Psychosocial variables and sleep in adolescents with neck pain? A systematic review with meta-analysis

Andias, Rosa[1,2] and Silva, Anabela G.[1,2]

[1] School of Health Sciences, University of Aveiro, Campus Universitário de Santiago, 3810-193 Aveiro, Portugal

[2] Center for Health Technology and Services Research (CINTESIS), Piso 2, Edifício nascente, Rua Dr. Plácido da Costa, s/n, 4200-450 Porto, Portugal

Summary: The prevalence of chronic idiopathic neck pain (NP) in young people is increasing and it has surpassed low back pain as the most prevalent complaint (1, 2). NP results in limitations of activities of daily living, decreased quality of life, frequent school absences and has a negative impact on families (3, 4). Additionally, having NP at younger ages is a risk factor for having NP in adulthood (5). It has been suggested that NP may be associated with high levels of depression, stress (6), anxiety (7), catastrophizing (8), fear of movement and disability (9). Central sensitization and sleep have also been reported as important factors for the onset and persistence of chronic NP (10). However, no systematic review synthetizing and assessing the quantity and quality of the evidence comparing adolescents with and without NP has been performed. This would help to understand NP at younger ages and inform on relevant measurement outcomes for interventions as well as prevention and intervention strategies directed at this age group.

Aim of Investigation: The aim of this systematic review is to retrieve, critically assess and synthetize the available evidence investigating whether psychosocial changes and sleep are associated with NP in adolescents.

Methods: The research strategies followed the guidelines of Cochrane and were registered in PROSPERO. Studies were identified from searches in electronic databases (Pubmed, ScienceDirect, Web of Science, PEdro, Scielo, Scopus and Academic Search Premier) and screening of references of included studies. Two reviewers (RA and AGS) independently screened studies against pre-determined inclusion criteria defined as: studies comparing adolescents with and without idiopathic NP (acute or chronic) aged 12 to 18 years old, for any of the following variables: depression, anxiety, catastrophizing, fear of movement, stress, sleep, self-efficacy and disability. The two reviewers independently assessed the quality of included studies using the Newcastle-Ottawa Scale. Data extraction regarding sample characteristics, NP characteristics, measurement procedures, outcomes and results were performed by RA using

standardized forms and checked by AGS. Data were reported as WMD (± 95% CI) or OR (± 95% CI) and two meta-analysis were performed using META XL software.

Results: Fourteen studies were included and a total of 20 comparisons for different variables were made between adolescents with and without NP. Depression, sleep, anxiety and stress were assessed in 7 (6, 11-16), 6 (10, 13, 17-20), 2 (7, 8), and 2 studies (6, 11), respectively, all of which reported that adolescents with NP show significantly higher levels of depression, anxiety and stress and poorer sleep when compared to adolescents without NP. A meta-analysis was performed with the 4 studies that assessed depression by gender and the results showed a significant heterogeneity across studies (Q=118.24, p=0.00; I^2=97% and Q=82.07, p=0.00; I^2=96%, respectively for girls and boys), and showed that depression was significantly associated with increased odds of reporting NP, in girls (OR= 2.36; $CI_{95\%}$=1.26, 4.42) and boys (OR=2.26; $CI_{95\%}$=1.06, 4.84). A second meta-analysis was performed for sleep and, despite the significant heterogeneity across studies (Q=11.46, p=0.00; I^2=74%), they showed significant differences in quantity and quality of sleep between adolescents with and without NP (OR=1.63; $CI_{95\%}$=1.23, 2.18). Two studies assessed self-efficacy (11, 14) and only 1 found significantly lower levels of self-efficacy for girls with NP but not for boys. Catastrophizing was assessed in 1 study only (8), which reported that adolescents with NP have higher levels of catastrophizing when compared to adolescents without NP. The methodological quality of included studies ranged from 2 to 6 and the concordance between the two reviewers was K=0.88.

Conclusions: The studies found were very heterogeneous in terms of measurement procedures and instruments. Despite the limited number of studies exploring the association of some psychosocial variables with NP, taken together, the results suggest that depression, anxiety, stress, catastrophizing and sleep may play a relevant role in adolescents' NP. Nevertheless, the quality of some studies was low. Interestingly, no study was found on fear of movement and disability. Further high quality studies are needed, particularly characterizing disability, stress, self-efficacy, catastrophizing and fear of movement. These results suggest that psychosocial variables may be important targets when designing interventions for adolescents with NP.

1. Hoftun GB, Romundstad PR, Zwart JA, Rygg M. Chronic idiopathic pain in adolescence - high prevalence and disability: The young HUNT study 2008. Pain. 2011;152(10):2259-66.

2. Scarabottolo C, Pinto RZ, Oliveira C, Fernando Zanuto E, Cardoso J, Christofaro D. Back and neck pain prevalence and their association with physical inactivity domains in adolescents. European Spine Journal. 2017;26(9):2274-80.
3. Palermo T. Impact of recurrent and chronic pain on child and family daily functioning: a critical review of the literature. Journal of developmental and behavioral pediatrics 2000;21(1):58-69.
4. Andreucci MA, Campbell P, Dunn KM. Are Sleep Problems a Risk Factor for the Onset of Musculoskeletal Pain in Children and Adolescents? A Systematic Review. Sleep. 2017;40(7). Epub 2017/05/23.
5. Brattberg G. Do pain problems in young school children persist into early adulthood? A 13-year follow-up. European journal of pain (London, England). 2004;8(3):187-99. Epub 2004/04/28.
6. Diepenmaat ACM, Van Der Wal MF, De Vet HCW, Hirasing RA. Neck/shoulder, low back, and arm pain in relation to computer use, physical activity, stress, and depression among dutch adolescents. Pediatrics. 2006;117(2):412-6.
7. Rees CS, Smith AJ, O'Sullivan PB, Kendall GE, Straker LM. Back and neck pain are related to mental health problems in adolescence. BMC public health. 2011;11:382-8. Epub 2011/05/26.
8. Sá S, Silva AG. Repositioning error, pressure pain threshold, catastrophizing and anxiety in adolescents with chronic idiopathic neck pain. Musculoskeletal Science and Practice. 2017;30:18-24.
9. Lee H, Hubscher M, Moseley GL, Kamper SJ, Traeger AC, Mansell G, et al. How does pain lead to disability? A systematic review and meta-analysis of mediation studies in people with back and neck pain. Pain. 2015;156(6):988-97. Epub 2015/03/12.
10. Auvinen JP, Tammelin TH, Taimela SP, Zitting PJ, Järvelin MR, Taanila AM, et al. Is insufficient quantity and quality of sleep a risk factor for neck, shoulder and low back pain? A longitudinal study among adolescents. European Spine Journal. 2010;19(4):641-9.
11. Niemi SM, Levoska S, Rekola KE, Keinänen-Kiukaanniemi SM. Neck and shoulder symptoms of high school students and associated psychosocial factors. Journal of Adolescent Health. 1997;20(3):238-42.
12. Härmä AM, Kaltiala-Heino R, Rimpelä M, Rantanen P. Are adolescents with frequent pain symptoms more depressed? Scand J Prim Health Care. 2002;20(2):92-6.
13. Ståhl M, Kautiainen H, El-Metwally A, Häkkinen A, Ylinen J, Salminen JJ, et al. Non-specific neck pain in schoolchildren: Prognosis and risk factors for occurrence and persistence. A 4-year follow-up study. Pain. 2008;137(2):316-22.
14. Pollock CM, Harries RL, Smith AJ, Straker LM, Kendall GE, O'Sullivan PB. Neck/shoulder pain is more strongly related to depressed mood in adolescent girls than in boys. Manual therapy. 2011;16(3):246-51. Epub 2010/11/26.
15. Myrtveit SM, Sivertsen B, Skogen JC, Frostholm L, Stormark KM, Hysing M. Adolescent neck and shoulder pain--the association with depression, physical activity, screen-based activities, and use of health care services. The Journal of adolescent health : official publication of the Society for Adolescent Medicine. 2014;55(3):366-72. Epub 2014/04/22.
16. Dolphens M, Vansteelandt S, Cagnie B, Vleeming A, Nijs J, Vanderstraeten G, et al. Multivariable modeling of factors associated with spinal pain in young adolescence. European Spine Journal. 2016;25(9):2809-21.
17. Shan Z, Deng G, Li J, Li Y, Zhang Y, Zhao Q. How schooling and lifestyle factors effect neck and shoulder pain? A cross-sectional survey of adolescents in China. Spine. 2014;39(4):E276-83. Epub 2013/11/21.
18. Paiva T, Gaspar T, Matos MG. Sleep deprivation in adolescents: correlations with health complaints and health-related quality of life. Sleep medicine. 2015;16(4):521-7. Epub 2015/03/11.

19. Silva AG, Sa-Couto P, Queirós A, Neto M, Rocha NP. Pain, pain intensity and pain disability in high school students are differently associated with physical activity, screening hours and sleep. BMC musculoskeletal disorders. 2017;18(1).
20. dos Passos MHP, Silva HA, Pitangui ACR, Oliveira VMA, Gomes GC, Araújo RC. Association between sleep quality and pain in the cervical region and scapular waist in adolescent athletes. Sleep Biol Rhythms. 2017;15(2):137-42.