

Static and dynamic postural control adaptations induced by playing Ice Hockey

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Sport Sci Health (2007) 2:00–00

DOI 10.1007/s11332-007-0000-0

Abstract

In ice hockey, players produce high velocities by skating and game actions are typically characterized by sudden accelerations and brisk decelerations. Thus, the vestibular system is particularly stressed. The aims of this study were to evaluate sensorial organization and head stabilization control of ice hockey players in order to investigate if this kind of activity induces specific sensori-motor adaptation.

We studied 8 elite hockey players, 8 amateur players and 10 healthy controls. Three tests were performed: (1) sensory organization test (SOT) to evaluate sensorial organization in maintaining steady stance in quiet standing; (2) head stabilization stance test (H-STAN) to evaluate head-to-trunk stabilization during quiet steady stance; and (3) stepping test (STEP) to evaluate skills in maintaining the head stable with respect to the trunk during walking in place. In SOT, elite players had a greater visual component and reduced vestibular component. In H-STAN test, elites, when standing on foam, presented head less stable than trunk. In STEP test, with respect to normal subjects amateurs elites, head was less stable in the sagittal plane with eyes open and more stable in the frontal plane with eyes closed.

Introduction

Inputs from visual, vestibular and somato-sensory systems combine together in order to stabilize the body in standing posture and the head during movement, adequate to the task: bending, walking, running, skating. Inputs from different cues are weighted with respect to different tasks and environmental conditions, and sensory strategies are the result of the modulation of sensory cues by the central nervous system (CNS). Both body stabilization during standing and head stabilization in space during movement are directly controlled by the vestibular system. Posture stabilization is necessary to provide a sensorimotor pre-movement platform for planning adequate motor control during the beginning of body movement itself. Head stabilization appears to be a necessary motor control [1] in order to provide a stable orientation platform (regarding both gravity and environment landmarks) necessary for an adequate progression of body movement. Input from different systems are essential to control posture and head stabilization.

It has been postulated [2] that high motor and sensory mechanisms are necessary both for simplest conditions like standing (posture control) [3] and walking (head control) [4]. Adequate posture and head controls are specific tasks of the vestibular system [5] and they are important both in daily activities and in sport performances. Hockey is a contact team game played, by international rules, in which the players perform various co-operative and

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Received: 21 June 2007 / Accepted: 15 October 2007