Physical Therapy in Sport 10 (2009) 67–70

Contents lists available at ScienceDirect

Physical Therapy in Sport

journal homepage: www.elsevier.com/ptsp

Clinical audit

Brazilian physiotherapy services in the 2007 Pan-American Games: Injuries, their anatomical location and physiotherapeutic procedures

Alexandre Dias Lopes*, Henrique Jorge Barreto, Ronaldo Carvalho Aguiar, Francine Barreto Gondo, João Grangeiro Neto

Brazilian Olympic Committee's Medical Department (Physiotherapy Service), Physiotherapy Service, 22631-000 Rio de Janeiro, Brazil

ARTICLE INFO

Article history:
Received 28 April 2008
Received in revised form
30 October 2008
Accepted 12 November 2008

Keywords:
Athletic injuries
Physical therapy modalities
Sports medicine

ABSTRACT

Objective: The purpose of this study was to assess the profile of the treatments performed at the physiotherapy department of the Brazilian Olympic Committee during the 2007 Pan-American Games.

Study design: Observational study.

Participants and design: Participants in this study included 434 athletes from the Brazilian Olympic Committee who were referred by the Brazilian medical department to the Brazilian physiotherapy department. The treatment registers were done in a standard form and stored for computer analysis and descriptive statistics calculation.

Results: Most athletes of the Brazilian delegation needed physiotherapeutic treatment ($n = 434$, 65.7%), and approximately one quarter of the athletes went to the Games with a previous injury ($n = 146$, 22.1%). The main complaints observed during the treatments were spine-related pathologies (lumbar pain, thoracic and cervical pain) ($n = 89$, 25.3%), tendinopathy ($n = 79$, 22.4%), and muscle strain ($n = 43$, 12.2%), among others. There were 2523 physiotherapeutic treatments performed, and the most utilized procedures were kinesiotherapy, which represented 24.9% ($n = 969$) of all the procedures performed, ultrasound ($n = 757$, 19.4%) and cryotherapy ($n = 670$, 17.2%).

Conclusions: A large number of athletes required physiotherapy services during the Games. Approximately one quarter of the athletes were injured before the competition started. The main pathologies were spine-related injuries, tendinopathy and muscle strain. The most frequently utilized procedures were kinesiotherapy, ultrasound and cryotherapy.

1. Introduction

During the Brazilian participation in the 2007 Pan-American Games, the country's official delegation, under the responsibility of the Brazilian Olympic Committee (BOC), had an exclusive team of physiotherapists among its members, connected to the BOC's Medical Department. For this competition, the country had the largest number of participants in the history of all Pan-American Games (660 athletes), which required an increase in the number of physiotherapists involved.

The current research aimed at presenting the profile of the treatments performed at the physiotherapy department of the BOC during the 2007 Pan-American Games, and this is one of the first studies ever carried out with this objective (Athanasopoulos et al., 2007; Jelsma, Dawson, Smith, Satumba, & Madzivire, 1997). Our purpose was to provide some contribution to the sports physiotherapy community, making data available to serve as relevant references for future physiotherapy teams working at major sports competitions (Kolt, 2004).

2. Method

2.1. Participants

The subjects of this study were the official athletic members of the Brazilian delegation during the 2007 Pan-American Games ($n = 660$) who were referred, by the BOC's medical department, to the BOC's physiotherapy department ($n = 434$). All of the physiotherapy procedures and data collection involved in the study were approved by the Medical Department of the BOC for the 2007 Pan-American Games, with previous consent of the athletes. All athletes underwent a medical evaluation before the physiotherapy treatment began.

The location of the physical treatment area was approximately 60 m^2, with 13 treatment tables in two different rooms. The office hours were from 7AM to 10PM (15 h/day), but this period was sometimes extended to accommodate the athletes' demands. The

* Corresponding author. Tel./fax: +55 21 3433 5777.
E-mail address: aledlopes@yahoo.com.br (A.D. Lopes).

1466-853X/$ – see front matter © 2009 Elsevier Ltd. All rights reserved.
doi:10.1016/j.ptsp.2008.11.002

Table 1
Number of the athletes treated and with previous injury.

Athletes treated	434 (65.7%)
Athletes with previous injury	146 (22.1%)

treatments were performed everyday from July 3 to July 29, 2007, for a total nonstop 26-day period. It should be emphasized that the Games took place from July 13 to July 29, 2007.

The team of physiotherapists in charge of the 660 members of the Brazilian delegation in the 2007 Pan-American Games was formed of 20 professionals. Five of them were responsible for 29 sports, and they performed their treatments in the rooms and under the circumstances described above. The other 15 physiotherapists were assigned to work with 12 specific sports (Athletics, Basketball, Baseball, Boxing, Football, Court Football, Olympic Gymnastics, Rhythmic Gymnastics, Handball, Judo, Acrobatic Springboard, and Volleyball); they did not always use the same space, but rather, they set up independent rooms for the exclusive treatments of the athletes for whom they were responsible.

2.2. Data analysis

All the treatment registers were made in a SOAP (Subjective, Objective, Assessment, Plan) assessment form and stored for computer analysis. All physiotherapists had a training session on completing the forms to ensure a standard procedure was followed. Descriptive statistics were calculated using computer software. The analysis was performed in SPSS, version 16.0 for Windows (Lead Technologies Inc. SPSS Inc., Chicago, IL, USA).

3. Results

Of the 660 athletes of the Brazilian delegation during the 2007 Pan-American Games, 65.7% (434) were treated at the physiotherapy department offered by the BOC. There were Brazilian athletes participating in all 41 different sports of the Games, and with the exception of beach volleyball, all sports teams were attended to by the physiotherapy department.

Approximately one quarter of the Brazilian athletes went to the Games with a previous injury ($n = 146$, 22.1%), and about three athletes from each team were injured before the Games started (mean = 2.9, SD = 2.8) (Table 1).

The main complaints observed during the treatments (25.3% ($n = 89$)) were spine-related pathologies (lumbar pain, thoracic and cervical pain). Analysis of the data revealed that tendinopathy was the second most frequent pathology ($n = 79$, 22.4%), followed by muscle strain ($n = 43$, 12.2%), contusion ($n = 41$, 11.6%), ligament rupture ($n = 34$, 9.7%), patellofemoral syndrome ($n = 15$, 4.3%), plantar fasciitis ($n = 12$, 3.4%), synovitis ($n = 9$, 2.6%), epicondylitis ($n = 6$, 1.7%), fracture ($n = 6$, 1.7%), displacement ($n = 5$, 1.4%), periostitis ($n = 5$, 1.4%) and a group of less-frequent pathologies, classified as others ($n = 16$, 4.5%) (Fig. 1). The pathologies classified as "others" were chondral lesion (3 cases), synovial cyst (3), stress fracture (2), iliotibial tract syndrome (2), trochanteric bursitis (1), meniscus injury (1), metatarsalgia (1), piriformis syndrome (1), pubeitis (1) and sacroileitis (1).

The parts of the body most referred to in the athletes' complaints were the spine ($n = 204$, 38.2%), followed by the thigh area ($n = 66$, 12.4%), knee ($n = 57$, 10.7%), ankle ($n = 52$, 9.8%), shoulder ($n = 46$, 8.6%), leg ($n = 30$, 5.6%), elbow ($n = 28$, 5.3%), wrist/hand ($n = 24$, 4.5%), hip ($n = 14$, 2.6%), thorax ($n = 4$, 0.8%), forearm ($n = 3$, 0.6%), head ($n = 3$, 0.4%) and arm ($n = 3$, 0.4%) (Fig. 2). Of the 38.2% spinal pathologies, 49.6% ($n = 101$) were related to the lower back, 26.7% ($n = 55$) were related to the cervical spine and 23.6% ($n = 48$) were related to the thoracic spine.

During the working period of the BOC's physiotherapy team, 2523 physiotherapeutic sessions and 3897 physiotherapeutic procedures (cryotherapy, diadynamic current, kinesiotherapy (muscle strengthening and/or flexibility exercises), Functional Electric Stimulation – FES, interferential current, short-wave diathermy, osteopathy, superficial heat, taping, TENS, and ultrasound) were performed, which correspond to an average of 1.54 procedures per performed treatment. The five physiotherapists in charge of the 29 sports were responsible for 26.9% ($n = 1048$) of all procedures.

Kinesiotherapy represented 24.9% ($n = 969$) of all the procedures performed by the department; ultrasound corresponded to 19.4% ($n = 757$); cryotherapy 17.2% ($n = 670$); superficial heat 12.8% ($n = 500$); interferential current 11.1% ($n = 432$); TENS 7.3% ($n = 286$); short-wave diathermy 2.7% ($n = 104$); diadynamic current 2.4% ($n = 94$); taping 1.4%; osteopathy 0.6% ($n = 25$) and FES

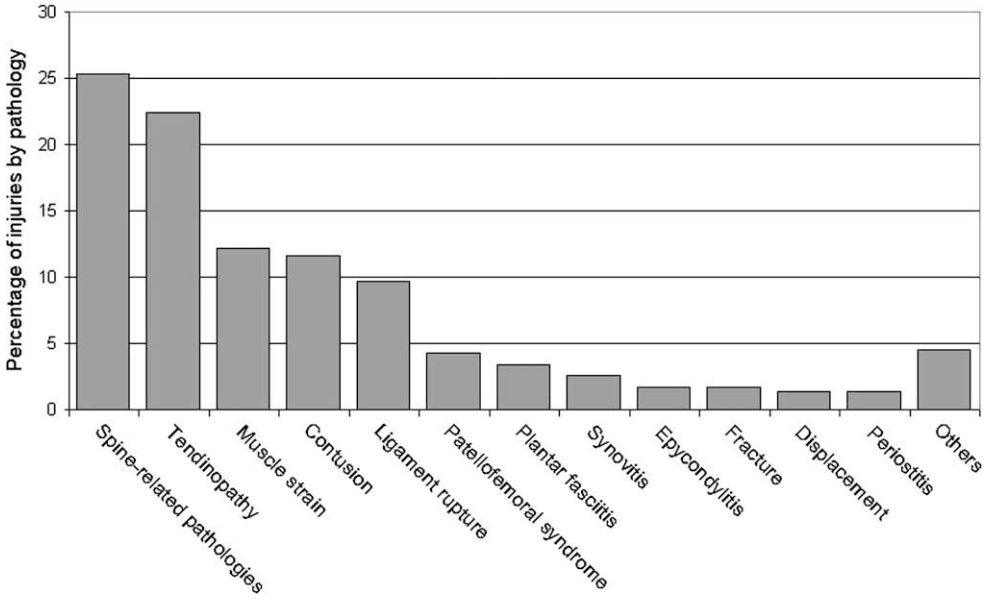

Fig. 1. Percentage of injuries by pathology.

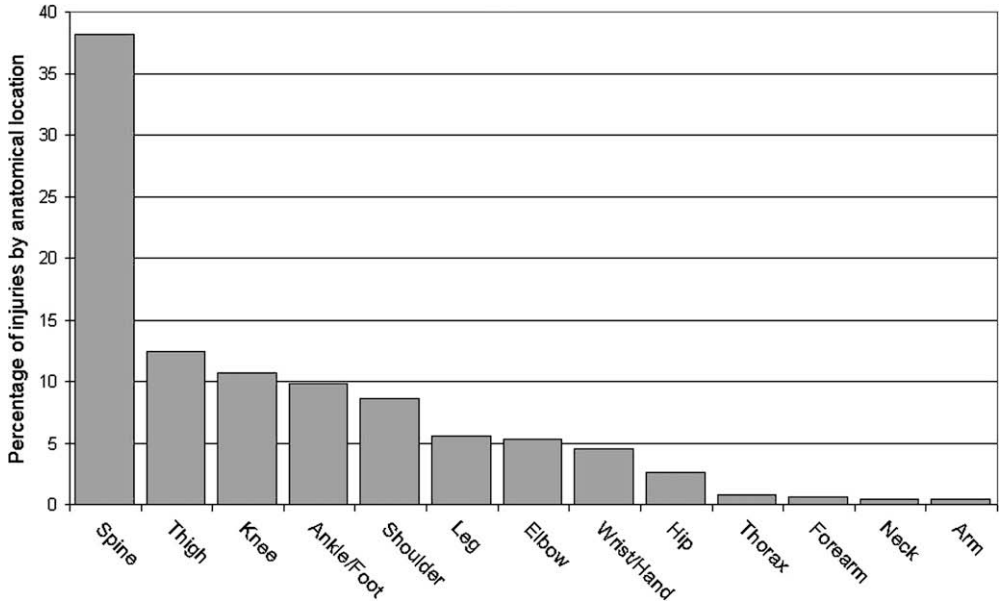

Fig. 2. Percentage of injuries by anatomical location.

0.2% ($n = 6$) (Fig. 3). Each procedure was utilized 14.19 times (SD = 19.6; range 1–147), and each sports team received an average of 50.46 physiotherapeutic sessions (SD = 50; range 1–220) during the Games.

Massage therapy corresponded to 1102 procedures, out of which 64.4% ($n = 710$) were full body massages, 25.3% ($n = 278$) were leg massages and 10.3% ($n = 114$) were arm massages. However, the massage therapy was performed only by massage therapists (6 professionals), who were not physiotherapists but were members of BOC's Medical Department.

4. Discussion

This is one of the first studies to report numbers regarding the physiotherapy services provided by one country during an international sports event (Bulley & Donaghy, 2005; Jull & Cupit, 1984a, 1984b).

The most frequent complaints at the physiotherapy department were spine-related pathologies, and the vast majority of the athletes complained of lumbar spine pain. This fact confirms the findings of previous studies that revealed a significant number of athletes presenting with lumber spine pathologies (Bulley & Donaghy, 2005; Granhed & Morelli, 1988; Hägglund, Waldén, & Ekstrand, 1988; Hainline, 1995; Hickey, Fricker, & McDonald, 1997; Hutchinson, 1999; Kujala, Taimela, Erkintalo, Salminen, & Kaprio, 1996; Lundin, Hellstrom, Nilsson, & Pëterson, 2001; Sward, Hellstrom, Jacobsson, Nyman, & Peterson, 1991; Sward, Hellstrom, Jacobsson, & Pëterson, 1990).

A study carried out with elite rhythmic gymnasts revealed that 79% of these athletes had previously presented with lumbar pain, which prevented them from training; meanwhile, another study showed that 85% had at least one lumbar pain episode lasting longer than seven weeks (Hutchinson, 1999; Sward et al., 1991). In a study with wrestlers and Greco-Roman style wrestlers, 59% of the

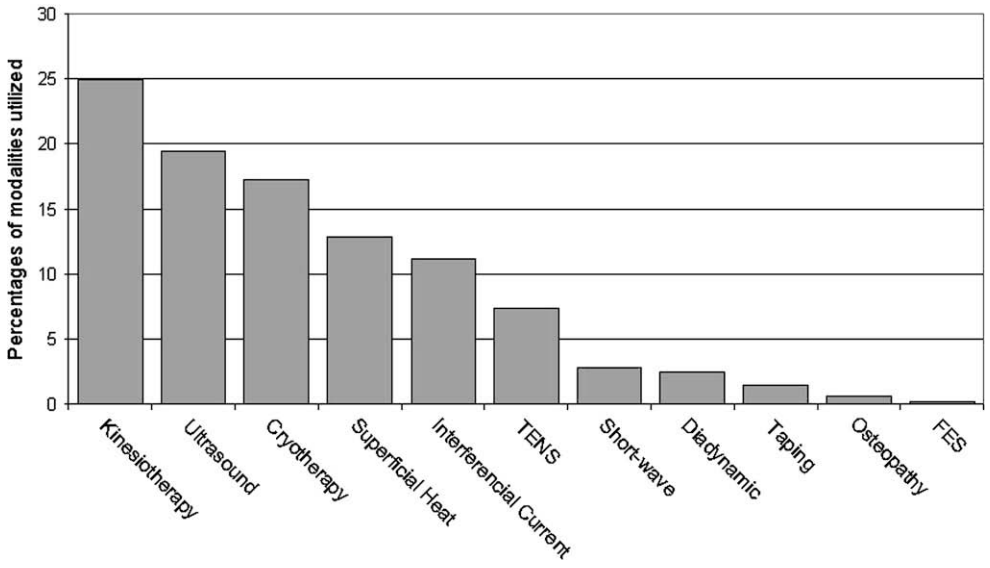

Fig. 3. Percentage of physiotherapeutic procedures utilized.

athletes presented with lumbar pain (Granhed & Morelli, 1988), while in another study, 54% had the same problem (Lundin, Hellstrom, Nilsson, & Peterson, 2001). Lumbar pain has prevented 38% of professional tennis players from participating in at least one tournament during their careers (Hainline, 1995). The lumbar pain incidence rate found among amateur tennis players was 32%, among soccer players it was 37% (Lundin et al., 2001), and among competitive tennis players it was approximately 20%.

The most frequently observed pathology was overload lumbar pain, which was recently analyzed (Bono, 2004) and was considered the major pathology in the athletes' spine, known as Lumbar Strains or Lumbar Sprains.

Tendinopathy appeared as a second most frequent group of pathologies among the athletes, followed by muscle strain. These three major groups of pathologies treated at our department represented approximately 60% of all injuries. This number supports the data reported by Athanasopoulos et al. (2007), who observed that during the Athens Olympic Games, these same three pathologies were also the most frequent among the athletes who received physiotherapy treatment.

The spine was the most affected part of the body during the Athens Games, presenting a high rate of spine-related pathologies, and the figures found in Athens were very similar to the ones found in our study (Athanasopoulos et al., 2007). The thigh and the knee were, respectively, the second and third most affected parts, which can be explained by the large number of tendonitis and muscle strain injuries that were treated. Therefore, the spine, thigh and knee were responsible for approximately 50% of all lesions presented by our athletes.

The most utilized physiotherapeutic procedures were kinesiotherapy and ultrasound. These two modalities combined correspond to approximately 40% of all procedures performed. These procedures were also the most frequently performed with the athletes who sought treatment at the physiotherapy department at the Polyclinic during the Athens Olympic Games (Athanasopoulos et al., 2007). Several other procedures were also constantly utilized during the working period, including cryotherapy, superficial heat and TENS, since most athletes previously presented with chronic pathologies and were seeking analgesia. This finding confirms the study carried out by Athanasopoulos et al. (2007). Furthermore, a small number of athletes went to the physiotherapy department seeking taping. One of the main results found in our study, and at the same time a cause of great concern, was the fact that a large number of athletes (22.1% of all athletes) were previously injured prior to the competition. The existence of previous injuries is an important factor regarding the gravity of the injury and how serious it could become (Hickey, Fricker, & McDonald, 1997). We can connect the large number of patients who sought physiotherapy services (65.7% of all athletes) with the high number of athletes who came to the Games already complaining about an injury.

The infra-structure of physiotherapy treatment provided to the athletes by BOC during the Pan-American Games was similar to that offered during the Olympic Games and the South-American Games. All the physiotherapy equipment was taken to the host city in special travelling containers with an average total weight of 1 ton.

With this work, we intend to contribute to the sports physiotherapy community working with delegations at major sports competitions, both national and international; this work provides data to physiotherapists, doctors and boards of directors during the preparation of future delegations, not only concerning human resources but also on the necessary equipment. Moreover, there are very few studies carried out regarding the physiotherapy activity during major sports competitions, and this work may contribute to the literature available on this subject.

5. Conclusion

This work reveals that the vast majority of the athletes in the Brazilian delegation looked for physiotherapeutic treatment. Approximately one quarter of the athletes were injured before the competition started. The major pathologies presented were spine-related injuries, tendinopathy and muscle strain. The spine, thigh and knee were the most affected parts of the body, and kinesiotherapy, ultrasound and cryotherapy were the most frequent procedures performed at the physiotherapy department.

Conflict of Interest Statements

The authors do not foresee any conflict of interest in publishing this paper. If further information is required in regard to this please email the required details to aledlopes@yahoo.com.br.

Ethical Approval

This research was approved by the Medical Department of the Brazilian Olympic Committee. If further information is required in regard to this please email the required details to aledlopes@yahoo.com.br.

Acknowledgements

Special thanks to all physiotherapists, delegation members of the 2007 Pan-American Games, and the BOC for its support on this work.

References

Athanasopoulos, S., Kapreli, E., Tsakoniti, A., Karatsolis, K., Diamantopoulos, K., Kalampakas, K., et al. (2007). The 2004 Olympic games: physiotherapy services in the Olympic village polyclinic. *British Journal of Sports Medicine, 41*, 603–609.

Bono, C. M. (2004). Low-back pain in athletes. *Journal of Bone and Joint Surgery American, 86*, 382–396.

Bulley, C., & Donaghy, M. (2005). Sports physiotherapy competencies: the first step towards a common platform for specialist professional recognition. *Physical Therapy in Sport, 6*, 103–108.

Granhed, H., & Morelli, B. (1988). Low back pain among retired wrestlers and heavyweight lifters. *American Journal of Sports Medicine, 16*, 530–533.

Hägglund, M., Waldén, M., & Ekstrand, J. (1988). Previous injury as a risk factor for injury in elite football: a prospective study over two consecutive seasons. *British Journal of Sports Medicine, 40*, 767–772.

Hainline, B. (1995). Low back injury. *Clinics Sports Medicine, 14*, 241–265.

Hickey, G. J., Fricker, P. A., & McDonald, W. A. (1997). Injuries to elite rowers over a 10-yr period. *Medicine Science Sports Exercise, 29*, 1567–1572.

Hutchinson, M. R. (1999). Low back pain in elite rhythmic gymnasts. *Medicine Science Sports Exercise, 31*, 1686–1688.

Jelsma, J., Dawson, H., Smith, G., Satumba, C., & Madzivire, D. (1997). Provision of physiotherapy services at the sixth all Africa games. *British Journal of Sports Medicine, 31*, 246–248.

Jull, G. A., & Cupit, R. L. (1984a). Physiotherapy at the XII Commonwealth Games Part I: organization and utilization of services. *Australian Journal of Physiotherapy, 30*, 3–9.

Jull, G. A., & Cupit, R. L. (1984b). Physiotherapy at the XII Commonwealth Games Part II: Injuries and Management. *Australian Journal of Physiotherapy, 30*, 10–14.

Kolt, G. (2004). Physical therapies, sports medicine, and the Olympic spirit. *Physical Therapy in Sport, 5*, 107–108.

Kujala, U. M., Taimela, S., Erkintalo, M., Salminen, J. J., & Kaprio, J. (1996). Low-back pain in adolescent athletes. *Medicine Science Sports Exercise, 28*, 165–170.

Lundin, O., Hellstrom, M., Nilsson, I., & Pëterson, L. (2001). Back pain and radiological changes in the thoraco-lumbar spine of athletes. A long-term follow-up. *Scandinavian Journal Medicine Science Sports, 11*, 103–109.

Sward, L., Hellstrom, M., Jacobsson, B., Nyman, R., & Peterson, L. (1991). Disc degeneration and associated abnormalities of the spine in elite gymnasts. A magnetic resonance imaging study. *Spine, 16*, 437–443.

Sward, L., Hellstrom, M., Jacobsson, B., & Pëterson, L. (1990). Back pain and radiologic changes in the thoraco-lumbar spine of athletes. *Spine, 15*, 124–129.