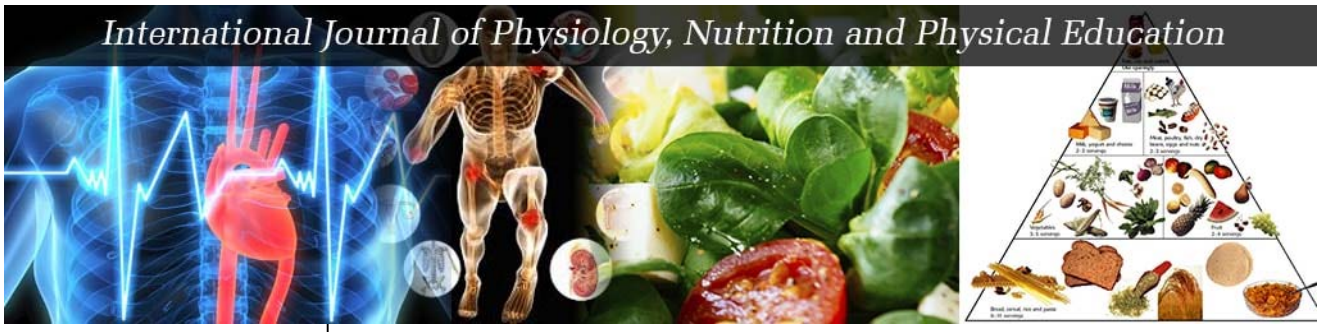

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Effect of ocular muscle imbalance on fundamental skills of junior male hockey players

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Abstract
It is believed that athletes need certain visual abilities to perform at the highest level. However, despite the need for understanding ocular muscle balance and visual fatigue in hockey not only for talent identification but also in sports performance, very few studies have been conducted in the past in this regard still very little information is available on effect of ocular muscle imbalance on skill ability of hockey players, hence the present study was planned. The present study was conducted to find out the effect of ocular muscle imbalance on skill ability of hockey players. 100 state level junior male hockey players (Ave. age 16.23 yrs) were selected as sample. The criteria for selection of subjects were participation in state level hockey competitions in the state of Chhattisgarh. Random sampling method was preferred choice in the present investigation. Ocular muscle imbalance was tested at Department of Ophthalmology, All India Institute of Medical Science, Raipur. To assess basic fundamental skills of hockey, three dimensional SAI Hockey Skill Testing for Talent Spotting at Young Age was used. The results clearly indicate that hockey skill ability of junior hockey players is significantly affected by ocular muscle imbalance. It was concluded that ocular muscle balance is the key factor as far as execution of basic skill in field hockey is concerned.

Keywords: Ocular muscle imbalance, skill ability, hockey

Introduction
Vision is an essential part of most human activities including sports and games because it is the process of reacting to what we see (Martin, 1993) [6]. The discipline of sports vision is a relatively young and growing area of optometry that explores the importance and repercussion of the visual system during one's athletic performance. On average, the competitive athlete's vision is no better than the rest of the population. There is always a high percentage of visual deficiency amenable to correction, even in elite groups. Athletes with visual deficiency partaking in sports with a high visual demand may well be lost to that event. Optimal visual correction allows these players to compete on level terms. Skilled movement is not a spontaneous muscular response but represents a sequence of complicated processes within the central nervous system. An athlete absorbs information from the surrounding sporting environment and processes this information. The final output produces a movement response. This model of humans as information processing systems is commonly used to explain the role of vision in producing and controlling skilled movement.

In sporting context, sports such as field hockey and tennis requires high visual demand while football and rugby, may not require high acuity demand, but need other qualities such as peripheral awareness. The high visual demand is often associated with ocular muscle balance. Balance is the ability to maintain the body's center of mass over its base of support. A properly functioning balance system allows humans to see clearly while moving, identify orientation with respect to gravity, determine direction and speed of movement, and make automatic postural adjustments to maintain posture and stability in various conditions and activities. Balance is achieved and maintained by a complex set of sensorimotor control systems that include sensory input from vision (sight), proprioception (touch), and the vestibular system (motion, equilibrium, spatial orientation); integration of that sensory input; and motor output to the eye and body muscles [Davidson; M. Nussbaum, 2004] [3]. Hence to execute skill movement in a sport like field hockey ocular muscle balance is the key apart from

other factors. Since hockey is India's national games, so many studies have been conducted to assess the impact of various factors on hockey performance. Notable among them are studies done by Dureha and (2010) [4], Manna *et al.* (2011) [5], Sharma *et al.* (2012) [8], Parthiban, I.J. (2012) [7], Tripathi *et al.* (2013) [9] respectively but so far no study as yet being conducted in which basic hockey skills of junior players have been ascertained in the light of their ocular muscle balance, hence present study was planned.

Hypothesis

It was hypothesized that fundamental skills of male hockey players will be compromised due to ocular muscle imbalance.

Methodology

The following methodological steps were taken to conduct the study

Sample

100 state level junior male hockey players (Ave. age 16.23 yrs) were selected as sample. The criteria for selection of subjects were participation in state level hockey competitions in the state of Chhattisgarh. Random sampling method was preferred choice in the present investigation.

Tools

Ocular Muscle Balance

Ocular muscle balance of the selected subjects was determined through ophthalmic tests namely visual acuity, cover-uncover and visual fatigue test respectively.

SAI Hockey Skill Test

To assess basic fundamental skills of hockey, three dimensional SAI Hockey Skill Testing for Talent Spotting at Young Age was used. It consists of three items i.e. shooting in the target (goal), Balancing the ball on the stick and Moving with the ball i.e. ball controlling ability. The reliability and validity of this test is scientifically established.

Procedure

100 junior male hockey players who took part in state level championship held at Chhattisgarh were selected on the basis of convenience sampling method. Three dimensional SAI Hockey Skill test battery were completed by each selected subject under strict supervision of the scholar. The ocular examination of the selected subjects was conducted in mainly in AIIMS Raipur in a group of 10-20 subjects. The interpretation of ocular findings was done as per the medical card issued by the concerned ophthalmologist. Ocular findings and skill related scores on SAI hockey test battery was tabulated in case of each subject. To verify hypothesis, independent sample't' test was applied. The result presented in table 1.

Result

Table 1: Effect of Ocular Muscle Imbalance on Hockey Skill Ability of Junior Male Hockey Players

Skill Variables	Ocular Muscle Imbalance				MD	't'
	Not Seen (N=91)		Seen (N=09)			
	Mean	S.D.	Mean	S.D.		
Shooting in the target (goal)	6.68	1.41	2.11	0.78	4.57	9.52**
Balancing the ball on the stick	20.30	3.85	12.44	3.08	7.86	5.92**
Moving with the ball	4.69	0.63	6.24	0.46	1.55	7.17**

** Significant at .01 level

Entries reported in table 1 indicate that shooting skills of junior male hockey players with ocular muscle imbalance (M=2.11) was found to be significantly inferior as compared to shooting skills of junior male hockey players in which no ocular muscle imbalance was observed (M=6.68). [t=9.52, $p<.01$)

It was also found that balancing ability of junior male hockey players suffering from ocular muscle imbalance was significantly inferior (M=12.44) as compared to balancing ability of junior male hockey players with no sign of ocular muscle imbalance (M=20.30). [t=5.92, $p<.01$]

Entries reported in table 1 indicate a significant effect of ocular muscle imbalance on dimension of hockey skill ability i.e. moving with the ball among junior male hockey players. The calculated t=7.17, which is statistically significant at .01 level, scientifically suggesting that ball controlling ability of junior male hockey players without ocular muscle imbalance (M=4.69) was found to be significantly superior as compared to ball controlling ability of junior male hockey players with ocular muscle imbalance (M=6.24).

Discussion

The importance of visual skills in sports performance have also been highlighted by various researchers like Abernethy (1997) [1], Yoshio Mi-Sook Lee (2005) [10], Bulson *et al.* (2009) [2] in the past. In the present study, subjects with ocular disorders have inferior balancing ability i.e. balance of their body. The major cause of inferior balancing ability has been attributed to lack of normal visual acuity and deficient ocular alignment. The inability to balance their bodies properly also results in inferior shooting and ball controlling ability because both this skills requires proper positioning of body prior to executing these skills. Since good visual skills are dependent upon ocular muscle balance, hence there is no surprise that junior hockey players with ocular muscle imbalance lag behind in skill ability as compared to junior hockey players normal ocular muscle balance.

Conclusion

It was concluded that ocular disorders do affect the skill ability of junior male hockey players in a significant manner. Thus, ocular examination is a foremost necessity before selection of the junior hockey players.

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