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Original research

Self-reported prevalence, pain intensity and risk factors of low back pain in adolescent rowers

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ABSTRACT

Objectives: The primary objective of this study was to determine the lifetime and point prevalence of low back pain, the related pain intensity and the rowing-related aggravating factors for low back pain in adolescent rowers who participated in school-level competitions. The secondary objective was to determine whether between-gender differences existed in these data.
Design: Retrospective cross-sectional survey
Methods: 130 adolescent male and 235 adolescent female rowers aged between 14 and 16 years were recruited in this study. Participants completed a questionnaire to determine their lifetime and point prevalence of low back pain, their pain intensity and rowing-related factors that aggravated their low back pain.
Results: A high lifetime and point prevalence of low back pain were found in both adolescent male (93.8% and 64.6%, respectively) and female (77.9% and 52.8%, respectively) rowers. A significant between-gender difference was reported for both statistics ($p < 0.001$). A significantly lower ($p = 0.003$) level of pain intensity via a visual analog scale was found for males (4.1/10) when compared to females (5.0/10). Similar rowing-related aggravating factors were reported by males and females although fewer males reported that lifting the rowing shell aggravated their low back pain.
Conclusions: A high lifetime and point prevalence of low back pain was reported by the adolescent rowers recruited in this study. While a greater proportion of adolescent male rowers reported low back pain, they reported a lower intensity of pain when compared to their female counterparts. Coaches, clinicians and rowers should be made aware of these findings such that future research and development can focus on promoting pain management strategies in this sport.

1. Introduction

The prevalence rate of low back pain (LBP) in adolescents in the general population ranges from 7% to 66% and this is known to vary according to a range of factors.[2,8] For example, the prevalence rate has been shown to increase with age,[8] and gender differences have also been reported in lifetime and point prevalence of LBP in the general adolescent population.[8,17] A lower lifetime and point prevalence of LBP is known to be evident in adolescent males when compared to females, with lifetime prevalence in 14-year-olds reported to be 43.7% in males compared to 48.5% in females ($n = 1608$)[21] and point prevalence in 17-year-olds has been found to be 22.3% for males and 41.1% for females ($n = 1283$).[17] Understanding the prevalence rate of LBP in adolescent populations is important as it is a known risk factor for LBP in adulthood.[7]

Specific groups of adolescents appear to be at greater risk of developing LBP than others.[17,21] Both retrospective surveys[25] and 12-month prospective phone interviews[29] have indicated that rowers of various age and experience are at a high risk of developing LBP. Previous work has also found that gender differences exist in LBP incidence in rowers with male rowers being reported to have a higher incidence of LBP when compared to female rowers in elite junior populations.[25] Smoljanovic et al.[25] reported that the incidence of LBP in international competitive elite junior rowers (median age of 18 years) was 32.3%. While the incidence for males being slightly higher than for females (34.4% as opposed to 29.9%), statistical analysis was not used to determine whether the gender differences were significant. No studies have been published investigating prevalence of LBP in adolescent rowers that compete in secondary school-level competitions. This age group and level of competition is of importance as many rowers learn how to row at this time through their schools.

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There is also limited information regarding the factors potentially associated with rowing related LBP in adolescent populations. It is important to understand the aggravating factors in populations at risk of LBP in order to better tailor management strategies. Therefore, several attempts to identify risk factors have been made with repeated spinal flexion loading coupled with high training volume and intensity reportedly linked with LBP in rowers.[1,23,29] In another study of 2165 adult ex-rowers it was found that commencing rowing before the age of 16 years as well as having a larger body mass and greater height were associated with rowing related back pain,[26] although this retrospective survey may be associated with an element of recall bias. Further, the volume of ergometer rowing has been suggested to be a factor in the development of LBP[26,29] and previous studies have also suggested that increased lumbar flexion found with prolonged ergometer rowing was possibly related to LBP.[22,30] Interestingly, no differences in injury rate were reported between sweep rowing (where the rowers use one oar) and scull rowing (where the rowers use two oar), although these injuries were not specific to the lumbar region.[29] To the best of our knowledge, no study has outlined or compared the aggravating factors associated with LBP in an adolescent male and female rowing population. These aggravating factors may differ given that males row with a more slouched posture than females during ergometer rowing[16] and males have greater strength but poorer relative back muscle endurance than females.[12]

There is currently a dearth of evidence regarding LBP prevalence, pain intensity and associated aggravating factors, in amateur adolescent rowers. Therefore, the aim of this study was to quantify and compare the LBP prevalence (lifetime and point), pain intensity and rowing related aggravating factors in amateur adolescent male and female rowers.

2. Methods

The participants in this study included rowers who competed for independent boys and girls schools in Western Australia. After approaching the rowing coordinators at each of the associated schools, a total of 130 male rowers and 235 female rowers between 14 and 16 years of age participated in this study. This sample represented 42% and 72% of the schoolboy and schoolgirl rowing competitions, respectively. The range of competitive rowing experience for both male and female cohort ranged from 1 to 4 years. The inclusion criteria for this study were: (i) participants must have been training in a rowing for a school in preparation for regular rowing competition and (ii) participants must have been aged between 14 and 16 years of age. Permission to conduct this study was granted by the relevant institutional ethics committee (approval numbers HR 59/2010 and HR80/2005). All participants that completed the questionnaire provided assent/consent from the school's rowing coordinators, coaches, individual rowers and their guardians prior to their participation.

Participants in this study completed a single questionnaire handed out by members of the research team at the start of the schoolboy and schoolgirl competitive rowing seasons. Participants completed the questionnaire in groups of 15–40 and members of the research team supplemented the questionnaire with verbal definitions (see below) and visual demonstrations where necessary prior to the questionnaire being filled in. Opportunity was also provided to the participants to clarify any queries they had.

Supplementary material related to this article can be found, in the online version, at http://dx.doi.org/10.1016/j.jsams.2013.08.003.

The questionnaire (which is shown in the supplementary material) initially included questions on general characteristics such as age, height and mass. There were then questions relating to LBP. LBP was defined as pain located between L1 and gluteal folds and this area of the body was shown in a visual manner to the participants. The question relating to lifetime prevalence of LBP was adapted from the Nordic Musculoskeletal Questionnaire[10] to include 'experience' in the question while the point prevalence (current status) of LBP question had been used in previous rowing-related research.[19,27] The visual analog scale (VAS) was used to determine the usual level of LBP in the week prior to data collection.[18] Rowers with LBP were then able to select factors from a list that brought on, or exacerbated their LBP. These factors were compiled through consultation with rowing coaches, rowers, researchers and clinicians as well as through examining previous research.[19,27] This list included the following factors; lifting a rowing shell, rowing in a sweep boat, rowing in a quadruple scull, rowing in a single scull, ergometer rowing or long rows in a training session. They were also given the opportunity to specify other factors that aggravated their LBP. It should be noted that the double scull was not provided as an option in this questionnaire as this boat was not used in rowing regattas. Further, the definition of a long row in a training session was verbally described to participants as more than 20 min of continuous ergometer or on-water rowing which was not part of the warm up part of training. The questionnaire concluded by assessing the number of rowing-related training hours and other sporting commitments (options were 0 h, <5 h or >5 h).

Statistical analyses were performed using SPSSV19 (SPSS, Inc., Chicago, USA). Means and standard deviations were used to present the participants' height, mass, age, weekly rowing training hours, and LBP intensity were presented for both adolescent male and female rowers. The LBP lifetime prevalence, point prevalence and aggravating factors were presented as a proportion of the sample. Independent *t*-tests were used to determine whether between-gender differences were evident in age, height and mass as well as for the weekly total training hours (on-water and on-land). Fisher's exact tests between two independent proportions were used to determine whether there were between-gender differences for lifetime prevalence, point prevalence and rowing related aggravating factors. This was done for each age group and for the entire cohort. The Mann–Whitney *U* test was used to determine whether differences in the intensity of LBP were evident between-gender. In order to control for the potential bias of participation in sports other than rowing, a secondary analysis was performed with the rowers split into two groups based on the number of hours the rowers reported spending on sports other than rowing per week (1 = <5 h and 2 = >5 h) Chi-square statistics (χ^2) were used to compare differences in the number of hours per week the male and female rowers participated in and sports outside of rowing. An alpha level of 0.05 was used to represent statistical significance between genders in LBP prevalence and pain intensity. An alpha level of 0.01 was used to compare gender differences in aggravating factors to decrease the chance of making a type I error.

3. Results

No significant difference ($p = 0.159$) was evident between-gender for age (males, 15.1 (0.8) years and females, 15.0 (0.8) years) and adolescent male rowers were significantly ($p < 0.001$) taller (males, 1.79 m (0.08) and females, 1.68 m (0.08)) and heavier (71.0 kg (11.9) and 58.4 kg (8.9)) than the females. These results were consistent across the three age groups of 14,15 and 16 years ($p < 0.01$).

There was a high lifetime and point prevalence of LBP in adolescent male and female rowers (Table 1). These prevalence rates were significantly higher in males when compared to females (Table 1). When grouped by age, males had significantly higher ($p = 0.002$ and