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ROLE OF SPORTS VISION AND EYE HAND COORDINATION TRAINING IN PERFORMANCE OF TABLE TENNIS PLAYERS

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ABSTRACT
PAUL, M.; BISWAS, S. K.; SANDHU, J. S. Role of sports vision and eye hand coordination training in performance of table tennis players. Brazilian Journal of Biomotricity, v. 5, n. 2, p. 106-116, 2011. Successful performance in interceptive tasks depends upon the acquisition of visual information about the approaching object. The present study therefore evaluated the effects of sports vision and eye hand coordination training on sensory and motor performance of table tennis players. 45 University level table tennis players were randomly divided into 3 equal groups of n=15. The experimental group underwent 8 weeks of sports vision and eye hand co-ordination training. The placebo group read articles pertaining to sports performance and watched televised table tennis matches, while the control group followed only routine practice sessions for 8 weeks. Measures of visual function and motor performance were obtained from all participants before and immediately after 8 weeks of training. Statistically significant pre to post training differences were evident by better improvement in visual variables and motor performance for the experimental group as compared to placebo and control. The present study therefore concluded that visual training program improves the basic visual skills, which in turn are transferable into sports specific performance.

Key Words: Table Tennis, Sports Vision, Reaction Time, Movement Time, Saccade, Depth Perception, Eye Hand Coordination.

INTRODUCTION
Vision is one of the several sensory organs which receive information from the external environment and for years it has been recognized that many sports place demands on vision and particular visual skills. The earliest proponent of this concept was Galen, a Roman Physician who in the second century believed that there is a relationship between
ball sports, body and visual status (HITZEMAN & BECKERMAN, 1993). Inspite of this early recognition of visual importance in sports it stood neglected for many years and it was not before the middle of 20th century that new scientific opinions were developed and the thought, “sports being a multidisciplinary approach” came into picture (JAFARZADEHPUR & YARIGHOLI, 2004).

Sports Vision as such includes specific visual determinants which precisely coordinates a player’s activity during the game. It has been seen that successful athletes generally have better skill, accuracy and spatio-temporal constraints on visual information acquisition. As such if two similar athletes meet in competition and one has a better trained visual system, the athlete with enhanced visual system will perform better (LORAN & GRIFFITHS, 2001). Sport activities often have a close relationship between perception and action therefore temporally constrained sport tasks require that players extract the most valuable source of visual information and use this information to quickly anticipate the opponent’s movement outcome (SHIM et al., 2006).

There are evidences which support the claims of vision playing an important role in the perceptual ability of an athlete relating proportionately to his/her motor response. Revien & Gabor (1981) stated that visual abilities affect sports performance and the acquisition of motor skills, which can be improved with training. Supporting the same Quevedo et al. (1999); stated that sports vision training is conceived as a group of techniques directed to preserve and improve the visual function, with the goal of incrementing sports performance through a process that involves teaching the visual behavior required in the practice of different sporting activities. West & Bresson (1996) indeed indicated a positive effect on the performance of cricketers to judge the length of ball after specific visual training program. Salmela & Fiorito (1980), showed improved performance in hockey players, when accurate pre shot visual clues were obtained. The results of several other studies also assert the claim that visual skills training can improve sports performance (KLUKA et al., 1996; WORRELL, 1996). Therefore it should hold true that if a subject’s visual system is at higher level, then the overall performance will be at higher level as well (GRIFFITHS, 2002). Vision and reaction to visual stimuli in sport is therefore important in contributing to performance enhancement and can be seen as a limiting factor in the differentiation between elite and recreational sports participation (BAHILL & LA RITZ, 1984).

In regard to racquet sports where players are exposed to multisensory visual constraints, the participant is required to perform inspite of visual uncertainty thereby tasking his/her ability to predict the event. This prophecy of events can be seen as an interaction between two systems namely, ‘software’ system of acquired skill prediction and ‘hardware’ system of intrinsic visual ability (STARKES & DEAKIN, 1984; ABERNETHY & RUSSELL, 1987; WILLIAMS et al., 1999). Although “hardware” skills are not the appropriate determinants of an athlete’s superior ability (ABERNETHY, 1991; WILLIAMS et al., 1999) yet they can set potential limit to the functioning of software skills (FERREIRA, 2003). The present study therefore trained and measured both hardware and software visual skills specific to the sport.

Table tennis as such is characterized by perceptual uncertainty and time pressure. Being a dynamic sport it involves an incessantly varying visual environment. In order to respond to such a variable stimulus the player requires a superior acquisition of visual information about the impending object. As such the ability to hit the ball requires continuous convergence of eyes, assessing the speed of the ball and predicting its path which moves rapidly in space without any spatial clue. Further when trying to intercept an approaching object, the players have to deal with the time latency essential to alter the motor commands based on sensory visual information. Thus, if the visual system is not receiving
information accurately or quickly enough, performance may suffer. For example, in table tennis serve, ball flight time is approximately 800ms, during which the opponent must select an appropriate trajectory for the racquet based on the information available early in ball flight (RODRIGUES et al., 2002). It is therefore important for visual systems to be functioning at advanced levels because player’s performance can be one of the most rigorous activities for the visual system.

Table tennis has long been practiced to train for visual and coordination activities specific to other sports but the sport itself was ignored for its training specificity; which is a major factor determining sports training. Willmore & Costill (2004) in their Principle of Specificity stated that, “The training program must stress the physiological systems that are critical for optimum performance in the given sport”. The statement indicates that specificity is anything that works a body system in conditions similar to the actual sport. Complying to the same Zupan et al. (2006) stated that training specificity indicates that athletes should train like they compete, meaning a cyclist will compete better in cycling if he/she trains riding the bike as compared to practicing running. Therefore it is essential to determine the skills specific to the sport in order to train them specifically and attain improvement and excellence in performance. Relating to this concept table tennis being a dynamic sport, training of sensory and motor system may influence the expert performance (SEVE et al., 2003).

Although theories state vision as an essential adjunct to motor ability, its training effect on performance enhancement stands debated. Per se the studies contradicting the positive effect of sports vision training (ABERNETHY & WOOD, 1997, 2001; COHN & CHAPLIK, 1991) have been sceptic as are the studies supporting (REVIEN & GABOR, 1981; MC LEOD & HANSEN, 1989; KLUKA et al., 1996) such claims. A reason to this may be that, the studies claiming to prove a positive relationship between visual training and athletic performance are lacking in proper scientific design, as is the case with studies that try to disapprove such a relationship (WOOD & ABERNETHY, 1997). As such to substantiate the claims of sports vision training augmenting sports performance, and its role in specific sport of table tennis the present study was designed.

MATERIAL AND METHODS

Participants

Forty Five university level table tennis players both male and female aged between 18-28 years from District Table Tennis Academy, Amritsar participated in the study. The participants who volunteered for the study completed a screening questionnaire, which consisted of questions regarding visual examination, ocular abnormalities, eye hand dominance, years of playing, level of play and prevalence of injury. The subject with 6/6 vision were selected and those with refractive errors or any musculoskeletal injuries were excluded from the study. After initial screening a written informed consent was obtained from participants. The study was approved by Institutional Medical Ethics Committee of Guru Nanak Dev University, Amritsar.

Study design

The study was experimental with different subject design. The subjects were randomly assigned to three equal groups- experimental (n=15), placebo (n=15), and control (n=15). Placebo group was taken to exclude possible Hawthorne Effect and to ensure that the effects had actually occurred because of training.
Parameters

The present study included visuo-motor parameters that are critical for table tennis play at any level. Pre and post training data from following parameters were collected. Before testing procedure the subjects were acquainted to the apparatus and tests, and underwent one practice session.

Choice Reaction and Movement time: In the present study choice reaction and movement time was measured using Reaction timer (Moyart, Lafayette, U.S.A) for dominant side.

Depth Perception: This visual ability was assessed using Electronic Howard-Doloman Device, (DP-129, Medicaid System, India). In this the subjects were asked to align a central movable rod to two stationary rods from a distance of 4.5m. Alignment of central rod which the participants deemed as correct and number of attempts taken to align it was displayed on LCD panel and impulse counter respectively.

Saccadic eye movement: Ocular motility in the horizontal and vertical planes was measured using two modified Hart charts (ZUPAN et al., 2006).

Accommodation: Accommodation was measured as the number of letters read in one minute from a near and far chart kept at a distance of 0.15 m and 6 m respectively (ZUPAN et al., 2006).

Eye Hand Coordination: Eye hand coordination was tested on Vienna testing system (Schuhfried, Austria) using Double labyrinthine test. Participants in the test controlled an onscreen animated ball from contacting a continuously varying path using two hand held knobs. After the session the results were displayed as number of errors each time the ball touched the boundary.

Sports Specific Performance Assessment: The evaluation of player’s performance pre and post training was done using Alternate Push Test (PURASHWANI, DATTA & PURASHWANI, 2010). For test administration the participants were asked to make number of rallies of alternate counter (one forehand and one backhand) at the left corner of the table with the controller for a period of 30 s after sufficient warming up and practice. Scoring was done as maximum number of returns out of two chances of 30 s each. All assessment sessions were supervised by district level coach (Certified by Table Tennis Federation of India).

Training Protocol

Group-I: Experimental Group

Participants in this group underwent visual and eye hand coordination training for 8weeks, 3 days per week along with regular table tennis practice. Each session lasted for 45minutes. The training protocol involved the following procedures:

1) Eye exercises included swinging ball or marsden ball and swinging ball with pointed finger exercise for eye hand coordination, brock string exercise for training spatial location and marbles in a carton exercise for peripheral awareness (REVIEN & GABOR, 1981).

2) Hart Chart and Near and Far Chart therapy (ZUPAN et al., 2006).

3) Depth perception training: The participants were trained for depth perception on Electronic Howard-Doloman Device, (DP-129, Medicaid System, India). The training procedure involved aligning a central movable along with two stationary rods within an illuminated box using a hand held electronic control. The participants were encouraged to
align the rods with minimum number of attempts and increasing distance from 3, 3.5, 4 and finally 4.5 m as the training progressed.

4) Reaction and movement time training: Reaction and movement time for the players was trained on Reaction timer (Lafayette, Moyart, U.S.A). To train for afore mentioned parameters the participants were instructed to respond to visual stimulus following a ‘cue’. The response by the participant involved pressing the button corresponding to the visual stimulus represented by green light emitting diodes. The initial ‘cue’ delay was set at 1.2 s which was progressively reduced to 0.2 s.

5) Eye hand coordination training: Eye hand coordination training was performed on Vienna Testing System (Schuhfried, Austria). During the training process the participants held two joysticks in either hand and traced a ball displayed on the screen along a path without touching the boundaries in minimum possible time and error.

Group II: Placebo group.

Members of this group were given simple reading material and watched televised table tennis matches for 8 weeks. All participants in this group were given statement about the positive effect of reading and knowledge on sports performance during the study period apart from regular table tennis practice.

Group III: Control group.

The participants in this group undertook only regular table tennis practice.

Data Analysis

The data was obtained from the described tests and was analyzed using the Statistical Package for Social Sciences (SPSS)/17.0 (Copyright © SPSS Inc.). Each of the variables of visual and motor performance were analyzed to determine if there was significant difference between pre to post training values and whether these changes were influenced by the particular training conditions. Statistical tests used to analyze the present study were paired t-test, one-way ANOVA and multiple range Scheffe’s test.

RESULTS

The pre to post training results of paired t-test for reaction time showed a statistically significant improvement in experimental group (t=13.068, p<0.001) as compared to placebo (t=2.049, p>0.05) and control (t=0.014, p>0.05) which presented non-significant variation. Similarly for movement time the experimental group (t=18.767, p<0.001) showed significantly better improvement post training as compared to placebo (t=2.016, p>0.05) and control (t=1.244, p>0.05). One way ANOVA with post hoc (Table 2) also indicated that the experimental group developed faster reaction and movement time as compared to placebo and control group post training.
Table 1 - Descriptive statistics (Mean± Standard Deviation) of all visual skills & eye hand coordination.

<table>
<thead>
<tr>
<th>Measures</th>
<th>Experimental Group Pre-test</th>
<th>Experimental Group Post-test</th>
<th>Placebo Group Pre-test</th>
<th>Placebo Group Post-test</th>
<th>Control Group Pre-test</th>
<th>Control Group Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT (ms)</td>
<td>0.227±0.009</td>
<td>0.239±0.01</td>
<td>0.231±0.012</td>
<td>0.229±0.011</td>
<td>0.230±0.009</td>
<td>0.229±0.008</td>
</tr>
<tr>
<td>MT (ms)</td>
<td>0.187±0.017</td>
<td>0.169±0.017</td>
<td>0.189±0.021</td>
<td>0.187±0.022</td>
<td>0.188±0.018</td>
<td>0.187±0.017</td>
</tr>
<tr>
<td>Depth Perception</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chance</td>
<td>3.0±1.5</td>
<td>2±1.0</td>
<td>3.4±1.2</td>
<td>3.1±1.3</td>
<td>3.2±1.0</td>
<td>3.1±1.0</td>
</tr>
<tr>
<td>Impulse</td>
<td>1.75±0.88</td>
<td>1.31±0.52</td>
<td>1.86±0.52</td>
<td>1.75±0.54</td>
<td>1.85±0.84</td>
<td>1.79±0.63</td>
</tr>
<tr>
<td>Ocular motility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HS</td>
<td>28.5±2.7</td>
<td>34.5±2.7</td>
<td>30.9±2.8</td>
<td>32±2.7</td>
<td>28.4±2.2</td>
<td>30.9±2.6</td>
</tr>
<tr>
<td>VS</td>
<td>27.5±2.2</td>
<td>32±2.1</td>
<td>28.4±2.2</td>
<td>29.1±2.1</td>
<td>28.7±2.1</td>
<td>29.5±2.0</td>
</tr>
<tr>
<td>AC</td>
<td>31.1±1.8</td>
<td>32.9±2.6</td>
<td>29.9±2.6</td>
<td>30.6±2.7</td>
<td>29.6±3.0</td>
<td>30.4±2.3</td>
</tr>
<tr>
<td>Eye Hand Coordination</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DLT</td>
<td>123.8±16.6</td>
<td>108.8±16.8</td>
<td>127.16±3</td>
<td>124.3±16.5</td>
<td>126.1±16.6</td>
<td>123.8±16.0</td>
</tr>
<tr>
<td>Performance Evaluation Score</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PES</td>
<td>33.6±5.4</td>
<td>36.7±4.9</td>
<td>31.3±5.3</td>
<td>31.9±5.4</td>
<td>31.4±4.6</td>
<td>31.9±4.6</td>
</tr>
</tbody>
</table>

Comparison of pre to post test findings for variables determining depth perception predicted statistically significant training variation. Experimental group for both chance (t=2.739, p<0.05) and impulse (t=7.040, p<0.05) showed a significant change in contrast to placebo (t=2.092, p>0.05; t=2.210, p>0.05) and control group (t=0.459, p>0.05; t=0.533, p>0.05) for both chance and impulse respectively. One way ANOVA with post hoc test (Table 2) revealed similar outcome.

Table 2 - Results of One Way ANOVA and Scheffe's Post Hoc Comparison for Visual Variables, Eye Hand Coordination & Performance Evaluation Score.

<table>
<thead>
<tr>
<th>Measure</th>
<th>df_{mean}</th>
<th>df_{exp}</th>
<th>F</th>
<th>p</th>
<th>Scheffe's PostHoc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reaction Time</td>
<td>2</td>
<td>42</td>
<td>4.078</td>
<td>0.2</td>
<td>Exp&gt;Placebo, Control</td>
</tr>
<tr>
<td>Movement Time</td>
<td>2</td>
<td>42</td>
<td>4.728</td>
<td>0.167</td>
<td>Exp&gt;Placebo, Control</td>
</tr>
<tr>
<td>Depth Perception (chance)</td>
<td>2</td>
<td>42</td>
<td>4.791</td>
<td>0.134</td>
<td>Exp&gt;Placebo, Control</td>
</tr>
<tr>
<td>Depth Perception (impulse)</td>
<td>2</td>
<td>42</td>
<td>3.259</td>
<td>0.243</td>
<td>Exp&gt;Placebo, Control</td>
</tr>
<tr>
<td>Horizontal Saccade</td>
<td>2</td>
<td>42</td>
<td>8.027***</td>
<td>0.259</td>
<td>Exp&gt;Placebo, Control</td>
</tr>
<tr>
<td>Vertical Saccade</td>
<td>2</td>
<td>42</td>
<td>7.323</td>
<td>0.293</td>
<td>Exp&gt;Placebo, Control</td>
</tr>
<tr>
<td>Accommodation</td>
<td>2</td>
<td>42</td>
<td>4.989</td>
<td>0.183</td>
<td>Exp&gt;Placebo, Control</td>
</tr>
<tr>
<td>Double labyrinthine test</td>
<td>2</td>
<td>42</td>
<td>4.454</td>
<td>0.175</td>
<td>Exp&gt;Placebo, Control</td>
</tr>
<tr>
<td>Two Hand Co-ordination test</td>
<td>2</td>
<td>42</td>
<td>4.863</td>
<td>0.188</td>
<td>Exp&gt;Placebo, Control</td>
</tr>
<tr>
<td>Performance Evaluation Score</td>
<td>2</td>
<td>42</td>
<td>4.414</td>
<td>0.174</td>
<td>Exp&gt;Placebo, Control</td>
</tr>
</tbody>
</table>

(***) Significant p<0.001; (**) Significant p<0.01; (*) Significant p<0.05; NS- Non Significant.

Ocular motility defined by horizontal saccade, vertical saccade and accommodation in the present study delivered a positive post training response for the experimental group. Experimental group for horizontal saccade showed a statistically significant improvement (t=14.983, p<0.001) as compared to placebo (t=2.674, p<0.05) and control (t=2.514, p<0.05). Similar response was consistent for vertical saccade with experimental group (t=15.6, p<0.001) having a better pre to post training change than placebo (t=2.750, p<0.05) and control (t=2.827, p<0.05). Supporting the changes in other visual variables experimental group’s facility for accommodation post training (t=2.493, p<0.05) also exhibited improvement as opposed to placebo (t=0.849, p>0.05) and control (t=2.103, p>0.05). One way ANOVA with post hoc test showed greater increase in saccadic and accommodative scores for the experimental group (Table 2).

Post training findings for double labyrinthine test featured as the experimental group (t=9.413, p<0.001) showing better statistically significant improvement in relation to placebo (t=2.263, p<0.05) and control (t=2.168, p<0.05). One way ANOVA with post hoc
testing showed statistically significant difference between groups with higher gains in experimental group (Table 2).

Following trail to improvement in visual variables and eye hand coordination, motor performance of the players also showed significant change. Pre to post training data analysis showed statistically significant improvement in performance evaluation scores for experimental (t=6.313, p<0.001) group as compared to placebo (t=2.358, p<0.05) and control (t=2.168, p<0.05).

DISCUSSION

Visual sensory input may account for up to 85-90% of the sensory input of an athlete during an athletic contest (ZUPAN et al., 2006). Being the first step of information processing vision forms an important component of successful sports performance. As such an athlete’s ability to vary his visual determinants and coordinated movement in interceptive task add to his skills. Pertaining to the distinctive role of vision in sports, there has been claims that the use of visual training programs can be productive in player’s performance.

Parallel to these claims the results of the present study indicated a significant improvement in visual variables for the experimental group. These findings are consistent with the literature reviewed by Cohen (1988), which revealed that a constructive visual training program improves the visual skills in athletes.

The improvement in visual abilities is in conjunction to human motor learning behavior, which involve learning of new skills and even refining of existing skills with repetition. Relating to this principle, the continuous repetition of vision exercises and task lead to improvement in visual skill variables.

The visual facility of saccadic motility & accommodation, which plays a significant role during visual challenges in dynamic sport of table tennis showed improvement in the experimental group post training sessions. These improvements can be in relation to the hypothesis that frequent training of the visual system should lead to stronger muscle fibers and more efficient neuronal response (ZUPAN et al., 2006). Also as saccadic eye movements are used for fixation of vision on ball (RIPOLL & LATIRI, 1997), during play the player with superior saccadic latencies can pick up the trajectory of the ball early and more accurately. This advantage was seen in the performance of experimental group.

Adding to the visual ability of saccadic eye movement accommodation also has a role to play. Accommodation is the perceptual interpretation of the information at a subliminal level. This is where the processing is done without conscious processing to develop strategies, react to variation and making good contact between racquet and the ball. Accommodation acts like a reflex, but can also be consciously controlled and trained. Jafarzadehpur and Yarigholi (2004) showed significant differences between facility of accommodation and acuity in champions and normal non players, stating that the development of these two parameters may improve the efficiency of visual system.

In quick interceptive task of table tennis where the ball moves rapidly in space with a flight time of approximately 800 ms and without any spatial clue, an advance reaction and movement time becomes a deciding parameter of performance. In the present study experimental intervention showed productive results for both reaction and movement time. The improvement in both the parameters may be in response to enhanced neural linkage and pathway between sensory perception and motor response. Also vision training can improve accuracy of the motor response by more precise visual location assessment.
These visual location assessment can be in regard to perceptual skills, such as detecting the presence of a ball in briefly presented sport scenes (ALLARD & STARKES, 1980); making efficient search for relevant, informative parts of the opponent’s body and fields (ABERNETHY & RUSSEL, 1987; GOULET et al., 1989; WILLIAMS et al., 1994); or anticipating the ball direction and the opponent’s action from advance information (ABERNETHY, 1990; JONES & MILES, 1978; WILLIAMS & DAVIDS, 1998). As such a player with good sensory visual ability has the luxury of increased time to react to the stimulus before it has occurred thereby reducing the overall reaction and movement time during the game.

In order to hit the ball at right time a player must also gaze the distance of the ball precisely. The three dimensional location of the distance is the property of the visual system for depth perception which again improved with training. Appropriate perception of depth in players is essential for the motor system to position the body before the hit. Further to make the proper hit the sensory visual and motor system must be well coordinated. This is what signifies the eye hand coordination i.e. the ability of the visual system to guide the motor system (TANIGUCHI, 1999). Good eye hand coordination increases the player’s ability to perform complex movement, respond effectively to external stimuli and create fluent movement. In relation to table tennis eye hand coordination helps the player in proper positioning of the racquet as well as control the arm velocity and direction of hit (RODRIGUES et al., 2002). The players in the study showed improvement in accordance to afore mentioned responses for experimental group. This improvement in eye hand coordination apart from modified neural linkages can also be explained on the hypothesis of spatial and temporal coupling of eye and hand as long as the motor reaction relies on visual information (SAILER et al., 1999).

The improvement in various sensory and motor skills post training can be transferable in performance during actual sports. In the present study a significant improvement in performance post training for experimental group was seen. The improvement showed 9% increase in performance evaluation score. According to the fundamental principles of specificity, this improvement can be attributed to visual training as in the present study those visual skills that are critical for table tennis performance were trained. It is important to note that none of the players involved in this study, had any previous experience of specific visual training thus, those software and hardware visual skills would have been improved by constructive visual training program and do not just develop automatically. Thus the findings of the present study is in contrast to Wood and Abernethy (1997), and Abernethy and Wood (2001) who in their study attributed the improvement in performance to acquaintance with the test procedure rather than vision training, however they included a very small sample. Also familiarity with a piece of equipment can only account for improvement during the first few tests/practice cycles. Long-term improvements should be attributed to changes in the body whether mental or physical (RUSSO et al., 2003). It is also note worthy that placebo and control group also showed some improvement in performance, this increment can be attributed to the regular supervised table tennis sessions.

The study therefore concluded a causal relationship between improvement in visual abilities post training and performance of players. There may be several reasons why the visual training program used in this study was effective, though several studies by optometrist showed no such improvements after visual training. One such reason could be that the frequency and duration of training given in previous studies was insufficient for improvement to be observed. Secondly researchers also neglected use of suitable tests to measure the transfer of development to performance in competitive situation.
Though there being contrasting claims about visual adaptations post training, visual abilities remain an inseparable part of an athlete's performance and skill. As such an individual who can process more visual information in a shorter period and make the proper response will have an advantage in competition (ADAM & WILBERG, 1992).

PRACTICAL APPLICATION
Athletes and coaches are in continuous search of newer and better techniques to enhance performance, and vision playing a particular role in athletic ability can form a platform for this search. The results of the present study indicate that the visual skill and eye hand coordination training program improves the basic visual and motor skills of the table tennis players. Also the improved visual skills were transferable into the performance as seen by improved performance evaluation scores for experimental group. As such a specific visual training program targeted to a particular sport can be productive for the performance of an athlete.

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