



Review Article

Copyright© Rodrigo PODEROSO

Gymnastics Program and The Reduction of Medical Certificates at The Municipal Hospital of Cuiabá-HMC

Rodrigo PODEROSO^{1*} and Pedro PODEROSO²

¹PODEROSO, Rodrigo, PhD in Sports Science in the Physical Education course at the University of Cuiabá- UNIC- Cuiabá-Mato Grosso

²PODEROSO, Pedro, Graduated in Physical Education at the University of Marília-UNIMAR, Marília- São Paulo

*Corresponding author: Rodrigo PODEROSO, PODEROSO, Rodrigo, PhD in Sports Science in the Physical Education course at the University of Cuiabá- UNIC- Cuiabá-Mato Grosso.

To Cite This Article: Rodrigo PODEROSO* and Pedro PODEROSO. Gymnastics Program and The Reduction of Medical Certificates at The Municipal Hospital of Cuiabá-HMC. Am J Biomed Sci & Res. 2025 25(4) AJBSR.MS.ID.003338, DOI: [10.34297/AJBSR.2025.25.003338](https://doi.org/10.34297/AJBSR.2025.25.003338)

Received: 📅 January 13, 2025; Published: 📅 January 22, 2025

Abstract

Introduction: Gymnastics can help to reduce the number of medical certificates in hospitals, as it can help to prevent occupational illnesses and improve the mental health of employees. Studies in the literature have pointed to gymnastics as an important tool for alleviating some of the problems caused by the pace of work in modern life. Occupational gymnastics (OG) consists of a set of physical exercises that are carried out in the workplace, with the aim of exercising the most overloaded body regions and preventing neuromuscular wear and tear on the worker and the consequent appearance of work-related illnesses (WMSDs).

Objective: To analyze the influence of a gymnastics program (PGL) on reducing the number of sick leave certificates at a company in the Cuiabá-HMC Municipal Hospital.

Methodology: The sample included 1,580 employees, 960 of whom were female and 620 male, aged between 20 and 70, who worked at the HMC. All the data was collected from the employees' medical records. The PGL was carried out twice a week, in the morning and evening shifts, on both shifts, for 12 months.

Results: It can be seen that in the period without gymnastics, absences due to medical certificates accounted for 354 certificates, while in the period with gymnastics there were 206, a reduction of 40.23%. As for systemic illnesses, there was a 19.28% reduction in sick leave after the gymnastics program was implemented. When analyzing musculoskeletal disorders, we found that in the first period there were 195 certificates, and in the second there was a reduction of 49.56%, to 98 certificates.

Conclusion: As a result of our study, and the entire approach related to it, and in agreement with the literature, it can therefore be concluded that with the reduction in the number of occupational diseases, there was a reduction in the number of occupational diseases. attested, there was also an improvement in the health and quality of life of its practitioners.

Keywords: Nurses, Anthropometry, Obesity

Introduction

Scientific studies indicate that reducing sedentary behavior and practicing Occupational Gymnastics or Physical Activity in the workplace can reduce pain, osteoarticular disorders [10,41-46] and a significant decrease of 51.52% in medical certificates [9]. That's

right, gymnastics reduces sick leave. Other significant improvements were found in mood, stress reduction, calmness, happiness and productivity in a study by the University of Bristol in the UK.

The mechanization of the activities carried out in the work-

place, together with the new technologies resulting from the process of globalization and the flexible accumulation of capital, led to the establishment of a relationship between stress and the work environment in the 1960s. This relationship was generated by the physical and emotional wear and tear resulting from overwork in various institutions, as workers significantly intensified their pace during their daily working hours. Since then, in the mid-1990s, the newly discovered research has been brought to Brazil, culminating in a deeper discussion of the relationship between workers' health and the impact of their working environment on it [1,2].

The transformations that have taken place in this environment in recent decades have led to changes in the working environment and, depending on the way it carried out, can be related to wear and tear, worsening of health conditions and even lead to illness itself [69].

In the era of globalization, the distribution of work activities, increased competitiveness in the job market and fear of unemployment end inducing workers to submit to moral and sexual harassment, accumulation of functions in order to achieve proposed goals, excessive workload, among others. These factors can contribute to an imbalance in the emotional state, eating pattern, physical activity routine, sleep and, thus, the emergence of psychological and metabolic diseases [11].

The institutions that pose the greatest occupational risks to workers' health are the Brazilian hospitals, which are characterized by placing them in environments with intense and exhausting work rhythms [14-20]. The hospital environment is characterized by its employees being overloaded with work, such as the exhausting rhythms of shifts, undue postures during procedures performed on patients, conflicts within teams, long periods in the same position and the professional's own contact with different types of health-disease processes presented by patients, such as suffering, pain and death [12].

With the aim of promoting workers' health through physical exercise, the Workplace Gymnastics Program (WGP), also known internationally as Workplace Physical Activity Intervention, has emerged. It includes a program of specific physical exercises to compensate for the muscle groups most required during work activities⁶, a physical- motor exercise that can compensate for wear and tear and help with prevention. The program can have broad objectives, such as promoting self-knowledge, self-esteem and possible improvements in social interaction within the company [14].

The main benefits for companies that hire professionals to carry out PGL are increased productivity, a reduction the incidence of occupational illnesses and lower medical costs. For employees, the benefits include improved self-esteem, improved interpersonal relationships, reduced pain, reduced stress reduced fatigue and improved physical, mental and emotional health. In addition to the benefits traditionally known in the literature, gymnastics positively influences other variables that can affect workers' health, such as overall motor coordination and reaction time [47].

As a result of these changes in the working environment, there

has been a concern about Quality of Life at Work (QOLW), which is defined by the factors and characteristics present in the working environment. This theme aims to enable (ensure) the needs of workers when carrying out their work activities, with the aim of acquiring more satisfied, productive people and better quality services. Specifically, in the case of nursing, which is a technical-scientific profession in which mental activities are used, but also physical activities; if the individual does not have both in perfect harmony, they begin to present health problems that compromise their work activity.

There are various types of gymnastics that can be performed in the workplace, each with its own characteristics and benefits.

Preparatory, Activities carried out before or in the first hours of work, consisting of stretching, increasing blood circulation, viscosity and lubrication of joints and tendons.

Compensatory, specific exercises to correct postural deviations resulting from work activity. It is performed in the middle of the working day, as a break, and is practiced to reduce fatigue and prevent chronic occupational diseases.

These are exercises designed to strengthen the muscles used at work, reducing muscle overload and preventing injuries.

Relaxation, performed at the end of the working day to oxygenate the muscles involved in repetitive tasks throughout the day, helping to reduce stress and muscle tension.

Gymnastics provides a break in the routine for employees, with a positive impact on the organizational climate. Staying in one position for too long is very harmful to our bodies. That's why it's recommended to do compensatory gymnastics in the middle of the working day.

Stretching exercises help to improve muscle flexibility and increase joint range of motion, helping to reduce muscle tension that can cause pain and fatigue. Physical exercise has a positive impact, helping to control muscle pain and postural changes that can damage the body. It helps prevent injuries caused by repetitive strain or inappropriate postures adopted at work. When employees feel better physically and mentally, there tends to be an increase in productivity and performance. This has a positive impact on the organization, such as more motivated professionals on a daily basis and better financial results.

Methods

The study complied with the Guidelines and Regulatory Norms for Research Involving Human Beings issued by the National Health Commission (466/2022) and (510/2016). Initially, a request was sent to the study site for data collection. After the site's authorization, which was approved and authorized, the research project was sent to the Ethics Committee for Research with Human Beings of the University of Cuiabá (UNIC) for an ethical opinion, which was approved by the same institution, and everyone signed the Free and Informed Consent Form (FICF).

The population of this study included 1580 employees, 960 of

whom were female and 620 male, aged between 20 and 70, who worked at the HMC. All the data was collected from the employees' medical records. The PGL was carried out five times a week, in the morning and evening, on both shifts, for 12 months. The employees came from the administrative and care sectors. In the administrative sector, the subjects spent most of their time sitting and in front of computers. In the care sector, the employees were more manual, predominantly standing, with small movements and squatting movements lifting different loads. To take part in the study, the subjects had to meet the following criteria: 1) be employed by the company during the study period (February 2022 to December 2023); and 2) have a minimum attendance of 75% in the Gymnastics classes given between January 2022 and December 2023.

The instrument used was the employee's medical records, in which the following data was collected: a) data characterizing the sample; b) number, reason and length of absences due to medical certificates; c) frequency and technical characteristics of the gymnastics program, between the months of January 2022 and December 2023. The data used to characterize the sample was age and gender. The file was checked to see if the employee was hired before January 2022. To analyze the medical certificates, only those related to the employee's illness, medical treatment and surgical treatment were selected. Medical certificates related to accompanying a family member to an appointment or similar; scheduled medical appointments; dental appointments and treatment; medical examinations and similar; pregnancy; certificates without the reason for absence or date; plastic surgery; and accidents at work were excluded. During this period the company did not develop any campaign or intervention to improve quality of life, so as not to interfere with the PGL results.

The PGL made available at the company was carried out by a trained professional (trained in Physical Education and registered with the Regional Council of Physical Education - CREF/MT), and

took place in 15-minute classes, four times a week for 12 months. Each class included an initial part (5 minutes), a main part (5 minutes) and a final part (5 minutes). The initial part focused on increasing the heart rate with global activities involving small movements and multi-member coordination. The second (main) part consisted of flexion exercises for the upper and lower limbs, and/or muscle strengthening with isometric and dynamic exercises, specific to the workers' function, taking into account the sectors already mentioned. The final part included relaxation, stretching and calming down activities. The classes were designed following an analysis of the jobs and specific professional functions. Occupational gymnastics included preparatory gymnastics, compensatory gymnastics, strengthening gymnastics and relaxation gymnastics.

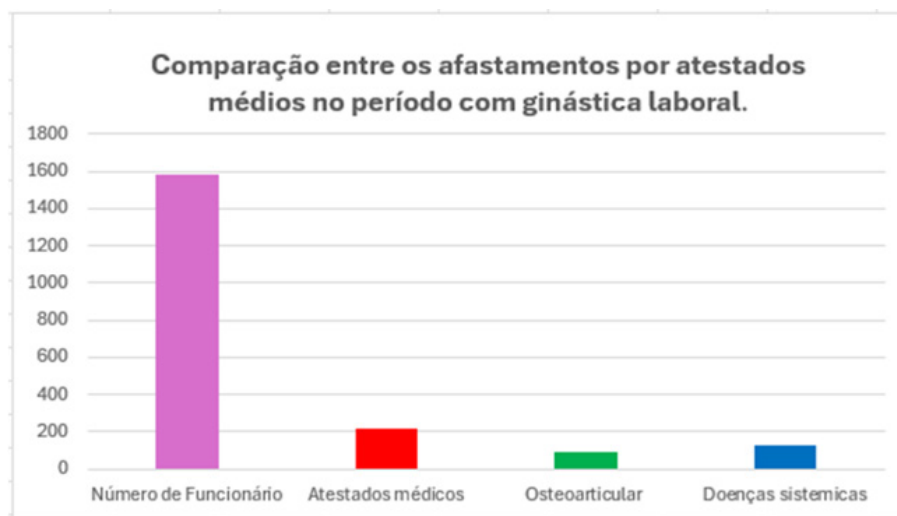
Results

Table 1 Shows a comparison between the number of absences due to medical certificates in the period without gymnastics, and Table 2, the period with gymnastics. The absences due to medical certificates were separated into two groups, those related to systemic diseases (excluding sexually transmitted diseases), and those related to musculoskeletal diseases. The systemic diseases reported in the medical certificates were varicose veins in the lower limbs, unspecified rheumatism, unspecified abdominal pain and high blood pressure. As for musculoskeletal diseases, the certificates were for shoulder pain, knee pain, RSI, WMSD and low back pain.

It can be seen that in the period without occupational gymnastics, absences due to medical certificates accounted for 354 certificates, while in the period with occupational gymnastics there were 206, a reduction of 40.23%. As for systemic illnesses, there was a 19.28% reduction in sick leave after the gymnastics program was implemented. When analyzing musculoskeletal disorders, we found that in the first period there were 195 certificates, and in the second there was a reduction of 49.56%, to 98 certificates.

Table 1: Comparison of average sick leave in the period without gymnastics.



Table 2: Comparison of average sick leave during the period with occupational gymnastics.

Discussion

Gymnastics can make a huge contribution to reducing employee stress and anxiety, providing a moment of relaxation during working hours. Repetitive Strain Injuries (RSI) are a set of diseases that affect the muscles, tendons and nerves of the upper limbs, neck and spine, caused by the excessive and repetitive use of these structures during work activities.

When Gymnastics at Work is carried out efficiently in the company, related to the movements involved in the activities that cause these injuries, it contributes to muscle strengthening and fatigue reduction. Gymnastics at Work can be a very effective alternative to combat the incidence of back pain and low back in companies. In addition, research has also shown that encouraging this practice in companies helps to correct workers' posture, indicating that employees take this practice into their daily lives [9].

In the administrative sectors of a hospital, where employees spend most of their time sitting in front of a computer to formulate procedure guides, the prevalent complaint before the application of GL was in the shoulder and arm (86.6%), lumbar spine (86.6%) and wrist/hand (33.3%) regions, according to studies carried out in a public hospital. In this study, the participants reported feeling pain after the working day (86.6%), 80% during this period, crucial moments when gymnastics should be implemented as a way of preventing RSI and WMSD [13].

The quest to increase productivity and reduce sick leave makes gymnastics an excellent intervention (FIGUEIREDO, 2012).

A study carried out in the administrative sector of a hospital in the interior of the state of São Paulo showed that, after applying GL at the institution, all the participants reported an increase in daily well-being and an improvement in interpersonal relationships, and 86.6% of the participants also reported that the gymnastics program promoted positive lifestyle improvements. Of these 86.6%, 46.6% said that they exercised more frequently, which leads us to

conclude that the participants have acquired an interest in cultivating healthier habits in order to look after their own health [13]. A related study, also carried out in a hospital administrative sector, showed that the beneficial results were similar: an improvement in the participants' mood, well-being and quality of life, as well as flexibility and a reduction in the incidence of muscle pain [70-74].

However, few studies have explored the causes of the number of absences due to medical certificates [35-40]. The results found in Silveira's (2000) study corroborate those of MENDES, where there was a reduction in the amount of absenteeism in both sexes during the application of the PGL. According to Reis, (2001) [55-64], this trend towards a reduction in absenteeism also occurred in this study, which showed a drop of 6 absences during the intervention period with warm-up and stretching exercises. In the study by Martinez and Matiello Júnior (2012) [21-34], individuals reported an improvement in their physical health, which could result in fewer absences due to illness.

Coelho and Burini (2009) [8] report numerous epidemiological studies that relate the level of physical exercise to a reduction in disease, but the mechanisms related to this are not fully understood and there is no consensus on the amount of exercise needed for this benefit. Bielemann, Knuth and Hallal (2010) [4] highlight physical exercise as a means of disease prevention, stating that its practice reduces chronic diseases, generating savings in public health spending. As in the studies by Coelho and Burini (2009) [8] and Bielemann, Knuth and Hallal (2010) [4-6], the results presented in this study indicate a reduction in systemic diseases, even with a reduced number of classes and reduced class time. In their study, Reis, Moro and Contijo (2003) observed a reduction in medical certificates dealing specifically with low back pain after the implementation of the gymnastics program. This corroborates the results found in this study, where there was a drop of around 55.56% in the number of certificates for musculoskeletal disorders.

In the study by Candotti, Stroschein and Noll (2011) [7], they

explain that the reduction in sick leave due to musculoskeletal disorders is evidenced when they report a reduction in the intensity and frequency of pain in the muscle groups involved in daily work, after three months of intervention with the LMP. The reduction in lower back pain was pointed out in the study by Reis, Moro and Contijo (2003), with a 90% decrease in cases following the application of the LMP.

The importance of preventing musculoskeletal diseases such as RSI/WMSD goes far beyond the physical aspects, as they can have repercussions on employees' mental health and trigger mental disorders (ALENCAR 2010). Picoloto and Silveira (2008) [48-54] and Szeto and Lam (2007) [65-69] highlight the high prevalence of musculoskeletal symptoms in workers and their relationship with age, gender, occupation and schooling. Public and private coffers also see the losses caused by employees taking time off work due to medical certificates. In the studies here on the administrative, wardrobe, nutrition and dietetics and Medical Archive and Statistics Service (SAME) sectors of a hospital, the benefits gained in terms of workers' health after practicing GL were also significant.

When analyzing the importance of an occupational gymnastics program in reducing the number of medical certificates and consequent absences at an industrial waste treatment company, a reduction in absolute numbers of 51.52% was observed in these certificates, both for systemic diseases and musculoskeletal diseases. This corroborates the literature, which emphasizes the importance of occupational gymnastics as a means of preventing illnesses, reducing absenteeism, improving interpersonal relationships and consequently reducing costs related to employees taking time off work.

Conclusion

The results showed a significant improvement in musculoskeletal pain caused by RSI and WMSD, in psychological health and in better interaction between team members and willingness to go to work. In addition to the positive results of occupational gymnastics on workers' health, there is also a need for more studies on its effectiveness in the day-to-day work of these workers, since there are still few studies on the subject in this environment. By producing more studies, it is hoped that institutions will become aware of the importance of safeguarding workers' health through preventive measures such as gymnastics.

References

1. ALENCAR MCB, Ota NH (2011) Removal from work. *Rev Ter Ocup Univ Sao Paulo* 22(1): 60-67.
2. ARAUJO ANA, Filho Lunardi W D, Alvarenga MRM, Oliveira R D, Souza JC, Vidamantas S (2017) Sociodemographic profile of nurses in the hospital network. *Rev enferm UFPE online* 11(11): 4716-25.
3. BELANCIERI MF, Bianco MHBC (2004) Stress and psychosomatic repercussions in nursing workers at a university hospital. Santa Catarina: *Rev Texto Contexto Enferm* 13(1): 124-131.
4. BIELEMANN R, Knuth AG, Hallal PC (2010) Physical activity and cost reduction due to chronic diseases in the Unified Health System. *Rev Bras Ativ Fis Saude* 15(1): 9-14.
5. BRASIL (2012) Ministry of Health. Department of Health Care. Department of Primary Care. National Food and Nutrition Policy. Ministry of Health. Department of Health Care. Department of Primary Care. Brasília: Ministry of Health.
6. CALLWAY CW, et al. (1988) Circumferences. In: Lohman TG, Roche AF, Martorell R. *Anthropometric standardization reference manual*. Champaign, IL: Human Kinetics pp.39-54.
7. CANDOTTI CT, Stroschein R, Noll M (2011) Effects of gymnastics at work on back pain and postural habits adopted in the work environment. *Rev Bras Cienc Esporte* 33(3): 699-714.
8. COELHO CF, Burini RC (2009) Physical activity for the prevention and treatment of chronic non-communicable diseases and functional disability. *Rev Nutr (Campinas)* 22(6): 937-946.
9. CUNHA Laux, Rafael, Pagliari, Paulo, Viannei Effting Junior, et al. (2016) Workplace Gymnastics Program and Reduction of Medical Certificates. *Science & work* 18(56): 130-133.
10. DE FREITAS-SWERTS FC, Robazzi ML (2014) The effects of compensatory exercise in the workplace to reduce work-related stress and musculoskeletal pain. *Latin American nursing magazine* 22(4): 629-636.
11. FERNANDES JC, et al. (2017) Working hours and health among nurses in public hospitals according to gender. *Rev Saude Publica*.
12. FERNANDES MA, Soares LMD, Silva JS (2018) Mental disorders associated with work in nursing professionals: a Brazilian integrative review. *São Paulo: Rev Bras Med Trabalho* 16(2): 218-224.
13. FERRACINI GN, Valente FM (2010) Presence of musculoskeletal symptoms and effects of workplace gymnastics in employees in the administrative sector of a public hospital. *São Paulo: Dor Magazine* 11(3):233-236.
14. FIGUEIREDO F, Mont'alvao C (2008) *Labor gymnastics and ergonomics*. 2nd edn. Rio de Janeiro: Sprint.
15. FINKELSTEIN S, HAMBRICK DC, CANNELLA AA (2009) *Strategic leadership: theory and research on executives, top management teams, and boards*. New York: Oxford University Press.
16. FRAMER E, KAPLAN G, PRONK N, O'DONNELL M (2014) Chapter 17: Addressing obesity at the workplace. *Health Promotion in the Workplace 4th Edn*. Troy, MI: American Journal of Health Promotion Inc pp. 509-534.
17. GIL A C (2002) *How to develop research projects*. 4a ed. São Paulo: Atlas.
18. GU JK, Luenda E Charles, Ki Moon Bang, Claudia C Ma, Michael E Andrew, et al. (2014) Prevalence of obesity by occupation among US workers: the National Health Interview Survey 2004-2011. *J Occup Environ Med* 56(5): 516-528.
19. GUDZUNE KA, et al. (2013) Physicians build less rapport with obese patients. *Obesity (Silver Spring)* 21: 2146-2152.
20. INTERNATIONAL DIABETES FEDERATION - IDF (2006) The IDF consensus worldwide definition of the metabolic syndrome. *IDF* pp.16.
21. JELLIFFE DB (1966) *The assessment of the nutritional status of the community*. Geneva: WHO pp. 13.
22. KETEL IJ, Volman MN, Seidell JC, Stehouwer CD, Twisk JW, et al. (2007) Superiority of skinfold measurements and waist over waist-to-hip ratio for determination of body fat distribution in a population-based cohort of Caucasian Dutch adults. *Eur J Endocrinol* 156(6): 655-661.
23. KIM MJ et al. (2013) Association between shift work and obesity among female nurses: Korean Nurses' Survey. *BMC Public Health* 13: 1204.
24. KOTTWITZ MU, Simone Grebner, Norbert K Semmer, Franziska Tschan, Achim Elfering (2014) Social stress at work and change in women's body weight. *Ind Health* 52(2): 163-171.

25. KOUWENHOVEN PASMOOIJ T, A Burdorf, J W Roos Hesselink, M G M Hunink, S J W Robroek. (2016) Cardiovascular disease, diabetes and early exit from paid employment in Europe; the impact of work-related factors. *Int J Cardiol* 215: 332-337.
26. KYLE RG, et al. (2017) Obesity prevalence among healthcare professionals in England: a cross-sectional study using the Health Survey for England. *BMJ Open* 7: e018498.
27. LAVOIE TREMBLAY M, Charles Sounan, Julie G Trudel, Geneviève L Lavigne, Kara Martin, et al. (2014) Impact of a pedometer program on nurses working in a health-promoting hospital. *Health Care Manag (Frederick)* 33(2): 172-180.
28. LETVAK S, RUHM C, GUPTA S (2013) Differences in health, productivity and quality of care in younger and older nurses. *J Nurs Manag* 21(7): 914-921.
29. LOBELO F, QUEVEDO IG (2016) The evidence in support of physicians and health care providers as physical activity role models. *Am J Lifestyle Med* 10(1): 36-52.
30. LORING B, ROBERTSON A (2014) Obesity and inequities: guidance for addressing inequities in overweight and obesity. Copenhagen.
31. LOWDEN A, et al. (2010) Eating and shift work -effects on habits, metabolism and performance. *Scand J Work Environ Health* 36: 150-162.
32. MACHADO LSF, Eder Pereira Rodrigues, Luciana de Matos Mota Oliveira, Rodrigo Cunha Sales Laudano, Carlito Lopes Nascimento Sobrinho, et al. (2014) Health problems reported by nursing workers in a public hospital in Bahia. *Rev Bras Enferm* 67(5): 684-691.
33. MAGNAGO TSBS, et al. (2010) Working conditions, sociodemographic characteristics and musculoskeletal disorders in nursing workers. *Minutes Paul. sick.*, São Paulo 23(2): 187-193.
34. MARTINEZ JFN, Matiello Junior E (2012) The limits of occupational gymnastics for understanding the health determinants of bank workers. *Thinking about Practice* 15(3): 610-624.
35. MAURO MYC, et al. (2010) Nursing working conditions in the wards of a university hospital. *Esc Anna Nery Rey Sick* 14(1): 13-18.
36. MARQUEZEA EC, Lucia C Lemosa, Nilson Soaresa, Geraldo Lorenzi-Filho, Claudia R C Morena (2012) Weight gain in relation to night work among nurses. *Work* 41(1): 2043-2048.
37. MENDES RA (2000) Labor Gymnastics (GL): Implementation and Benefits in the Industries of the Industrial City of Curitiba [Master's thesis]. Curitiba: Federal Center for Technological Education of Paraná.
38. MCELLIGOTT D, CAPITULO KL, MORRIS DL, CLICK ER (2010) The effect of a holistic program on health-promoting behaviors in hospital registered nurses. *J Holist Nurs* 28(3): 175-183.
39. MENDES KDS, SILVEIRA RCCP, GALVÃO CM (2008) Integrative review: research method for the incorporation of evidence in health and nursing. *Texto Contexto Enferm* 17(4): 758-764.
40. MONTEIRO CA, CONDE WL, POPKIN BM (2007) Income-specific trends in obesity in Brazil: 1975-2003. *American Journal of Public Health* 97(10): 1808-1812.
41. MOREIRA SILVA I, Teixeira PM, Santos R, Abreu S, Moreira C, et al. (2016) The effects of workplace physical activity programs on musculoskeletal pain: a systematic review and meta-analysis. *Workplace Health Saf* 64(5): 210-222.
42. MØRKEDAL Bjørn, Romundstad Pål R, Vatten Lars J (2011) Informativeness of indices of blood pressure, obesity and serum lipids in relation to ischaemic heart disease mortality: the HUNT-II study. *European Journal of Epidemiology* 26(6): 457-461.
43. NATIONAL INSTITUTES OF HEALTH -NIH (1998) National Heart, Lung, and Blood Institute. Obesity Education Initiative Expert Panel. Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults -The Evidence Report. *Obes Res* 6: 51S-209S.
44. OLIVEIRA AFC, NOGUEIRA MS (2010) Obesity as a risk factor for hypertension among nursing professionals at a philanthropic institution. *Rev esc sick USP* 44(2): 388-394.
45. OLSON R, Sharon V Thompson, Brad Wipfli, Ginger Hanson, Diane L Elliot, et al. (2016) Sleep, dietary, and exercise behavioral clusters among truck drivers with obesity. Implications for interventions. *J Occup Environ Med* 58(3): 314-321.
46. PARK MH, C Falconer, R M Viner, S Kinra (2012) The impact of childhood obesity on morbidity and mortality in adulthood: a systematic review. *Obes Rev* 13(11): 985-1000.
47. PEREIRA CCDA (2013) Technical excellence of occupational gymnastics programs: a didactic-pedagogical approach. São Paulo: Phorte.
48. PICOLOTO D, Silveira E (2008) Prevalence of musculoskeletal symptoms and associated factors in workers in a metallurgical industry in Canoas -RS. *Collective health science* 12(2):507-516.
49. PRICE GM, Uauy R, Breeze E, Bulpitt CJ, Fletcher AE (2006) Weight, shape, and mortality risk in older persons: elevated waist-hip ratio, not high body mass index, is associated with a greater risk of death. *Am J Clin Nutr* 84(2): 449-460.
50. PRONK NP (2015) Fitness of the US workforce. *Annu Rev Public Health* 36: 131-149.
51. PROPER KI, KOPPES LL, MEIJER S, BEMELMANS WJ (2013) The association between body mass index status and sick leave and the role of emotional exhaustion a mediation analysis among a representative sample of dutch employees. *J Occup Environ Med* 55(10): 1213-1218.
52. RAMOS FRS, Barth PO, Brito M, Caram C, Silveira LR, et al. (2019) Sociodemographic and work aspects associated with moral distress in Brazilian nurses. *Acta Paul sick* 32(4): 406-415.
53. REILLY JJ, KELLY J (2011) Long-term impact of overweight and obesity in childhood and adolescence on morbidity and premature mortality in adulthood: systematic review. *Int J Obes* 35(7): 891-898.
54. REIS FF, BRAGA ALS (2015) Night work and its impacts on the health of the nursing team: integrative review. *Rev Enferm UFPE online, Recife* 9(3): 7133-7145.
55. REIS ES (2001) Ergonomic analysis of work associated with break kinesiotherapy as preventive and therapeutic measures in a poultry slaughterhouse [Master's thesis] Florianopolis: UFSC.
56. ROOS E, Tea Lallukka, Ossi Rahkonen, Eero Lahelma, Mikko Laaksonen (2013) Laaksonen M. Working conditions and major weight gain-a prospective cohort study. *Arch Environ Occup Health* 68(3): 166-172.
57. RUSH T, LEARDMANN CA, CRUM CIANFLONE NF (2016) Obesity and associated adverse health outcomes among US military members and veterans: Findings from the millennium cohort study. *Obesity (Silver Spring)* 24(7) 1582-1589.
58. SANCHEZ BUSTILLOS A, VARGAS KGJRD, GOMERO CUADRA R (2015) Work productivity among adults with varied body mass index: results from a Canadian population-based survey. *J Epidemiol Glob Health* 5(2): 191-199.
59. SEGHE TO W (2018) Body Adiposity Index: validation and associated factors in adults in a population-based study. 2015. Thesis (Doctorate in Nutrition Science). Federal University of Viçosa.
60. SILVEIRA MG (2008) Effects of gymnastics at work on morphological and functional variables, lifestyle and absenteeism of workers in the pharmaceutical industry in Montes Claros -MG [Master's thesis]. Vila Real: University of Trás-os-Montes and Alto Douro.
61. SINGH D (2002) Female mate value at a glance: relationship of waist-to-

- hip ratio to health, fecundity and attractiveness. *Neuro Endocrinol Lett* 4: 81-91.
62. SILVA FJ da (2011) Work ability and fatigue among nursing workers. São Paulo pp. 84. Dissertation (Master's) -School of Nursing at the University of São Paulo.
 63. SILVA RM, Regina Célia Gollner Zeitoune, Carmem Lúcia Colomé Beck, Milva Maria Figueiredo de Martino, Francine Cassol Prestes (2016) The effects of work on the health of nurses who work in clinical surgery departments at university hospitals. *Rev. Latino-Am. Enfermagem* 24: e2743.
 64. SILVEIRA CDS, et al. (2013) Profile of overweight and obesity in nursing workers in intensive care and emergency units. *Science & Health Magazine, Porto Alegre* 6(3): 157-162.
 65. SZETO GPY, Lam P (2007) Work-related musculoskeletal disorders in urban bus drivers of Hong Kong. *J Occup Rehabil* 17(2): 181-198.
 66. SORENSEN G, et al. (2016) Integrating worksite health protection and health promotion: a conceptual model for intervention and research. *Prev Med* 91: 188-196.
 67. STEVENS S (2014) Get serious about obesity or bankrupt the NHS. *NHS England*.
 68. SWINBURN BA, Gary Sacks, Kevin D Hall, Klim McPherson, Diane T Finegood, et al. (2011) The global obesity pandemic: shaped by global drivers and local environments. *Lancet* 378(9793): 804-814.
 69. TEIXEIRA RC, MANTOVANI MF (2009) Nurses with chronic illness: relationships with illness, prevention and the work process. *Rev Esc Enferm USP* 43(2): 415-421.
 70. THOMAS J R, Nelson J K, Silverman S (2007) *Research Methods in Physical Activity*. 5a edn. Porto Alegre: Artmed.
 71. YARBOROUGH CM, Stacy Brethauer, Wayne N Burton, Raymond J Fabius, Pamela Hymel, et al. (2018) Obesity in the workplace: Impact, outcomes and recommendations, *Journal of Occupational and Environmental Medicine* 60(1): 97-107.
 72. YUSUF S, Hawken S, Ounpuu S, Leonelo Bautista, Maria Grazia Franzosi, et al. (2005) Obesity and the risk of myocardial infarction in 27,000 participants from 52 countries: a case-control study. *Lancet* 366(9497): 1640-1649.
 73. WORLD HEALTH ORGANIZATION. WHO. (2017) Obesity and overweight: Key facts.
 74. WALSH IAP, Bertoncello D, Frizzo HCF, Alves SG, Santos WLM (2014) Perception of employees at a Clinical Hospital on the effects of Occupational Gymnastics. *Uberaba: Refacs Magazine* 2(1): 22-27.