Revision Article

Physiological and emotional responses to stress in nursing students: an integrative review of scientific literature

Respostas fisiológicas e emocionais ao estresse em estudantes de enfermagem: revisão integrativa da literatura científica

Respuestas fisiológicas y emocionales al estrés en estudiantes de enfermería: revisión integrativa de la literatura científica

Sonia Betzabeth Ticona Benavente[1], Ana Lucia Siqueira Costa[2]

ABSTRACT

Objective: To analyze the scientific results published in national and international nursing journals related to the physiological and emotional responses of nursing students. **Methods:** We performed an integrative review of scientific literature, focusing on the databases PUBMED, MEDLINE, CINAHL, LILACS and SciELO. In the sample, we included works available in full text, in Portuguese, English or Spanish, published between July 2004 to July 2009, and which contained at least one descriptor in the title and three in the text, directly related to physiological and psychological manifestations of stress in nursing students. **Results:** Of 126 articles identified, only 13 referred to the theme; of these, five addressed psychological manifestations, four addressed physiological manifestations, and four others identified both. Of the total, four studies were longitudinal and nine were transverse. **Conclusion:** In terms of results, it was observed that the theme should be further studied and developed in the process of teaching and learning of nursing, because it was verified that stress is a frequent occurrence and has major consequences for these students.

Descriptors: Nursing student/psychology; Stress; Physiological stress; Psychological stress

RESUMO

Objetivo: Analisar a produção científica relacionada às respostas fisiológicas e emocionais em estudantes de enfermagem, registrada nos periódicos nacionais e internacionais de enfermagem. **Métodos:** Foi realizada uma revisão integrativa da literatura científica, tendo como foco as bases de dados PUBMED, MEDLINE, CINAHL, LILACS e SciELO. Na amostra, foram incluídos trabalhos escritos na íntegra, em português, inglês ou espanhol, no período de julho de 2004 a julho de 2009, que continham, pelo menos, um descritor no título e três no texto, diretamente relacionados a manifestações fisiológicas e psicológicas do estresse em estudantes de enfermagem. **Resultados:** Dos 126 artigos identificados apenas 13 referiram-se ao tema, deles, cinco abordaram manifestações psicológicas, quatro, manifestações fisiológicas e outros quatro ambas. Do total, quatro foram estudos longitudinais e nove transversais. **Conclusão:** Pelos resultados atingidos, observou-se que o tema ainda deve ser estudado e desenvolvido no processo de ensino e aprendizagem da enfermagem, pois verificou-se que o estresse é uma ocorrência frequente e com consequências importantes entre esses estudantes.

Descritores: Estudante de enfermagem/psicologia; Estresse; Estresse fisiológico; Estresse psicológico

RESUMEN

Objetivo: Analizar la producción científica relacionada a las respuestas fisiológicas y emocionales de estudiantes de enfermería, registrada en los periódicos nacionales e internacionales de enfermería. **Métodos:** Se realizó una revisión integrativa de la literatura científica, teniendo como foco las bases de datos PUBMED, MEDLINE, CINAHL, LILACS y SciELO. En la muestra, fueron incluídos trabajos escritos íntegramente, en portugués, inglés o español, en el período de julio del 2004 a julio del 2009, que contenían, por lo menos, un descriptor en el título y tres en el texto, directamente relacionados a manifestaciones fisiológicas y psicológicas del estrés en estudiantes de enfermería. **Resultados:** De los 126 artículos identificados apenas 13 se refirieron al tema, de ellos, cinco abordaron manifestaciones psicológicas, cuatro, manifestaciones fisiológicas y otros cuatro ambas. Del total, cuatro fueron estudios longitudinales y nueve transversales. **Conclusión:** Por los resultados alcanzados, se observó que el tema aun debe ser estudiado y desarrollado en el proceso de enseñanza y aprendizaje de la enfermería, pues se verificó que el estrés es una ocurrencia frecuente y con consecuencias importantes entre esos estudiantes.

Descriptores: Estudiante de enfermeria/psicología; Estrés; Estrés fisiológico; Estrés psicológico

[1] *Nurse graduated from the Universidad Nacional de San Agustín de Arequipa, Peru.*

[2] *PhD in Nursing. Professor of the Medical-Surgical Nursing Department, Escola de Enfermagem of the Universidade de São Paulo -USP- São Paulo (SP), Brazil.*

Corresponding Author: **Ana Lucia Siqueira Costa**
Av. Dr. Enéas de Carvalho Aguiar, 419 - Cerqueira César - São Paulo - SP - Brazil
CEP. 05435-000 E-mail: anascosta@usp.br

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INTRODUCTION

Stressful experiences make individuals develop different coping strategies, so as to adapt and survive. To begin with, the adaptation process is considered an integrating part of living beings. But with regard to the contemporary man, it became a complex process, often followed by psychosomatic manifestations that are highly harmful to the quality of life[1]. When a particular situation is considered by an individual as difficult, or as something that exceeds his/her resources and puts his/her well-being at risk, stress reactions develop[2].

Currently, stress studies have gained popularity, both in daily conversations and in scientific literature[3-4]. Stress is considered a predisposing, triggering, and co-causing factor for multiple diseases, that can become serious with time[5-6].

Students of the healthcare area experience high levels of stress. A comparative analysis among students of the medicine, obstetrics, child care, nursing and medical technology courses demonstrated that the course subjects and personal conditions to perform activities cause a deeper impact among nursing students[7]. When comparing 558 undergraduate students of computer sciences, law, nursing, and letters, it was possible to observe that minor mental disorders were prevalent among nursing students. The most frequent psychosomatic disorders were tension, psychological stress, and low performance[8]. It is known that these alterations contribute to a low performance and bring serious consequences to such students' health state[9].

The nursing student is immerse in the teaching-learning process, which is characterized by the possibility of taking part in the experience, which might be threatening or challenging, but is also particularly important, for being related to one's professional preparation[7,10]. The adaptation to the teaching-learning process along the course is a constant concern students have[11].

Several authors have verified different sources of stress among nursing students. Academic demands, related to the workload increase, constant exams[12-13], and elaboration of correct reports and papers[13], are examples of sources of stress for students. Other sources of stress are connected to interpersonal and intra-personal relationships, that is, searching for new friends, and working with people they do not know[14-15], problems with professors, who can sometimes be demanding, intimidating and strict[15], limited time to perform several roles, related to family, work, and college[11], as well as financial problems, which are more and more common nowadays[11,16].

In conclusion, there is a consensus about stress being an expected and usual occurrence in the nursing academic environment. Obviously, it is important to consider the fact that students from different educational institutions experience different levels of stress during the teaching-learning process, and depend on the reality they live in, which will influence the intensity of stress during different stages of a student's life[17].

Aiming to discover symptoms produced by stress in nursing students, the present research was based on scientific literature and developed with the objective of: performing an integrative review of scientific literature, related to physiological and psychological manifestations of stress in nursing students.

METHODS

The integrative review method, with a descriptive character and quantitative approach, was chosen in order to reach the study objective. The integrative review method allows search, critical assessment, and a synthesis of the available evidence related to the investigated theme, which results in the identification of the current knowledge regarding the investigated theme, as well as gaps that guide future researches[18].

The methodology considers six stages, which were followed in this study, namely: to establish the research question, to select the researches that will comprise the sample, to categorize the studies, to assess the included studies, to interpret results, and to synthetize knowledge.

The bibliographic survey was performed through the online network of the Library of the Escola de Enfermagem da Universidade de São Paulo. Articles were selected from the following electronic databases: National Library of Medicine (PUBMED), Health Information from the National Library of Medicine (MEDLINE), Cummulative Index of Nursing and Allied Health Literature (CINAHL), Literatura Latino-Americana e do Caribe em Ciências de Saúde (LILACS) e Scientific Electronic Library Online (SciELO). The key words used to search for articles were: nursing student, stress, physiological stress, and psychological stress in Portuguese, Spanish, and English. These descriptors resulted in 126 articles with complete text, and those related to physiological and psychological stress manifestations among nursing students were selected. After reading the articles, 13 were chosen for being directly related to the theme in question.

The inclusion criteria were: complete articles, written between July 2004 and July 2009, in Portuguese, Spanish, or English, which had at least one key word in the title and three in the text, and were directly related to physiological or psychological stress among nursing students. The selection period was chosen to include recent researches, which characterize the current stress analysis phase.

A data collection form was elaborated and filled out for each article in the study sample. The form allowed the following information to be collected:

- Article identification: the article title and the journal where it was published were considered;
- Authors identification: authors were identified according to their academic background and titles; and
- Type of study: Researches were identified by their objective, method, results, and conclusions.

RESULTS

From the total of 126 articles found, only 13 were related to the theme "physiological and psychological stress manifestations among nursing undergraduate students", as demonstrated by Figure 1. In LILACS database, the articles found were only summaries. Therefore, they were excluded and are not part of the data presented in Image 1. The articles found were published in the following journals/magazines: Nurse Education Today (two articles), Journal of Psychiatric and Mental Health Nursing (one article), Journal of Physiological Anthropology (one article), Social Psychiatry and Psychiatric Epidemiology (one article), Research in Nursing & Health (one article), International Journal of Nursing Studies (two articles), International Journal of Nursing Education Scholarship (one article), Archives of Psychiatric Nursing (one article), Revista Chilena de Neuro Psiquiatria (one article), Biomedical Research, (one article), and Revista Referência (one article).

As to the authors academic background, as presented in Table 1, it is possible to observe that the majority of them were nurses (29; 55.8%), 11 of which with PhD titles; some of them were physicians (16; 30.8%); a few were physiotherapists (6; 11.5%) and one was a psychologist (1; 1.9%). Mostly, authors were nursing professors in different institutions.

Among the articles found, five approached psychological manifestations related to stress among nursing students; four approached physical manifestations, and four approached both (physical and emotional manifestations).

The 13 analysed articles were the result of researches, 11 of which followed the quantitative approach, one followed a mixed approach (quantitative and qualitative), and one, a qualitative approach. From the total, four were longitudinal studies and nine were cross-sectional studies.

When analysing the research objectives, as described in Chart 1, different approaches were verified among the authors. Some[17,19-20,22-23,25-26] analysed the relationship between stress and physiological or psychological manifestations, and others[10,12,21,24,27-28] explored the general health state of the students involved in the researches.

Articles about psychological stress manifestations were written by different authors. Researchers identified students with low self-esteem levels towards the last stages of their undergraduate courses. Stress and self-esteem levels were significantly different among students in different stages of their course. Stress was significantly

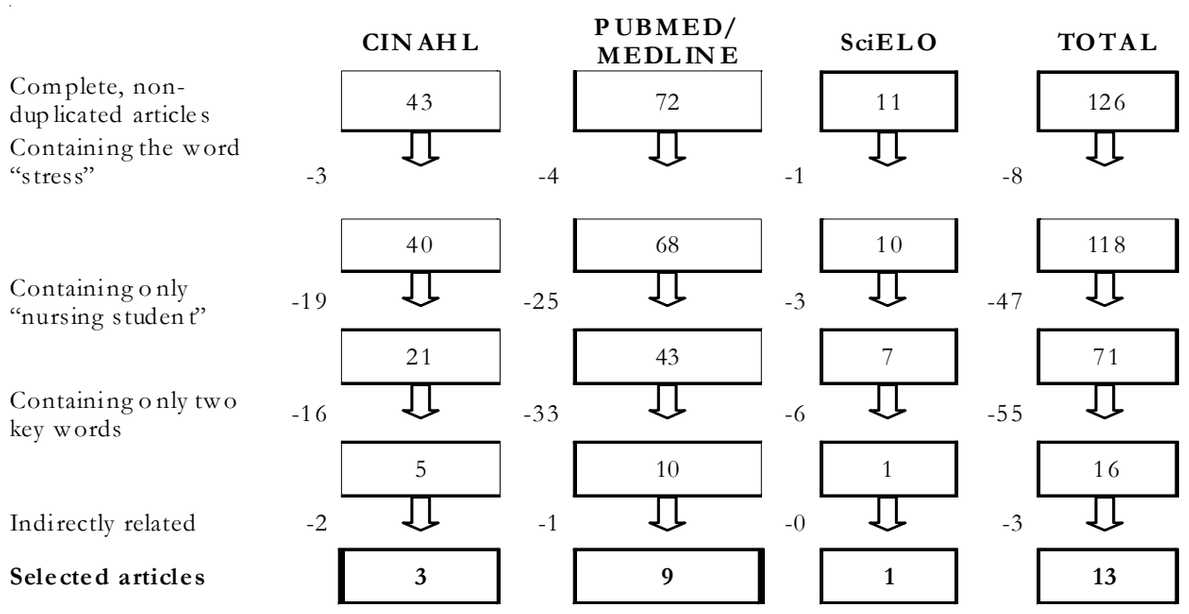

Figure 1 – Flow chart showing the selection process for the articles in the sample - July 2004 to July 2009

Table 1- Academic background distribution according to the authors' titles. São Paulo, 2009.

Title / Academic Background	Student	Bachelor	Master	PhD	Total
Nurse	1	9	8	11	**29**
Physician	4	3	3	6	**16**
Physiotherapist	-	1	1	4	**6**
Psychologist	-	-	-	1	**1**
Total	**5**	**13**	**12**	**22**	**52**

Chart 1 – Distribution of the 13 articles, according to the research objectivses. São Paulo, 2009.

Authors	Objectives
Tully[10]	To examine the affective well-being of nursing students during the first and second years of the course.
Pacheco[12]	To identify stress situations experienced during the course, stress sources, and analyse manifestations and coping mechanisms utilized.
Edwards et. al.[17]	To investigate self-esteem-related stress experiences during three years of the undergraduate course and the changes that took place.
Watson et al.[19]	To follow up on a nursing student group, from the beginning of the course to the end of the first year and study the relationship among the psychological variables (personality, stress, coping, and burnout).
Ono et al.[20]	To investigate the expression of emotions and empathy under active-stress conditions, aiming to reduce stress.
Luo e Wang[21]	To explore factors that affect the psychological state and the interactions between stress factors and mental symptoms, coping style, social support, and first clinical experiences.
Ross et al.[22]	To examine depression indexes and the associations between depression and stress, social support, and self-esteem.
Omigbodun et al.[23]	To investigate stress factors and psychological morbidity among medicine, dentistry, physiotherapy, and nursing students.
Sarid et al.[24]	To study the possible association between academic stress – assessing the immunological state, health state, and a healthy behaviour – and the academic performance along the first year of the course.
Mitchell et al.[25]	To assess the contribution of psychosocial factors to back pain among nursing students.
Takatsuji et al.[26]	To assess the effects of stress during the exams period, through the analysis of salivary cortisol, immunoglobulin A (IgA) and chromogranin A (CgA).
Marty et al.[27]	To determine the prevalence of stress among science students of the Universidad Los Andes and to compare subgroups by gender, course, and year.
Saint Arnault e Kim[28]	To explore the relationship among social groups, depression symptoms, and somatic symptoms for women in two Asian countries.

higher among students in the beginning of the 3rd year, when compared to stress levels presented in other stages of the course[17].

DISCUSSION

Based on the results analysis, it was possible to observe that articles were mainly published in international nursing journals/magazines, with no publications found in national journals.

It was possible to verify that stress among nursing students, as well as its manifestations are of interest to the area professors. This finding demonstrates that nursing professors are concerned about the students' learning and the reflexes the academic life might bring to these individuals' future professional lives.

A higher number of researches approaching emotional aspects were identified. Such result might be a consequence of a higher number of available instruments to assess this type of manifestation.

A lower number of researches approached physiological stress manifestations. This might be justified by the difficulty finding appropriate instruments that can be reproduced in different samples. Furthermore, this approach requires specialized laboratory support for objective results regarding stress-specific hormones, which increases costs and impacts on the development of studies in the area.

High levels of psychological morbidity and burnout were identified among Chinese students. Stress also increased along the course stages and emotion-focused coping strategies were used by such students[19].

The reactions nursing students had towards communication in stressful situations were measured through two experiences. Emotion and empathy were the variables analysed and the encephalogram and electrocardiogram lines were the variation record. Results demonstrated that expressing emotions activates the brain left temporal lobe, and empathic physiological responses varied according the student's perception of

different empathy elements. In this study, it was possible to conclude that the expression of emotions and perception of empathy reduce stress, thus information sharing is a core point to reduce stress[20].

Studies demonstrated that stress incidents and negative coping are positively related to psychological symptoms to some extent. Positive coping and social support are correlated with reducing psychological symptoms[21]. Another study reports that social support and self-esteem were negatively related to depression[22].

In Nigeria, data collection was performed through a questionnaire on sociodemographic characteristics, stress factors perception, and the General Health Questionnaire-12. Students more frequently reported as stress-related factors a noisy environment, lack of safety, and transportation means. Authors still report that gender was not a significant factor for the psychological morbidity[23].

As to the physiological stress manifestations, researchers collected saliva samples from students, and requested them to answer a questionnaire in three different occasions: a month after the beginning of the semester, after the final exams, and after the grades had been published. Authors identified an increase in the levels of some specific antibodies: HCMV IgG and IgA, a month after the beginning of the semester and after the final exams. The antibody levels decreased after the final exams and during the grades publication period. Even considering such variation in the level of antibodies, the health state and behaviour were stable during the stressful period[24].

A comparative study that compared the relation between nursing students and lumbar pain demonstrated that those with pain were physically more active, presented a higher stress score, and frequently used passive coping strategies when compared to the control group. The regression analysis revealed that the stress perception, coping strategy used, physical activity practiced, spinal movement, and age contributed to the presence of lumbar pain[25].

A physiological assessment of stress analysed 15 healthy nursing students going through preparatory simulated exams, with 100 multiple-choice questions about anatomy, and physiology, for the Osaka National Exam. Salivary cortisol was collected in three different moments, an hour before the exam, immediately after it finished, and two hours after it had finished. The concentrations of salivary cortisol, IgA and CgA were determined through an enzyme trial. Results revealed that the concentrations of IgA and CgA presented a statistically significant increase immediately after the exam had finished and decreased after two hours. No significant differences were observed in the salivary cortisol concentration in the period covering 1 hour before the exam, immediately after it and 2 hours after it[26].

In a study that correlated stress and infectious diseases, a positive association was found between the common cold (61.7%) and herpes (21.3%). Students with lower stress scores presented a negative correlation with infectious diseases[27].

When comparing Korean nursing students and Japanese nursing students with regard to depression and records of somatic symptoms in a specific period, it was possible to verify that both cultures are similar according to the indexes of the Beck Depression Inventory. However, Korean women have significantly higher stress averages than Japanese women[28].

When identifying physical stress manifestations among students, such as sweating, shaking, physical weakness; and psychological manifestations, such as panic, anguish, solitude, abandonment, sadness, demotivation, frustration, helplessness, and anger, it was possible to verify that anguish was the most reported symptom among all the manifestations[12].

The General Health Questionnaire-30 identified that stress levels are above the limit, which suggests that nursing students might develop a physical or psychiatric disease[10].

CONCLUSIONS

The present research found 13 articles about psychological and physiological stress manifestations experienced by nursing students.

It was possible to conclude that nursing students present psychological and physiological stress manifestations more often than other areas' students.

Socioeconomic differences contribute to the emergence of several stress factors, and gender is not a relevant factor when analysing stress manifestations among nursing students.

A number of studies associate physical stress manifestations, such as: lumbar pain, immunoglobulin level alterations, cortisol secretion increase, and low immunity diseases.

When using questionnaires that assess the general health state and whether depression is present, results varied; however, there was a trend towards physical and mental disorders among the analysed students.

Results still point out to the fact that there were no samples from researches performed in Brazil, because they had not been entirely published, demonstrating a need for studies that analyse the particularities of the country, and incorporate socioeconomic and cultural characteristics of Brazilian students to the stress analysis.

It is recommended that this type of study is known specially by nursing professors, and that support systems

are created for students, so that they can better benefit from the academic stage of their lives.

Another recommendation is for studies to be developed so as to identify stress manifestations and sources, aiming to generate intervention strategies to improve such students' quality of life. The students who are trained to use coping strategies will better enjoy their academic life and apply it in their future professional lives.

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