Musculoskeletal symptoms in nursing students: concept analysis

Sintomatologia musculoesquelética em estudantes de enfermagem: uma análise de conceito

Sintomatología musculoesquelética en estudiantes de enfermería: un análisis de concepto

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ABSTRACT
Objective: to analyze the musculoskeletal symptomatology concept in undergraduate nursing students through Rodgers' evolutionary method. **Method:** An integrative review of the literature was performed for the identification and selection of ten articles. A concept analysis was performed according to Rodgers' evolutionary method. Article search was performed using the EBOSCO Host platform, Virtual Health Library and Google scholar for the years from 2004 to 2018. **Results:** Based on the 3 elements of Rodgers model we found: 1) substitute terms and related concepts, where musculoskeletal disorders and musculoskeletal symptoms were highlighted; 2) as essential attributes of the concept we highlight pain and discomfort, as well as, measurement using the Nordic Musculoskeletal Questionnaire; and 3) risk factors were identified as antecedents, and the consequences were the impact on students' lives. **Conclusions:** This study contributes to the knowledge and clarification of the concept of musculoskeletal symptomatology in nursing students.
Descriptors: Nursing Students; Musculoskeletal Physiological Phenomena; Concept Formation; Health Education; Methods.

RESUMO
Objetivo: Analisar o conceito de sintomatologia musculoesquelética nos estudantes de licenciatura em enfermagem segundo o método evolucionário de Rodgers. **Método:** Foram incluídos dez artigos através de uma revisão integrativa da literatura para identificação e seleção dos artigos. Análise de conceito foi pelo método evolucionário de Rodgers para análise dos dados. Os artigos pesquisados na plataforma Host EBOSCO, na Biblioteca Virtual de Saúde e no Google Scholar de 2004 a 2018. **Resultados:** Com base no método de Rodgers, foi possível a identificação: 1) termos substitutos e conceitos relacionados, onde foram destacados os distúrbios musculoesqueléticos e os sintomas musculoesqueléticos; 2) como atributos essenciais do conceito destacamos, dor e desconforto, bem como mensuração pelo Questionário Nórdico-Musculoesquelético; e 3) os fatores de risco foram identificados como antecedentes e o impacto na vida dos estudantes como consequências. **Conclusão:** Este estudo contribuiu para o conhecimento e esclarecimento do conceito de sintomatologia musculoesquelética em estudantes de enfermagem.
Descritores: Estudantes de Enfermagem; Fenómenos Fisiológicos Musculoesqueléticos; Formação de Conceito; Educação em Saúde; Métodos.

RESUMEN
Objetivo: Analizar el concepto de sintomatología musculoesquelética en los estudiantes de enfermería según el método evolutivo de Rodgers. **Método:** Se incluyeron diez artículos. Hecho una revisión integrativa de la literatura para identificación y selección de los artículos. Análisis de concepto según el método evolutivo de Rodgers. Los artículos fueron recogidos en la plataforma Host EBOSCO, en la Biblioteca Virtual de Salud y en Google Scholar de 2004 a 2018. **Resultados:** Con base en el método de Rodgers, fue posible la identificación: 1) términos substitutos y conceptos relacionados, donde fueron destacados los disturbios musculoesqueléticos y los síntomas musculoesqueléticos; 2) como atributos esenciales del concepto destacamos, dolor e incomodidad, así como la medición por el Cuestionario Nórdico-Musculoesquelético; 3) los factores de riesgo se identificaron como antecedentes y el impacto en la vida de los estudiantes como consecuencia. **Conclusión:** Este estudio contribuye al conocimiento y clarificación del concepto de sintomatología musculoesquelética en estudiantes de enfermería.
Descriptores: Estudiantes de Enfermería; Fenómenos Fisiológicos Musculoesqueléticos; Formación de Concepto; Educación en Salud; Métodos.

INTRODUCTION

The musculoskeletal symptomatology is one of the most common conditions in our society, affecting the individual regardless of gender, age or socioeconomic context. The presence of musculoskeletal symptomatology is considered as one of the main factors of disability during an person's life cycle[1-2].Therefore, it is currently considered a real public health problem due to the impact it has on an individual's personal and professional life, as well as, on productivity, or even by the rate of absenteeism and decrease in quality of life, which is increasingly linked to this type of symptomatology[1,3].

Considering a nurses' working conditions and performed tasks, nursing is one of the professions in which the impact of musculoskeletal symptomatology is more evident[4]. These conditions range from biomechanical, physiological, psychological and social requests, regardless of the position and function of the nurse, also depending on the organization, not allowing recovery and adequate rest times[4].

Also, nursing students, once they begin their academic training, perform and experience the same working condition situations as the nurse, being exposed to the same factors that can trigger this musculoskeletal symptomatology[5].

To understand this scenario, the consulted literature shows that this concept has variations in its definition, which evidences the need for refinement and clarification of the concept of musculoskeletal symptomatology. It is possible to identify various forms / words / expressions that represent the concept and, in a certain way, may be considered as synonyms. Nevertheless, they also convey a lack of consensus in their use in the literature consulted. For this reason, it is necessary to clarify the concept of musculoskeletal symptoms in nursing students, identifying their attributes, antecedents, consequences and, also, the protective factors that may contribute to their minimization or prevention. The need for concept analysis began with the philosopher Aristotle. By then, a concept was abstractions of reality consisting of essential characteristics[6-8].

Thus, it is justified the study of the conceptual analysis of the term musculoskeletal symptomatology in undergraduate students in nursing, under the evolutionary view of Rodgers[6].

OBJECTIVE

To analyze the musculoskeletal symptomatology concept in undergraduate nursing students through Rodgers' evolutionary method.

METHOD

Ethical aspects

It should be emphasized that this study does not require analysis by the Ethics Committee because it is an integrative review and concept analysis.

Design, study location and period

For this study two methodologies were associated: Rodgers' evolutionary method and integrative literature review[9-10]. Rodgers' evolutionary method[6], which is also known as the evolutionary

method of conceptual analysis in the literature, is characterized by being an inductive and descriptive model, which is used to investigate the history of a particular concept[6]. This model understands that a concept is used according to its particular context, is dynamic and changes over time[7]. This model is based on a philosophical current, referring that the analysis of a concept is fundamental for knowledge, as it allows the identification its characteristics and common phenomena[6].

The lack of clarity of the concept can contribute to a common-sense interpretation, depending upon who will use it. In order to have a perfect understanding and be used for scientific knowledge, the concept must be shaped through conceptual analysis[11] permitting language uniformity and facilitating its comprehension[8,11]. This is a rich methodology because it uses mixed studies stages (qualitative and quantitative), which subsidizes fundamental aspects for the analysis of the concept under study[11-12].

In this method three essential aspects for the development of the concept are distinguished: meaning, use and application. In other words, the meaning of a concept depends on the context in which it is used[8]. It consists of six interactive and simultaneous steps, that help us to understand the concept and its context[6], as presented in Chart 1.

Chart 1 - The Stages of Rodgers' Evolutionary Model

Stages of Rodgers' Evolutionary Model
1. Definition of the concept of interest and associated expressions (related concepts and substitute terms)
2. Selection of the field for data collection
3. Analysis of the essential attributes (characteristics of the concept)
4. Contextual basis of the concept (antecedents and consequents)
5. Identification of an example of the concept to be investigated
6. Determination of the implications and hypotheses for the concept

Source: Adapted from Rodgers[6].

The methodology selected for identification and selection of the bibliography was integrative review of the literature. This was the option was because it included an association between primary and secondary research, allowing the synthesis of results and a more comprehensive and deepened understanding of the concept[9-10]. It also permits the generation of new knowledge regarding the concept being studied. This review is in line with the fourth stage of the evolutionary method, as it will be from this point that the characteristics of the concept will be identified. The methodological rigor applied to this method was taken into account, following the 6 different phases as recommended: 1) Identification of the subject and selection of the hypothesis or question of research for the elaboration of the integrative review; 2) Establishment of criteria for inclusion and exclusion of studies / sampling or literature search; 3) Definition of the information to be extracted from the selected studies / categorization of

the studies; 4) Evaluation of studies included in the integrative review; 5) Interpretation of results; and, 6) Review presentation/ knowledge synthesis[9-10].

The inclusion criteria used for the selection of articles were: publications in Portuguese, English and Spanish; articles with full text available and published between January 2004 and June 2018.

Study protocol

The research question was formulated according to the PCC acronym[13] as following: P (Population - nursing students); C (Concept - musculoskeletal symptomatology); C (Context – during the undergraduate Nursing Degree). We therefore established the following research question: What is the concept of musculoskeletal symptomatology applied to undergraduate nursing students?

The electronic search was carried out in the following health databases: Bibliotheca Virtual em Saúde (BVS); SCOPUS and EBSCOhost and Google Academic. The following descriptors were used: (musculoskeletal symptoms) OR (musculoskeletal disorders) OR (Musculoskeletal system) AND (Nursing Students).

To analyze and synthesize the articles selected, were used fundamental elements of Rodgers' evolutionary method[6].

Samples, inclusion and exclusion criteria

The articles followed the order: reading the title, abstract and full text. 544 references were identified, and 470 were rejected by title. From the 74 remaining articles, duplicates and without full text were excluded. 10 articles were selected for final revision.

Chart 2 - Selected Items

Authors	article title	journal (vol, n°, pag, year)
Lövgren, M., Gustavsson, P., Melin, B., & Rudman, A.[14]	Neck/shoulder and back pain in new graduate nurses: A growth mixture modeling analysis.	*International journal of nursing studies*, 51(4), 625-639.2014
Backåberg, S., Rask, M., Brunt, D., & Gummesson, C.[15]	Impact of musculoskeletal symptoms on general physical activity during nursing education.	Nurse Education in Practice, 14(4), 385-390.2014
Menzel, N., Feng, D., & Doolen, J.[16]	Low back pain in student nurses: literature review and prospective cohort study.	International journal of nursing education scholarship, 13(1), 19-25. 2016
Kneafsey, R., & Smallwood, J.[17]	Musculoskeletal injury–Are Universities doing enough to protect students?	Nurse education today, 30(5), 383-385. 2010
Oliveira, M. A., Greco, P. B. T., Prestes, F. C., Machado, L. M., Magnago, T. S. B. S, & Santos, R. R.[18]	Trastornos/dolor musculoesquelético en estudiantes de enfermería de una universidad comunitaria del sur del Brasil.	Enfermería Global, 16(3), 128-174. 2017

To be continued

Chart 2 (concluded)

Authors	article title	journal (vol, n°, pag, year)
Smith, D. R., & Leggat, P. A.[18]	Musculoskeletal disorders among rural Australian nursing students.	Australian Journal of Rural Health, 12(6), 241-245. 2004
Abledu, J. K., & Offei, E. B.[1]	Musculoskeletal disorders among first-year Ghanaian students in a nursing college.	African health sciences, 15(2), 444-449. 2015
Dawson, A. P., Steele, E. J., Hodges, P. W., & Stewart, S[19].	Development and test–retest reliability of an extended version of the Nordic Musculoskeletal Questionnaire (NMQ-E): a screening instrument for musculoskeletal pain	The Journal of Pain, 10(5), 517-526.2009
Singh, A., Devi, Y. S., & John, S.[20]	Epidemiology of musculoskeletal pain in Indian nursing students.	International Journal of Nursing Education, 2(2), 6-8. 2010
Nunes, H., Cruz, A., & Queirós, P.[21]	Dor músculo esquelética a nível da coluna vertebral em estudantes de enfermagem: prevalência e fatores de risco.	Revista de Investigação Enfermagem, S2 (14), 28-37.2016

Analysis of results

The data analysis was carried out based on exploratory, selective, analytic and interpretative reading of articles that composed the final sample of the integrative review and concept analysis[6]. The results were presented by charts and discussed in the appropriate literature.

RESULTS

Ten articles that met the inclusion criteria were included in the study. Regarding the year of publication, articles were published in 2004[18], 2009[19], 2010[17,20], 2014[14-15], 2015[1], 2016[16,21], and 2017[18].

On what concerns the countries of origin, articles are from Australia[18-19], India[20], Brazil[5,18], USA[16], Gana[1], Portugal[21], UK[17] and Sweden[14-15].

In the primary studies, the samples varied between 59[19] and 1.163[15] students. Nine descriptive studies[1,14,16,18,21] were included with the level of evidence III and a narrative review of the literature, with level of evidence IV[17].

Based on the researched literature and articles selected, and considering the research concept, musculoskeletal symptoms are a problem described and addressed in all articles. It highlights the use of the concept in health, namely in Nursing, Ergonomics and Occupational Health.

Musculoskeletal symptomatology is mentioned as a current problem in nurses[15] and is highlighted as a risk to nursing students' health[14,20], due to the activities carried out either in the school environment[5,15] or during clinical teaching[5,15].

Having in mind the fundamental elements of Rodgers' evolutionary method[6], this analysis allowed us to identify the characteristics of the concept, essential attributes and contextual basis of the concept, as shown in Chart 3.

Chart 3 - Musculoskeletal symptoms according to Rodgers's evolutionary method[6]

Concept characteristics (related and substitutive)	Essential attributes of the concept (express their nature)	Contextual basis of the concept (background and consequences)
Musculoskeletal Disorders[1,14,17-18] Musculoskeletal symptoms related to work[5] Musculoskeletal symptoms[5,14,16,20-21] Musculoskeletal injury[17]	Musculoskeletal pain and discomfort or numbness[1,5,14,17,21] Location: neck, shoulders, lumbar and cervical, knees, wrists and hands[1,5,14,17-18,21] Limitation of normal activities such as work, domestic service or hobbies[1,5,19,21] Slow and insidious multicausal symptomatology[5] Nordic Questionnaire for Musculoskeletal Injuries[1,5,19,21]	**Antecedents** Physical factors (inadequate postures, excessive load and positioning, repetition of movements, physical activity)[1,5,14,17-18,21] Individual factors (age, female gender, previous clinical history, ethnicity)[5,17,20] Organizational and psychosocial factors (repetitive work, high work rhythm, stress, anxiety, excessive use of the computer, nursing students, attendance of the last year of the course)[5,14,17-18,20] Family history and having an accident[20] **Consequences** altered quality of life[14,16,18,20] sleep problems[5,14,16] academic stress[1,20] change in life activities[14,16,18,20] change in well-being[5,14,17,20]

DISCUSSION

Based on the searched articles, and after the analysis of the above table, different forms of expression emerged to describe the musculoskeletal symptomatology. In this analysis, the most evident terms were musculoskeletal disorders[1,14,17-18], musculoskeletal symptoms[5,14,16,19-20], work-related symptoms[5] and, finally, musculoskeletal injuries[17].

This concept analysis allowed us to identify the essential attributes that characterize the musculoskeletal symptomatology, namely: pain; discomfort and numbness; limitation of normal activities such as work, domestic service or hobbies; and, that the most affected areas are the lumbar region, followed by the neck, shoulders, wrists and knees[14,21].We chose the concept of musculoskeletal symptomatology because it is characterized as a subjective experience of alteration of function or appearance of the body[21], not being considered a medical diagnosis.

Nursing always keeps its essential focus on the use of the 4 elements that constitute the nursing metaparadigm: person, health, environment and nursing for the expansion of knowledge. The use of the musculoskeletal symptomatology concept fits the person living this subjective experience. In this sense, it is not possible to develop care models without having a referential from personal and collective reflections on the value of this care in the socio-political context in which it operates. Furthermore, nowadays professions linked to social sciences (where Nursing is inserted), enhance the health of the citizen and the construction of citizenship itself[22].

The use of this concept allows a unified language that expresses those elements of care, and comparisons between clinical contexts, client populations, geographical areas or time[23-24]. This line of thought is a guide to understand the concept and contributes to its adaptation to this population[25].

Musculoskeletal symptoms are described as an unpleasant physical perception, pain, feeling of weight, tingling and fatigue of an individual, according to the individual's perception[20,23,26].

The Nordic musculoskeletal questionnaire was the most used to evaluate the presence of musculoskeletal symptoms. It allows to measure the attributes that characterize the concept under analysis, that is, to identify the most affected areas with pain, numbness and disability for 12 months, which makes it one of the most used instruments to characterize this symptomatology[5,19,21].

This instrument was translated and validated for the Portuguese population, showing a good internal consistency according to the coefficient of reliability Kuder-Richardson of 0.855[25]. The Kappa coefficient ranged from 0.8 to 1, showing good levels of reproducibility in the test-retest. It is an easy to apply self-administered questionnaire, as it presents a body diagram to identify the anatomical regions. It was applied in Portuguese nursing students to evaluate musculoskeletal pain and its risk factors[21].

In these articles, the causes most described as being at the origin of this type of symptomatology are: overload; repetitive movements; inappropriate postures related with positioning and transferring patients; and the excessive use of the computer[5,14-15,27]. Being a female, nursing student and attending the last year of the nursing degree, are considered as the antecedents which are at the origin of the musculoskeletal symptomatology[5].

A Portuguese study also refers as probable cause of this symptomatology: a previous accident and a family history of musculoskeletal disorders[21].

Concerning the consequences we highlight: changes in quality of life[14,16,18,20] sleep and rest[14,16], anxiety[5,14,16,20], academic stress[1,20] and wellbeing[5,14,16,20].

These consequences are associated with the establishment of social and affective bonds, the requirement of long hours of study, the demand for greater autonomy and responsibility during the nursing degree (which is considered complex and challenging, as they constantly must deal with human limits)[22]. By having a very practical component, the nursing degree permits students to perceive their limitations in terms of knowledge, generating feelings and sensations that can alter their health balance[1,22].

All these findings are in line with what is described in the literature on musculoskeletal symptomatology in nurses. Nursing students are exposed to the same kind of work as nurses when they are in clinical teaching context, in practical classes and in extracurricular practices, adopting inappropriate postures, repetitive movements and weight overload[3]. Therefore, students end up presenting the same changes as the nurses who are already in clinical practice: anxiety, stress, changes in quality of life, decreased physical and mental performance[22].

The consulted articles emphasize the need to implement effective interventions and strategies to prevent and reduce symptoms

in students, with greater emphasis on the duration of the nursing degree and was multidisciplinary intervention[1,5,15-16,20-21].

Study limitations

This concept analysis used the integrative review methodology to identify, select and include the articles.

However, there are still some limitations, namely the number of databases consulted, access to the full text and the language (only studies in Portuguese, Spanish, and English were included).

Despite the positive implications that emerged from this work, the use of the evolutionary Rodgers[6] method may be one of the limiting issues. As such, it is suggested the use of exploratory methodologies, as the analysis of the concept of musculoskeletal symptomatology in nurses. This will probably bring out other attributes and characteristics that may be associated with the concept.

Contributions to the sector of nursing, health, or public policies

Both the concept analysis under the evolutionary perspective of Rodgers and the integrative revision in this article, add value to qualitative studies. It requires scientific precision that reduces us to the essence of the concept, one of the characteristics that define qualitative methodology.

This concept analysis permitted the clarification of the concept of musculoskeletal symptomatology and the identification of its attributes. Furthermore, it allowed the identification of the musculoskeletal Nordic questionnaire as an instrument that measures the attributes of musculoskeletal symptomatology in nursing students. On the other hand, it enabled the identification of the predisposing factors for musculoskeletal symptoms and its consequences in nursing student's life.

The development of intervention programs seems to be fundamental for the prevention of musculoskeletal symptoms.

Nursing degree admission requires students to have cognitive, physical and emotional resources. The university / school must provide conditions so that nursing students can deal with situations that may interfere and compromise their quality of life.

CONCLUSIONS

The objective of this study was to contribute to the knowledge and clarification of the concept of musculoskeletal symptomatology in nursing students, describe their attributes, risk factors and health consequences. It is undeniable the importance of knowing the factors that contribute to musculoskeletal symptomatology in order to permit an earlier intervention.

Therefore, preventive interventions should be implemented to reduce the occurrence of musculoskeletal symptoms. Factors that predispose to this symptomatology must be considered, such as: overload; repetitive movements; inappropriate postures related with positioning and transferring patients; and the excessive use of the computer. Attention should also be paid to the differences in gender, family history, personal history of accidents, physical exercise, among others.

An assessment, before and after the intervention, should be made on: the quality of life, subjective well-being and psychological health (stress, anxiety and depression), to verify if there were improvements in the variables that have been studied as consequences of this symptomatology.

The use of both methodologies together allows the answering of the outlined objective, with responsibility and scientific rigor, showing once again how qualitative methodology can contribute to the production of useful information able to be transferred to practice.

For future research it is recommended to intervene in the prevention of musculoskeletal symptoms, considering the risk factors, as well as, assess the impact of this intervention by measuring the quality of life, well-being and psychological health (stress, depression, anxiety) of undergraduate nursing students.

REFERENCES

1. Abledu JK, Offei EB. Musculoskeletal disorders among first-year Ghanaian students in a nursing college. Afr Health Sci [Internet]. 2015 [cited 2018 Dec 27];15(2):444-9. Available from: https://doi.org/10.4314/ahs.v15i2.18

2. Alhariri S, Ahmed AS, Kalas A, Chaudhry H, Tukur KM, Sendhil V, Muttappallymyalil J. Self-reported musculoskeletal disorders and their associated factors among university students in Ajman, UAE. Gulf Med J [Internet]. 2016 [cited 2018 Dec 27];5(S2):S61-70. Available from: https://www.gulfmedicaljournal.com/download/2016/poster_procedings/11.pdf

3. Martins AC, Felli VE. [Musculoskeletal symptoms in undergraduate students of nursing]. Enferm Foco [Internet]. 2013 [cited 2018 Dec 27];4(1):58-62. Available from: http://revista.cofen.gov.br/index.php/enfermagem/article/view/505 Portuguese.

4. Ribeiro T, Serranheia F, Loureiro, H. Work related musculoskeletal disorders in primary health care nurses. Appl Nurs Res [Internet]. 2017 [cited 2018 Dec 27];33:72–7. Available from: https://doi.org/10.1016/j.apnr.2016.09.003

5. Oliveira MA, Greco PB, Prestes FC, Machado LM, de Souza Magnago TS, dos Santos RR. Musculoskeletal disorders/pain in undergraduate nursing students in a community university in southern Brazil. Enferm Global [Internet]. 2017 [cited 2018 Dec 27];16(3):128-74. Available from: http://dx.doi.org/10.6018/eglobal.16.3.248551

6. Rodgers BL. Concept analysis: an evolutionary view. In: Rodgers BL, Knafl KA. Concept development in nursing: foundations, techniques, and applications. 2nd ed. Philadelphia: Saunders; 2000. p. 77-102.

7. Dinmohammadi M, Peyrovi H, Mehrdad N. Concept analysis of professional socialization in nursing. Nurs Forum [Internet]. 2013 [cited 2018 Dec 27]; 48(1):26-34. Available from: https://doi.org/10.1111/nuf.12006

8. Carbogim FC, de Oliveira LB, de Araújo Püschel VA. Critical thinking: concept analysis from the perspective of Rodger's evolutionary method of concept analysis. Rev Lat Am Enfermagem [Internet]. 2016 [cited 2018 Dec 27]; 24:e2785. Available from: https://doi.org/10.1590/1518-8345.1191.2785

9. Sousa LM, Marques-Vieira C, Severino SS, Antunes AV. [The methodology of integrative review of literature in nursing]. Rev Inv Enferm [Internet]. 2017 [cited 2018 Dec 27];S2(21):17-26. Available from: http://hdl.handle.net/20.500.12253/1311 Portuguese.

10. Talmelli LFS, Gratão AC, Rodrigues RA. [Hybrid model for concept development in nursing using integrative review and thematic content analysis]. Saúde Transf Soc [Internet]. 2016 [cited 2018 Dec 27];7(1):9-15. Available from: http://incubadora.periodicos.ufsc.br/index.php/saudeetransformacao/article/view/4118 Portuguese.

11. Nuopponen A. Methods of concept analysis-tools for systematic concept analysis (part 3 of 3). LSP Journal [Internet]. 2011 [cited 2018 Dec 27];2(1):4-15. Available from: https://rauli.cbs.dk/index.php/lspcog/article/view/3302

12. Malterud K. Systematic text condensation: a strategy for qualitative analysis. Scand J Public Health [Internet]. 2012 [cited 2018 Dec 27];40(8):795-805. Available from: https://doi.org/10.1177/1403494812465030

13. Sousa LM, Marques JM, Firmino CF, Frade F, Valentim OS, Antunes AV. [Frameworks to research question in evidence-based practice]. Rev Inv Enferm [Internet]. 2018 [cited 2018 Dec 27];S2(23): 31-9. Available from: http://hdl.handle.net/20.500.12253/1287 Portuguese.

14. Lövgren M, Gustavsson P, Melin B, Rudman A. Neck/shoulder and back pain in new graduate nurses: A growth mixture modeling analysis. Int J Nurs Stud [Internet]. 2014 [cited 2018 Dec 27];51(4):625-39. Available from: https://doi.org/10.1016/j.ijnurstu.2013.08.009

15. Backåberg S, Rask M, Brunt D, Gummesson C. Impact of musculoskeletal symptoms on general physical activity during nursing education. Nurse Educ Pract [Internet]. 2014 [cited 2018 Dec 27];14(4):385-90. Available from: https://doi.org/10.1016/j.nepr.2014.02.003

16. Menzel N, Feng D, Doolen J. Low back pain in student nurses: literature review and prospective cohort study. Int J Nurs Educ Scholarsh [Internet]. 2016 [cited 2018 Dec 27];13(1):19-25. Available from: https://doi.org/10.1515/ijnes-2015-0057

17. Kneafsey R, Smallwood J. Musculo-skeletal injury–Are Universities doing enough to protect students? Nurse Educ Today [Internet]. 2010 [cited 2018 Dec 27];30(5):383-5. Available from: https://doi.org/10.1016/j.nedt.2009.10.010

18. Smith DR, Leggat PA. Musculoskeletal disorders among rural Australian nursing students. Aust J Rural Health [Internet]. 2004 [cited 2018 Dec 27];12(6):241-5. Available from: https://doi.org/10.1111/j.1440-1854.2004.00620.x

19. Dawson AP, Steele EJ, Hodges PW, Stewart S. Development and test–retest reliability of an extended version of the Nordic Musculoskeletal Questionnaire (NMQ-E): a screening instrument for musculoskeletal pain. J Pain [Internet]. 2009 [cited 2018 Dec 27];10(5):517-26. Available from: https://doi.org/10.1016/j.jpain.2008.11.008

20. Singh A, Devi YS, John S. Epidemiology of musculoskeletal pain in Indian nursing students. Int J Nurs Educ [Internet]. 2010 [cited 2018 Dec 27];2(2):6-8. Available from: http://www.indianjournals.com/ijor.aspx?target=ijor:ijone&volume=2&issue=2&article=002

21. Nunes H, Cruz A, Queirós P. [Musculoskeletal pain at the level of spine in nursing students: prevalence and risk factors]. Rev Inv Enferm [Internet]. 2016 [cited 2018 Dec 27];S2(14):28-37. Available from: https://www.researchgate.net/publication/298408087_Dor_musculo_esqueletica_a_nivel_da_coluna_vertebral_em_estudantes_de_enfermagem_Prevalencia_e_fatores_de_risco Portuguese.

22. Cestari VR, Barbosa IV, Florêncio RS, de Paula Pessoa VL, Moreira TM. Stress in nursing students: study on sociodemographic and academic vulnerabilities. Acta Paul Enferm [Internet]. 2017 [cited 2018 Dec 27];30(2):190-6. Available from: http://dx.doi.org/10.1590/1982-0194201700029

23. International Council of Nurses. Guidelines for ICNP catalogue development. Geneva (SWZ):ICN; 2008.

24. Zagonel IP. Concept analysis: na intellectual Exercise in nursing. Cogitare Enferm [Internet]. 1996 [cited 2018 Dec 27];1(1):10-4. Available from: http://dx.doi.org/10.5380/ce.v1i1.44944

25. Mesquita CC, Ribeiro JC, Moreira P. Portuguese version of the standardized Nordic musculoskeletal questionnaire: cross cultural and reliability. J Public Health [Internet]. 2010 [cited 2018 Dec 27];18(5):461-6. Available from: https://doi.org/10.1007/s10389-010-0331-0

26. Garcia TR (org). Classificação internacional para a prática de enfermagem CIPE®: versão 2017. Porto Alegre: Artmed; 2016. 227 p.

27. Azevedo RS. Relação do uso do smartphone e os sintomas músculo-esqueléticos em adolescentes [Thesis on the Internet]. Porto (PT): Escola Superior de Tecnologia da Saúde do Porto, Instituto Politécnico do Porto; 2016 [cited 2018 Dec 28]. 63 p. Available from: http://hdl.handle.net/10400.22/11050