Original Article

Incidence injury analysis on rowers in the spanish mediterranean fixed bench championship 2012

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ABSTRACT

Penichet-Tomás A, Jiménez-Olmedo JM, Saiz-Colomina S, Jove-Tossi M, Martínez-Carbonell JA, Silvestre-García M. Incidence injury analysis on rowers in the spanish mediterranean fixed bench championship 2012. *J. Hum. Sport Exerc.* Vol. 7, No. 3, pp. 648-657, 2012. The standardized assessment of sports injuries provides important epidemiological information and instructions to prevent them. The aim of this study was to determine if the pattern detrimental impact on fixed seat rowing agreed with the literature review of the Olympic rowing modality. A retrospective questionnaire was administer to 79 male rowers, with an age mean of 27.66 ± 7.15, belonging to the male in the senior category VIII Rowing Spanish Mediterranean Bank Fixed Championship that took place in Torrevieja during the 25th, 26th and 27th of May. The anatomical regions that were damage the most were the ankle (15.4%) and lower back (13.2%). These injuries have occurred with higher incidence in training (55.1%) as the most recidivist injury, the ankle, which has occurred for 73% of the time during this moment. The most common injury is the overuse (44.2%) and the most repeated diagnosis was sprain (23.1%). **Key words**: ROWING, INJURY, PERFORMANCE, COMPETITION, FIXED BENCH.

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INTRODUCTION

Achieving excellence in rowing requires an optimization technique to maximize efficiency and force production (Pollock et al., 2012). The importance of the technic and the demand can make the rowing as a susceptible sport injury. Optimization of paddle technique is critical to enhance performance and minimize the risk of injury (Jones et al., 2010). Stardarized testing technique provides an important epidemiological information and instructions to prevent them (Junge et al., 2009).

There are several studies that have been published over the years about the harmful impact on the sport of rowing Olympic discipline. These researches have been based mainly on analysing the level of muscle activation (Fenwick et al., 2009) where many of them have helped electromyography for accuracy of the study (Pollock et al., 2009, 2012). Being back pain, and more specifically back pain, a common problem in the rowers of all levels (Holt et al., 2003), as the intercollegiate (Teitz et al., 2002; Perich et al., 2011) and elite rowers (McGregor et al., 2002), activation trunk'areas has been present in almost all of them, along with other anatomical regions. These studies came to conclusions like that altered trunk kinematics suggest that this acts as a lever and you should have less stiffness to transfer forces from the legs to the upper extremities (Pollock et al., 2012). During periods of maximum force production there is a co-activation trunk flexor and spin's extensor muscles segments L3-S1 showing most of movement which may be more susceptible to injury (Pollock et al., 2009).

In rowing, risk index of injury is low as well as in sports like sailing and canoeing (Junge et al., 2009). However, according to the literature, the diversity in body areas to injury are not low. Numerous studies have research the incidence and etiology harmful in rowing (McNally et al., 2005; Rumball et al., 2005; Smoljanovic et al., 2009; Wilson et al., 2010; Winzen et al., 2011). All these studies corroborated that most injured anatomical region is the lower back or lumbar area followed by other body areas such as the ribs, shoulder, knee (Taylor et al., 2009), wrist, forearm and other areas of the back and spine can be seen below.

Low back pain is the most common musculoskeletal injury in rowers (McGregor et al., 2004; Maurer et al., 2011) therefore, there are specific studies regarding to the etiology of this anatomical region. Rowers can reach relatively high levels of lumbar flexion during a rowing race and these levels increase with the develop of the race, that is fatigue (Caldwell et al., 2003). In the Bahr's et al. research in 2004 conducted that low back pain seems to be more common in endurance sports, including rowing, and that specifically affecting during training and competition.

As a result, it has researched quite over the last decade on incidence and etiology harmful in Olympic rowing. However, there are not the same number of research in the traditional rowing modality of fixed bank. Hence, this research aims to determine whether the pattern detrimental impact on fixed seat rowing is agreed with the literature on Olympic rowing.

MATERIAL AND METHODS

Subjects

A retrospective questionnaire was administered to a total of 79 male rowers, with a mean age of 27.66 ± 7.15 (16 to 48 years old), who were part of the ten participating teams for the senior male category VIII Rowing Spanish Mediterranean Bank Fixed Championship (2012) which was held in Torrevieja on the 25th,

26th and 27th of May. All subjects gave written informed consent before beginning the study had previously been approved by the research ethics committee of the University of Alicante.

The subjects of this research have also been further divided into two groups, high performance and low performance for comparisons between groups. Subjects considered high performance are all members of the teams that have been ranked in the top five, in the final competitors A and winner of the final B. In addition, subjects are considered under performance all other, as those who were part of either of the two teams eliminated in the race or the members of the sixth, seventh and eighth ranked.

Table 1. *Subjects.*

	Frequency	***Percentage***
All subjects	79	100
High performance subjects	30	38
Under performance subjects	49	62

Instruments

To carry out this study used a retrospective questionnaire adapted (Penichet et al., 2012; Perez et al., 2012) from a previously validated (Elorant & Tittonen, 2006) that completed by hand. For the fill in process, they rowers were asked regarding to the four most significant injury they had suffered along its career as rowers. For this purpose in each of the sections of the questionnaire had four columns corresponding to each of the four possible injuries.

Procedure

Once the competition subjects filled in the retrospective questionnaire throughout the 26th for the second day of competition where they played the heat round and repechage. Researchers and collaborators were interviewing the rowers after their own and his coach consent, during the rest periods in each team, being before or after participation in each round. This data collection was done by hand.

Regarding the more complex information to identify the injuries suffered, we explained as “impact injuries” the one’s who appear at a specific time as a type of hit that has received the athlete to hit an opponent or object. Furthermore, injuries are those that use their athlete have done in a time point. Finally, the overuse injury are those who at some point will reveal the athlete symptoms but can hardly remember the exact moment where you start the mechanism of injury, refers only started hurting him (Pérez et al., 2011).

Statistical Analysis

For statistical analysis was used Sciences Social Statistical Package (SPSS) v.19.0 software. First, descriptive statistics were applied, the comparison of means and compare percentages. By Chi-square test were determined statistical significance for nonparametric tests from $p < 0.05$.

RESULTS

The figure 1 the results shows that the anatomical region where most injuries occur is the ankle 15.4% in the overall sample, 20% for the high-performance group and 12.5% in subjects underperformance. The second injury being the lumbar also coincides with 13.2%, 17.1% for high performance group and 10.7% in under performance group.

Focusing on the entire samples, the following injuries are cervical lesions with 7.7% and elbow, shoulder, knee and leg with 6.6% each. Next are forearms and spine with a percentage of 4.4% each and the clavicle, thigh, pelvis, feet and fingers with 3.3% by region. Finally there are arms, wrist and toes with 2.2% each anatomical region and abdomen, hips, hands, chest and nails with 1.1% each lesion.

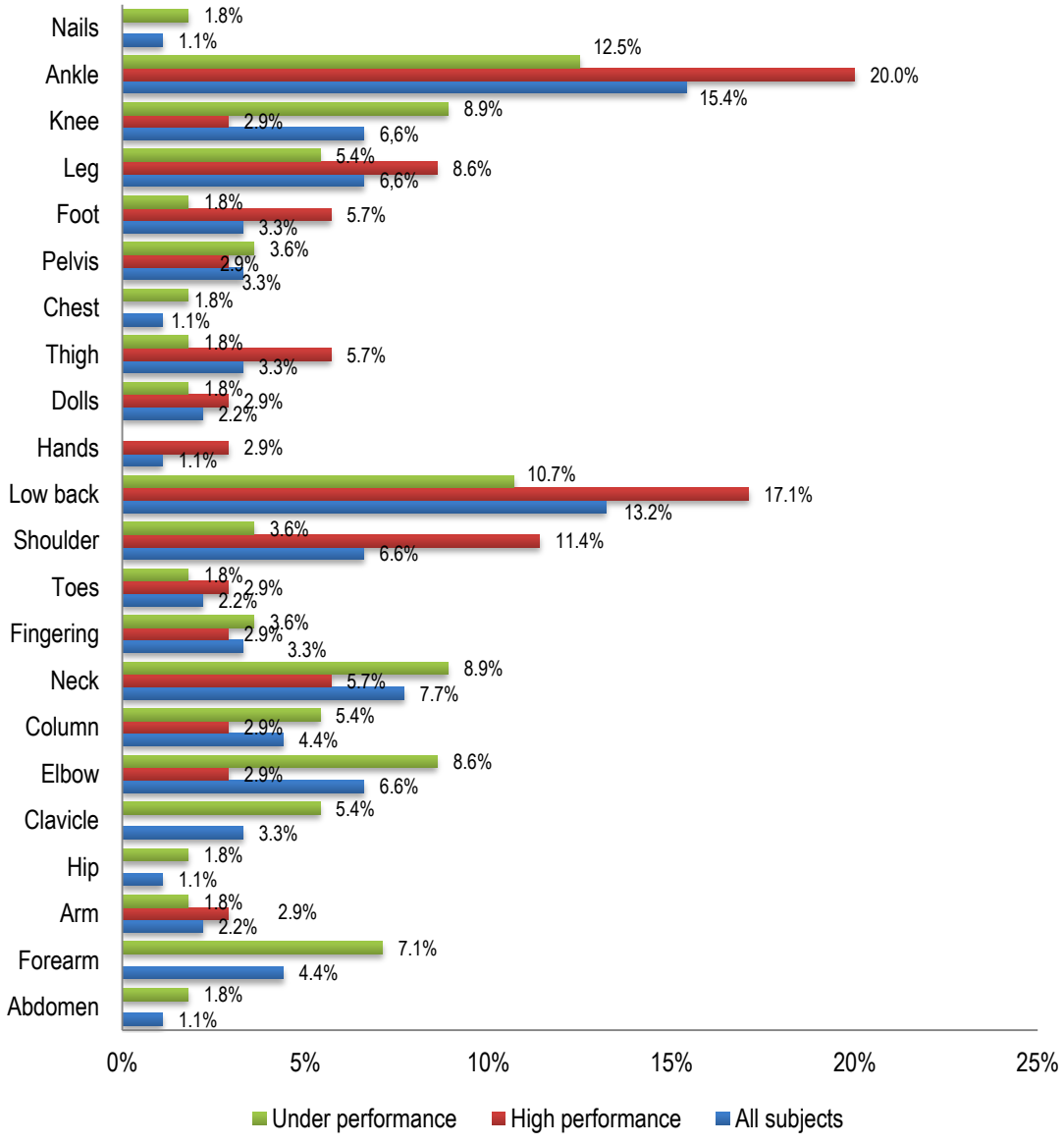

Figure 1. *Percentage incidence according to anatomic region injurious.*

In high performance subjects, after the lumbar and ankle with a higher index, the following anatomic regions with a higher incidence rate found injurious shoulder with 11.4% and 8.6% leg. The neck, thigh and foot equals its incidence with 5.7% respectively as the other areas of the body, ie, arm, elbow, spine, fingers, toes, hands, wrist, pelvis and knee have the same harmful effect with 2.9% each.

The elbow joints, knee and neck with 8.9% each zone, and forearm with 7.1%, are the most characteristic anatomical regions after ankle and lumbar underperforming subjects. The clavicle, spine and leg match in the percentage with 3.5% while the fingers of the hand, shoulder, and pelvis do with 3.6% and the abdomen, arm, hip, toes foot, wrist, thigh, chest, feet and nails also show in 1.8%.

Figure 2 shows how in all subjects in general and in the two different groups of performance, the new injury is predominant compare with the recurrent increased significantly. The new injury in the total sample is an incidence of 67.8% ($p<0.05$) compared to a 25.4% relapsed ($p<0.05$) and increased by 6.8% (among which also found significant differences). And for the underperformance group, the new injury with 62.2% ($p<0.05$) differed significantly against recidivist with 21.6% and increased to 16.2%.

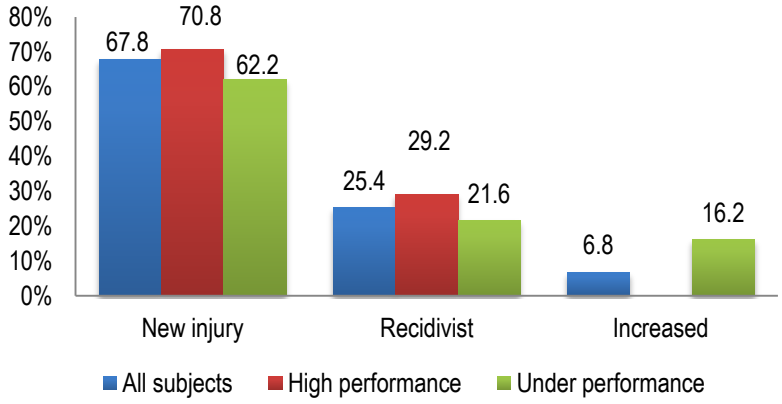

Figure 2. *Percentage of incidence by type of injury.*

There are also significant differences in the high performance subjects to suffer a new injury with 70.8% ($p<0.05$) compared to the remaining 29.2% who are recidivist offenders, because no subject had an injured increased.

A 23.1% of all subjects suffered sprain injuries, as seen in Figure 3, followed by fracture and tendinitis with 15.4% each. 11.5% of the subjects in this group suffered bruises while 9% have had muscle tears. The wound surface with 3.8% and the burn and dislocation with 1.3% each are the lowest percentages.

The strain is also the most common injury in the high performance group with 24.1% followed by 20.7% fracture and muscle breakdown with 17.2%. The two least frequent bruising with 10.3% and 3.4% with tendinitis.

In subjects underperforming again the strain which has the highest incidence but this time is equated with tendinitis with 22.4%. He was preceded contusion and fracture with 12.2% each, the wound surface with 6.1% muscle breakdown with 4.1% and finally the dislocation and burn with a 2% each.

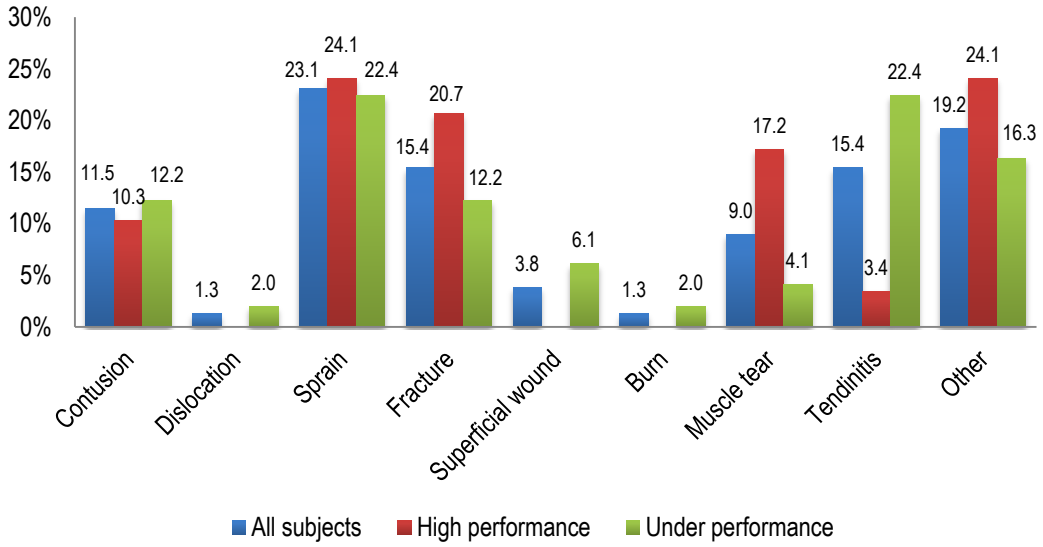

Figure 3. *Incidence rate injury according to type of harmful diagnostic.*

In Figure 4, the results indicate that 44.2% of subjects overall are injured overuse, 28.6% by impact and the remaining 27.3% for use.

There are significant differences ($p<0.05$) in the way the injuries occour to subjects of high performance, more specifically between overuse with 55.6% and 14.8% with use. The 29.6% of the remaining injuries are caused by impact. In the group of under performance are more equal percentages with 38% overuse and cause repeated use followed with 34% and 28% impact.

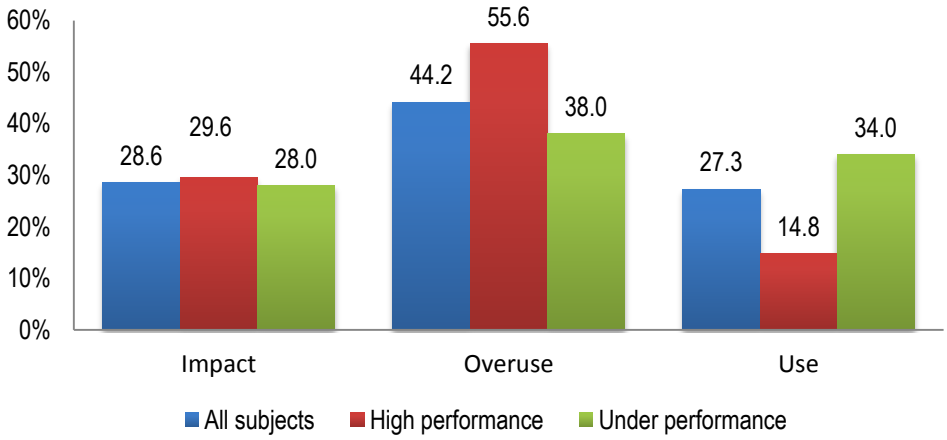

Figure 4. *Percentage incidence harmful depending on how the injury occurred.*

In the overall sample, we found significant differences between the injuries occurring in training with 55.1% ($p<0.05$) compared to those who occur on the warming-up at 2.6% and in competition with 14.1 %. 28.2% had suffered an injury in other different time, as shown in Figure 5.

As same as the high performance subjects who are injured by 62.1% ($p<0.05$) in training compared to 13.8% and 6.2% in the competitions and warming-up respectively. In under performance also significant differences between training with 51% ($p<0.05$) 14.3% before the competition but not warming-up with a rate of 0%. Finally as a result, 34.7% of subjects in the underperformance level, 17.2% of high performance has been injured at other times than those seen previously.

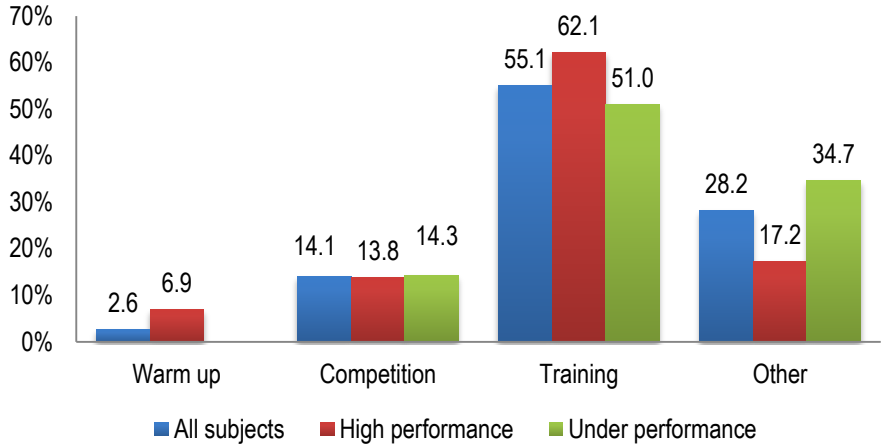

Figure 5. *Percentage incidence harmful depending on when the injury occurred.*

In Figure 6 it shows that 73% of ankle injuries occur during training, 18% in the competition as the remaining 9% in other moment. On the other hand, lower back injuries occur in 55% at another time versus 27% that occurs during training and competition by 18%.

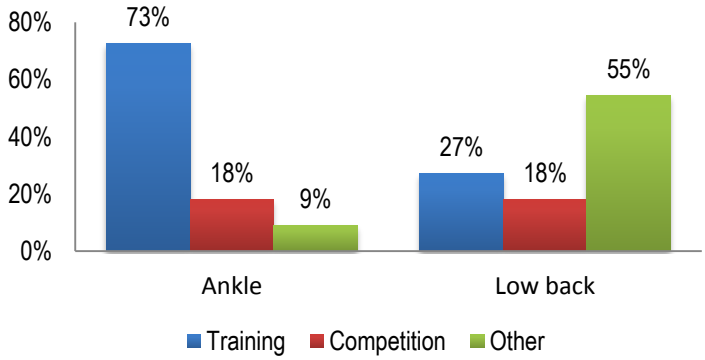

Figure 6. *Percentage incidence of injuries when the two most significant.*

DISCUSSION

The two most common injuries in the form of fixed bench are the ankle (15.4%) and lumbar (10.7%) respectively, significantly ($p<0.05$). None of the research into mobile bench rowing emphasizes the ankle injury as an incident but almost all those who have studied the incidence harmful agree that the most common injury in mobile bench is the same as the second most common in fixed bench ie the lumbar (Rumball et al., 2005; Smoljanovic et al., 2009, Wilson et al., 2010; Winzen et al., 2011).

The most frequent diagnosis of injuries in this rowing modality is a sprain with 23.1% as in the Summer Olympic Games 2008 by 49.6% but in this case was considered to athletes of all sports (Junge et al., 2009).

In these same Olympics Games a third of injuries occurred among athletes followed by impact from overuse (22%) and non-contact overuse (20%). In traditional rowing athletes is different, because the overuse is the main cause with 44.2% followed by impact with 28.6% and 27.3% with use. However, overuse was also the leading cause of injury in the Junior World Rowing Championships in Beijing 2007 (Smoljanovic et al., 2009). In the study by Winzen et al. (2011) German national elite rowers, the most common cause of injuries was also overuse.

According Bahr et al., (2004) back pain occurs more often during periods of training and competition in Olympic rowing, however, in the form of bench fixed these injuries occur with 55% in other times than training (27%) and competition (18%).

CONCLUSIONS

Injuries occur in fixed bench with the highest incidence in ankle and lower back while in mobile bench lumbar injury is the most characteristic. In the form of fixed bench dominated new lesions ($p<0.05$) compared to recidivists and increased and strains in the diagnosis.

Both rowing modalities agree that the most common way of having an injury is overuse but at the moment only in training agree because in bench fixed differences between training and competition are significant ($p<0.05$). This is because the most significant injury in fixed seat rowing is the ankle and occurs significantly more in training. However lumbar injuries happen more at other times different to training and competitions. A limitation of this research has been the few literature in fixed bench. This study focused mainly on describing and comparing the incidence of harmful between rowing fixed bench and mobile modality, but leaves an unknown matter that is found mainly the etiology of these injuries.

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