

# Susceptibility of body injuries during a fall of people after amputation or with abnormalities of lower limb

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## Abstract

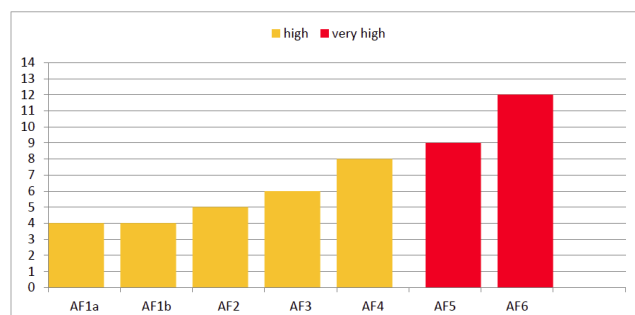
**Background and Study Aim.** In the world every 20 seconds he/she is reaching amputation of a lower limb because of diabetes [1]. However they in Poland are making amputation on average hourly [2]. Amputees within lower limbs are included in a group of the increased risk of the fall and traumas associated with fall [3]. These people are exposed especially to fractures within upper limbs and to injuries of the head [4-6].

The purpose of this study was the knowledge about susceptibility of body injuries during a fall of people after amputation or with abnormalities of lower limb

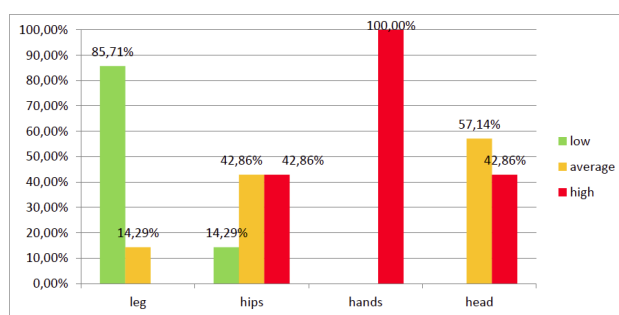
**Material and Methods.** Way of managing body parts (head, hands, hips, leg) during simulated fall were measuring susceptibility test of body injuries during a fall – SBIDF [6]. During each of three task that test is composed of, correctness of motor control of hips, hands and head (additionally legs in third task) were assessed during simple simulation of collision with the ground (on a signal, on soft ground subject is ought to change posture from vertical to horizontal – lying on back). The test was carried out without orthopaedic bullets and without the prosthesis on soft base. Results of observations: “0” lack of error, “1” first grade error, “2” second grade error. Total number of points is general indicator of SBIDF: low (0), average (1-3), high (4-8) and very high (9-14). The measure of susceptibility of the predetermined parts of the body to injuries (SBPIDF) is the sum of the points from all tasks analyzed separately for the each parts of the body: low (0), average (1), high (2–6). Marginal values of SBPIDF (as a result of adding errors made during the tasks) for the different parts of the body include between: legs 0–2; hips 0–3; hands 0–6; head 0–3. However the marginal values of adding points estimated after completing the Task 1 and 2 are in the range of 0 and 4 points, and Task 3 in the range of 0 and 6 points. For this reason a comparative analysis (for the parts of the body and each tasks) takes into account the indicator of proportion of errors (expressed in percentage) applied to the possible maximal value of estimated points (SBPIDF%max). For example, for the hands this value is 6 points and 2 points for legs.

The surveys included seven men in age from 14 to 37 ( $= 26.4$ ) with the different level of amputation of a lower limb ( $n = 5$ ) or with abnormalities of lower limb ( $n = 2$ ). They are involved in a Cracow Amputee Football squad, some of them are representatives of Poland in this sports discipline. Trainings take place once during the week on the court with the artificial surface. Cardinal variable for result presentations is SBIDF indicator. AF letters are a prefix of the given Amputee Footballer code, digits from 1 to 6 are marking his position in the ranking, and in case of the same result next small letters of the alphabet were assigned: a, b, c etc.

**Results.** Two persons (AF5, AF6) revealed very high level of susceptibility of body injuries caused by loss of the balance and collision with the ground (SBIDF indicator from 9 to 12 points). Five remaining footballers (AF1a, AF1b, AF2, AF3, AF4) revealed high level (SBIDF indicator from 4 to 8 points) (Figure 1).

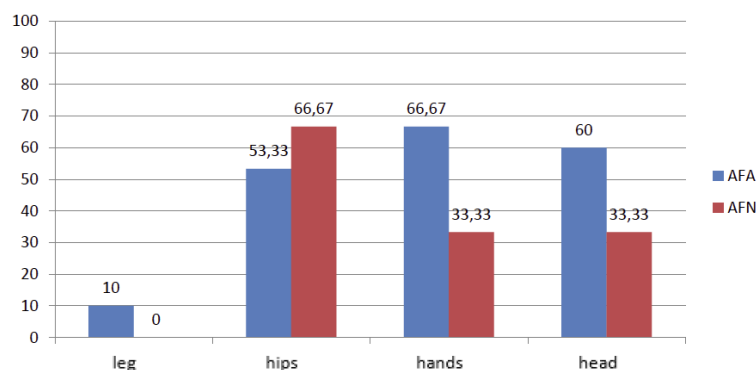


**Figure 1.** Indicator of susceptibility of body injuries during a fall (SBIDF) examined Amputee Footballers ( $n = 7$ ).



**Figure 2.** Susceptibility of body injuries during a fall (SBIDF) examined Amputee Footballers ( $n = 7$ ).

Footballers with abnormalities of lower limb (AF1b, AF3), and footballers after amputation with respect to the average result they revealed high susceptibility (appropriately SBIDF = 5, SBIDF = 7.6). Body part with the most exposed to damage (SBPIDF) are hands (100% examined persons revealed high susceptibility) next the head and hips (43%). The leg is a least exposed body part (86% footballers revealed low susceptibility) (Figure 2 and 3).



**Figure 3.** Susceptibility of the predetermined parts of the body to injuries during a fall (SBPIDF) examined Amputee Footballers after amputation (AFA, n = 5) and Amputee Footballers with abnormalities of lower limb (AFN, n = 2) described with indicator PUCCPU%max.

**Conclusions.** Mistakes of managing individual body parts during simulated fall by examined footballers let to predict their body injuries caused by the fall in different circumstances of their everyday motor activity, particularly during the training or the match.

Since exercises of safe falling were involved in the weekly practice of examined footballers (Figure 4 and 5) (a supervision of the doctor and the coach is ensured, and for a specialist part is responsible a physiotherapist, specialist in theory and methodology of safe falling), so there will be assessed effects of increasing cyclically (of stabilization) of their **motor safety** (which is the consciousness of the person undertaking to solve a motor task or consciousness the subject who has the right to encourage and even enforce from this person that would perform the motor activity, who is able to do it without the risk of the loss of life, injuries or other adverse health effects [7]).



**Figure 4.** Cracow Amputee Football squad.



**Figure 5.** Amputee Footballers during the match.

**Keywords:** abnormalities of lower limb • amputee footballers • body injuries • loss of the balance • collision with the ground

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