Musculoskeletal pain is prevalent among recreational runners who are about to compete: an observational study of 1049 runners

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Question: What is the prevalence and nature of musculoskeletal pain in recreational runners immediately before a race? **Design**: Cross-sectional survey. **Participants**: Adults intending to compete in a recreational running race between 5000 and 10 000 metres. **Measures**: Demographic data collected about the respondents included: age, gender, height, weight, duration of running experience, distance run per week, number of training sessions per week, training surface, and use of coaching. Respondents were asked if they had any pain. If pain was present, data were collected regarding its location, duration, current intensity, and behaviour. All data were self-reported. **Results**: Data were collected from 1049 runners at five recreational races in São Paulo, Brazil. Of these respondents, 227 (22%) reported musculoskeletal pain before the race. Male respondents reported a greater running experience, a higher distance run per week, and a greater body mass index. Despite this, the prevalence of pain was 20% among the 796 male respondents and 27% among the 253 female respondents (RR 1.35, 95% CI 1.05 to 1.72). Where pain was present, it was typical of overuse injuries and its duration, intensity, and behaviour were similar between male and female respondents. **Conclusion**: The prevalence of musculoskeletal pain in recreational runners about to compete is substantial. Physiotherapists might be able to circumvent worsening of existing overuse injuries in this population with advice and preventive interventions. **[Lopes AD, Costa LOP, Saragiotto BT, Yamato TP, Adami F, Verhagen E (2011) Musculoskeletal pain is prevalent among recreational runners who are about to compete: an observational study of 1049 runners. *Journal of Physiotherapy* 57: 179–182]**

Key words: Running, Overuse injury, Recreational, Pain

Introduction

The participation of recreational runners in non-elite races (also known as 'fun runs') has increased steadily over the last decade. For example, one of the biggest Brazilian race organisers reported a ten-fold increase in the number of runners who registered for fun runs between 2001 and 2010 (Corpore Brasil 2011). Unfortunately, running is not an activity without risk, and one of the likely consequences of the popularity of running is that the absolute number of injuries in this population is also growing. Not surprisingly, the number of studies measuring the prevalence or incidence of injuries in runners has also increased, especially for marathon runners (Walter et al 1989, Satterthwaite et al 1999, Chorley et al 2002, Fredericson and Misra 2007, van Gent et al 2007, van Middelkoop et al 2008, Buist et al 2010).

Most reported injuries related to recreational running are overuse or gradual onset injuries, ie, injuries caused by repeated microtrauma without a single, identifiable event (Bahr 2009, Tonoli et al 2010). The majority of the studies cited above have identified these injuries with a definition related to time lost from sporting activity. However, most overuse injuries do not result in cessation of participation in sports (Lopes et al 2009, Tscholl et al 2008). Recent research has indicated the importance of describing overuse injuries in terms of pain and reduced performance (Bahr 2009). As the athlete does not always recognise symptoms as an injury, a significant number of recreational runners might unknowingly be suffering an overuse injury while still participating (Lopes et al 2009). Therefore the aim of this study was to describe the prevalence of running-related musculoskeletal pain in recreational runners immediately before a race.

We aimed to answer the following specific research questions:

1. What is the prevalence of musculoskeletal pain in recreational runners who are about to compete in a race?
2. Is the prevalence the same among male and female runners?
3. What are the typical location, duration, intensity and behaviour of the pain?
4. Is the presence of pain associated with the amount of training?

Method

Participants

We conducted a cross-sectional survey study from a convenience sample. These runners were recreational athletes preparing to compete in one of five different races in São Paulo, Brazil. In total, approximately 20 000 fun runners participated in these five races. The distance of these races ranged from 5000 to 10 000 metres. These races were chosen randomly from the fun run calendar of the city of São Paulo between August and December 2009. We aimed to survey 200 runners from each race. We included runners

Table 1. Mean (SD) of demographic characteristics of all the respondents and of the respondents within each gender.

	All (n = 1049)	Males (n = 796)	Females (n = 253)	*p*
Age *(yr)*, mean (SD)	39 (11)	40 (12)	37 (11)	0.002
Weight *(kg)*, mean (SD)	72 (12)	76 (11)	58 (7)	< 0.001
Height *(cm)*, mean (SD)	171 (9)	174 (7)	166 (7)	< 0.001
BMI *(kg/m^2)*, mean (SD)	24.3 (2.8)	24.9 (2.6)	22.3 (2.3)	< 0.001

Table 2. Median (IQR) or % of characteristics of the training routine among all the respondents and among the respondents within each gender.

	All (n = 1049)	Males (n = 796)	Females (n = 253)	*p*
Running experience *(mo)*, median (IQR)	36 (12–84)	36 (12–96)	24 (12–60)	< 0.001
Running distance *(km/wk)*, median (IQR)	30 (15–40)	30 (20–50)	20 (12–30)	< 0.001
Training sessions *(n/wk)*, median (IQR)	3 (3–4)	3 (3–4)	3 (3–4)	0.013
Training surface (%)				
Asphalt		77	67	
Treadmill		15	25	
Sand/Grass/Clay		8	9	
Coaching utilisation (%)		25	29	

aged 18 years or over and we ensured that all participants completed the survey only once. The data were collected 2 hours or less before the start of each race.

Data collection

Data were collected through a self-report questionnaire. This questionnaire contained questions on demographics, training characteristics, and the presence of current running-related musculoskeletal pain. (See Appendix 1 on the eAddenda for an English translation of the questionnaire.) In addition, those runners who reported current running-related musculoskeletal pain were asked to describe the location of their symptoms with a body chart and to rate the intensity of their pain using a numerical rating scale ranging from 0 (no pain) to 10 (most severe pain). Finally, an adapted version of the Blazina Scale was used to collect data on pain characteristics (Schwartz et al 1988).

Data analysis

We used descriptive statistics to summarise the data. The continuous variables were expressed as median and interquartile ranges or mean and standard deviation depending on the distribution of the data, while categorical data were expressed as percentages. Also depending on the distribution of the data, either the Mann-Whitney test or independent t test was used to compare the data between the genders and to compare the amount of training between respondents with and without pain. Relative risk with 95% CI was used to compare the prevalence of pain between the genders. For all comparisons, a probability value of $p < 0.05$ was regarded as statistically significant.

Results

A total of 1049 runners (796 men and 253 women) completed the survey. The characteristics of all respondents and the characteristics of the respondents according to gender are presented in Table 1. Among the 1049 respondents, 227 (22%) reported the presence of musculoskeletal pain. This suggests that more than one out of five recreational runners is participating in a running event with current symptoms of a running-related musculoskeletal injury. Analysing by gender, 159 (20%) of the 796 male respondents reported the presence of musculoskeletal pain. Among the females, 68 (27%) of the 253 respondents reported the presence of musculoskeletal pain, indicating a significantly greater prevalence of pain among females (RR 1.35, 95% CI 1.05 to 1.72).

The characteristics of the training routines among all the respondents and among the respondents according to gender are presented in Table 2. On average, male respondents had a substantially longer running history and substantially greater training distance per week.

Details of the duration, intensity, and characteristics of the running-related musculoskeletal pain are presented in Table 3. Overall, these outcomes were similar for men and women. The knee was the most commonly reported location of running-related musculoskeletal pain. The median pain duration reported was approximately one month with a median pain intensity of 3.5 points on the numerical rating scale.

Table 4 presents a comparison of the amount of training between runners who reported pain prior to their race and runners who did not. The presence of pain prior to the race was not associated with the number of training sessions per week. However, runners with pain reported significantly greater years of running experience and significantly greater weekly running distance than runners without pain.

Table 3. Median (IQR) of the duration and intensity of the pain and % of the location and behaviour of the pain reported by all the respondents with pain and by the respondents with pain within each gender.

	All (n = 227)	Males (n = 159)	Females (n = 68)
Pain duration *(days)*, median (IQR)	30 (7–365)	30 (7–319)	30 (7–1095)
Pain intensity *(0-10)*, median (IQR)	3 (2–5)	3 (2–5)	4 (3–5)
Pain location (%)			
Knee	28	28	27
Foot/Ankle	20	23	13
Spine	13	13	13
Hip	11	8	16
Leg	11	10	12
Thigh	9	9	12
Other	9	9	7
Pain behaviour (%)			
Pain after running	30	30	31
Pain during running that does not affect running performance	24	21	31
Pain during running that affects running performance	21	24	15
Pain that causes cessation of participation	2	1	4
Pain before running that goes away during or after running	6	8	3
Continuous pain	5	5	6
Unknown	12	11	10

Table 4. Median (IQR) of the amount of training among the respondents who reported pain and among the respondents who reported no pain.

	Pain (n = 227)	No pain (n = 822)	*p*
Running experience *(mo)*, median (IQR)	48 (18–108)	36 (12–84)	< 0.001
Running distance *(km/wk)*, median (IQR)	30 (20–50)	30 (15–40)	0.012
Training sessions *(n/wk)*, median (IQR)	3 (3–4)	3 (3–4)	0.793

Discussion

This cross-sectional survey revealed that approximately one in five recreational runners is participating with current pain. In the group as a whole, the weekly running distance and the number of years of running experience were associated with the presence of musculoskeletal pain prior to a race. However, gender also had a strong influence. Although men reported longer running experience, higher running distance per week, and higher body mass index, the prevalence of running-related musculoskeletal pain was higher for women. The prevalence of musculoskeletal pain prior to the race among the women (27%) was significantly greater than the prevalence among men (20%).

The knee was the most commonly reported location of running-related musculoskeletal pain. Pain in this location often reflects running-related overuse injuries such as tendinopathy or patellofemoral pain syndrome (Fredericson and Misra 2007). The median duration of the pain reported was approximately one month. The median pain intensity of 3 points on a 0–10 numerical rating scale represents mild pain. These outcomes suggest chronic musculoskeletal conditions with mild pain intensity, which is typical of overuse injuries. Although these findings can be considered a concern for clinicians and sports-related professionals, the consequences for amateur athletes of participating in training sessions and races despite their pain is unknown as this research question remains poorly investigated. Therefore prospective cohort studies recruiting a representative sample of runners in order to determine the consequences of our findings are needed urgently.

Although the prevalence of symptoms reported in other studies can be considered substantial, the data reveal only part of the problem. Injuries in prospective studies have usually been defined as time-loss injuries, ie, injuries that preclude the athlete from training and competing. In doing so, the problem of overuse injuries is partly neglected, because overuse injuries do not necessarily lead to cessation of participation. Nevertheless, such injuries can cause pain and impaired function and are associated with tissue damage (Bahr 2009). The athlete does not always recognise such symptoms as an injury. Our results suggest that a significant number of recreational runners are unknowingly suffering an overuse injury while still participating in

training sessions and races. This may be a contributing factor to the high reported incidence of running-related injuries, as an existing injury may be exaggerated through continued participation.

We examined whether the respondents' years of running experience, their weekly running distance, and the number of training sessions per week were associated with the presence of pain prior to race participation. We observed that respondents with pain were on average 12 months more experienced in running than the respondents who did not report pain. The longer exposure of the musculoskeletal system to running may explain this association. Any runner executes around 50 to 70 strides per minute and each ground contact generates loads ranging from 3 to 8 times the total body weight through the lower limbs (Macera et al 1989). The application of this load for long periods of time accumulated over years of running training could explain the association between running experience and presence of musculoskeletal pain in our study cohort. We also observed a statistically significant difference in the weekly running distance between respondents with and without pain, which is consistent with previous studies (Fredericson and Misra 2007, Macera et al 1989, Walter et al 1989). However, the distribution of the data suggests that it is not the average weekly running distance that is important, but whether the distance is above a certain threshold, which is also consistent with other studies (Fredericson and Misra 2007, Macera et al 1989). We did not observe a significant difference in the number of training sessions per week between respondents with and without pain, which is consistent with the findings of van Middelkoop and colleagues (2008).

We are aware of some limitations of our study and we suggest that our findings should be interpreted cautiously. First, although we recruited a representative sample, our analysis is purely cross-sectional and no causation should be interpreted from our study. We suggest that more prospective, longitudinal studies should be performed in the future. Second, due to feasibility issues, we collected all information from the respondents through self-report questionnaires, with no clinical assessment being performed. We understand that the athletes could interpret the presence of pain in different ways, and a clinical assessment would supplement the data collected by the questionnaires. Nevertheless we do believe that the data and our subsequent analyses do give a reasonable and useful indication of the current presence of running-related musculoskeletal pain in recreational athletes who are competing in a running event.

This study presents important information on the issue of sports participation despite the presence of pain. To our knowledge, there is no study on the effects of early identification of overuse injuries and possible physiotherapy interventions for this problem. Therefore studies on this topic are needed urgently. We also suggest that studies should be performed to investigate the relationship between the presence of pain and actual disability (or performance) in this population. Finally, qualitative studies would clarify why amateur runners commonly decide to participate in competitions despite their pain.

The prevalence of recreational runners competing in a race with musculoskeletal pain is high. As musculoskeletal pain is a factor associated with overuse injury, it is possible that more than 20% of recreational runners are suffering an overuse injury while still participating. Physiotherapists might be able to circumvent worsening of existing overuse injuries in this population with advice and preventive interventions. ■

eAddenda: Appendix 1 available at jop.physiotherapy.asn.au

Ethics: This study was approved by the ethics committee of the Universidade Cidade de São Paulo, Brazil.

Acknowledgements: Dr Leo Costa is supported by FAPESP, Brazil.

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