Szczecin, 04.03.2026

Summary

Evaluation of selected morphological features and circulatory parameters of competitors flying in a vertical wind tunnel (indoor skydiving)

Piotr Kolano

Promotor: dr hab. Monika Chudecka, prof. US

Promotor pomocniczy: dr Elżbieta Sieńko – Awierianów, prof. US

Keywords: wind tunnel, body structure, pain threshold, hand muscle strength, selection in sport, body composition, morphological features, circulatory system, pulse, blood pressure, indoor skydiving.

Body build and physiological parameters, including those related to the cardiovascular system, determine an athlete's aptitude for a given sport and have an impact on whether or not they are successful in it. Physique and body proportions as well as biological (including physiological) potential are important aspects that should be considered when personalising a training programme.

Indoor skydiving is a young sport in Poland. Therefore, there has been no detailed research in Poland on the body build and physiological parameters of indoor skydiving athletes. The dynamic growth of indoor skydiving and the growing availability of vertical wind tunnels have highlighted the need for research analysing such aspects as body composition and build, response to stimuli and physiological (especially cardiovascular) parameters in individuals practising the sport. Such research could help optimise indoor skydiving training.

The aim of the present study was to determine the optimum physique of indoor skydiving athletes, analyse their cardiovascular responses by monitoring their cardiovascular parameters and assess their response to stimuli (pain threshold) and arm muscle strength.

The study included 86 indoor skydiving athletes who competed in the Polish Indoor Skydiving Championships and Champions League at FLYSPOT Katowice. The comparison group comprised 30 male first-time indoor skydivers.

Body build parameters and body composition were measured and selected cardiovascular parameters, such as blood pressure (BP) and heart rate, were assessed. The isometric strength of arm muscles and pain thresholds were also analysed. Tests were carried out twice - immediately before and immediately after an indoor skydiving activity session. The results were analysed statistically.

The mean age of the athletes included in the study was 37.2 years. They had been pursuing the sport professionally for an average of 6.8 years. The mean age of first-time skydivers was 36.3 years.

The study showed no relationship between the body build of indoor skydiving athletes and whether or not they were successful in the sport. However, it demonstrated relationships between being successful in indoor skydiving and selected body composition parameters. Indoor skydiving training sessions were found to significantly affect cardiovascular parameters in the athletes included in the study. In this group of participants, there was a correlation between lower pre-session systolic and diastolic BP levels and higher final ranking. Moreover, an analysis of pre- to post-session changes in BP in athletes showed a positive correlation between a smaller difference in BP and higher final ranking. The statistically significantly higher BP values in first-time skydivers before a flight in the wind tunnel were due to emotional factors (activation of the adrenergic system). In both groups, pain thresholds at measurement points on the arm measured immediately after a flight in the wind tunnel were statistically significantly higher than those measured before the flight. Thus, the study showed that even a one-off indoor skydiving activity session can result in a significant increase in pain thresholds in first-time skydivers. The study also demonstrated a statistically significant pre- to post-session increase in arm muscle strength in both the groups of participants. Regular indoor skydiving sessions, which put strain on the body due to the need to maintain the correct body positions in the wind tunnel, were found to result in an increase in muscle strength.

04.03.2026 Hołowa PK