ORIGINAL ARTICLE

Evaluation of physiologic pain knowledge by physiotherapy students

Avaliação do conhecimento fisiológico da dor de estudantes de fisioterapia

Elen Soares Marques[1,2], Thiago Xarles[3], Thuany Medeiros Antunes[3], Karla Kristine Dames da Silva[3], Felipe José Jandre Reis[3,4], Laura Alice Santos de Oliveira[2,3], Leandro Alberto Calazans Nogueira[2,3]

DOI 10.5935/1806-0013.20160008

ABSTRACT

BACKGROUND AND OBJECTIVES: Pain is a severe world health problem, making its management a challenge for health professionals. The study of pain has been superficially addressed during health professionals' qualification, reflecting in ineffective clinical practices. This study aimed at evaluating the level of neurophysiologic pain knowledge of physiotherapy students after using active teaching-learning strategies to address the subject.

METHODS: This was an uncontrolled experimental study with 14 students of the fifth period of the Physiotherapy course. During the school year, pain neurophysiology teaching was based on active teaching-learning strategies, focused on problems and practical application of possible solutions by students. Neurophysiologic Pain Questionnaire was used to evaluate pain neurophysiology knowledge before and after the discipline.

RESULTS: There has been significant improvement (p=0.002) in the number of right answers to the Neurophysiologic Pain Questionnaire at intervention completion as compared to baseline evaluation.

CONCLUSION: Physiotherapy students have improved their knowledge about pain neurophysiology with the use of active teaching-learning strategies.

Keywords: Active learning, College education, Educational evaluation, Pain, Physiotherapy.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A dor é um grave problema mundial de saúde, tornando o gerenciamento dessa condição um desafio para os profissionais de saúde. O estudo da dor tem sido abordado de maneira superficial durante o processo de formação desses profissionais, refletindo-se em práticas clínicas ineficazes. O objetivo deste estudo foi avaliar o grau do conhecimento neurofisiológico da dor de estudantes de fisioterapia, após serem utilizadas estratégias ativas de ensino-aprendizagem na abordagem do tema.

MÉTODOS: Foi conduzido um estudo experimental não controlado com 14 estudantes do quinto período do curso de Fisioterapia. Durante o período letivo, o aprendizado da neurofisiologia da dor foi baseado em estratégias ativas de ensino-aprendizagem, com foco problematizador e aplicação prática das possíveis soluções por parte dos estudantes. O Questionário Neurofisiológico da Dor foi utilizado para avaliar o conhecimento da neurofisiologia da dor, antes e após o curso da disciplina.

RESULTADOS: Foi observada melhora significativa (p=0,002) do percentual de acertos no Questionário Neurofisiológico da Dor final da intervenção quando comprado à avaliação inicial.

CONCLUSÃO: Os alunos de fisioterapia obtiveram melhora do conhecimento neurofisiológico da dor com a utilização de estratégias ativas de ensino-aprendizagem.

Descritores: Aprendizagem ativa, Avaliação educacional, Dor, Educação superior, Fisioterapia.

INTRODUCTION

Pain may be considered a major health problem, representing 70% of emergency assistance and one third of medical consultations[1]. Musculoskeletal disorders (MSD) correspond to approximately 80% of outpatient physiotherapeutic services consultations being pain the most prevalent complaint[2]. MSD is the second most common condition contributing for years lived with incapacity, being second only to mental and behavioral disorders. Among musculoskeletal disorders, lumbar and cervical pain are the second and the fourth, respectively[3]. Chronic pain is classified as pain persisting beyond normal tissue healing time, lasting more than three months and without apparent biological value[1]. Considered a worldwide public health problem, chronic pain affects approximately 60 million people, corresponding to 10% of the world population[4,5].

Scarce knowledge about pain mechanisms, as well as its inadequate management, may generate major human resources

1. Faculdade de Ciências Médicas e da Saúde, Juiz de Fora, MG, Brasil.
2. Centro Universitário Augusto Motta, Mestrado em Ciências da Reabilitação, Rio de Janeiro, RJ, Brasil.
3. Instituto Federal do Rio de Janeiro, Departamento de Fisioterapia, Rio de Janeiro, RJ, Brasil.
4. Universidade Federal do Estado do Rio de Janeiro, Departamento de Clínica Médica, Instituto Federal do Rio de Janeiro, Rio de Janeiro, RJ, Brasil.

Submitted in September 04, 2015.
Accepted for publication in January 20, 2016.
Conflict of interests: none – Sponsoring sources: Partially carried out with the support of Instituto Federal do Rio de Janeiro and the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES), Brazil.

Correspondence to:
Leandro Alberto Calazans Nogueira
Rua Carlos Wenceslau, 343 – Realengo
21715-000 Rio de Janeiro, RJ, Brasil.
E-mail: leandro.nogueira@ifrj.edu.br

costs for patients, their families and society[6]. The understanding of biological, social and psychological factors involved in pain evaluation and management should be acquired during health graduation programs[7]. However, deficits in the construction of knowledge they have been observed in the formation of health professionals[7-9]. Once graduated, such professionals consider themselves unprepared to assist patients with persistent pain and attribute this to the period of professional qualification[9,10]. The teaching of pain for health professionals in all qualification levels has been identified as an important measure to change ineffective pain management practices. However, most educational programs, especially for graduation students, include minimum or no content about pain and/or its management[11,12].

Aiming at minimizing the lack of knowledge about pain (acute, chronic or cancer-related) among health professionals, the International Association for the Study of Pain (IASP) has established since 1994 curriculum recommendations for different health courses, among them physiotherapy. The curriculum highlights four components to measure biological and psychosocial factors contributing to pain, dysfunction and incapacity: 1) multidimensional nature of pain (mechanisms and basic concepts); 2) pain evaluation and measurement; 3) pain management (rehabilitation and interdisciplinary management); and 4) clinical conditions (commonly treated clinical conditions)[13]. Notwithstanding IASP recommendations, few courses in the health area have an exclusive discipline for education on pain, rather addressing this content along other disciplines[14,15]. In Brazil, there is a proposal to include a "Minimum program on Pain mechanisms and Analgesia" as independent discipline[16], however there are no studies evaluating the implementation of such program.

In addition to this gap in health professionals qualification aimed at understanding pain, there is also a deficit in the use of pedagogic methodologies encouraging the active knowledge building by students, as well as the incentive to health education proposals giving priority to pain prevention and management by patients. In this context, in light of the professional qualification deficit about pain and the major relevance of the subject, it is necessary that health students and professionals have advanced knowledge about pain concepts, mechanisms, evaluation, quantification and management.

This study aimed at evaluating the level of neurophysiologic knowledge of pain of physiotherapy students using active teaching-learning strategies to address the subject.

METHODS

This is an experimental, uncontrolled study carried out with a convenience sample of 14 students of the fifth period of a physiotherapy course. Exclusion criteria were individuals not participating in the activities proposed by the discipline. All participants have signed the Free and Informed Consent Term (FICT).

Neurophysiologic Pain Questionnaire (NPQ) was used to evaluate knowledge about pain neurophysiology before and after attending the fifth period of physiotherapy. NPQ is a self-applied tool, originally developed with 19 items to evaluate knowledge related to pain neurophysiology, where each item has three options of answer: true, false or not sure. After evaluating NPQ psychometric properties, it was observed that just 12 items are needed to reach the same results of the original questionnaire[17]. Final result is described in absolute and relative values of correctly answered items. The reviewed questionnaire, made up of 12 items, was adapted to the Portuguese language and answered by students of the discipline. Scores equal to or above 65% of NPQ right answers, in 90% of participants, were considered satisfactory to evaluate the acquisition of neurophysiologic pain knowledge[18].

During one semester, there have been 12 formative meetings among students and professors, where active teaching-learning strategies were used aimed at providing knowledge building about pain neurophysiology. Before and after such meetings, students have answered the NPQ. The number of right answers was compared for both evaluation moments.

Students learning about pain neurophysiology was based on active teaching-learning strategies, which have led students to reflection and afterward to practical application of possible solutions. In such strategies, two active education elements were stressed, professor-facilitator and students as protagonists in knowledge building. Professors have the role of facilitators, favoring students' autonomy in the learning process, while students are the active part of the process, which helps them to become reflexive, creative and independent professionals in the future[18]. Within active learning approach carried out by students, different teaching-learning strategies were adopted to build knowledge about pain neurophysiology, namely:

a) Text study – activity characterized by critical text study and active search for information and ideas of the studied author[19]. In our case, it was the reading and discussion of the book "Explaining Pain"[20]. This book has a wide variety of educative interventions aiming at changing the understanding of people about pain and its function, promoting pain neurophysiology knowledge, pain rehabilitation based on biopsychosocial model, in addition to decreasing kinesiophobia and pain catastrophizing[21].

b) Role play – characterized by theatrical performance as from a subject or problem focus. In this study, this was implemented by means of appreciation and then dubbing by students of the video "Understanding pain in five minutes" (available at https://www.youtube.com/watch?v=Y2kNiHHFYh0)[22].

c) Directed study – the act of studying under professor guidance, aiming at answering specific questions. This study was carried out by means of research and discussion of articles about "Education on pain" and their approaches, being emphasized Cognitive Behavioral Therapy (CBT) and the use of metaphors. CBT values the act of establishing goals, of making choices, of acting and of having control over reality[23], being observed good results in the management of

chronic pain patients[24]. The use of metaphors and histories during pain education techniques is effective for presenting complex information in a simple way and with everyday elements[25].

d) Strategies of Health Education – students as protagonists, in the role of professor/facilitator of the teaching process for users of the Single Health System (SUS). This strategy consisted of two meetings lasting approximately 60 minutes each, being held in consecutive weeks, and having as target audience musculoskeletal patients of the Hospital Universitário Gaffrée e Guinle and of the Instituto de Neurologia Deolindo Couto. Meetings consisted of presentations and chats about health education, recommending actions for health education and promotion. Meetings were developed, prepared and presented by students. During health education meetings, emphasis was given to pain, its neurophysiology, pain-related psychosocial risk factors, benefits and ideal intensity of physical exercises and guidance about improving quality of life. Presentations were made in a playful manner, using visual resources of slides presentation, animated videos, drawings and metaphors.

Statistical analysis

Data were stored in electronic file using the program Excel and were processed with the Statistical Package for the Social Sciences (SPSS). Success rate of each student and of each NPQ question were calculated and statistical analysis was applied to each one of them. Results are presented in percentages, as well as mean and standard deviation. For being a single population evaluated in two different moments, we decided to use paired Student *t* test due to the parametric nature of data distribution. Scores before and after evaluation of results were compared, considering statistically significant less than 5% $p<0.05$.

This study was carried out according to guidelines of Resolution 466-12, of the National Health Council, in compliance with the Declaration of Helsinki of 1975 and was approved by the Research Ethics Committee, Instituto Federal do Rio de Janeiro, under CAAE number 47161015.7.0000.5268.

RESULTS

All students (n=14) have participated in proposed activities and have answered the questionnaire, with no losses during the study. Figure 1 shows distribution of scores obtained by students in the NPQ in evaluation moments. At baseline evaluation, students have answered correctly in average 7.5 (SD=4.8) items of the questionnaire, representing 62.5% of success. Just 21.4% of students had scores above 65% of right answers, showing a dissatisfactory level of knowledge about pain neurophysiology in the beginning of the study. In the final assessment, the average of the items was 10.8 (SD=3.7) representing 90% right answers. Scores above 65% of right answers were observed in 90% of students. There has been statistically significant difference (p=0.002) between students' scores before and after attending the discipline (Figure 2).

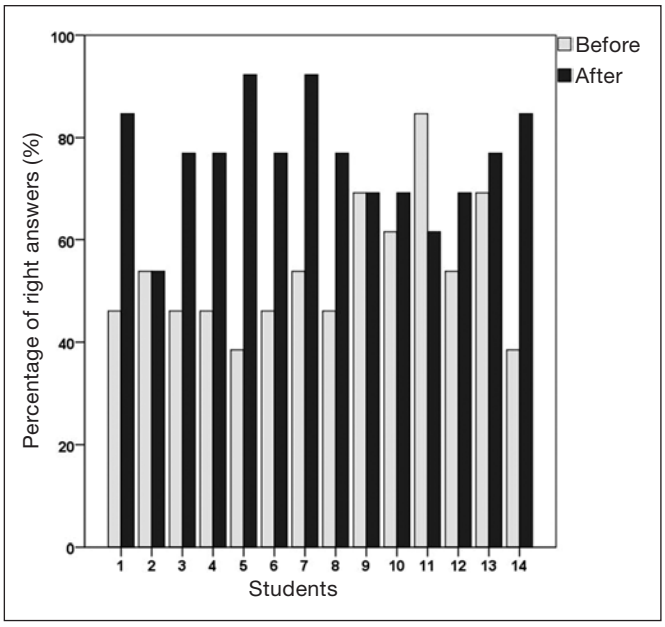

Figure 1. Success rate of students observed before and after attending the discipline

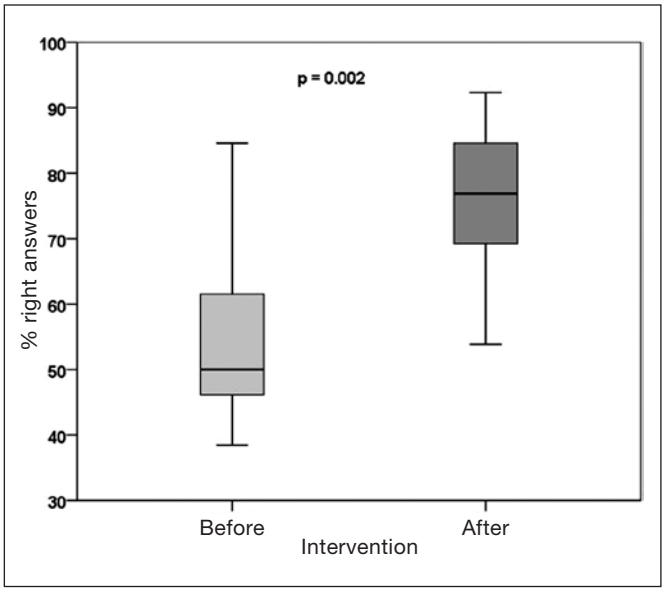

Figure 2. Boxplot indicating the percentage of right answers by items observed before and after intervention

Table 1 shows absolute and percentage values of the number of right answers per item. Four items (3, 7, 11 and 12), had high initial success rate, above 85%, while seven items (1, 2, 4, 5, 6, 8 and 9) had success rate below 60%. Items 1, 5, 7, 10, 11 and 12 of the questionnaire, after intervention, had success rate above 85%. Success rate before and after intervention was higher for items 1, 4, 5 and 9, while items 3 and 7 had a slight decrease in success rate.

Table 1. Absolute and percentage values of right answers by items observed before and after attending the discipline

	Before	After
Questions	Right answer %	Right answer %
1	4 (28.6)	14 (100)
2	0 (0.00)	1 (7.1)
3	13 (92.9)	11 (78.6)
4	5 (35.7)	11 (78.6)
5	8 (57.1)	14 (100)
6	7 (50.0)	11 (78.6)
7	14 (100)	12 (85.7)
8	2 (14.3)	7 (50.0)
9	3 (21.4)	10 (71.4)
10	9 (64.3)	12 (85.7)
11	13 (92.9)	14 (100)
12	12 (85.7)	13 (92.9)
Total	90	130

DISCUSSION

Pedagogic teaching-learning strategies used to build neurophysiologic pain knowledge of physiotherapy students were successful as shown by the higher number of right answers for most items of the questionnaire applied at the end of the discipline. At baseline evaluation, students had a low level of neurophysiologic pain knowledge. After intervention there has been improvement in scores being reached moderate scores on pain knowledge. Most students (79%) have improved their neurophysiologic pain knowledge with strategies used along the period. From 12 evaluated items, nine items had a higher number of right answers at final evaluation.

Baseline evaluation of pain neurophysiologic knowledge has shown a superficial knowledge of students about the subject. Alves et al.[9] have investigated pain physiology and management knowledge of physiotherapy students with a 27-question questionnaire.

Questions were divided in groups addressing different characteristics, such as pain pathophysiology, pain subjectivity and evaluation, physiotherapeutic resources to control pain, non pharmacological and pharmacological therapy to control pain. Low success rates were observed both for pain pathophysiology and multidimensionality and therapy. These findings are in line with our study which has shown lack of knowledge about the relationship between pain intensity and injury severity, in addition to lack of understanding of pain triggering and maintaining mechanisms on part of students. Results might be justified by the way in which pain is addressed during graduation, being seen as a complementary concept for different disciplines rather than a central subject[14].

The set of strategies used in the discipline has provided expressive improvement of neurophysiologic pain knowledge in our study. Latimer, Maher and Refshauge[26], using the Health Care Providers Pain and Impairment Relationship Scale questionnaire (HC-PAIRS), have also observed improved chronic pain knowledge through the change in beliefs and attitudes of physiotherapy students after the holding of a chronic pain teaching module, being observed a lower association by students between pain and functional incapacity or limitation. The effect of education could be perceived immediately after the module and one year after it.

Students beliefs about pain may be influenced by professors' beliefs, especially those conducting the clinical practice, and by social representations built throughout life. Educative approaches, promoting adequate knowledge about pain physiology and its management, should be provided not only to students, but also to professors and to the clinical team[26], since learning is associated to education institutions, to professors-facilitators and to professional models with which they interact.

A study by Ferreira et al.[27] has evaluated beliefs and attitudes of physiotherapy students with regard to chronic low back pain using the HC-PAIRS questionnaire. Authors have identified the belief that pain justifies functional incapacity and limitation of these patients. Results found by the authors may be justified by the low level of knowledge about pain neurophysiology, as observed in our study before attending the discipline. Deficiencies on basic knowledge about pain were also observed among medical students[28], young anesthesiologists[29] and nursing students[30].

Students with high scores in the test about pain management had positive attitudes to manage pain[30]. So, it is believed that beliefs and attitudes may be changed after the building of knowledge based on a biopsychosocial model[31] or after a chronic pain course[26]. These findings confirm our study results, which have observed increased knowledge about pain neurophysiology after attending a discipline addressing the subject. Physiotherapists' beliefs and attitudes are also able to influence the prognosis of patients with chronic pain, due to long interaction times during treatment[32]. This way, adequate knowledge of neurophysiologic pain mechanisms may favor the use of a broader evaluation of chronic pain patients, providing a humanized approach and, as a consequence, a more favorable prognosis.

The use of active teaching-learning strategies in the discipline, as well as the problem-based methodology, may favor the qualification of independent students able to reflect about the process and to develop adequate skills to apply this knowledge[33]. As from this experience, it was possible to observe positive results in knowledge building about pain neurophysiology among students of the fifth period of the Physiotherapy course. So, it is necessary to think about curriculum changes to implement basic disciplines and differentiated pedagogic strategies aiming at improving the understanding of pain physiology and management[34,35].

Limitations of our study were the small number of participants (n=14) and the lack of a control group. These limitations may restrict the generalization of our study results. However, other previous studies have observed similar results about physiologic pain knowledge among health area students. Improved knowledge building after the implementation of an

active teaching-learning process has also been observed. Our study may indicate the need for the implementation of new strategies to favor the learning of chronic pain mechanisms and management of Brazilian physiotherapists, in order to improve the quality of assistance to chronic pain patients.

CONCLUSION

The level of neurophysiologic pain knowledge of Physiotherapy students was enhanced by disciplines specifically addressing contents about pain. Active teaching-learning strategies were able to favor this knowledge building.

REFERENCES

1. IASP International Association for the Study of Pain. Disponível em <www.iasp-pain.org> Acesso em: 08 julho 2015.
2. Nogueira LA, Urtado CB, Chaves AM, Ferreira M, Santos C, Casarin CA, et al. Perfil epidemiológico do ambulatório de fisioterapia de um hospital universitário. Ter Man. 2011;9(1):45-50.
3. Vos T, Flaxman AD, Naghavi M, Lozano R, Michaud C, Ezzati M, et al. Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. Lancet. 2012;380(9859):2163-96.
4. IASP/EFIC Unrelieve Pain is a Major Global. Disponível em <www.efic.org/userfiles/Pain Global Healthcare Problem.pdf> Acesso em: 08 julho 2015.
5. Goldberg DS, McGee SJ. Pain as a global public health priority. BMC Public Health. 2011;11:770.
6. Fishman SM, Young HM, Lucas Arwood E, Chou R, Kerr K, Murinson BB, et al. Core competencies for pain management: results of an interprofessional consensus summit. Pain Med. 2013;14(7):971-81.
7. Sereza TW, Dellaroza MS. O que está sendo aprendido a respeito da dor na UEL? Semina Ciênc Biol Saúde. 2003;24(1):55-66.
8. Steglitz J, Buscemi J, Ferguson MJ. The future of pain research, education, and treatment: a summary of the IOM report "Relieving pain in America: a blueprint for transforming prevention, care, education, and research". Transl Behav Med. 2012;2(1):6-8.
9. Alves RC, Tavares JP, Funes RA, Gasparetto GA, Silva KC, Ueda TK. Evaluation of pain knowledge of Physiotherapy students from a university center. Rev Dor. 2013;14(4):272-9.
10. Clenzos N, Naidoo N, Parker R. Physiotherapists' knowledge of pain: a cross-sectional correlational study of members of the South African Sports and Orthopaedic Manipulative Special Interest Groups. South Afr J Sport Med. 2013;25(4):95-100.
11. Simpson K, Kautzman L, Dodd S. The effects of a pain management education program on the knowledge level and attitudes of clinical staff. Pain Manag Nurs. 2002;3(3):87-93.
12. Watt-Watson J, Hunter J, Pennefather P, Librach L, Raman-Wilms L, Schreiber M, et al. An integrated undergraduate pain curriculum, based on IASP curricula, for six health science faculties. Pain 2004;110(1-2):140-8.
13. IASP Disponível em <http://www.iasp-pain.org/Education/CurriculumDetail.aspx?ItemNumber=2055> Acesso em 15 setembro 2015.
14. Hoeger Bement MK, Sluka KA. The current state of physical therapy pain curricula in the United States: a faculty survey. J Pain. 2015;16(2):144-52.
15. Briggs EV, Battelli D, Gordon D, Kopf A, Ribeiro S, Puig MM, et al. Current pain education within undergraduate medical studies across Europe: Advancing the Provision of Pain Education and Learning (APPEAL) study. BMJ Open. 2015;5(8):e006984.
16. Castro CE, Parizotto NA, Barboza HF. Programa mínimo sobre mecanismos de dor e analgesia para cursos de graduação em Fisioterapia. Rev Bras Fisioter. 2003;7(1):85-92.
17. Catley MJ, O'Connell NE, Moseley GL. How good is the neurophysiology of pain questionnaire? A Rasch analysis of psychometric properties. J Pain. 2013;14(8):818-27.
18. Dolphens M, Nijs J, Cagnie B, Meeus M, Roussel N, Kregel J, et al. Efficacy of a modern neuroscience approach versus usual care evidence-based physiotherapy on pain, disability and brain characteristics in chronic spinal pain patients: protocol of a randomized clinical trial. BMC Musculoskelet Disord. 2014;8(15):149.
19. Anastasiou LGC. Ensinar, aprender, apreender e processos de ensinagem. In: Anastasiou LGC, Alves LP, organizadores. Processos de ensinagem na universidade: pressupostos para estratégias de trabalho em aula. Joinville (SC): UNIVILLI; 2003. 11-38p.
20. Butler DS, Moseley GL. Explain Pain. Adelaide, Australia: Noigroup Publications, 2003.130p.
21. Bostick GP, Toth C, Dick BD, Carr EC, Stitt LW, Moulin DE. An adaptive role for negative expected pain in patients with neuropathic pain. Clin J Pain. 2015;31(5):438-43.
22. Vídeo educativo desenvolvido por Pain Australia e disponível gratuitamente. Disponível em: <https://www.youtube.com/watch?v=RWMKucuejIs> Acesso em 15 setembro 2015.
23. Dobson D, Dobson KS. A terapia cognitivo comportamental baseada em evidências. Porto Alegre: Artmed; 2009. 17p.
24. Phillips K, Clauw DJ. Central pain mechanisms in chronic pain states--maybe it is all in their head. Best Pract Res Clin Rheumatol. 2011;25(2):141-54.
25. Gallagher L, McAuley J, Moseley GL. A randomized-controlled trial of using a book of metaphors to reconceptualize pain and decrease catastrophizingin people with chronic pain. Clin J Pain. 2013;29(1):20-5.
26. Latimer J, Maher C, Refshauge K. The attitudes and beliefs of physiotherapy students to chronic back pain. Clin J Pain. 2004;20(1):45-50.
27. Ferreira PH, Ferreira ML, Latimer J, Maher CG, Refshauge K, Sakamoto A, et al. Attitudes and beliefs of Brazilian and Australian physiotherapy students towards chronic back pain: a cross-cultural comparison. Physiother Res Int. 2004;9(1):13-23.
28. Tauben DJ, Loeser JD. Pain education at the University of Washington School of Medicine. J Pain. 2013;14(5):431-7.
29. Bakshi SG, Jain P, Kannan S. An assessment of basic pain knowledge and impact of pain education on Indian Anaesthesiologists - a pre and post questionnaire study. Indian J Anaesth. 2014;58(2):127-31.
30. Latchman J. Improving pain management at the nursing education level: evaluating knowledge and attitudes. J Adv Pract Oncol. 2014;5(1):10-6.
31. Overmeer T. Implementing psychosocial factors in physical therapy treatment for patients with musculoskeletal pain in primary care. Örebro; 2010. Tese [doutorado]. Örebro Universite.
32. Houben RM, Ostelo RW, Vlaeyen JW, Wolters PM, Peters M, Stomp-van den Berg SG. Health care providers' orientations towards common low back pain predict perceived harmfulness of physical activities and recommendations regarding return to normal activity. Eur J Pain. 2005;9(2):173-83.
33. Moseley L. Unraveling the barriers to reconceptualization of the problem in chronic pain: the actual and perceived ability of patients and health professionals to understand the neurophysiology. J Pain. 2003;4(4):184-9.
34. Watt-Watson J, Murinson BB. Current challenges in pain education. Pain Manag. 2013;3(5):351-7.
35. Jones LE, Hush JM. Pain education for physiotherapists: is it time for curriculum reform? J Physiother. 2011;57(4):207-8.