J. Multidiscip. Res. Healthcare. Vol. 8, No. 2 (2022), pp.49–55

CHITKARA

Journal of Multidisciplinary Research in Healthcare

Journal homepage: https://jmrh.chitkara.edu.in/

Necessity for Sports Vision Training in Institutions of Higher Learning: A Concise Evaluation

Aayushi Gupta[1] and Renu Thakur[2*]

[1,2]*Chitkara School of Health Sciences, Chitkara University, Punjab, India*

[*]renu.thakur@chitkara.edu.in (Corresponding Author)

ARTICLE INFORMATION

Keywords:
Sports Vision, Visual Disorders, Recreation, Sports Program

DOI: 10.15415/jmrh.2022.82006

ABSTRACT

Background: One of the most important senses in the human body is vision, which is used in many daily activities. Sports vision training is a rapidly expanding industry in the field of visual-skill development. Sports vision training had previously only been used on athletes to enhance their visual abilities and athletic performance. Still, given the pandemic's effects and the rise in ocular ailments among college students, there is an urgent need to address their visual issues

Purpose: To explore the need of sport vision training in higher education institutes

Methods: This article examines the value of sports vision training, its necessity, and how it can be incorporated to meet the increased visual needs of college students. 170 articles were identified in this study, of which 38 were included. The search techniques included "Citation Searching" and "Using Keyword." Google Scholar, Semantic Scholar and PubMed were used as the search engines. Both AND and OR were used as Boolean operators

Conclusions: This review also sheds a broad light on the visual problems among university students and why there is a high need to tackle them. This research concluded that to overcome the visual problems among university students, sports vision training should be opted for in higher education institutes.

1. Introduction

One of the essential components of the human body senses is vision (Chiang et al., 2012). Vision is sometimes referred to as the preeminent sense because it controls many jobs and stimuli (Buys & Ferreira, 2008). Vision provides a living being with a great sense of capability and helps them do all their day-to-day activities. The basic components of vision include Visual Acuity (ocular health, Refractive Status, and Normal Eye health), Visual Efficiency Skills (Oculomotor, Accommodative and Binocular Vision skills), and Visual Information Processing (the ability of the eye to process and respond to different stimuli) (Scheiman et al., 1995). In addition to daily tasks, the visual system is also essential for sports performance(Kruger et al., 2009). In light of this, sports vision training has been instigated and can be traced back to the early 19th century (Kidd, 2008). Sports vision entails various visual exercises to help players perform better in particular sports. By considering the prerequisite demands of a particular sport, it enhances the performance of players. Several previous investigations also support this conclusion (Kirschen & Laby, 2011). Sports vision training significantly affects static activities, such as target shooting, and sports that demand dynamic coordination, such as hockey or football, by improving the athletes' peripheral and central visual skills. Visual-perceptual and visual-cognitive skills were improved in experienced athletes, according to research spanning a variety of sports (Ericsson & Williams, 2007). Additionally, studies on professional and college baseball players found that they had greater visual acuity, increased contrast sensitivity, and better visual tracking ability than non-athlete controls (Laby et al., 1996; Uchida et al., 2013; Vickers & Adolphe, 1997). However, several contraindicating pieces of research (Eccles, 2006; Zwierko, 2008) have shown no differences in visual ability between athletes and non-athletes. Though, the theory of improvement should primarily be the one to be supported by most of the studies. Sports vision training treatments have been carried out in a variety of methods. However, the three main scientific presumptions that underpin the programs are as follows: For certain sports, the outlook of vision is essential (a), (b) Through training, these perspectives of visual function may be improved and (c) greater visual skills will result in higher performance. Despite the favorable outcomes of several recent studies on sports vision training, most of the work was done with athletes who already had highly developed visual abilities

©Author(s) 2022. This article is published with open access at https://jmrh.chitkara.edu.in.
ISSN No.: 2393-8536 (Print) ISSN No.: 2393-8544 (Online) Registration No. : CHAENG/2014/57978

and often worked to develop those abilities during their regular training further.

Nonetheless, the number of studies considering how sports vision training affects non-athletes like average university students is limited. Studies have indicated that the rise in technological advancements in the education sector also plays as one of the key factors leading to the problems associated with ocular and physical disorder (Chitkara et al., 2020; Dada & Igbe, 2021). Therefore, the need to investigate the benefits of such training is much more among university students considering the rise of visual skills problems among them. According to three-year longitudinal research conducted in 2000 on university students in Norway, there is a substantial correlation between time spent reading scientific literature and refractive shift toward myopia (p 0.001 and p 0.05, respectively) (Kinge et al., 2000). Similarly, in research conducted in Chennai, India, in 2014, it was observed that computer vision syndrome affects 78.6% of medical students and 81.9% of engineering students due to their constant computer use and hectic schedules (Logaraj et al., 2014). In this review, an attempt has been made to examine the benefits of sports vision training and the need for a sports vision training program for university students.

2. Methodology

The article search was based on two different search techniques: "Citation Searching" and "Using Keywords." Sports vision training, visual skills, visual talents, University students, visual perception, and recreational sports programs were among the terms used. Google Scholar, Semantic Scholar and PubMed were three of the search engines used. Both AND and OR were used as Boolean operators. A total of 170 articles were identified, out of which 38 articles were included in this study as shown in Figure *1*. This study primarily includes original articles and case studies that considered the impact of recreational sports, sports vision training, and the prevalence of visual problems among university students.

2.1. *Visual Impairment in College Students*

In addition to the rise in online learning since COVID, the explosion in technology is also to blame for the younger generation's preference for inside activities over outside ones. According to another claim, the prevalence of myopia has reportedly grown dramatically for the exact cause. The most impacted group is college students or those between the ages of 18 and 25 years (Liu et al., 2021). According to Al Tawil Layan et al., among female undergraduate medical and business students, neck or shoulder discomfort was the most typical complaint brought on by extended computer usage. Out of 713 female undergraduate students, 66.5% reported having a headache, and 51.5% reported having dry eyes in the light, moderate, or severe form. Computer vision syndrome affected 1.5 times as many business students as medical students (odds ratio=1.5; 95% confidence interval: 1.22, 2.24) (Al Tawil et al., 2020). A similar outcome was also reported in the 2020 research by Sancho et al. on 244 Spanish university students, in which they discovered that the prevalence of CVS was 76.6%, with headache and itching being the most common symptoms (Cantó-Sancho et al., 2021).

According to Garcia-Muoz et al., accommodative and binocular dysfunction was also found to be prevalent among 175 university students, with a prevalence of 13.15 percent overall and a prevalence of 45.14% for refractive dysfunction. These findings go beyond computer vision syndrome and myopia.

Additionally, accommodative dysfunctions were discovered in 2.29% of university students, binocular dysfunctions in 8% of them, and accommodative dysfunctions combined in 2.86% of them. Convergence insufficiency, with a prevalence of 3.43%, and convergence excess and accommodation excess, with a frequency of 2.29%, were the most common dysfunctions among the accommodative and binocular disorders (García-Muñoz et al., 2016). Even more recently, research on 156 Portuguese adults aged 18 to 35 found that 32% of them had binocular vision and accommodative abnormalities, either alone or in combination with refractive problems. Additionally, 10.9% had binocular vision abnormalities, and 21.1% had accommodative problems. Additionally, following convergence insufficiency (7.1%) and accommodative infacility (5.8%), accommodative insufficiency (11.5%) was the most common disease (Franco et al., 2022).

2.2. Recreation and Sports Programs Impact on University Students

Numerous studies have reported a positive impact of recreational sports programs on university students. A study conducted by 42'Osipov et al. supported the same, which analyzed students in higher institutes based on their participation in physical activities and university sports programs. They found that introducing sports activities into university programs can help improve the students' muscle power and overall endurance (Osipov et al., n.d.). On a similar ground but with a different variable was a study performed by Danbert et al. in which they observed the impact of sports and recreational programs on the academic performance of university students. For this study, they considered a total of 4,483 students, out of

which 1,183 were members of recreational sports programs. At the end of the study, they found an increase in the academic performance of the students who were members of the program, unlike those who were not (Danbert et al., 2014). Not only did the academic performance improve through the recreational sports program, but Michael A. Kanters also noted an affirmative response in reducing stress among university students (Kanters, 2000). Elkins et al. also reported a positive impact of recreational training programs on the sense of community among university students by providing 125 university students with an online survey. Not only they found a positive effect on the sense of community among the students who participated in recreational sports programs, but they also observed a high acceptance factor among students for diversity (Elkins et al., 2011). Likewise, Miller et al. also determined that students who partake in sports and recreational training have a better understanding of social belonging and were also excelling more academically than those not enrolled in the recreational sports programs (Miller, 2011). Furthermore, Irhin et al. observed that recreational sports programs can also help improve physical health. In their study, they considered a total of 495 university students, studied their health status before and after their enrollment in the recreational sports program and concluded that recreational sports programs could lead to a tremendous improvement in students' physical health (Irhin et al., 2013).

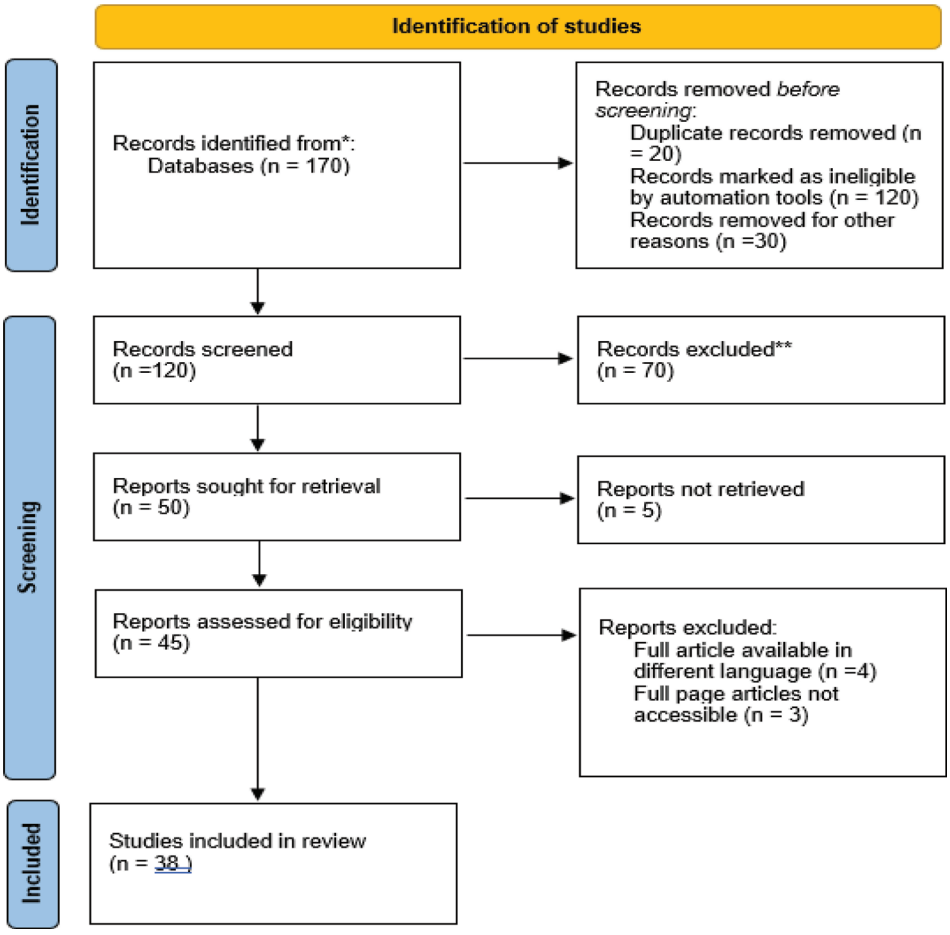

Figure 1: *Google Scholar, Semantic Scholar and PubMed .Article Extraction according to the norms of PRISMA (primarily focuses on the reporting of reviews evaluating the effects of interventions).

2.3. Athletes Responses to Sports Vision Training

Sports vision has a significant influence not just on athletes' visual ability but also on their performance, according to the majority of studies done too far. To support the same Marwa Ahmed Fad et al. examined the impact of visual training on volleyball players. Their findings revealed that the sports vision exercises improved their serve performance and decreased their reaction times (Marwa & Shalaby, 2019). In the same vein, research by Kumar et al. Daniel on the impact

of visual skills and performance of hockey players and youth hockey players, respectively, revealed that sports vision training significantly affects the speed of recognition & visual search, eye-hand speed, and eye-foot speed, as well as speed dribbling & shooting accuracy choice reaction time task at the D2 board and the functional field of view task (Schwab & Memmert, 2012; Kumar et al., 2011). Additionally, comparative research on ice hockey players by Jenerou and Alison suggested that base out vergence ranges, binocular accommodating facility, and Wayne Saccadic Fixator (WSF) scores had improved significantly. Goals, shots on goal, and shooting % during sports vision training both before and after (Jenerou & College, 2015). Likewise, Zwierko Teresa et al. examined that an eight-week eye training program may enhance 3 of the 6 oculomotor variables in the study on the effect of sports vision training on the binocular visual function of university female athletes. The near-dissociated phoria (2=14.56, p=0.001 for the right eye; 2=14.757, p=0.001 for the left eye) and fusional convergence (2=8.522, p=0.014) will also be positively impacted (Zwierko et al., 2015). Sports vision training proved beneficial for both male and female rugby players when provided with 15-30 minutes of sports vision training and 10 minutes of sports vision training, respectively (Du Toit et al., 2008, 2010). Sports vision training also turned out to be beneficial in the Referee's mindfulness and decision-making process, as suggested by Babaei & Badami in their study of eight weeks. Three sessions per week of sports vision training were provided to the Referees, and the findings showed that the visual perception and decision-making accuracy in sports vision training, mindfulness training, and combined groups were significantly improved (Babaei & Badami, 2020).

2.4. Effect of Sports Vision Training on Dyslexia and Low Vision Patients

Not only athletes but sports vision training is found to be effective on dyslexic children also. The same was sustained by Badami et al. Their study provided 12 weeks of sports vision training to 7-10 years old dyslexic children while following the experimental approach. After the 12 weeks of training, the evaluation was based on pre- and post-differences in motor skills, visual perceptual, and reading skills. Eventually, after 12 weeks of sports vision training, a significant increase in phonological scores, a decrease in common errors, and an increase in comprehension scores was noted, which led to the conclusion that sports vision training can help in the improvement of visual perceptual skills of 7-10 years old dyslexic children (Badami et al., 2016). Similarly, sports vision training was also found to be effective on low vision patient, which is suggested by a case report conducted by Laby and published in 2018. In this case, the author provided sports vision training to 37 years old women suffering from usher syndrome. The patient in consideration was asked to undergo a weekly sports vision training program using Dynavison (D2) system and Neurotracker for 12 sessions. A significant improvement in the patient was noted in her average Dyanvision proactive score, which began with thirty-five buttons and ended with forty-six buttons which was viewed as a considerable increase. Also, her responsive ability recuperated to twenty-eight percent. An interesting finding was her general development in optical performance regarding both "quickness" of viewing things and a recuperated capability to evade barriers (Laby, 2018).

Using Sports Vision Training with College Students

Now that it is obvious how helpful sports vision training has been for athletes and why it must be implemented in colleges, it is critical to comprehend the strategies that may be employed to achieve the same results. As far as we know, only two studies have been conducted to date examining the effects of sports vision training on college students. The first study was carried out in 2011 by Mahomed et al. in which they considered 169 undergraduate physiology students; after the experimental approach, the control group was given a 15-minute sports vision training while the experimental group was given a 15-minute rest, after which all the pretests and post-tests were done. The results showed a noticeable improvement in the experimental group's sequencing and eye-hand coordination tests. The experimental group showed more significant gains than the control group, except concentrating (Mahomed et al., 2013). In the second trial, which Du. Toit et al. carried out in 2016 that they improved the approach by including an additional group and a new sports vision training program called Eyedrills. In this research, the training program's length was also extended to 8 weeks. Concerning the earlier research, this one also used physiology students, although it used a sample size of 406 instead. After the students had their 8 weeks of instruction, the findings indicated that the lab-based training program was found to be more successful in enhancing the participants' visual abilities than the Eyedrills group. Additionally, the lab-based group in this trial fared better in focus, vergence, and visualization than the prior one (Du Toit et al., 2015).

3. Conclusion

Numerous data are presented in this study that highlights the significance of sports vision training and how it has been a precursor for improving not only athletes but also dyslexic and low-vision patients. This review also sheds a broad light

on the visual problems among university students and why there is a high need to tackle them. This research concluded that to overcome the visual problems among university students, sports vision training should be opted for in higher education institutes

4. Competing Interests

The authors declare that no competing interests exist

5. References

Al Tawil, L., Aldokhayel, S., Zeitouni, L., Qadoumi, T., Hussein, S., & Ahamed, S. S. (2020). Prevalence of self-reported computer vision syndrome symptoms and its associated factors among university students. *European Journal of Ophthalmology*, *30*(1), 189–195. https://doi.org/10.1177/1120672118815110

Babaei, M., & Badami, R. (2020). Effect of Sport-Vision Training and Mindfulness on Vision Perception and Decision-Making Accuracy of Basketball's Referees. *Positive Psychology Research*, *5*(3).

Badami, R., Mahmoudi, S., & Baluch, B. (2016). Effect of sports vision exercise on visual perception and reading performance in 7- to 10-year-old developmental dyslexic children. *Journal of Exercise Rehabilitation*, *12*(6), 604–609. https://doi.org/10.12965/jer.1632728.364

Buys, J., & Ferreira, J. T. (2008). The South African Optometrist The development of protocols and norms for sports vision evaluations. In *S Afr Optom* (Vol. 67, Issue 3).

Cantó-Sancho, N., Sánchez-Brau, M., Ivorra-Soler, B., & Seguí-Crespo, M. (2021). Computer vision syndrome prevalence according to individual and video display terminal exposure characteristics in Spanish university students. *International Journal of Clinical Practice*, *75*(3). https://doi.org/10.1111/IJCP.13681

Chiang, H. K., Su, T. Y., Chang, S. W., Chang, J., & Chang, D. O. (2012). Tear film thermal image characteristics analysis in temporal and spatial aspects. In *Human Eye Imaging and Modeling*. https://doi.org/10.1201/b12081

Chitkara, M., VS, K., & Dutta, H. (2020). *Redefining Indian Universities: An Insight of Education Sector towards Evolution of Industry 4.0 and 5.0. University News*.

Dada, I. O., & Igbe, I. A. (2021). Feeding habits, Overweight, Obesity and Hypertension and Associated Factors among Polytechnic Students in Ekiti State, Southwest Nigeria. *Journal of Multidisciplinary Research in Healthcare*, *7*(1), 33–48. https://doi.org/10.15415/jmrh.2020.71003

Danbert, S. J., Pivarnik, J. M., McNeil, R. N., & Washington, I. J. (2014). Academic Success and Retention: The Role of Recreational Sports Fitness Facilities. *Recreational Sports Journal*, *38*(1). https://doi.org/10.1123/rsj.2013-0010

Du Toit, P. J., Krüger, P. E., Fowler, K. F., Govender, C., & Clark, J. (2010). Influence of sports vision techniques on adult male rugby players. *African Journal for Physical, Health Education, Recreation and Dance*, *16*(3). https://doi.org/10.4314/ajpherd.v16i3.60931

Du Toit, P. J., Kruger, P. E., Joubert, A., & Lunsky, J. (2008). Effects of exercise on visual performance of female rugby players. *African Journal for Physical, Health Education, Recreation and Dance*, *13*(3). https://doi.org/10.4314/ajpherd.v13i3.24770

Du Toit, P. J., van Rensburg, D. C. J., van Rensburg, A. J., & Grant, C. C. (2015). Influence Of Two Visual Skills Training Techniques On Performance Of University Students. *Medicine & Science in Sports & Exercise*, *47*(5S), 661. https://doi.org/10.1249/01.mss.0000478520.46240.bc

Eccles, D. W. (2006). Thinking outside of the box: The role of environmental adaptation in the acquisition of skilled and expert performance. *Journal of Sports Sciences*, *24*(10), 1103–1114. https://doi.org/10.1080/02640410500432854

Elkins, D. J., Forrester, S. A., & Noël-Elkins, A. V. (2011). The Contribution of Campus Recreational Sports Participation to Perceived Sense of Campus Community. In *Recreational Sports Journal* (Vol. 35).

Ericsson, K. A., & Williams, A. M. (2007). Capturing Naturally Occurring Superior Performance in the Laboratory: Translational Research on Expert Performance. *Journal of Experimental Psychology: Applied*, *13*(3), 115–123. https://doi.org/10.1037/1076-898X.13.3.115

Franco, S., Moreira, A., Fernandes, A., & Baptista, A. (2022). Accommodative and binocular vision dysfunctions in a Portuguese clinical population. *Journal of Optometry*, *15*(4), 271–277. https://doi.org/10.1016/J.OPTOM.2021.10.002

García-Muñoz, Á., Carbonell-Bonete, S., Cantó-Cerdán, M., & Cacho-Martínez, P. (2016). Accommodative and binocular dysfunctions: prevalence in a randomised sample of university students. *Clinical and Experimental Optometry*, *99*(4), 313–321. https://doi.org/10.1111/cxo.12376

Irhin, V. N., Irhina, I. V., & Nikulin, I. N. (2013). University sports and recreation activities system as a factor of ensuring the students health. *World Journal of Medical Sciences*, *9*(3), 162–166. https://doi.org/10.5829/idosi.wjms.2013.9.3.1131

Jenerou, A., & College, M. (2015). A Vision Training Program's Impact on Ice Hockey Performance. *Optometry & Visual Performance*, *3*(2), 139–148.

Kanters, M. A. (2000). Recreational Sport Participation as a Moderator of College Stress. *Recreational Sports Journal*, *24*(2). https://doi.org/10.1123/nirsa.24.2.10

Kidd, B. (2008). A new social movement: Sport for development and peace. In *Sport in Society* (Vol. 11, Issue 4). https://doi.org/10.1080/17430430802019268

Kinge, B., Midelfart, A., Jacobsen, G., & Rystad, J. (2000). The influence of near-work on development of myopia among university students. A three-year longitudinal study among engineering students in Norway. *Acta Ophthalmol. Scand*, *78*, 26–29.

Kirschen, D. G., & Laby, D. L. (2011). The role of sports vision in eye care today. *Eye and Contact Lens*, *37*(3), 127–130. https://doi.org/10.1097/ICL.0b013e3182126a08

Kruger, P., Campher, J., & Smit, C. (2009). The role of visual skills and its impact on skill performance of cricket players. *African Journal for Physical, Health Education, Recreation and Dance*, *15*(4), 605–623. https://doi.org/10.4314/ajpherd.v15i4.49548

Laby, D. M. (2018). Case Report: Use of Sports and Performance Vision Training to Benefit a Low Vision Patient's Function. *Optometry and Vision Science*, *95*(9), 898–901. https://doi.org/10.1097/OPX.0000000000001231

Laby, D. M., Rosenbaum, A. L., Kirschen, D. G., Davidson, J. L., Rosenbaum, L. J., Strasser, C., & Mellman, M. F. (1996). The visual function of professional baseball players. *American Journal of Ophthalmology*, *122*(4), 476–485. https://doi.org/10.1016/S0002-9394(14)72106-3

Liu, J., Chen, Q., & Dang, J. (2021). Examining risk factors related to digital learning and social isolation: Youth visual acuity in COVID-19 pandemic. *Journal of Global Health*, *11*, 1–8. https://doi.org/10.7189/jogh.11.05020

Logaraj, M., Madhupriya, V., & Hegde, S. (2014). Computer vision syndrome and associated factors among medical and engineering students in Chennai. *Annals of Medical and Health Sciences Research*, *4*(2), 179. https://doi.org/10.4103/2141-9248.129028

Mahomed, A. F., Kleynhans, M., Govender, C., & Du Toit, P. J. (2013). The effect of sports vision exercises on the visual skills of university students. *Suid-Afrikaanse Tydskrif Vir Natuurwetenskap En Tegnologie*, *32*(1). https://doi.org/10.4102/satnt.v32i1.842

Marwa Ahmed Fadl, M. N. S., & Nader Shalaby, M. (2019). Effects of Visual Exercises on Improving the Serve Performance Level for Junior Volleyball Female Players. *International Journal of Psychosocial Rehabilitation*, *23*(6), 821–840. https://doi.org/10.37200/IJPR/V23I6/PR190850

Miller, J. J. (2011). Impact of a University Recreation Center on Social Belonging and Student Retention. In *Recreational Sports Journal* (Vol. 35).

Osipov, A., Kudryavtsev, M., Fedorova, P., Serzhanova, Z., Panov, E., Zakharova, L., Savchuk, A., Yanova, M., Zhavner, T., & Klimuk, Y. (n.d.). *Components of positive impact of exposure on university physical culture and sports on students' physical activity*.

Scheiman, M. M., Rouse, M. W., & Leslie, S. (1995). Optometric Management of Learning-Related Vision Problems. *Clinical and Experimental Optometry*, *78*(3). https://doi.org/10.1111/j.1444-0938.1995.tb00802.x

Schwab, S., & Memmert, D. (2012). The impact of a sports vision training program in youth field hockey players. *Journal of Sports Science and Medicine*, *11*(4), 624–631.

Suresh Kumar, M., Kumar, M. S., & Suresh Kumar, M. (2011). Impact of Sport Vision Training for Enhancing Selected Visual Skills and Performance Factors of Novice Hockey Players. *Indian Journal of Movement Education and Exercises Sciences (IJMEES)*, *I*(1).

Uchida, Y., Kudoh, D., Higuchi, T., Honda, M., & Kanosue, A. K. (2013). Dynamic visual acuity in baseball players is due to superior tracking abilities. *Medicine and Science in Sports and Exercise*, *45*(2), 319–325. https://doi.org/10.1249/MSS.0b013e31826fec97

Vickers, J. N., & Adolphe, R. M. (1997). *Gaze behaviour during a ball tracking and aiming skill Quiet eye and Sports Performance View project Quiet Eye Research View project*.

Zwierko, T. (2008). Differences in Peripheral Perception between Athletes and Nonathletes. *Journal of Human Kinetics*, *19*, 53–62. https://doi.org/10.2478/v10078-008-0004-z

Zwierko, T., Puchalska-Niedbał, L., Krzepota, J., Markiewicz, M., Woźniak, J., & Lubiński, W. (2015). The effects of sports vision training on binocular vision function in Female University Athletes. *Journal of Human Kinetics*, *49*(1), 287–296. https://doi.org/10.1515/hukin-2015-0131

Journal of Multidisciplinary Research in Healthcare

Chitkara University, Saraswati Kendra, SCO 160-161, Sector 9-C, Chandigarh, 160009, India

Volume 8, Issue 2 **April 2022** **ISSN 2393-8536**

Copyright: [© 2022 Aayushi Gupta and Renu Thakur] This is an Open Access article published in Journal of Multidisciplinary Research in Healthcare (J. Multidiscip. Res. Healthcare) by Chitkara University Publications. It is published with a Creative Commons Attribution- CC-BY 4.0 International License. This license permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.