3.0 REVIEW OF SCIENTFIC LITERATURE

The aim of this chapter is to review existing evidence based scientific literature, physical fitness components of football players, in relation with yogic practices and understand the status of research problem methodologically and hypothetically. To justify the research topic, identifying key points in current knowledge need to be understand. For this purpose, information has primarily been gathered from various research publications on journals abstracts, and thesis bibliographies, and conference proceedings. The review is being organized as follows.

A. Physical Fitness components B. Soccer Skills.

Physical Fitness components comprises of two parameters. They are:

I. Health Related physical fitness components are those factors that are related to how well the systems of our body work. This is again divided in to 5 factors.

Body Composition: The relative percentage of body fat compared to lean body mass (muscle, bone, water, etc. in the body).

Flexibility: The range of movement possible at various joints.

Muscular strength: The amount of force that can be produced by a single contraction of a muscle.

Muscular endurance: The ability of a muscle group to continue muscle movement over a length of time.

Cardiovascular Fitness: The ability of the circulatory system (heart and blood vessels) to supply oxygen to working muscles during exercise.

II. Skill related physical fitness components are the features of fitness which gives the structure for successful sport or active participation. This is divided in to 6 factors.

Speed: The ability to move quickly from one point to another in a straight line

Agility: The ability of the body to change direction quickly

Balance: The ability to maintain an upright posture while still or moving

Coordination: Integration with hand and/or foot movements with the input of the senses.

Reaction Time: Amount of time it takes to get moving.

Power: The ability to do strength work at an explosive pace.

In this study, only health related physical fitness components were included and assessed.

The soccer skills for this study were taken from Bobby Charlton soccer skill test.

Bobby Charlton is renowned personality in the field of football from UK. They are:

Dribbling

Lofted pass

Shooting

Short pass

Juggling

3.1 Physical Fitness Components

Physical fitness can be thought of as an integrated measure of most, if not all, the body functions (skeleton-muscular, cardio-respiratory, hemato-circulatory, psycho-neurological and endocrine–metabolic) involved in the performance of daily physical activity and/or physical exercise. Hence, when physical fitness is tested, the functional

status of all these systems is actually being checked. This is the reason why, physical fitness is nowadays considered one of the most important health indicator by the people (Ortega, Ruiz, Castillo, Sjostrom, 2008). Several studies reveled that, low level of physical fitness leads to injuries (Heir & Eide, 1997) and poor performance in sports.

Physical fitness defined as "the ability to fulfill daily tasks with vigor and alertness, without undue fatigue and with ample energy to enjoy leisure-time pursuits and to meet unforeseen emergencies" (Caspersen, Powell, & Christenson, 1985). The most frequently athletic ability (Pate, 1983) components fall into two groups: related to (i) health (ii) skills for sports players.

Different type of fitness training is required for different sports and games. For example, distance running requires a very high level of endurance, but a low level of other abilities. Whereas, footballers need a high level of speed, endurance, strength, flexibility, agility, co-ordination, balance along with technical skills.

Cardio respiratory endurance (CRE) is required throughout the game or sport event. The energy required to do this is supplied aerobically, which requires our heart, lungs and blood system to supply oxygen to the working muscles throughout the game. In soccer Attackers required more speed ability as compared to defense players. Defenders should have more body fat than midfielders and forward players (Sporis Goran et al., 2009). Analysis and physiological measurements have revealed that modern football is highly energetically demanding, and the ability to perform repeated high-intensity work is of importance for the players. Furthermore, the most successful teams perform more high-intensity activities during a game when in possession of the ball. Hence, footballers need a high fitness level to cope with the physical demands of the game. For better

performance in sports, speed and strength are necessary in which, change of direction, acceleration and jumps are important factors (Newton, Murphy, Humphries, Wilson, Karemer & Hakkinen, 1997). Hence, strength and power in leg muscles are important for soccer players (Ronnestad, Kvamme, Sunde, & Raastad, 2008). Apart from that a good soccer player must have the psychological characteristics i.e. high level of concentration, good reaction time, low level of competitive anxiety (Junge A et al., 2000).

3.1.1 Hand Grip Muscle Strength (HGS)

Muscular strength has been defined as the capability to exert force on an external object or resistance (Singh, 1991; Stone, 1993; Siff, 20010). Since the maximum force that can be generated depends on several factors (for example, the size and number, proportion of muscle fibers, coordination of the muscle groups, etc.) there is no single test for measuring muscle strength. The main health-related muscular fitness components are maximal strength, explosive strength, endurance strength and iso-kinetic strength (Ortega, Ruiz, Castillo, Sjostrom, 2008).

The muscular strength is usually measured with respect to individual group of muscles acting together. The synergistic action of flexor and extensor muscles and the interplay of muscle group is an important factor in the strength of resulting grip. Many factors influences the strength of the grip, including muscles strength, hand dominance, fatigue, time, age, nutritional status, restricted motion and pain (Borman, Sahu, & Choudary, 2016).

This is one of the Physical Fitness components which have been used as an objective scientific procedure in a several situation. It has been used to assess general muscle strength in order to find work capacity (Gilbert, Knowlton, 1983). Previous studies

showed that, yoga practice improves grip strength in adult male volunteers trained in physical education (Telles et.al., 1993).

Strength training relates to sports performance by incorporating and activating specific muscles in addition to relevant movement required by a sport. A plan that *is* put into place to increase the demand placed on muscles through strength training will then in turn increase lean muscle and performance (Behm, Drinkwater, Willardson, & Cowley, 2010). Strength training will increase our metabolic rate, build our muscles and provides more strength. Weight machines, free weights and resistance bands can be a part of our strength training workout plan.

The handgrip test is one of the most used tests for assessing muscular fitness in epidemiological studies. In adults, handgrip strength has been reported to be a strong predictor of morbidity and life expectancy (Metter, Talbolt, Schrager, Convit, 2002). Due to its importance for health, methodological investigations have been carried out to increase the accuracy of measurement in both adults (Ruiz, Mesa, Gutierrez, Castillo, 2002) and young people (Ruiz, Espana-Romero, Ortega, Sjostrom, Castillo, Gutierrez, 2006).

Greater muscular strength is associated with enhanced force-time characteristics (e.g. rate of force development and external mechanical power), general sport skill performance (e.g. jumping, sprinting, and change of direction), and specific sport skill performance, and hence is also associated with enhanced potentiating effects and decreased injury rates (Suchomel, Nimphius, & Stone, 2016).

3.1.1a: Yoga and Hand Grip Muscle Strength (HGS)

The isometric contraction during yoga postures leads to a significant increase in muscle strength (Madan, Thombre, Bharathi, Nambinarayan, Thakur, Krishnamurthy, & Chandrabose, 1992). All our subjects reported that they felt more alert and fresh and could concentrate better on their studies. This is in agreement with the findings of Udupa and Singh (1972) shows that the practice of yoga increases the performance quotient and makes a person psychologically more stable and mentally more competent. The practice of yoga for three months was found to increase hand grip strength in male volunteers whose occupation was to teach physical education to high school students (Telles, Nagarathna, Nagendra, Desiraju, 1993).

Dash, & Telles (2001) found significant increases in hand grip strength following yoga in adults, children and in patients. Yoga breathing through a particular nostril, or through alternate nostrils increases hand grip strength of both hands without lateralization (Raghuraj, Nagarathna, Nagendra, Telles, 1997).

Table 3.1.1 : Physical fitness components – Hand grip Muscle Strength						
Sl. No.	Author and Year	Design	Participants	Intervention	Outcome measures	Outcome
1	Ortega, Ruiz, Castillo, Sjostrom, 2008).	Cross sectional	N=859 Male=357 Female=502 Spanish adolescent	----------	Sit and Reach, Hand grip, Standing broad Jump, Bent arm hang, 4x10 mt shuttle run, 20 mt. Shuttle Run,	Muscular fitness was ↑ in older adolescent than in younger adolescent. Cardio-respiratory fitness was ↑ in younger compared to older adolescent females. In males, Cardio-respiratory fitness was ↑ in younger adolescent.
2	Borman, Sahu, & Choudary, 2016	RCT	N=15 residential male Age-12±1	Yogasana 1 to 1.5 hr/day for 4 weeks	Hand grip strength	YG showed ↑ handgrip in both left and right hand.
3	Suchomel, Nimphius, & Stone, 2016	Review	----------	----------	Jumping, Sprinting, change of direction tasks.	↑ Muscular strength strongly related with ↑ in overall performance and also general sports skills of an athlete.
4	Kumar, Prasad, Balakrishnan, Muthukumaraswamy, Ganesan, 2016.	Experimental Pre-Post test		Upa yoga, Surya Kriya, Angamardhana, Bhuta Suddhi, and asanas	single-leg stork test and the plank test	significant↑ in core strength and balance

5	Neha Gothe and Edward McAuley, 2015	RCT	N=118, Healthy adults Mean Age=62.	Asana and Stretching & strengthening exercise Hatha yoga gr=61 SSE group=57 8 weeks (3 times / week for 1hr/day)	Balance, strength, flexibility and mobility	Both the group showed significant ↑ in all the measures.
6	Wang, Greendale, Yu, Salem, 2016	Experimental Pre-Post test	N=20 Age= 70.7 ± 3.8 years	Hatha yoga training biweekly 60-minute Hatha yoga for 32 weeks	(1) functional performance, (2) flexibility, (3) muscle strength, and (4) balance	Significant ↑ in physical function and muscle-specific lower-extremity strength. Flexibility and balance performance remained unchanged.
7	Tracy, Hart, 2013	RCT Pre-Post test	Yoga gr. N=10 Age=29±6 yr Control gr. N=11, Age=26±7 yr	Yoga, 24 sessions in 8 weeks	Isometric dead lift strength, handgrip s trength, lower back/hamstring and shoulder flexibility, resting heart rate and blood pressure, maximal oxygen consumption (treadmill), and lean and fat mass (dual-energy x-ray absorptiometry) were measured	Yoga subjects exhibited ↑ dead lift strength, substantially ↑ lower back/hamstring flexibility, ↑ shoulder flexibility, and modestly ↓ body fat compared with control group. No change in handgrip strength, cardiovascular measures, or maximal aerobic fitness.

8	Telles, Sharma, Yadav, Singh, Balkrishna, 2014	Pre-Post test	N=50 male adults Mean age= 26.9 ± 6.2 years	High frequency Yoga breathing and breath awareness given alternate day for 15 minutes	Bilateral handgrip s trength, leg and back strength, finger tapping and arm tapping speed	Significant ↑($P < 0.05$) in right hand grip strength after high frequency yoga breathing. Both finger and arm tapping ↑ after both practices
9	Zakir Ahamed, Murugavel, 2011	RCT Pre-Post test	N=120 High school boys Jr. soccer players LIPT gr.-30 MIPT gr.-30 HIPT gr.-30 Control gr.-30	Plyometric training 1 hour per day, 3 days per week for 12 weeks	speed, agility, flexibility, leg strength, Cardio Respiratory Endurance and soccer techniques (dribbling, passing, kicking and shooting).	Moderate intensity polymetric training found more appropriate training for significant ↑ over motor fitness components and soccer techniques.

3.1.2 Muscle Endurance

The measurement of muscular endurance is based on the number of repetitions performed. Muscular endurance is defined as "the ability of muscle groups to external force for many repetitions or successive exertions" (Davidson, Passmore, Brook, and Truswell, 1979). Endurance, strength and speed are all keys to better performance, but the combination of endurance and strength creates muscular endurance, allowing an athlete to perform multiple repetitions against resistance for a long period of time. Hence, muscle endurance plays an important role in sports.

The benefit of having good muscular endurance is to increase our capacity to train for longer periods of time in high intensities, reduce recovery time and strengthen our cardiovascular system *(*Morris, Froelicher, 1991 and Chandrashekhar, Anand, 1991*).* It also increases the number of red blood cells and blood plasma in our circulatory system which enhance the volume of blood being pumped by the heart.

Endurance is a very important ability in sports (Helgerud, Engen, Wisløff, & Hoff, (2001) as it liberates energy. the product of all psychic, physical organs and systems. All the movement work outs are depends on endurance. According to Dr. Hardayal Singh (1984), "Endurance is the ability to do sports movements, with the desired quality & speed under conditions of fatigue".

Yoga and Endurance:

Bent knee sit up test is one of the simple and best tests to evaluate abdominal strength endurance. Previous studies reveled that, there is a significant increase in the abdominal

strength endurance by giving asana practice among college male students of Amaravati, Maharashtra, India (Pathare, 2016).

Yoga and Muscle Endurance

Hatha-yoga (asana) practices enhance muscular endurance and other fitness variables. Earlier study on high school boys found considerable enhancement in physical fitness variables (Kuldip, 2016). Yogic exercises and Pranayama are effective for improvement of muscular strength and endurance of arms and shoulders, speed and agility, muscular strength and endurance of trunk in state level Handball, Volleyball, Taekwondo and Judo players (Rani, & Malik, 2017). Previous findings revealed that, there was a large enhancement in the abdominal strength endurance for having conducted 6 weeks of yogasana training on female Post Graduate students (Sangeetha, 2017). Komathi and Kalimuthu, (2011) studied the influence of yoga on abdominal strength among school boys. The outcome showed significant improvement by following a twelve weeks yogic practice.

Table 3.1.2 : Physical fitness components – Muscle Strength Endurance						
Sl. No.	Author and Year	Design	Participants	Intervention	Outcome measures	Outcome
1	Pathare, 2016	RCT Pre –post test	N=50 Male college students Age=18-25 yr	Suryanamaskar, Yogasana for 6 weeks	Agility, Strength Endurance, Explosive leg power	Significant↑ in agility, abdominal strength and leg power among yoga group.
2	Kuldip, 2016	RCT Pre –post test	N=15 boys Age=15-18 yr	Pranayama and asanas for 8 weeks	Strength endurance, Speed, explosive power	Significant ↑ in physical fitness variables of pull Ups, Sit Ups, Standing Broad Jump, 50 Yard dhash and 1.5 mile run/walk except shuttle run.
3	Rani, & Malik, 2017	RCT Pre –post test	N=30 Male players of 8-Handball, 8-Volleyball, 8-Taekwondo and 6-Judo Age=15-19 yr Y gr=15 C gr=15	Yogic practices for 5 days/week for 6 weeks	AAHPERD Youth Fitness Test - Pull-ups, Bent-Knee Sit-ups, Shuttle run Standing Broad jump, 50 Yard Dash, 600-Yeard or 9 Min, Run-Walk.	Significant ↑ in all the variables of yoga group. Control group showed insignificant.
4	Sangeetha, 2017	Pre –post test	N=30 Female post graduate students	Breathing practice, Asana & Pranayama 12 weeks	Abdominal strength, Harvard step test to assess Endurance and flexibility	Significant↑ in abdominal strength and Endurance found due to yoga intervention.
5	Shiraishi, Bezerra, 2016	Pre –post test	N=47 women Y gr.-26 Age-24±3.5 C gr. – 21Age-25±5.1	Yogasana 6 weeks, 3 session/week 1hr/session.	Push up & Sit up	Significant ↑ in upper body muscles and in abdominal muscle endurance.

6	D'souza, Avadhany, 2014	RCT Pre –post test	N=100 (91 underwent assessment) M-46 F-45 Age=7-9 yr school going children Y gr. & PE gr.	Suryanamaskar, Yogasana, Pranayama, Physical exercise training for 3 month & detraining after 3 months	Strength, Endurance and Whole body endurance	Significant ↑ in respiratory muscle strength of yoga group.
7	Helgerud, Engen, Wisløff, & Hoff, 2001	RCT	N=19 Elite Jr. soccer players Age=18.1±.8 yr Training gr.=9 Control gr. =10	Specific aerobic training consisted of Interval training, Twice/week for 8 weeks.	Hemoglobin (Hb), Hematocrit (Hct), Vital capacity (VC) and forced expiratory volume in 1 sec., Jumping height, Strength test (bench press), Squat test, 40m sprint test, Kicking velocity test	↑ Soccer performance by ↑ distance covered, enhancing work intensity, and ↑ number of sprints and involvements with the ball during a match.
8	Styles, Matthews, & Comfort, 2016	Pre –post test	N=17 Elite professional soccer players Age = 18.3 ± 1.2 years	Strength training 6 weeks, 2 session / week	Strength, sprint	Significant ↑ in absolute and relative strength & ↑ in sprint performance is being observed.

3.1.3. Cardiovascular Endurance

Cardiovascular endurance is the ability of the heart, lungs and blood vessels to deliver oxygen to your body tissues. The more efficiently our body delivers oxygen to its tissues, the lower your breathing rate is. Cardiovascular endurance is a health related component of physical fitness that relates to the ability of the circulatory and respiratory systems to supply fuel during sustained physical activity and to eliminate fatigue products after supplying fuel ((Davidson, Passmore, Brook, and Truswell, 1979). Cardiovascular fitness is often called aerobic exercise which enhances the ability of the heart and lungs to supply oxygen-rich blood to the working muscles. Cardiovascular fitness enhances the muscle's ability to use this oxygen to supply adequate energy for movement (Kenney, Wilmore, & Costill, 2015). A regular Cardiac workout makes reduces fat in the body, improves muscle tone and fitness level. Enhancement of health is due to regular walking, jogging and sprint exercises (Pollock, Gaesser, Butcher, Després, Dishman, Franklin, & Garber, 1998). Tran, Holly, Lashbrook, Amsterdam (2001) studied the influence of hath yoga practice on the healthy, untrained volunteers with respect to health-related components of physical fitness and found significant improvement in yoga group. Previous literature revealed that, the long term training helps to increase the physical fitness capacity (Deba Prasad Sahu & Sandip De, 2015).

Yoga and Cardiovascular endurance

The influence of yoga, circuit training and physical exercise training on college girls was studied and the outcome shows the considerable enhancement on endurance (Malathy, & Dean, 2016). Previous findings show that, there was significant difference in cardio-respiratory endurance of experimental group between pre and posttest (Vinu, 2015). Six week yoga training program shows positive effects on cardio-vascular endurance (Santosh, 2016). Yogic exercises and Pranayama are effective for improvement of muscular strength and endurance of arms cardio-vascular endurance (Rani & Malik, 2017). The study was conducted on 60 high school students by giving yogic practices for 10 weeks. The statistical analysis showed that, there is a significant improvement found in cardio vascular endurance (Kumaraswamy & Sanjeev, 2016). Sangeetha, (2017) conducted a study on 30 post graduated female students. The result showed that, there is a significant effect in pre-post test on cardiovascular endurance.

Table 3.1.3 : Physical fitness components – Cardio-Vascular Endurance						
Sl. No.	Author and Year	Design	Participants	Intervention	Outcome measures	Outcome
1	Tran, Holly, Lashbrook, & Amsterdam, 2001	Pre-post test	N=10 M=1 F=9 Age=18-27 yr	Asana, Pranayama, Breathing practices, dynamic warm up exercises, relaxation technique. 2 sessions/week for 8 weeks	Muscular Strength, Muscular Endurance, Cardio-vascular endurance, Body composition and Flexibility	Maximal strength and VO_{2max} were evaluated on day 1, and muscular endurance, flexibility, body composition, and pulmonary function were measured Significant ↑ in all variables of Health related Physical Fitness components.
2	Malathy, & Dean, 2016	RCT Pre-post test	N=120 college women Age=17-20yr Four groups PE -30, CT-30 Y-30, C-30	Physical Exercise Circuit training, yoga training 90 min/day and 6 days/week for 12 weeks	Endurance	Physical exercise training, circuit training and yogic practice ↑ endurance level thereby enhance the performance of college girls
3	Sahu, & De, 2015	RCT	N=100 Male college Age=18-19 yr Four groups-25 each A-Aerobic training B-Hathayoga C-Aerobic & Hatha D-Control gr.	Aerobic training, Hatha yoga training 3 days/week for 10 weeks	AAHPERD Youth Fitness Test - Pull-ups, Bent-Knee Sit-ups, Shuttle run Standing Broad jump, 50 Yard Dash, 600-Yeard or 9 Min, Run-Walk.	Aerobic training found more significant in comparison with hatha yoga and combination of aerobic and hatha yoga among college male students.
4	Vinu, 2015	RCT Pre-Post test	N=30 Male Age=18-24 yr YG-15 CG-15	Yogic practices 12 weeks	Cardio respiratory endurance (9 min Run/walk test)	Cardio-respiratory endurance, has significantly ↑ for yogic practice group.

5	Santosh, 2016	Pre-Post test	N=40 M Exp-20 C-20	Pranayama 6 weeks	Cardio- Respiratory Endurance (Harvard step test)	significant ↑ in cardio-vascular endurance of experimental group
6	Kumaraswamy & Sanjeev, 2016	Pre-Post test	N=60students Clinical	Yogasana training 90 min/day for 10 weeks	Flexibility, Strength, Endurance, Speed, Agility	Significant ↑ was found in all the variables except speed.
7	Sovová, Čajka, Pastucha, Malinčíková, Radová, & Sovová, 2015	Pilot / Clinical	Yoga group N=58, Male-16, Female-42 Age=50.0±11.06 yr C gr. N=54, M-16, F-38, Age=48±11.86	Asana, Pranayama, breathing practices 1 hour/day for 2 yr	Resting (HR_{rest}), & (BP_{rest}), (HR_{max}), blood pressure at maximum exertion, maximum performance (W_{max}/kg), (VO_{2max}/kg/min), maximum metabolic equivalent (MET_{max}), max minute ventilation (V_{Emax}), VCO_{2max}, maximum carbon dioxide production, and respiratory exchange ratio (RER).	The yoga group had statistically significantly higher HR_{max}, W_{max}/kg, VO_{2max}/kg/min, and MET_{max} and statistically significantly lower body weight, BMI, BP_{rest}, V_{Emax}, VO_{2max}, and VCO_{2max}.

8	Lau, Yu, & Woo, 2015	Two arm non blinded controlled	N=173 adults Chinese Age=52.0 ± 7.5 years Y gr.=87, C gr.=86	Hatha yoga-Asana, Pranayama, Breathing practices 60 min/day For 12 weeks	Cardio respiratory endurance, Muscular strength & endurance, Lower back & Hamstring flexibility	Significant ↑ in $VO_{2\ Max,}$ Curl-up, push-up test and modified Sit and Reach test. Significant changes found for heart rate between groups in women but not in men.
9	Sinha, & Sinha, 2014	Non RCT	N= 9 Male army soldieres Age=22.3±1.31 yr	Surya Namaskar, Meditation and Pranayama 1 hour/day, 5 days/week for 11 months	Physiological, Cardio Respiratory and ventilator parameters Test taken on 3 phases. 3rd month, 6th month & 11th month.	The physiological parameters $VO_{2,}$ HR, VCO_2, V_E & V_T showed a significant ↓ in the 3rd phase as compared to other two phases. O_2P, an indicator of myocardial oxygen carriage, showed significant ↓ in the 3rd phase when compared to 1st phase of the training.
10	Sinha, Sinha, Pathak, & Tomer, 2013	Comparative	N=20 male Age=20-26	Suryanamaskar 1 hr daily for 7-8 years	Oxygen consumption (VO2 in L.min–1), carbon dioxide output (V CO2 in L.min–1), minute ventilation (VE in L.min– 1), tidal volume (VT in L.breath–1), breathing rate (f_R in breaths.min–1).	Cardio-respiratory stress in Suryanamaskar group was found ↓ as compare to Bycycle exercise group.

3.1.4. Body Mass Index (BMI)

Participation in sports and games and getting success require high level of fitness which is globally accepted. The basic level of fitness has a vital role in improving any sport performance but there seems to be a lack of specific knowledge regarding effect of sports achievements of the family members on the Physical Fitness of their child. Body Mass Index is a method of estimating a person's body fat level based on a person's weight and height measurement. While the BMI calculation is an indirect measurement, it has been found to be a fairly reliable indicator of body fat measures in most people.

Body mass index (BMI) can be used to screen patients because the test is simple, correlates to fatness, and applies to both men and women. The BMI may not apply to some individuals with more than normal muscle mass and acceptable levels of body fat. In some ethnic groups, such as soothing Islanders, BMI overestimates fatness and risk. It has been a matter of great concern for the sports teacher and coaches to assess the Physical Fitness and BMI of their wards.

The earlier finding shows the considerable difference in treatment group on body mass index (Sukumar, 2017) and a significant decrease in BMI by performing 10 weeks Sūryanamaskāra practice on school athletes (Haldar, 2017).

3.1.5 Flexibility

Flexibility is defined as "the ability to execute movements with greater range" (Varma & Prasad). Yoga practices improves the flexibility as both are inter related to each other. The regular practice of asanas enhances range of motion and also the lubrication at joints.

Among health related physical fitness components, players do stretching before warm up exercises and after cool-down practices. These stretching practices enhance wide range of motions at joints, toning up of muscles there by increases flexibility (Kisner, Colby, & Borstad, 2017). There are various practices to avoid injuries during sports events and flexibility which plays major role in preventing injuries. Previous findings show that, flexibility shall be improved through the practice of yoga (Megha & Jyoti, 2017, Alaspure, 2016).

The previous findings revealed that there was a significant difference between experiment group and control group on flexibility (Sukumar, 2017). According to Dr. Khushal Jagtrao Alaspure (2016), the effect of six weeks asanas training program had showed a significant improvement on flexibility. Dr. Kumara Swamy & Sanjeev Patil (2016) studied the effect of yogasana training on flexibility of high school bys. The results show that, there was a significant improvement in the hamstring flexibility of high school boys.

Table 3.1.4 & 3.1.5 : Physical fitness components – BMI and Flexibility

Sl. No.	Author and Year	Design	Participants	Intervention	Outcome measures	Outcome
1	Sukumar, 2017	RCT Pre-Post test	N=40 Women Age=35-45 yr Y gr.=20 C gr.=20	Yogasana and breathing practices 6 days/week for 10 weeks	Body mass index and flexibility	Significant ↑ on body mass index and flexibility in yoga group.
2	Haldar, 2017	_____	N=200 male students Age= 11-12 yr	_____	Speed, Agility, Explosive leg strength, % body fat	Government aided madrasah boys performed better than Govt. aided school boys on Agility, Explosive leg power and body fat %.
3	Alaspure, 2016	RCT Pre-Post test	N=20 College students Age-18-20	yogasana training 6 weeks	flexibility and co-ordination	Significant ↑ in flexibility and improved performance with regard to co-ordination, but which is insignificant.
4	Bal and Kaur's, 2009	RCT	N=30 male college students Age=18-25 yr	Hatha yoga Asana for 6 weeks	Flexibility and Agility	Significant ↑ on agility and flexibility in yoga group.

3.2 Football skills

Football is an exceptionally alternating, energetic sport relating skillful actions (Bloomfield et al., 2007; Cometti et al., 2001; Mohr et al., 2003).Skill is the sportsman's ability to carry out physical or intellectual tasks with a utmost level of achievement with least amount of effort. The most recent meaning of skill is: 'the reliable production of goal-oriented actions, which are cultured as well as particular to the task' (McMorris, 2004). The traditional definition of skill is 'the learned ability to bring about pre set outcome with utmost confidence often with spending least amount of time or energy or both' (Knapp, 1977). Bate (1996) suggested that all sports, to varying extents, involve the application of cognitive, perceptual or motor skill.

The motor skills required to successfully control, pass, dribble and shoot the ball at goal are fundamental skills of the soccer player (Ajmal Ali, 2010). Since, the performance in skill tests depends on physical fitness abilities, it is challenging for measurements of skill development.

The player has to sustain from fatigue in the game which impact on his skill ability. (Mohr et al., 2003). Therefore, the cognitive part, in the form of decision making, is the basic factor of skill. A high level of physical and psychological skills is essential to handle stressful situations in most of the sports and games (Maddison and Prapavessis, 2007). Achieving excellence in soccer is a complex inquiry that requires accurate combination of motor and mental skills. High levels of stress or low coping skills, whether on or off the field, can cause alterations in cognitive appraisal and focus that can interfere with physical performance. The influence of mental state on performance is as important as technical and tactical skills. It must be considered during training programs

(Taylor & Wilson, 2005). Various skills are required to apply learned tactics and strategies during trainings and competitions (Demontrond et al., 2006). In addition, these skills may be modulated by training program. Playing position is one of the important factors in team games which are to be addressed during training program. Each position has its own mental demands. Different playing positions require different game strategy along with mental skills (Cox & Yoo, 1995). The progress of game performance is normally seen in learning strategic and scientific skills and their combination into the match situation (Mitchell et al., 2006; Grehaigne et al., 2005).Physical condition, technical skills and tactical performance are very important variables for measuring performance in football (Rosch et al., 2000). The previous findings suggested that, the development of technical skill, cognitive function and sensory awareness of a player are more significant for soccer performance are the key performance indicators recorded during match play (Wing, Turner, Bishop, 2018). Generally, motor skills are involved in coordination of the arms, legs and other body parts and movement of actions such as running. The motor skills need control over ball; pass, dribble and shoot the ball at the goal are fundamental skills of the soccer player (Ali, 2011). Hence, the following fundamental skills are taken under this study.

3.2.1 Dribbling

Dribble is one of the most difficult ball skills to master and one of the most useful attacking moves. In typical game play, players attempt to propel the ball toward their opponents' goal through individual control of the ball, such as by dribbling. The dribbling is most basic skill of soccer which is the ability to carry the ball under control, whether

by using a series of simple taps or a fantastic move around a foe. The ability to dribble the ball by tackling opponent players is a hallmark of gifted players and hence is an oft-measured element of soccer skill (Reilly & Holmes, 1983; McGregor et al., 1999a; Rosch et al, 2000; Hoare & Warr, 2000; Haaland & Hoff, 2003). Thus suggesting this type of test to be a valid and reliable indicator of soccer skill (A.Ali, 2011). Reilly et al. (2000) reported that the dribbling test was the only statistically significant discriminator of soccer skill out of the battery of tests they used.

3.2.2 Lofted Pass

Lofted passes are great for clearing your lines, switching play or dinking the ball over the top to a striker who is making a run behind the other team's defensive line. Approach the ball at a slight angle, back swing of leg (using arms for balance) and follow through with the pass. The lofted passing test is developed to measure accuracy of passing (Bobby Charlton). It is important to be able to pass the ball over long distances because it is often the quickest way to exploit the space behind a defense, or the fastest method of switching the point of attack. Loughborough Soccer Passing Test (LSPT) has acceptable test-retest reliability and discriminative validity. On the other hand, it may not be practicable and useful way to understand the intra-individual change of skill performance in practice (Wen, Robertson, Hu, Song, Chen, 2018).

3.2.3 Shooting

It is an important element of football game from which the player's success and achievement shall be measured. Winning of the game is depends on number of goals scored by the players. Therefore, it is very much essential to hit the ball accurately to increase the attempts of scoring a goal. The test to assess overall skill performance is included in the test battery (Reilly & Holmes, 1983; Rosch et al., 2000; Haaland & Hoff, 2003) which needs number of attempts by using both feet. The players will be reward with maximum points who hits the ball at the corner of the goal post (A.Ali, 2011).

3.2.4 Short Passing

Passing the ball is a key part of association football. The purpose of passing is to keep possession of the ball by manipulating it on the ground between different players with the objective of advancing it up the playing field. Passing to mates accurately need proper force and co-ordination between the players and many scholars tested the passing skill (Rosch, et al., 2000, Haaland & Hoff, 2003, Rostgaard et al., 2008, Hoare and Warr, 2000). A distance of 5mt to 15 mt ball passing test influence on coaches and found errors in their subjective opinion and judgment to assess player's performance capability. Franks et al., (1986) says that this method of assessment by experts is totally unreliable. Moreover, it should be noted that whether passing short or long distances this type of test may be too simplistic to assess soccer skill. The match analysis suggest that, players carry out maximum short passes on artificial surface as compare to playing on grass. (Andersson et al., 2008).

3.2.5 Juggling

This skill allows the player to keep the ball in air by touching and tapping with different body parts (Ali, 2011). Juggling Improves Mental Skills. Learning to juggle is an important skill for young, developing soccer players. In addition to improving first touch and ball control, juggling also helps players develop important mental skills such as focus, concentration, effort, determination, goal setting, patience and self-control. Practically, juggling skill occurs rarely in the actual match, it has been used as test of co-ordination (Hoare & Warr, 2000; Rosch et al., 2000; Vanderford et al., 2004). Biofeedback training has been shown effective in stress management. The results showed significant improvement in Juggling performance by following physiological and psychological benefit of the training (Shah S et al., 2013).

Xxxxxx

Sl. No.	Author and Year	Design	Participants	Outcome measures	Outcome
1	Bloomfield, Polman, O'donoghue, & McNaughton, 2007	2 way analysis 3 groups	N=46, Male=25 Female=21 Gr. 1- PMC Gr. 2-RMC Gr. 3-control	Speed and Agility For 6 weeks	Program method of conditioning and Random method of conditioning showed significant decrease in body mass and BMI. PMC indicated greater in acceleration, deceleration, leg power and dynamic balance compared to RMC & control group.
2	Ajmal Ali, 2011	Review	----------	Cognitive tests, Perceptual & anticipation, Motor skill tests	Talent identification becomes more easy with cognitive, perceptual, motor, technique, validity, reliability tests.
3	Scurr, & Hall, 2009		N=7 male amateur soccer recreational player Age=26±3 yr	Kick accuracy, Kinematic analysis (using semi Motion 3D software).	Results revealed that, for recreational soccer players, altering an individual's self selected approach angle does not enhance kicking accuracy or ball velocity during a penalty kick. Though, kicking from an approach angle of 45º and 60º may alter aspects of kick technique, such as increasing pelvic rotation and thigh abduction of the kicking leg at impact, which have been reported to enable better ball contact (Barfield, 1998, Davidas et al., 2000).
4	Stone, & Oliver, 2009	Experimental	N=9 semi professional soccer player Age=20.7±1.4 yr	Slalom Dribble Test, Loughborough Soccer Shooting Test (LSST) & Modified Loughborough Intermittent Shuttle run test (LIST)	Participation in 45 min. of replicated soccer match play didn't cause any decrease in sprint performance. On the other hand, performance of extended intermittent exercise did significantly weaken the ability to both dribble with ball and shoot at goal.

5	Wing, Turner, & Bishop, 2018	Correlation	N=15 professional club football players	Anthropometric measures, Strength and power	The findings showed that, there was a significant correlation between CMJ (r=0.80), SJ (r=0.79) and TSA (r=0.64) in relation to heading success and predicted 1RM squat strength and tackle success (r=0.61).These data supports the importance of strength and power.
6	Wen, Robertson, Hu, Song, & Chen, 2018	Review	N=25	Feasibility of Laughborgh Soccer Passing Test	The Results shows that, the LSPT has acceptable test –retest reliability and discriminative validity. However, it may not be a useful way to understand the intra individual change of skill performance in practice.
7	Rowat, Fenner, & Unnithan, 2017	Correlation	N=25 male soccer player Age=16-18.5 y7r	Aerobic capacity (YYIR1), Repeated sprint ability (7x35m), acceleration (15m sprint) and 4 soccer skills (dribble with pass, dribbling speed, Passing and shooting accuracy)	Spearman's rank correlation showed YYIR1 and 15m sprint test were limited in predicting technical match performance. Pearson product moment correlation showed that the repeated sprint test was also limited in predicting technical match performance. A dribbling skill with a pass was found to be the best determinant of a player's technical ability in a match ($p \leq 0.001$)

8	Zago, Piovan, Annoni, Ciprandi, Iaia, & Sforza, 2016	Comparative	N=10 N=10 Elite soccer players Age=12.6±0.37 yr Fast gr.-5 Slow gr.-5	Anthropometric and biomechanical characteristics between the two groups.	As compared to slow, results reveals that, Faster player display higher stride rhythm, reduced mediolateral and craniocaudal range of motion of their centre of mass trajectory and show reduced articular range of motion at some lower limbs joint. This suggests that, faster players are able to provide dribbling technique travelling through a shorter path in more efficient and economical way.
9	de Villarreal, Suarez-Arrones, Requena, Haff, & Ferrete, 2015	RCT	N=26 C gr.=13 Combined gr.=13 (plyometric,acceleration, dribbling, shooting & soccer training) Supplementary training 40 min. per session/ twice a week	Sprint, Agility, Leg power, Yo Yo intermittent endurance along with Dribbling, passing and shooting skill test.	The explosive actions shall be improved with a specific combined plyometric and sprint training along with regular soccer practice as compared to usual soccer training only. The results showed beneficial impact on jumping, change of direction, sprinting and ball shooting speed which acts as important variables in match winning performance.

10	Gabbett, Whyte, Hartwig, Wescombe, & Naughton, 2014	Review		For this review, load was defined as the cumulative amount of stress placed on an individual from multiple training sessions and games over a period of time, expressed in terms of either external workloads performed (resistance lifted, run in kilometer) or the internal response (heart rate, rating of perceived exertion) to the workload.	More than 2000 studies retrieved from six databases. After screening titles, abstracts and full texts, author could identify 23 articles meeting required criteria. Varieties of training modalities were in use to improve the physical performance of adolescent football players, with strength training, interval training, dribbling and small sided games training, and combination of these modalities in addition to normal football training, resulting improved performance on wide range of physiological and skill assessments.
11	Saha, Saha, Mazlan, & Arriffin, 2013	RCT	N=42 Male soccer players Age-19 to 22 yr	heart-rate biofeedback & skin-conductance biofeedback training for 20 sessions	**Juggling performance** Training Gr-B ↑ & Gr-C ↑

3.3 SUMMARY OF THE LITERATURE REVIEW

The available studies on football player's physical fitness and match performance have found yoga as an effective intervention with almost no adverse effects; which appears as a promising complementary treatment for football players. Very less amount of literatures are available for the efficacy of yoga and physical fitness component interventions on players. Amongst available literature, majority of the studies had focused on psychological aspects and no studies could found on the physical fitness or football skill parameters. There were also several methodological limitations including lack of randomization, single group, small samples, limited detail regarding the intervention, and statistical uncertainty, prevent the ability to provide definitive conclusions or recommendations. To the best of our knowledge, there are no published studies with combination of yogic practices and physical fitness components on the performance of college football players. Hence this study was planned on this basis of these outcome parameters.

3.4 NEED AND SCOPE OF THE STUDY

The findings of this review are essential to gaining a precise estimate of participation in physical fitness activity by the players. The study is then identifies their fitness status, skill levels as compared to non players. Several studies have highlighted deficiencies in their comparative physical and psychological performance. However, small amount effort has been directed towards exploring fitness and yoga interventions aimed at meeting the specific needs of football player's performance. To fill this gap, we undertook this study of a 16 week yoga and fitness training program for football players, assessing physical fitness components and skill variables before and after (pre / post) the intervention. It was

intended to develop a unified strategy to improve football skills and fitness levels that could play an essential role in enhancing football player's performance.