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FITLIGHT TECHNOLOGY IN FOOTBALL: OPTIMIZING PERIPHERAL AWARENESS AND REFLEX TRAINING

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ABSTRACT

Background :

The role of FITLIGHT technology in enhancing peripheral vision and reaction ability has garnered considerable research interest. While the FITLIGHT instrument primarily improves these skills, researchers also investigate its potential applications in rehabilitation programs.

Aim of the study:

The primary aim of this study is to evaluate the impact of FITLIGHT® technology on enhancing peripheral vision and reaction capabilities among football players.

Method:

The search process obtained 85 records. Figure 1 presents the number of articles found in the electronic database and a flow chart of the literature search, including all the steps performed; only full texts were found in80 studies, among them 79 are in the English language; among them, 56 studies are conducted on the humans, and in the 56 studies 29 studies are held on the age group of between 19-44 years old adults and (1) preprints; and(2) Medline two exclusion criteria, Upon further inspection of the full text of the eligible articles and their respective bibliographical references, a total of 29 fulfilled all of the criteria, were included in the current systematic review.

Findings:

According to the information found in the reviews, it appears that most of the research has received positive feedback from this fitlight tool. While comparative studies, clinical and experimental studies have been more focused on evaluating this device in reaction time, agility, coordination, and rehabilitation only.

Conclusion:

The review emphasized the FITLIGHT instrument, which primarily enhances peripheral vision, reaction ability, balance, agility, and coordination. A total of 11 studies were analysed. This review discusses the strengths and limitations of the existing literature and provides recommendations for further research, specifically clarifying how FITLIGHT contributes to improving peripheral vision and exploring the relationship between peripheral vision and reaction ability.

Keywords: Peripheral, Vision, FITLIGHT, Reaction ability

Introduction:

FITLIGHT® is an advanced speed and cognitive training system designed to transform training, exercise, and performance assessment. This innovative system is highly effective for tactical performance, sports, and healthcare. It enhances users' reaction and response times, strengthens the connection between mind and body, and offers a range of benefits. Throughout training sessions, various performance metrics are recorded, allowing data to be stored for further analysis or used for immediate feedback. The system's lights provide experts, trainers, and coaches with detailed insights to identify areas for improvement.(1)

Football is a dynamic, fast-paced, and physically demanding 90-minute game that requires continuous movement, adaptability to unpredictable conditions, and responsiveness to evolving game situations. Originating in Britain in the 19th century, it remains one of the most popular sports worldwide. A football match consists of two teams, each with 11 players, competing on a 105x68 meter field, aiming to maneuver the ball into the opponent's goal without using their hands, except for the goalkeeper. Modern football has evolved significantly in terms of speed, skills, performance, and training. Players now incorporate the 18-yard box into their playing zone. If we analyze the space distribution, the goalkeeper occupies approximately 10 yards on three sides for hand use, leaving around 215 meters for the remaining 20 players. On average, a player takes about 23 to 24 seconds to cover this area.

Given the continuous pressure, and the need to track the ball, teammates, and opponents, football demands both mental and physical resilience, quick decision-making, and rapid reaction abilities.

Since 2014, Indian football has experienced significant growth following the establishment of the Indian Super League (ISL). The league has played a crucial role in elevating professional football in India, narrowing the gap with European football. The presence of high-profile international players and coaches has enhanced India's footballing reputation on the global stage. Additionally, the introduction of world-class technology, skilled coaching, and expert mentorship has contributed to the overall development of Indian footballers. Observations from ISL matches indicate remarkable improvements in players' speed, physical abilities, and strength, driven by advanced training methods, proper nutrition, and a competitive environment. The fast-paced nature of ISL matches, combined with tactical gameplay and refined skills, has reduced performance

gaps among players while enhancing their physical endurance, mental sharpness, quick decision-making, and reaction speed.

Vision is one of the five senses that the body relies on to perceive its surroundings. It is classified into two types: central and peripheral. Central vision is processed at the center of the eye and plays a crucial role in detecting fine details of objects directly in front of the body.

Peripheral vision allows individuals to detect stationary and moving objects without shifting their heads or eyes. It enables the perception of objects, surroundings, and details on the left and right sides of the visual field, beyond central vision. This capability is facilitated by the peripheral retina, a part of the retina located at the back of the eye, which converts light into nerve impulses for visual processing. The peripheral retina contains two types of photoreceptor cells: rods and cones. Cones are responsible for colour vision, while rods enable vision in low-light conditions. The rod-dominant peripheral retina enhances scotopic (low-light) vision and supports strong spatial summation, allowing for improved visibility in dim environments.**(2)**

It can recognize the broad dendritic branches of the peripheral ganglion cell by "scene gist recognition," which is perception without awareness. When it comes to postural stability, movement, and locomotion, this function is more important than central vision. **(3)**

Peripheral vision comes in three varieties: **near-peripheral vision**, which is between 18 and 30 degrees of the visual field; **mid-peripheral vision**, which is between 30 and 60 degrees of the visual field; and **far-peripheral vision,** which is between 60 and 110 degrees of the visual field**. (4)**

Since vision is crucial for sports performance, as demonstrated by several studies, visual education needs to be a major component of players' workout regimens. Compared to those who are not athletes, football players have been shown to have superior peripheral vision, depth perception, and visual tracking of moving objects.

(5)

Apart from physical strength and skill peripheral vision and reaction ability play an important role in developing the quality of a player, Players can quickly scan their surroundings, observe the changing movements of opponents and fellow players, enables players to observe off-the-ball actions, and assess situational awareness, while quick reaction ability helps them to react in-game. Together, these features enhance a player's ability to perform under pressure, influencing decision-making, passing, defensive stance, and overall gameplay.

Reaction ability, the ability to react, or visual reaction, is an autonomic reflex movement of the body without additional thought generated by visual stimuli. Abernethy was 1st evaluated by a visual training program in sports training. It has been observed that reaction time (RT) plays an important role in many fields, such as academics, sports, and daily life tasks. **(Teofilo et al., 2022)** There are two types of reactions: simple reaction time (SRT) and complex reaction time (CRT). SRT is the gap between the presence of a stimulus and the response given. At the same time, CRT is the recognition and selection of different stimuli, such as recognizing and responding to various stimuli in the game.

Aim of this Study:

- The primary aim of this study is to evaluate the impact of FITLIGHT® technology on enhancing peripheral vision and reaction capabilities among football players.

Objectives of The Study:

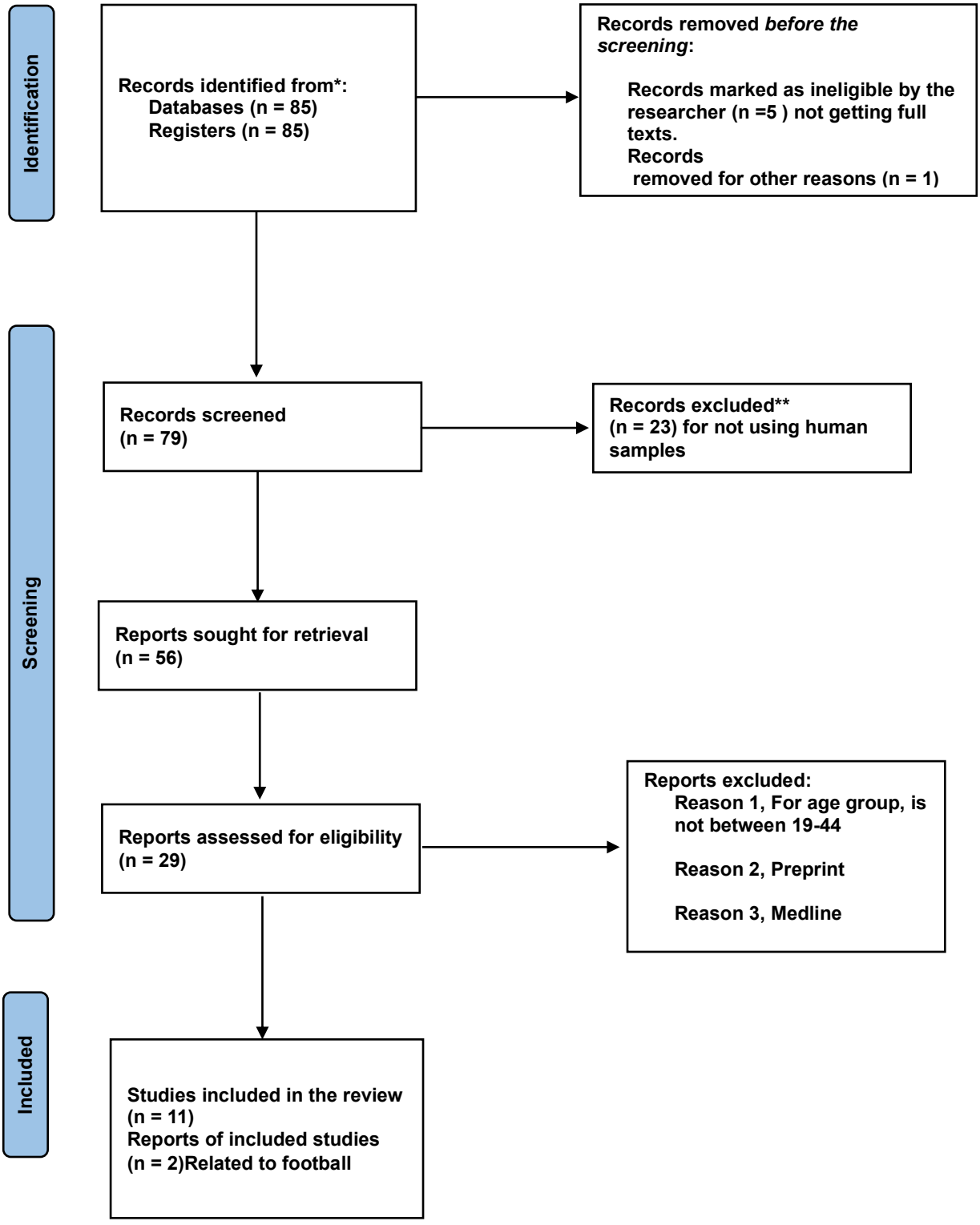
- Asses to understand the experiments with FITLIGHT® technology and its impact on training and match performance.
- To compare the performance metrics of players who undergo FITLIGHT® training against those who use traditional training methods.

Method :

SEARCH STRATEGY :

This systematic review was conducted according to the Preferred Reporting Items for Systematic Reviews. The University of Burdwan grants permission to search for relevant content related to the Peripheral Vision and Reaction Ability Among ISL and State-Level Players with the help of the FITLIGHT system (FITLIGHT Sports Corp., Canada). The strategy uses only one electronic database, PubMed/NCBI (National Center for Biotechnology Information, US National Library of Medicine). The following descriptors were used in the database: ((("("peripheral"[All Fields] OR "peripherally"[All Fields] OR "peripherals"[All Fields] OR "periphereal"[All Fields] OR "peripheric"[All Fields] OR "peripherically"[All Fields]) AND ("vision s"[All Fields] OR "vision, ocular"[MeSH Terms] OR ("vision"[All Fields] AND "ocular"[All Fields]) OR "ocular vision"[All Fields] OR "vision"[All Fields] OR "visions"[All Fields] OR "visioning"[All Fields]) AND (("reaction"[All Fields] OR "reaction s"[All Fields] OR "reactions"[All Fields]) AND ("aptitude"[MeSH Terms] OR "aptitude"[All Fields] OR "abilities"[All Fields] OR "ability"[All Fields]))) OR "fitlight"[All Fields]) AND ((excludepreprints[Filter] OR medline[Filter]) AND (fft[Filter]) AND (humans[Filter]) AND (english[Filter]) AND (adult[Filter])). Dedicated computer software is open-source reference management software for organizing, collecting, citing, and sharing research sources, "**Zotero**", improving Grammar and spelling checking "**Grammarly, Inc**".

Identification Of Studies Via Databases



(Plate 1. Flow chart according to the PRISMA guideline 2020)

SELECTION CRITERIA :

- **INCLUSION CRITERIA:**

We opted to include papers if they fulfilled all of the following criteria: (1) original article; (2) abstract available for screening; (3) Full text; (4) published in the English language;(5) Humans.

- **EXCLUSION CRITERIA:**

Exclusion criteria included: (1) samples presenting an age between 19 and 44 years of adults; (2) exclude preprints; (3) exclude Medline.

Data Extraction:

Two reviewers, **R. Rajak**, performed data extraction independently using a standardized extraction form. Any discrepancies that arose during the extraction process were resolved through discussion and consensus with A. Mishra, Professor at UCTC college. The following information was carefully extracted from each included study:

Study Characteristics: Authors, publication year, country, study design

Participant Characteristics: Age, sex, and Games.

Intervention Details: Type, frequency, and intensity of exercise.

Outcome Measures: Peripheral Vision.

Key Findings: Main results related to the impact of FITLIGHT on peripheral vision and reaction ability...

Search Result :

The search process obtained 85 records. Figure 1 presents the number of articles found in the electronic database and a flow chart of the literature search, including all the steps performed; only full texts were found in 80 studies, among them 79 are in the English language; among them, 56 studies are conducted on the humans, and in the 56 studies 29 studies are held on the age group of between 19-44 years old adults and (1) preprints; and (2) Medline two exclusion criteria, Upon further inspection of the full text of the eligible articles and their respective bibliographical references, a total of 29 fulfilled all of the criteria, were included in the current systematic review.

author & year	title	study design	sample size	measuring tool	statistics used	conclusion
Jo (6),	Bringing context to balance: development of a reactive balance test within the injury prevention and return to sport domain	clinical study	NA	Y Balance Test KitTM is in combination with the Fitlight training system.		This clinical study described the reactive balance test (RBT)and visuomotor test (VMT) as a functional assessment designed to evaluate an athlete's ability to maintain balance, visual response, and decision-making in a changing environment.

(5)	The Effects of a Visual Stimuli Training Program on Reaction Time, Cognitive Function, and Fitness in Young Soccer Players	Comparative study	42 = 38	The FITLIGHT Trainer (FITLIGHT Sports Corp., Aurora, ON, Canada) was used to measure the RT.	Paired *t*-test, Wilcoxon Ranks test, Whitney test, independent *t*-test, ANCOVA, Pearson and Spearman correlation, linear and multiple regression	The results of the present study indicate that better development of attention and concentration (cognitive function) and physical fitness could improve RT, leading to an improvement in athletic performance, especially during the developmental ages.
(7)	The Effect of Using Reactive Agility Exercises with the FITLIGHT Training System on the Speed of Visual Reaction Time and Dribbling Skill of Basketball Players	PRE-TEST POST-TEST	10	FITLIGHT training system,	A t-test analysis	\ FITLIGHT's reactive agility exercises positively enhance visual reaction time and dribbling skills.

(8)	Optimizing Reaction Time in Relation to Manual and Foot Laterality in Children Using the Fitlight Technological Systems	comparative analysis	231	Fitlight system	t-test	Fitlight technology is useful in improving reaction time, relation with the manual and foot level of manifestation.
(9)	The Impact of Implementing an Exergame Program on the Level of Reaction Time Optimization in Handball, Volleyball, and Basketball Players	This cross-sectional study	360	Fitlight technology	t-test & ANOVA	The study's results confirmed that the implemented exergame program that uses Fitlight technology significantly impacted motor, recognition, and cognitive reaction.

(4)	The Impact of Peripheral Vision on Manual Reaction Time Using Fitlight Technology for Handball, Basketball and Volleyball Players	A comparative analysis	412	Fitlight Technology Used in the Testing Process	ANOVA	According to our results, female samples achieved greater progress in reaction time than male groups for all four tests of the present study.
(10)	Acute Effects of Fitlight Training on Cognitive-Motor Processes in Young Basketball Players	Experimental	58 = 49	The FITLIGHT training system	Two-way repeated measures ANOVA	The Fitlight system increased perceived effort without reducing enjoyment, suggesting that it could enhance cognitive effort without decreasing motivation.
(11)	The effect of small-sided games using the FIT LIGHT training system on some harmonic abilities and some basic skills of basketball players	PRE-TEST POST-TEST	24	FITLIGHT training system,	A t-test analysis	Small-sided games using FITLIGHT played an active and significant role in improving the basketball players' harmonic abilities and basic skills.

(12)	Effects of Fitlight Training on cognitive-motor Performance in élite Judo Athletes	A longitudinal study	27	FITLIGHT training system	RM-ANOVA	CMT with Fitlight™ could be considered an additional support to coaches during the training period.
(13)	Study on the Impact of Implementing an Exercise Program Using Fitlight Technology for the Development of Upper Limb Coordinative Abilities in Basketball Players	Experimental	70=67	THE FIIT LIGHT training system	The Independent t-test	These findings suggest that junior training programs should incorporate modern technologies like FITLIGHT to enhance coordination and reaction skills.
(14)	American Football Headgear Impairs Visuomotor Drill Performance in Division I NCAA Football Athletes	Experimental	16	A FITLIGHT timing system	Repeated-measures ANOVA & Post hoc test	The research shows that using AF headgear, such as facemasks and visors, negatively impacts visuomotor performance.

Findings & Discussion

1. **Rehabilitation with FITIGHT**

The first study with the help of the fitlight technology in the Rehabilitation procedure where The test was done with the help of the Y Balance Test KitTM in combination with the Fitlight-training system and a video camera, where 36visual stimuli of the VMT occurred in a predetermined but randomized sequence, the Y-balance test (YBT) and visuomotor task (VMT) were tested.

Cognitive and Motor Assessments :

Most of the studies are based on measuring and enhancing the cognitive functions and the motor functions of the players with the help of this device, where most of the studies get significant results in every field of team sports.

Peripheral vision and FITLIGHT :

According to the reviews, the fitlight instrument significantly enhances and assesses peripheral vision.

Visuomotor Drills for Coaches:

Through the reviews I found that implementing innovative methods with FITLIGHT can transform coaching strategies and lead to continuous improvement tailored to individual player needs.

Conclusion:

The present study aimed to conduct a comprehensive analysis of the FITLIGHT instrument, which primarily enhances peripheral vision, response time, balance, agility, and coordination. A total of eleven studies were reviewed. This article examines the strengths and limitations of the existing literature, offers recommendations for further research, and includes references that clarify how FITLIGHT improves peripheral vision and its relationship with response time.

Conflict of Interest: NIL

Funding Agencies: NIL

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