occurrence. In a study about injuries conducted in a Sweden professional ballet company for five consecutive years, 390 injuries in 98 dancers were stated, that is, 0.6 injuries/1000 dancing hours, being the greatest part of injuries related to excessive activities[10].

According to Firette[7] some characteristic aspects of movements performed in dancing which lead to trauma are directly related to the developed training, as well as the demands of choreographic works. Moreover, 51.8% of the sample performed another physical activity, using 3.6 weekly hours (± 4.5) with this practice, which in a certain way, increased even more the physical exertion time and, as Moya states[11], general exercises, such as body building are not recommended to dancers, since they develop in a short time undesirable muscular atrophy for the dance aesthetics. According to the same author, this practice may be substituted for methods of body fitness.

According to Tarjet-Foxell and Rose[5], dancing professionals present all the problems from a vigorous athlete, among them high pain level, as has been observed in the performed study, where 70.2% of the subjects presented pain intensity ranging from moderate to severe. Moreover, personal, economical, psychological and physical factors increase stress in dancers, which may lead to pain increase and consequently risk of injuries. According to Kelman[12], it was observed that dancers present pain especially on the feet,

ankles, hips and back and that the consequent fear of injuries is current among this group once they can cause a permanent incapability and the end of their career as dancers.

Other studies revealed similar results to the ones found in this study, which evidenced greater occurrence of lumbar pain (85.8%), followed by knees (59.6%), and neck (53.3%). In one of them, conducted by Ramel and Moritz[13], who observed 147 dance professionals from the three biggest Sweden dance companies, it was revealed that back pain was the site of most recurrent complaints (70%), followed by knees and feet (60%) and neck (54%).

Some authors[14-15] still suggest that the increased number of dancers with pain and injuries in the lumbar region and lower extremities partly occurs due to the classic position of ballet, in which the lower limbs are in extreme external rotation; rest in the toes extremities at pointe position or at balancing with feet at half pointe. Besides that, ballet's natural repetitions; muscle-tendons imbalances, bad anatomic aligning of lower extremities; use of slippers; floor surface and long hours spent in rehearsals cause injuries due to repetitive exertion.

It was also observed in the study that pain presented significant influence in labor practice of the sample, being present in 60.3% of it, with moderate to severe intensity. Such factor was even more significant in the season of shows building, being present in 50.4% of the interviewees since they are more prone to higher physical and emotional stress, which consequently favors the occurrence of pain and injuries.

The studies conducted by Nah and Morris[16] and Wainwright, Williams and Turner[17] state there are significant evidences that psychological interventions may decrease damage in dancing and sports as well, and that when intervention programs are designed in order to reduce injuries in dancers, physicians should identify the psycho-social factors which are involved with injury risk perceived by the artists.

According to the statistical analysis performed (Pearson Correlation Test), positive correlations were observed ($p < 0.05$) between neck pain and age at dancing beginning ($r = 0.16$); lumbar pain and dancing ($r = 0.23$); sleep ($r = 0.32$); mood ($r = 0.19$) and personal relationships variables ($r = 0.18$); knees pain and dancing ($r = 0.23$); neck pain and sleep ($r = 0.25$) and mood variables ($r = 0.17$) and feet pain and dancing ($r = 0.20$) and mood variables ($r = 0.27$).

It was observed hence that painful symptomatology significantly interferes in the labor activities and daily life of the studied population; harming their performance once they use their bodies as a work tool and need their good functioning.

Therefore, the obtained results enabled us to answer a great part of the initial questionings and to clarify issues concerning the possible generalization of the results to other possible studies about pain in dance professionals. Moreover, it also enables us to establish detailed implications on its main implications in future research concerning consequent life quality improvement of these professionals.

Although there are some considerations concerning the number of studied subjects, we deduct that it is possible to transfer our results to other professional dancers populations from cities of other regions of the country, once the studied population is similar in anthropometrical and professional characteristics view point. We also thought that the extrapolation of our data may be considered once measures were taken during data collection in order to reduce the probability of measurement vices which could affect the internal validity of our study.

Nevertheless, due to the great importance of the topic, which is the case of painful symptomatology, there is a need for further and deeper studies with larger populations which would allow more precise evaluation and estimation of the impact of pain in professional dancers.

Due to the high prevalence and intensity of pain in dancers observed with the results, the application of physical therapy inter-

vention programs is crucial, both as prevention and rehabilitation. Such procedure would improve professionals' performance and life quality with the application of specific cinesiotherapeutic techniques which would be directed to this special group of athletes which are ballet dancers.

All the authors declared there is not any potential conflict of interests regarding this article.

REFERENCES

1. Baez BR, Corona T, Estañol B. Fisiopatología del dolor. Revista Medica: Instituto Mexicano del Seguro Social. México. 1990;8(3/4):121-4.

2. Teixeira MJ. Dor oncológica. Revista de Medicina. São Paulo. 1997;76(1):1-86.

3. Kanner R. Segredos em clínica da dor: respostas necessárias ao dia-a-dia em rounds, na clínica, em exames orais e escritos. Porto Alegre: Artmed; 1998.

4. Teixeira MJ, Figueiró JAB. Dor: epidemiologia, fisiopatologia, avaliação, síndromes dolorosas e tratamento. São Paulo (SP): Grupo Editorial Moreira JR; 2001.

5. Tajet-Foxell B, Rose FD. Pain and pain tolerance in professional ballet dancers. Br J Sports Med. 2002;29(1):31-4.

6. McCormack M, Briggs J, Hakin A, Grahame R. Join laxity and benign hypermobility syndrome in student and professional ballet dancers. J Rheumatol. 2004;31(1): 173-8.

7. Firetti P. Traumatismos na dança. Você e a dança. São Paulo, 1999;19(3):24-5.

8. Pimenta CAM, Teixeira MJ. Questionário de Dor de McGill: proposta de adaptação para língua portuguesa. Revista Brasileira de Anestesiologia. 1997;47(2):177-86.

9. Pimenta CAM, Teixeira MJ, Côrreia CF. 1º Estudo master da dor: fisiologia, fisiopatologia, aspectos psicossociais, escalas de avaliação e epidemiologia. São Paulo: Limay, Crems, Sbed; 1994.

10. Nilsson C, Leanderson J, Wykman A, Strender LE. The injury panorama in a Swedish professional ballet company. Knee Surg Sports Traumatol Artrosc. 2001;9(4): 242-6.

11. Moya JR. A importância da preparação física dos bailarinos. Você e a dança. São Paulo, 1999;19(3):24.

12. Kelman BB. Occupational hazards in female ballet dancers. Advocate for a forgotten population. AAOHN J. 2000;48(9):430-4.

13. Ramel E, Moritz U. Self-reported musculoskeletal pain and discomfort in professional ballet dancers in Sweden. Scand J Rehabil Med. 1994;26(1):11-6.

14. Coplan JA. Ballet dancer's tournout and its relationship to self-reported injury. J Orthop Sports Phys Ther. 2002;32(11):579-84.

15. Hillier JC, Peace K, Hulme A, Healy JC. Pictorial review: MRI features of foot and ankle injuries in ballet dancers. Br J Radiol. 2004;77(918):532-7.

16. Noh YE, Morris T. Designing research-based interventions for the prevention of injury in dance. Medical Problems of Performing Artists. 2004;19(2):82-9.

17. Wainwright SP, Williams C, Turner BS. Fractured identities: injury and the balletic body. Health. 2005;9(1):49-66.