



Low Back Pain and Neck Pain Due to Physical Activity In Adolescent: A Systematic Review

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Abstract:

Background- The lower back pain also with mid back and neck pain (NP) are common health issues in adolescence. The psychological factor as well as physiological factor are retarded as the main risk factor for back pain in adolescence according to the recent studies. Now a day also there are much more risk for the LBP and NP due to sitting in the wrong position in prolonged time for online classes. The main purpose of this study was to combine or summarize the results of the studies on the physical risk factors for the adolescent LBP and NP.

Methology- For this review article Cross-sectional and prospective English studies on NP and MBP in adolescents aged 10 to 18 were searched by a professional librarian in Medline (OvidSP), Premedline (PubMed), EMBASE, Cochrane, CINAHL, PEDro and PsycINFO up to October 2016. Collected the about 42 articles and summarize that in this review articles.

Result- There are eight cross-sectional studies had been included in this review article. Some are the aspects of sagittal alignment in sitting (increased lumbar lordosis) and standing (ante-position of the head, away-back posture) were associated with Neck Pain. Study comparability was hamper by conflicting with definitions of NP and MBP and a wide variety of outcome measures. A range of physical, psychological and social factors have been shown to be associated with musculoskeletal pain report, but the strength and direction of these relationships are non-clear.

Conclusion- Attempts to understand these conditions at a time close to their early onset may offer a better chance of developing effective prevention and treatment strategies. This systematic review indicates that prospective studies using a consistent definition of the neck pain and midback pain are needed. Such studies might further investigate sagittal alignment in sitting and standing as possible risk factors for NP and MBP in adolescence using a consistent terminology for the outcomes and longitudinal research designs.

Index Terms - Adolescent, Mid back pain, Low back pain, Neck pain, Systematic review

I. INTRODUCTION

In the mid age or adolescents between 15 -19 years, the low back pain (LBP) and neck pain (NP) has been ranked in top ten for the years lived with disability worldwide and rank higher than some well-recognized health problems of adolescence such as alcohol, drug abuse and smoking [1]. This is the age in which the person's health get much more affected due to improper behavior hygiene. According to the Norwegian study there are 7373 adolescents between 13 and 19 years, neck/shoulder was the most often affected location of musculoskeletal pain [2]. The underlying mechanisms for adolescent Neck pain and mid back pain are physiological, psychological, behavioral, genetic or a combination of these is not known well [1], but mid back pain incidence is similar to that of lower back pain and neck pain in children as well as adolescents [4]. Mid back pain prevalence even outnumbers lower back pain prevalence at the age of 9 and equalizes it at the age of 15 [5, 6]. These numbers are of particular significance as several studies that have shown the pain experiences in childhood and adolescence influences pain experience later in their life [7, 8]. From 58 children with persisting non-specific lower back pain or Mid back pain, the 90% of the children with Mid back pain and 55% of those with Lower back pain reported pain after skeletal maturity [10]. In the recent study the Dolphens M reported that self-induced symptoms were most strongly associated with the frequency of adolescent spine pain, but these all were followed by factors from the physical and psychosocial areas, and also role of lifestyle factors, such as physical activity, was limited [12]. Correspondingly in the adults, the mass of studies were investigated psychosocial or work related risk factors [13] and also focused on lower back pain [14]. In this the systemic review the lower back pain and neck pain are generally caused by the physical activity. And the main goal of this systemic review is to combine the results of the studies on the lower back and neck pain in adolescents between 10-18 years old.

II. RESEARCH METHODOLOGY

For this review article Cross-sectional and prospective English studies on NP and MBP in adolescents aged 10 to 18 were searched by a professional librarian in Medline (OvidSP), Premedline (PubMed), EMBASE, Cochrane, CINAHL, PEDro and PsycINFO up to October 2016. Collected the about 42 articles and summarize that in this review articles are follow;

2.1 Study Selection

Study Selection Titles and abstracts of the articles were screened by two authors (BW, TP, BW and TP). In a second step, the full text of the remaining articles was screened for eligibility by the same authors. The full text was also screened if no abstract was available or eligibility was unclear based on the text of the abstract. Two consensus meetings helped to resolve any discrepancies in terms of eligibility. In a last step, studies that focused on neck and/or mid back were selected for this review.

2.2 Quality Assessment

Two authors (BW and SR) evaluated the quality of the selected studies based on the “Critical assessment form for quantitative studies” [17]. As a Substitute, a question on assessments of random variability of data was added from the Downs and Black checklist [19] and two questions on biases [18] and on the acceptable description of the assessments [18, 19] were included. The assessment form is shown in Additional questionnaire file 2. All questions were either answered by YES (= 1 point) or NO (= 0 points) except for the question on biases where the scoring was reversed. As the question focus on drop-outs was only applicable to upcoming studies, the total quality score was maximally 14 points for cross-sectional and fair studies and 15 points for prospective studies. After individual rating, a accord meeting was held to make clear possible disagreements. The agreement of the two ratings was calculated by Cohen’s kappa using IBM SPSS Statistics 21. A study’s quality was considered as normal to high if it reached at least 60% of the maximum score [20].

2.3 Data Extraction

For the each article the one author (TP) removed information about the study, design, age, and gender of the contributors, the physical factors that were investigated, the measurements and tests that were used, and the main results. A post author (BW) Has double-checked these data. The coverage of this methodical review followed the PRISMA guidelines [21].

III. RESULTS AND DISCUSSION

3.1 Study Selection And Quality Appraisal

Figure 1: Demonstrates the study choice process that resulted in a total of eight cross-sectional studies to be contained in this review [22–29].

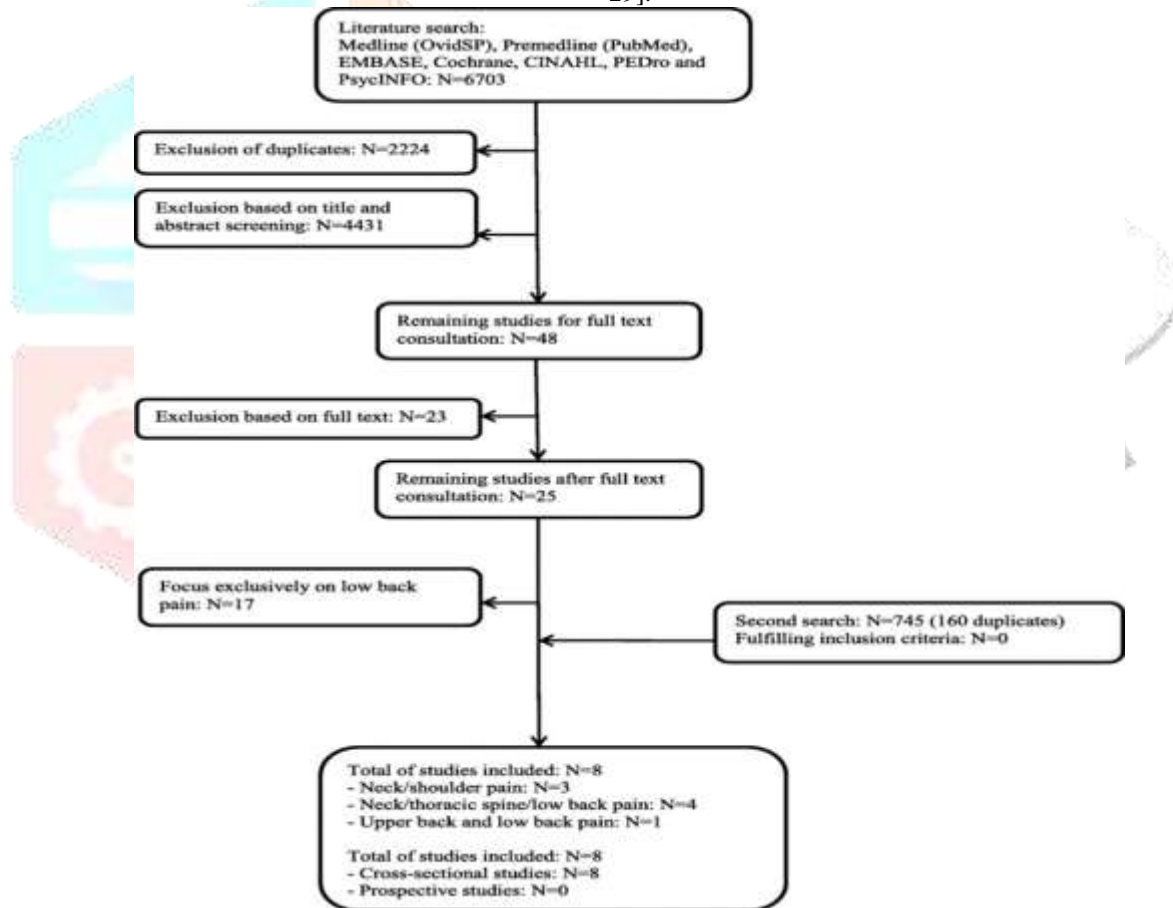


Figure 1 flow chart of the study search, eligibility and inclusion.

Three studies focused on NSP [26–28], four studies independently investigated pain in the neck, the thoracic spine and in the lower back [23–25, 29], and one study focused on upper and lower back pain [22]. After the compromise meeting, the two reviewers agreed on the scores of all articles, expressed in a resulting κ value of 1.00 ($p < 0.001$). The mean quality score of this studies was 10.3 ± 1.8 (range: 8 to 13 points out of 14 points). One cross-sectional study did not reach normal quality level according to the pre-evaluation adopted standard from the PEDro guidelines (Table 1 and 2)[43].

Table 1

Summary of study characteristics of included studies

Author, year	Title	Pain localization	Pain assessment: questionnaire	Study design	Participants: number (m/f) age	Investigated physical factors	Main results	Quality score
Cudre-Mauroux et al., 2006 [22]	Relationship between impaired functional stability and back pain in children: an exploratory cross-sectional study	Upper and lower back	Week prevalence	Cross-sectional	N = 125 (57/68) Median age = 10 years	Functional stability (Matthiass Test using a new scoring system)	No association between Matthiass test and upper back pain in the last week.	< 60%/14
Dolphens et al., 2012 [23]	Sagittal standing posture and its association with spinal pain.	Neck, thoracic spine, low back	Lifetime and one-month prevalence, concomitant doctor visit	Cross-sectional	N = 1196 (639/557) Boys: 12.6 ± 0.5 years Girls: 10.6 ± 0.5 years	Global sagittal alignment (pelvic displacement, trunk lean angle, body lean angle) and local spinopelvic parameters (e.g. number of vertebrae in the lumbar lordosis, vertebral level of apex, pelvic orientation in the sagittal plane) in habitual standing using digital images, inclinometry and accelerometry.	Neck pain: Boys: Positive association between lifetime prevalence of neck pain and anteroposition of the head (smaller craniocervical angle) and increased trunk lean angle ($R^2 = 0.03$). Positive association between month prevalence of neck pain and increased trunk lean angle ($R^2 = 0.06$). Girls: Positive association between lifetime prevalence of doctor visit and anteroposition of the head ($R^2 = 0.04$). Mid back pain: Boys: Positive association between doctor visits and increased trunk lean angle ($R^2 = 0.05$). Girls: No significant association.	12/14

Author, year	Title	Pain localization	Pain assessment: questionnaire	Study design	Participants: number (m/f) age	Investigated physical factors	Main results	Quality score
Dolphens et al., 2013 [24]	Classification system of the normal variation in sagittal standing plane alignment. A study among adolescent boys.	Neck, thoracic spine, low back	Lifetime and one-month prevalence, concomitant doctor visit	Cross-sectional	N = 639 (639/0) 12.6 ± 0.5 years	Global sagittal alignment (pelvic displacement, trunk lean angle, body lean angle) and local spinopelvic parameters (e.g. number of vertebrae in the lumbar lordosis, vertebral level of apex, pelvic orientation in the sagittal plane) in habitual standing using digital images, inclinometry and accelerometry.	Cluster analysis: 3 clusters of global alignment: neutral, sway-back, leaning-forward. Sway-back (large trunk lean angle and large body lean angle) significantly associated with lifetime prevalence of neck pain. Global posture category accounts for 2% in lifetime prevalence of neck pain and for 4% in month prevalence of neck pain. No association of spinal pain measures and local spinopelvic parameters.	11/14
Dolphens et al., 2014 [25]	Classification system of the sagittal standing alignment in young adolescent girls.	Neck, thoracic spine, low back	Lifetime and one-month prevalence, concomitant doctor visit	Cross-sectional	N = 557 (0/557) 10.6 ± 0.5 years	Global sagittal alignment (pelvic displacement, trunk lean angle, body lean angle) and local spinopelvic parameters (e.g. number of vertebrae in the lumbar lordosis, vertebral level of apex, pelvic orientation in the sagittal plane) in habitual standing using digital images, inclinometry and accelerometry.	3 postural subtypes. No association between posture clusters and spinal pain measures.	9/14

Author, year	Title	Pain localization	Pain assessment: questionnaire	Study design	Participants: number (m/f) age	Investigated physical factors	Main results	Quality score
Perry et al., 2008 [26]	Fitness, motor competence and body composition as correlates of adolescent neck/shoulder pain: an exploratory cross-sectional study.	Neck/shoulder (posterior neck and upper trapezius)	Lifetime and one-month prevalence, pain duration more than 3 months	Cross-sectional	1608 (825/783) 14.1 ± 0.2	Upper and lower limb power (seated basketball throw, standing long jump) Trunk endurance (sustained back extension test, abdominal curls) Grip strength Shoulder flexibility (shoulder stretch) Motor competence (neurodevelopmental index)	Boys: Higher odds of neck pain when upper and lower limb power increased. Lower odds for neck pain when back muscle endurance reduced. R ² of models between 0.02 and 0.09. Girls: Higher odds for diagnosed neck pain when back endurance decreased or increased (U-shape) and abdominal endurance increased. Lower odds for neck pain when upper limb power increased and lower limb power and shoulder flexibility decreased. R ² of models between 0.001 and 0.06.	13/14
Straker et al., 2008 [28]	Sitting spinal posture in adolescents differs between genders, but is not clearly related to neck/shoulder pain: an observational study.	Neck/shoulder	Lifetime, one-month and point prevalence	Cross-sectional	1470 (713/757) 14.1 ± 0.2	Sitting spinal posture (photographs, 7 sagittal angles) Questionnaire (lifetime, month, point prevalence of neck pain)	Adolescents with neck/shoulder pain: 2 degrees less trunk angle and 1 degree less cervicothoracic angle. After controlling for gender, no differences between the groups with and without neck pain.	9/14

Author, year	Title	Pain localization	Pain assessment: questionnaire	Study design	Participants: number (m/f) age	Investigated physical factors	Main results	Quality score
Straker et al., 2009 [27]	Relationships between prolonged neck/shoulder pain and sitting spinal posture in male and female adolescents.	Neck/shoulder	Month prevalence, pain duration more than 3 months	Cross-sectional	1593 (814/779) 14,1	Sitting spinal posture (photographs, 7 sagittal angles) Questionnaire (month prevalence of neck pain, duration of neck pain)	Adolescents with prolonged NSP: More flexed (decreased) cervicothoracic angle, more extended (decreased) trunk angle, more lordotic (decreased) lumbar angle, more anterior pelvic tilt. After controlling for gender: Association between prolonged NSP and increased lordosis/decreased lumbar angle ($R^2 = 0.02$) and increased anterior pelvic tilt ($R^2 = 0.02$).	11/14
Wirth et al., 2013 [29]	Spine Day 2012: spinal pain in Swiss school children - epidemiology and risk factors	Neck, thoracic spine, low back	Lifetime prevalence, recurrence, pain intensity, consequences (leisure activities, school absence, doctor visit, medication)	Cross-sectional	434 (211/223) 10.4 ± 2.8	Trunk functional stability (Matthiass test) Trunk asymmetry (forward bending test) Spinal mobility (fingertip-floor distance) Coordination (single leg stance)	No association of the outcome parameters with neck pain or mid back pain.	9/14

Table 1 Summary of study characteristics

Table 2

Quality assessment of the included studies

Study	Study purpose	Literature	Design			Sample		Outcomes			Results			Data variability	Conclusions	Total score
			Study design	Bias (Y = 0, N = 1)	Description	Justification	Description	Reliability	Validity	Report of statistics	Appropriate analysis	Clinical importance	Dropouts	Estimates provided	Appropriate	
Cadre et al., 2006 [22]	Y	Y	Y	Y	Y	N	N/Y	N	N	Y/N	Y	N	NA	Y	Y	8
Dolphens et al., 2012 [23]	Y	Y	Y	N	Y	N	Y	Y	N	Y	Y	Y	NA	Y	Y	12
Dolphens et al., 2013 [24]	Y	Y	Y	N	N	N	Y	Y	N	Y	Y	Y	NA	Y	Y	11
Dolphens et al., 2014 [25]	Y	Y	Y	N	N	N	N	Y	N	Y	Y	Y	NA	Y	N	9
Perry et al., 2008 [26]	Y	Y	Y	N	Y	N	Y	Y	Y	Y	Y	Y	NA	Y	Y	13
Straker et al., 2008 [28]	Y	Y	Y	N	Y	N	Y	Y	N	N	Y	N	NA	Y	Y	9
Straker et al., 2009 [27]	Y	Y	Y	N	N	N	Y	Y	N	Y	Y	Y	NA	Y	Y	11
Wirth et al., 2013 [29]	Y	Y	Y	Y	N/Y	N	Y	N	N	Y	Y	Y/N	NA	Y	Y	9

The results of both reviewers are stated only where they differed

Y Yes, N/No

Table 2 Quality assessment of the included studies

In this the review article, able to find that the physical risk factor for adolescent neck pain and mid back pain are hindered by the several factors here are the some studies that differentiated the neck pain and lower back pain [23-25,29] while the many other had focused on the neck/shoulder pain [26-28] and upper back pain [22]. Physical risk factors for MBP- There were only five studies found that investigated risk factor for mid back pain. And it reflect the broad observation that the thoracic spine receives remarkably less attention in the literature than the lower back or the neck [33]. That is why the midback pain was also named as the stepchild of spinal research [34]. Likewise, there are several studies in adults that underline the importance of the thoracic spine as basic for neck kinematics and for the development of neck pain [36-39], which is why tackling thoracic losses in the management of cervical harms was suggested [37]. moreover, the mid back pain is a more common condition in adolescence with a similar frequency to low back pain [3] that lead to endure into adulthood [10], where its one year frequency is about 30% in the working population [3, 35]. Physical risk factors for NP- If there the neck/shoulder pain was prolonged then the more lordotic sitting posture was associated with the neck/shoulder pain after controlling for gender [27,28]. The relationship between sitting posture and cervico-thoracic muscle creation was reported by Caneiro et al. [30], who observed the activity of the cervical erector spinae in the slump sitting, albeit in adult increased. Yet, correction of posture has been a suggested method in the therapy of patients with dysfunctions of the cervical spine [31]. However, the percentage of data changeability clarified by the subsequent numerical models was small (R^2 between 0.03 and 0.06) [23-25]. Such As for the standing posture, anteposition of the head and sway-back posture were correlated with NP methods, but mostly in boys.

III. Conclusion

The Young Spine Questionnaire (YSQ) [42] satisfies this condition and its use is strongly supported, even though beyond validation and cross-cultural version is needed [1]. This systematic analysis unable detect definite risk factors for adolescent neck pain and mid back pain. Based on this review article, sagittal orientation in sitting and standing should be added considered as possible risk factors for adolescent NP and MBP using a steady lexicon for the outcomes and longitudinal research patterns.

IV. Acknowledgement

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43. [Brigitte Wirth](#)¹, [Tobias Potthoff](#)¹, [Sandra Rosser](#)¹, [Barry Kim Humphreys](#)¹ and [Eling D. de Bruin](#)^{2,3} Physical risk factors for adolescent neck and mid back pain: a systematic review PMCID: PMC6151922 PMID: [30258567](#)