

PREVALENCE AND INCIDENCE RATE OF INJURIES IN RUNNERS AT A LOCAL ATHLETIC CLUB IN CAPE TOWN

ABSTRACT: People across the world are running on a daily basis to improve their health status. However, running can predispose an individual to injury to the back and lower limb. Baseline data on prevalence, incidence rate of injury and aetiological factors associated with running injuries are needed by physiotherapists to develop and implement effective prevention programmes to allow optimal performance in runners. Thus, the purpose of this study was to determine the prevalence and incidence of injuries in runners at a local athletic club.

Methods: A prospective, non-experimental cohort study was conducted over a 16 week period. A sample of 50 runners completed a self-administered questionnaire and an injury report form recording injuries sustained during the 16 week study period. Injury prevalence and cumulative incidence was calculated as a proportion rate along with 95% confidence interval.

Results: The prevalence rate of injuries was 32%. The incidence rate of injuries was 0.67 per 1000km run (95% CI: 0.41- 1.08). The most common anatomical sites for new injuries were the calf (20%) and the knee (18%).

Conclusions: The study found a moderate prevalence and incidence rate of injury in runners, thus the need for physiotherapy-led injury surveillance and prevention programmes have been highlighted.

KEY WORDS: PREVALENCE, INCIDENCE, RUNNING INJURIES, PREVENTION

INTRODUCTION

Running has become the preferred choice of physical activity by thousands of people to help improve cardio-respiratory function, physical function an overall health (Van Gent et al., 2007). Apart from these health benefits, running can also increase the risk in sustaining running injuries (Van Gent et al., 2007).

The prevalence of running injuries of the lower limb at a recreational and competitive level varies from 29% - 79% (Buist et al., 2007 and Taunton et al., 2003). This wide range in prevalence rates could possibly be due to differences in definitions of injury, the population at risk, the methods used to assess running injuries and exposure to running (Rauh et al., 2005). Buist et al. (2010) observed

629 runners over 8 weeks and found an incidence rate of injury of 30% per 1000 hours (95% CI= 25.4, 34.7) with a total of 163 new injuries (25.9%). Taunton et al. (2003) conducted a prospective study and observed 844 runners and found the knee (33.7% of 249 injuries) as the most common site of injury. In South Africa, a high proportion (51%) of knee injuries in male Indian runners in Durban was reported (Puckree et al., 2007). Another local study found an incidence rate of 6.04 % (Experimental group: n=94) and 6.71% (Control group: n=83) per 1000 running sessions in runners (Schwellnus and Stubbs, 2006).

Even though, these studies found moderate prevalence and incidence rates of injuries in South African runners, the data were extracted from cross sectional and retrospective study designs and not from a prospective cohort. Therefore, literature states that there is a need for prospective studies to determine prevalence of injury and underlying factors associated to running injuries which could help determine

easy measurable variables that could be associated to these risk factors (Hreljac and Ferber, 2006).

Physiotherapists and other health professionals are involved in the rehabilitation of common running injuries to the knee, lower leg, back and hip (Beers et al., 2008 and Ellapen et al., 2013). However, at times these common running injuries could be misdiagnosed and treated unsuccessfully as clinicians tend to overlook the cause of injury (Noakes, 2003).

Incorrect diagnoses could be due to: inadequate knowledge and understanding about the pathophysiology of common injuries; inaccurate subjective history about aetiological factors and incorrect physical examination (Couture and Karlson, 2002). Attaining knowledge on baseline information about the prevalence and incidence of injury; nature and extent of injury; and the aetiological factors associated to running injuries are essential steps in developing and implementing preventative programmes (Van Mechelen,

Hendricks C, MSc¹;
Phillips J, PhD²

¹ Division of Physiotherapy ,
School of Health and Rehabilitation Sciences,
University of Cape Town.

² Department of Physiotherapy,
University of the Western Cape.

Correspondence Author:

Candice Hendricks
Division of Physiotherapy
School of Health and
Rehabilitation Sciences,
University of Cape Town
Email: candice.hendricks@uct.ac.za

1997). Thus, Physiotherapists could gather and use this information to assist in planning and implementing effective rehabilitation and prevention programmes for runners to be restored back to training and competition.

Currently there is a dearth of research from local prospective studies on the prevalence, incidence rate of injury, common running injuries and risk factors to develop and implement appropriate intervention programmes for runners in Cape Town. This gap in literature highlights a need for updated prospective research in runners in a South African context.

Therefore the aim of this paper is to report on the prevalence and incidence rate of injury in runners at a local athletic club in Cape Town, South Africa. The risk factors associated with running injuries in this sample will be published on a later stage.

METHODS

A prospective, non-experimental, cohort study design was conducted in runners over a period of 16 weeks from March 2010 to June 2010. Ethical approval was obtained from the University of the Western Cape (10/1/11). Permission was obtained from the Chairperson of the athletic club and informed written consent was obtained from all participants.

SAMPLE

A running club in Cape Town, registered with Western Province Athletics Association was used in the study. A total of 91 runners were registered at the club for the 2010/2011 season. All the runners who met the inclusion criteria were invited for participation in the study. The inclusion criteria were: older than 19 years with no current injury. A total of 50 runners met the inclusion criteria and accepted the invitation to participate in the study.

INSTRUMENTS

Data was collected with two research instruments. The first instrument was a self-administered questionnaire capturing information on demographics, previous running injuries, history of training, and running experience.

This questionnaire was used reliably in a previous study (Fourie, 1994). The second instrument was an Injury Report Form that has been used reliably previously by Rauh et al. (2005). The Injury Report Form was used to record daily activities in training and competition for 16 weeks, absence from training or competitions, and limitations to participation due to injury. Information regarding the type of injury sustained, the mechanism of injury, the location of the injury on body, and the number of training and competitive days missed due to the injury was recorded as well.

A pilot study was conducted in runners from a different running club to determine face validity, comprehension of questionnaires and feasibility of the study. The questionnaire and injury report form was accepted by all the participants in the pilot study and no amendments were needed. The data of the pilot study was not included in the final results.

PROCEDURE

All participants were informed to meet at the Biokinetics gymnasium at the University of the Western Cape to complete the questionnaire on running history and to have clinical measurements done. The first author had visited the running club once a week for 16 weeks to assess and document injuries sustained by runners using the Injury Report Form. Injured runners were given advice on the Rest, Ice, Compression and Elevation (RICE) protocol and were referred to a physiotherapist for treatment at the day hospital. On completion of the 16 week period, the runners were given an information leaflet about preventing common running injuries.

DATA ANALYSIS

Data was captured during an athletic season (March to June 2010) and analyzed using the Statistical Package for Social Science (SSPS) version 18 and SAS v9 (SAS Institute Inc., Cary, NC, USA). Descriptive and inferential statistics were used to summarize the data and was expressed as frequencies, percentages, means and standard deviations. Incidence rate of injury was calculated per 1000km run using a

Poisson Regression model and presented with 95% confidence interval (CI).

INJURY DEFINITION

A running injury was defined as any reported muscle, joint or bone problem /injury of the back or lower extremity (i.e. hip, thigh, knee, shin, calf, ankle, foot) resulting from running in a practice or meet and requiring the runner to be removed from the practice or meet or to miss a subsequent one (Rauh et al., 2005).

Furthermore, the running injury should be severe enough to require medication, injection into the painful muscle, joint or tendon, surgery, physiotherapy, rehabilitative treatment, braces or orthotics (Schwellnus and Stubbs, 2006).

RESULTS

Two-thirds (68%; n=34) of the participants were males. The reported mean age was 46.02 years (SD=8.5; Range 28 to 65 years). The following characteristics: height, weight, running experience, history of previous injury is illustrated in Table 1.

The participants provided details regarding their history of participation in races and marathons. It was reported that all participants (n=50) had participated in half marathons (21km) and 72% had completed a marathon (≥ 42 km). The mean (SD) number of 21km and 42km marathons completed is illustrated in Table 2.

The majority of the participants (92%; n=46) reported previous running injuries. Of these injuries, 52% were re-current injuries. The common site of previous injury was the knee, lower back and calf as illustrated in Figure 1. The participants reported that muscle strains (72%) followed by ligament and joint sprains (40%) were the most common previous injuries sustained. Of the participants who had previous running injuries, 76% were in the 40-59 year age category.

A total of 16 (32%) participants sustained 50 running injuries over the 16 week period. Of the 50 running injuries, 72% were new injuries (initial) and the remaining (28%) were recurrent injuries as illustrated in Table 3. With

regards to gender, a higher percentage (37.5%; 6 out of 16) of females sustained running injuries than males (29.4 %; 10 out of 34) during the 16 week period. Furthermore, the majority (60%) of the injured runners had less than five years' experience of running. The mean age for this group of injured runners were 45.9 years (SD=9.1) and 94% of runners fell into the 40-59 age category.

The point prevalence of running injuries at the time of study was 32% with an incidence rate of 0,67 injuries per 1000km run (95% CI=0.41, 1.08). The most common site of running injuries was the calf (20%) and the knee (18%) as illustrated in Table 3. Furthermore, the most common type of injury was muscle strain (40%) as illustrated in Figure 2.

DISCUSSION

The main findings of this study indicate an injury point prevalence of 32% among runners (n=16) at the local athletic club in Cape Town. When compared to other studies, the reported prevalence is lower than the prevalence rate of 50% - 66% of other local studies (Puckree et al., 2007 and Schweltnus et al., 2006) but higher than the 22% of an international study (Lopes et al., 2011). The injury prevalence of this study implies that approximately one in three runners sustained an injury during the study period. This finding could have been related to runners training and participating in peak and competitive events, such as the Two Oceans and Comrades Marathons. However, information pertaining participation in the Comrades marathon was not obtained from this sample.

The estimated incidence rate of injury for this study was 0.67 injuries per 1000km run (95% CI=0.41, 1.08) over 16 weeks. This finding is lower than what Schweltnus and Stubbs (2006) had found (experimental: 6.04 per 1000 running sessions and control: 6.71 per 1000 running sessions). Possible reasons could be due to the differences in sample size, study period, training events and the training methods. Rauh et al. (2005) found an incidence of 17.0 per 1000 athletic exposures (i.e. athlete participating in one training/competition event) of 421 runners over

Table 1: Baseline measurements of the participants (N=50) Mean (SD)

Variable	Females (n=16)	Male (n=34)	Total (N=50)
Height (m)	1.5 (0.6)	1.7 (0.1)	1.6 (0.9)
Weight (kg)	67.7 (12.2)	74.8 (12.8)	72.6 (12.9)
BMI(kg/m ²)	27.5 (4.8)	25.4 (3.6)	26.1 (4.1)
< 5 years of running experience	14	12	26 (52%)
Previous running injury	14	32	46 (92%)

Table 2: Marathon participation (N=50). Mean and SD

Variable	N	Mean	SD
Number of 21km marathons	50	5.8	4.508
Number of 42km marathons	36	4.2	3.255
Average time of 21km	47	1.8 hrs	0.508
Average time of 42km	37	4.1 hrs	0.704
Running pace (min/km) during races	48	5.8 min/km	1.148

Table 3: Number of running injuries reported over 16 week period

Location of injuries	Initial injuries	Recurrent injuries	Total injuries (N=50)	Percentage (%)
Knee	8	1	9	18
Calf	9	1	10	20
Lower back	5	4	9	18
Ankle	1	3	4	8
ITB	3	1	4	8
Hamstring	4	0	4	8
Shin	1	2	3	6
Hip	0	1	1	2
Buttock	1	1	2	4
Piriformis	1	0	1	2
Groin	1	0	1	2
Quadriceps	2	0	2	4
Total	36	14	50	100

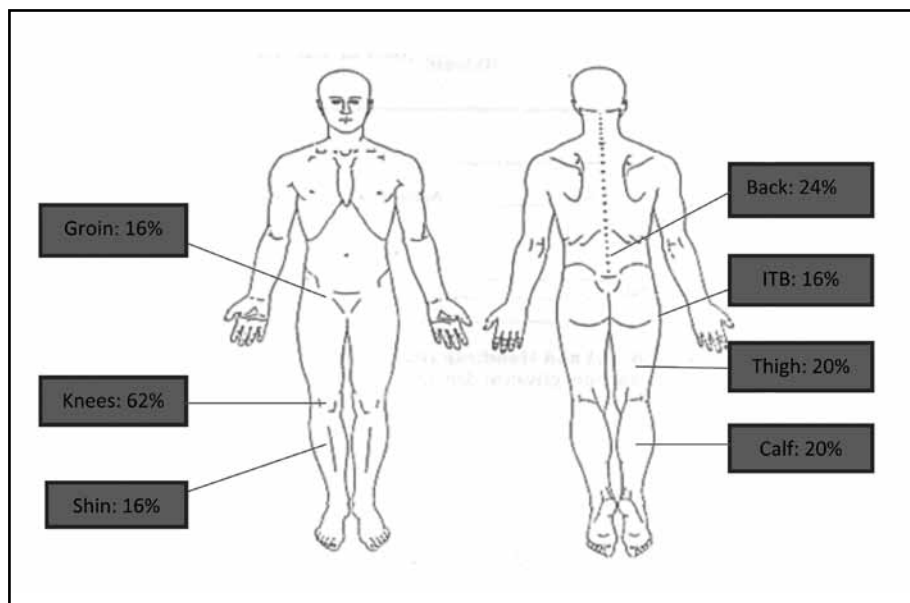


Figure 1: Common anatomical sites of previous running injuries

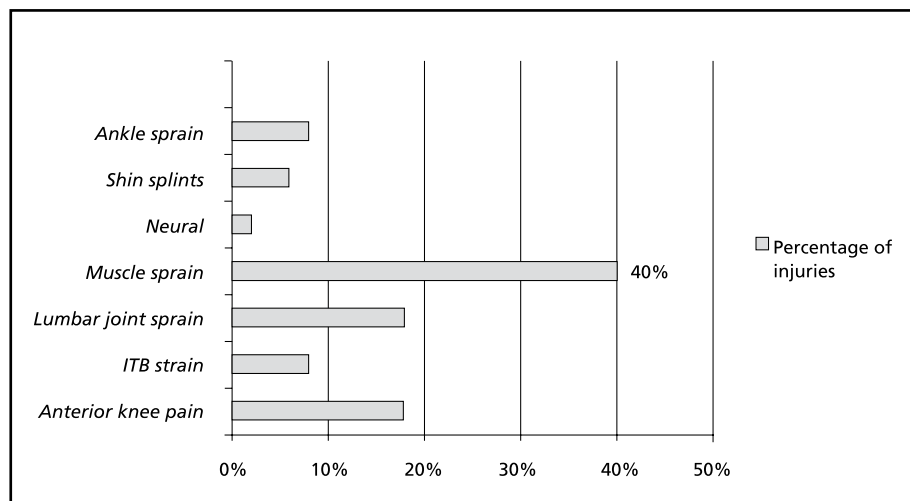


Figure 2: The proportion of types of running injuries sustained by runners

5-8 weeks. This rate is higher than the findings of the current study and it could be due to differences in the age and type of runners in the latter sample, as the runners were high school cross country runners.

Apart from the differences in methodologies amongst these studies, a major discrepancy is found with the calculation of incidence rate of injury. Some studies calculated the incidence rate according to 1000 hours of running (Buist et al., 2010) or 1000 running sessions (Schwellnus and Stubbs, 2006); whereas the current study calculated the incidence rate according 1000 km run. Overall, the studies highlighted the need for future prospective studies to identify the incidence rate of running injuries

by using a standardized formula and definition.

The most common site of running injuries reported was the calf (20%), the knee (18%) and lower back (18%). This finding is inconsistent to what literature had reported about the knee being the most common site of injury (Puckree et al.2007 and Taunton et al. 2003). However, the findings of this study are similar to that of van Middelkoop et al. (2007) who found the calf (33.9%) and knee (27%) as common sites of injury.

The most common type of running injuries found in this study, were muscle strain (40%), anterior knee pain (18%) and lumbar joint sprain (18%). This is similar to Anderson et al. (2001) who found that muscle strains and tendonitis

were the most common type of injury reported by runners. In addition, participants had reported that the most common previous running injury were muscle strains (72%). Thus, there seems to be a link between previous muscle strains and the high rate of calf injuries sustained during the study. This high percentage of previous injuries could in turn have an impact on the high prevalence of muscle strains reported in this sample.

A total number of 50 injuries were sustained during the 16 week study period. Participants reported that 28 % (n=14) of the injuries were recurrent injuries. The most prevalent re-occurring injury was non-specific lower back pain (8%). In addition, the lower back (24%) was reported as the second most common site for re-injury of previous running injuries. Therefore, the site of recurrent injury, the back, is consistent with the literature regarding recurrence of injury to the same anatomical structure (Van Mechelen, 1992). This could be due to the fact that recurrent lower back pain is due to excessive impact loading on the back during running as well as inherent muscle imbalances between the abdominal and paraspinal musculature and tightened hamstrings (Noakes, 2003). Even though the relationship between muscle imbalances and recurrent lower back pain were not analysed in this study, the information highlights the importance of screening previously injured anatomical structures to help prevent recurrent injuries.

The reported prevalence and incidence rate of injury in this study highlights that running injuries, such as calf muscle strains and anterior knee joint pain, are evident in some runners at the local athletic club in Cape Town.

These running injuries could affect the runner negatively in training and races and cause the runner to incur high medical costs from medical professionals who treat symptoms only and neglect to identify and address associated risk factors to their injury (Noakes, 2003). Thus, incorrect treatment of injuries, as a result of poor diagnoses, could result in unsuccessful recovery, recurrent injury, reduced activity within running and eventually dropping out of races

and training completely (Chorley et al., 2002).

Physiotherapists definitely have a role in the rehabilitation of injuries in runners to reduce the impact of injury on the runner's performance in races; to reduce the likelihood of re-injury and acquiring comorbid conditions. The reported baseline data (prevalence rate, incidence rate, common anatomical sites and type of running injuries) of this study serves as a foundation for physiotherapists for research in injury surveillance systems illustrating occurrence of injury and associated risk factors and injury prevention (Finch, 1997).

CONCLUSION

An increased participation in running across the world has inevitably resulted in an increase in incidence of running injuries (Van Gent, 2007). This study found a prevalence rate of 32% and an incidence rate of 0.67 injuries per 1000km run (95% CI: 0.41- 1.08) at a local athletic club in Cape Town. Muscle strain of the calf was the most common running injury in this sample. These findings pose a concern to this local community of runners since more than one in three runners was injured during this study period. An evidence-based prevention programme is needed to help reduce the likelihood of sustaining a running injury, or to manage an existing injury to restore the injured runner to their desired level of fitness and performance.

This information highlights a need for physiotherapists to screen runners for potential injury, especially during peak marathon seasons and to educate runners on the important role of physiotherapy in the management and prevention of injuries.

Since baseline data on prevalence and incidence rates of running injuries have been obtained from this sample, the next step in developing an effective prevention program for these runners would be to discuss the aetiological factors associated to injuries (Van Mechelen, 1997). However, the risk factors will be discussed in the next article.

LIMITATIONS OF STUDY

The findings of the study should be taken

with caution though, as there are some limitations that need to be taken into consideration. The study had recruited a small sample of runners from one local running club. This in turn could lead to an under-representation of the prevalence and incidence rates of injury in runners in Cape Town. Although the study had used sound methodology to gain information, it is recommended that future studies should increase their study period to 6 months; include a larger sample of runners from novice and competitive clubs; differentiate between recreational and competitive runners and identify factors associated with injury in each category; use a consistent definition of injury and measure of athletic exposure that is universal to have consistent findings that could be generalized to the greater running population.

ACKNOWLEDGEMENTS

I would like to acknowledge the South African Society of Physiotherapy (SASP) for their funding contribution towards this study. I would also like to acknowledge Prof. Richard Madsen (University of Missouri) for assisting with the statistical analyses. I would like to thank the Physiotherapy department of University of the Western Cape for all their support and contribution of resources during my research.

REFERENCES

Anderson K, Strickland S M, Warren R, (2001). Hip and groin injuries in athletes. *American Journal of Sports Medicine* 29: (4) 521-33.

Beers A, Ryan M, Kasubuchi Z, Fraser S, Taunton J, (2008) Effects of multi-modal physiotherapy, including hip abductor strengthening, in patients with iliotibial band friction syndrome. *Physiotherapy Canada*. 60:180-188.

Buist I, Bredeweg SW, Lemmink KA, (2007). The GRONORUN study: Is a graded training program for novice runners effective in preventing running related injuries? Design of a randomized controlled trial. *BMC Musculoskeletal Disorders* 8: 24

Buist I, Bredeweg SW, Bessem B, Van Mechelen W, Lemmink KAPM, Diercks RL, (2010). Incidence and risk factors of running related injuries during a preparation for a 4 mile recreational running event. *British Journal of Sports Medicine* 44: 598-604.

Chorley J N, Cianca J C, Divine J G, Hew T D, (2002). Baseline injury risk factors for runners starting a marathon training program. *Clinical Journal of Sports Medicine* 2: 18-23.

Couture C J, Karlson K A, (2002) Tibial stress injuries: decisive diagnosis and treatment of 'shin splints'. *The Physician and Sports medicine* 30(6):29-36.

Ellapen T J, Satyendra S, Morris J, van Heerden H J, (2013) Common running musculoskeletal injuries among recreational half-marathon runners in KwaZulu-Natal. *South African Journal Sports Medicine* 25: (2)39-43.

Finch C F, (1997). An overview of some definitional issues for sports injury surveillance. *Sports Medicine*, 24(3), 157-163.

Fourie M D, (1994). The incidence and characteristics of running related overuse injuries in long distance runners. Unpublished Master's Thesis, University of Pretoria, South Africa.

Hreljac A, Ferber R, (2006). A biomechanical perspective of predicting injury risk in running. *International Sports Medicine Journal*, Vol.7, No.2:98-108.

Lopes A D, Costa L, Saragiotto B T, Yamato T P, 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.

Noakes T, (2003). *The lore of running*. Leeds, UK: Human Kinetics.

Puckree T, Govender A, Govender K, Naidoo P, (2007) The quadriceps angle and the incidence of knee injury in Indian long distance runners, *South African Journal Sports Medicine*, 19: 9-11

Rauh M J, Koepsell T D, Rivara F P, Margherita A J, Rice S G, (2005). Epidemiology of Musculoskeletal Injuries among High School Cross-Country Runners. *American Journal of Epidemiology* 163: (2) 151-159.

Schwellnus M P, Stubbs G, (2006). Does running shoe prescription alter the risk of developing a running injury. *International Sport Medicine Journal* 7: (2) 138-153.

Taunton J E, Ryan M B, Clement D B, (2003). A prospective study of running injuries: the Vancouver Sun Run "In Training" clinics. *British Journal of Sports Medicine* 37: 239-244.

Van Gent R N, Siem D, van Middelkoop M, van OS A G, Bierma-Zeinstra S M, Koes B W, (2007). Incidence and determinants of lower extremity running injuries in long distance runners: a systematic review. *British Journal of Sports Medicine* 41: 469-480.

Van Mechelen, W. (1992). Running injuries: A review of epidemiological literature. *Sports Medicine*, 14, 320-335.

Van Mechelen W, (1997) Sports injury surveillance systems: "One size fits all?" *Sports Medicine* 24: (3) 164-168.

Van Middelkoop M, Kolkman J, Van Ochten J, Bierma-Zeinstra S, Koes B, (2007) Prevalence and incidence of lower extremity injuries in male marathon runners. *Scandinavian Journal of Medical Science and Sports* 18:140-144