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Amplification of Upper Extremity Power, Balance and Shoulder Stability in Soccer Goalkeepers With FIFA 11+ Shoulder Injury Prevention Programme

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ABSTRACT

To enhance players' performance and prevent injuries, warm-up exercises are often employed in soccer. The study's objective was to determine how the upper extremity strength, balance, and shoulder stability of soccer goalkeepers are impacted by replacing traditional warm-up routines with FIFA 11+ Shoulder Injury Prevention programme. In this quasi-experimental study, 36 soccer goalkeepers from Delhi NCR region were recruited based on inclusion criteria. 18 subjects (age: 18.94 ±3.08; BMI: 20.39 ± 2.29) belonging to the control group continued their customary warm up routine and the other 18 subjects (age: 19.39 ± 1.94; BMI: 20.10 ± 2.03) of the experimental group underwent FIFA 11 + Shoulder Injury Prevention Program for a duration of 8 weeks with a frequency of 3 times per week. IBM SPSS Statistics 26 was used to analyse the data. The baseline data for both the groups was found similar ($p>0.05$) at the beginning of the study. Both groups reported a statistically significant ($p<0.05$) increase in upper extremity power, balance, and shoulder stability post 8 weeks. Large effect sizes were obtained when post-intervention values of all parameters were compared between the 2 groups (Cohen's $d>1$). Also, the experimental group significantly outperformed the control group. It is concluded that, when compared to the conventional warm-up routine, the FIFA 11+ Shoulder Injury Prevention Programme is more effective at improving upper extremity performance, dynamic balance, and dynamic stability in male soccer goalkeepers over an 8-week period. This study also suggests that soccer goalkeepers should incorporate this into their normal warm-up routines.

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INTRODUCTION

With 200 million players globally, soccer is currently one of the most popular sports. Soccer can be considered as a high-intensity, intermittent, non-constant activity. It's a challenging sport with many manoeuvres like tackles, leaps, changes in direction, and speed, which put a lot of stress on the neuromuscular systems (Al Attar et al., 2021). Although participating in sports has many health benefits, playing a physically demanding sport like soccer is always associated with a risk of injury. However, studies aimed at promoting football participation have frequently prioritised talent and tactics than physical traits like stamina and speed (Ejnisman et al., 2016). In professional football, injury prevention is essential because of the consequences of lost performance, financial losses, and players' long-term health (Swart & Olivier, 2021). The measurement of static flexibility, dynamic flexibility, physical fitness, joint mobility, balance, proprioception, muscular endurance, and peak strength are the "five" most popular injury risk screening tests performed by national soccer teams (McCall et al., 2015).

Football goalkeepers are frequently forgotten when determining certain essential performance requirements.1–3 The most important performance requirements for goalkeepers must be determined on their own merit rather than in comparison to other players or positions in order to build better training plans that more closely represent their needs (West, 2018). Both in men's and women's football, goalkeepers appear to have longer careers, and Martínez-Lagunas et al. hypothesise this may be because of the less demanding position they play during a game (Martínez-Lagunas et al., 2014). At both an elite and non-elite level, goalkeepers do perform mostly critical and high-intensity tasks. Where these exercises are successful, they have the power to alter the course of a match by reviving and reawakening a team's competitive spirit (Sainz De Baranda et al., 2008). Goalkeeper assessments should take into account the fundamental abilities needed to produce different saves, as well as the ability to recognise changing game dynamics and react appropriately (Shamardin & Khorkavyy,2015).

Goalkeepers are distinguished by their ability to stop, reach, and throw the ball with their hands while landing on the ground with their upper extremities extended. It follows that they are more likely than field players to sustain injuries to their upper extremities. In fact, a previous study found that goalkeepers were five times more likely to sustain upper extremity injuries than field players were, and that their injuries also had more severe outcomes. As a result of upper extremity injuries, which accounted for 18% of custodian injuries, keepers were forced to take more days off from play or missed more games and practises than field players (Al Attar et al., 2021).

As a result of upper extremity injuries, which accounted for 18% of custodian injuries, keepers were forced to take more days off from play or missed more games and practises than field players (Ekstrand et al., 2013). One of the most frequent sports-related overuse injuries, particularly among overhead athletes, is disabled throwing shoulder (DTS). According to a prior study, 32% of young baseball pitchers were found to have DTS. The most prevalent diseases and overuse injuries associated with DTS, which mostly impact the joints, tendons, muscles, and ligaments, are well documented. Throwers who sustain injuries report shoulder and elbow pain, discomfort, and weariness, which could impair their ability to throw. Scapular dyskinesis, rotator cuff weakness, glenohumeral range of motion deficit, loss of glenohumeral internal rotation, and other risk factors for DTS have all been documented (Nagamoto et al., 2022).

In order to improve their performance and avoid injuries, football players frequently practice warm-up exercises. Warming up before exercise has been well studied and is widely believed to improve performance (McCall et al., 2015). Warm-ups are thought to improve athletic performance by increasing neuronal excitability, breaking down a viscous barrier to muscular movement, and stimulating blood flow to muscles. Injury prevention programme FIFA 11+ Shoulder (FIFA 11+S) aims to reduce upper extremity injuries using similar methods (Andrade et al., 2015).

To significantly decrease the total injury rate among soccer players, FIFA 11+ was developed as an injury prevention programme (Al Attar et al., 2021). The FIFA 11+S programme uses workouts that encourage eccentric rotator strength, neuro-muscular control, core stability, and agility to reduce upper extremity injuries in football goalkeepers (Al Attar et al., 2021). The FIFA 11+ shoulder programme is divided into three parts: part I has basic warm-up exercises, part II contains workouts to strengthen the finger muscles, wrist, elbow and shoulder, elbow, wrist, III contains more advanced warm-up and muscle control drills (part III). Prior to training, it takes 20 to 25 minutes to finish the FIFA 11+S. The goal of each exercise is to improve balance, eccentric rotator strength, neuromuscular control, and agility (Ejnisman et al., 2016).

Literature exists regarding FIFA 11+ Shoulder Injury Prevention Program's efficacy in reducing upper limb injuries in soccer goalkeepers; its effect on soccer goalkeepers' athletic performance has not been studied yet. Also, globally the awareness level of the FIFA 11+S program among goalkeepers and coaches is poor (Al Attar et al., 2022). The goal of this study is to ascertain how goalkeeper performance is impacted by the FIFA 11 + Shoulder Injury Prevention Curriculum.

METHODS

Study Design

This study is a quasi-experimental study (pre-post design). The Clinical Trial Registry-India number for this study was obtained prospectively (CTRI/2022/07/044134). The Institutional Ethics Committee, Indian Spinal Injuries Centre granted the ethical approval for this study prospectively (Reference No: ISIC/RP/2022/018, Date: 2/03/2022). Informed consent was obtained from all the participants before the study. The study was carried out in accordance with the Helsinki Declaration (2013) and the National Ethical Guidelines for Biomedical & Health Research Involving Human Participants published by Indian Council of Medical Research in 2017.

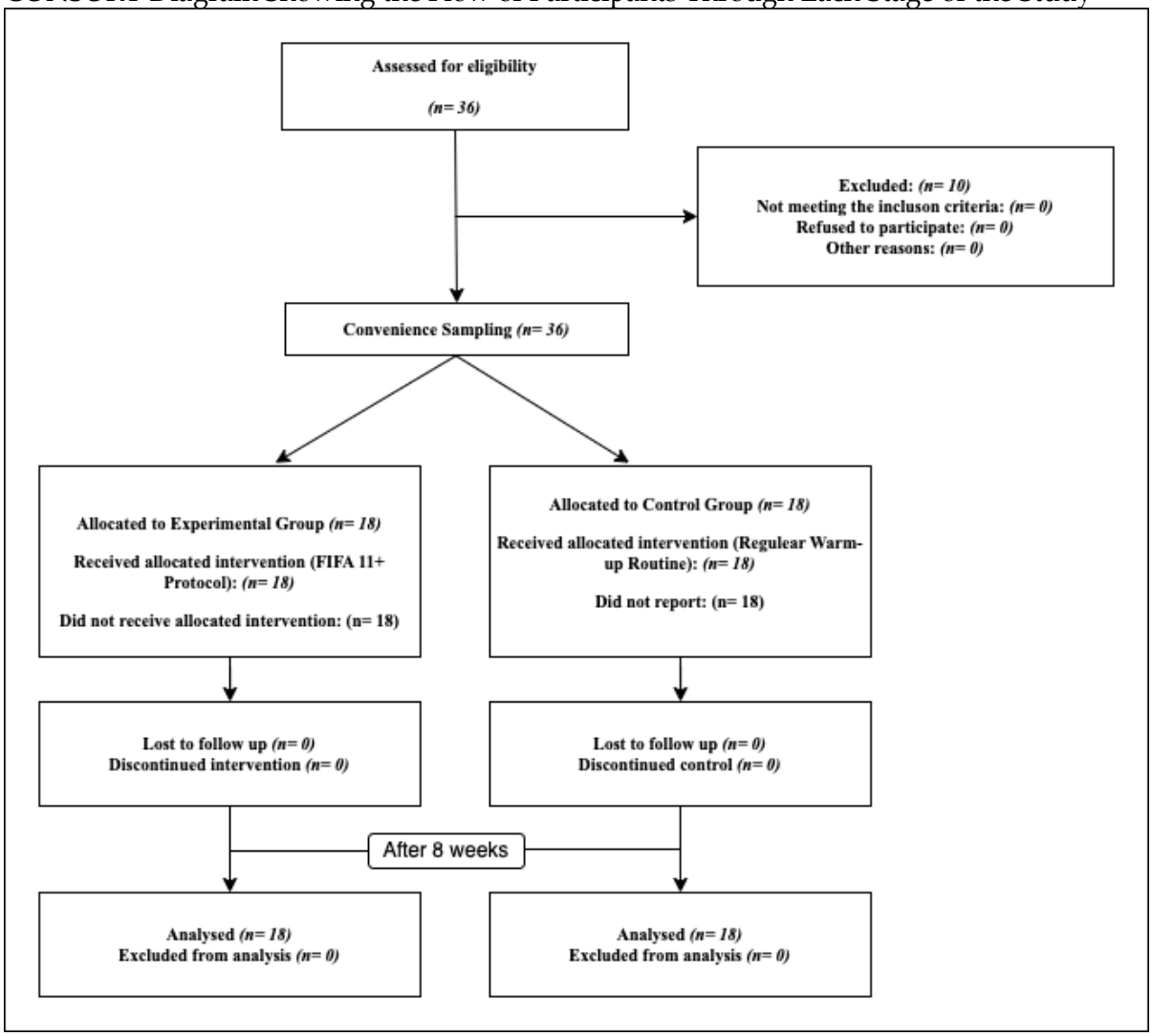
Study Group

36 soccer goalkeepers were recruited from Baichung Bhutia Football Club, Thyagraj Stadium, Village Soccer Academy, Hindustan Football Club, and Delhi Football Club, Delhi for March, 2022- May, 2022 on the basis of the inclusion and exclusion criteria in the study's pre-post experimental design. Criteria for inclusion: Age group is 18 to 35 years old, previous football experience must be at least three years old, and weekly exercise should average at least three training sessions, including games (Al Attar et al., 2021; Andrade et al., 2015; Ejnisman et al., 2016). Athletes who had any major shoulder surgery or an upper extremity bone fracture in the previous year should not participate in any other rehabilitation or injury prevention programmes. Exclusion criteria consisted of any medical history of injury in the upper limb that required medical attention in the last six months. The study protocol flowchart is shown in Figure 1. The goalkeepers were conveniently divided into two groups- the experimental and the control group.

Data Collection Tools

Before every training session, participants assigned to the control group (Group 1, n = 18) were asked to keep up their customary warm-up practice. Training involved 25 minutes of technical and tactical exercises, increasing mobility, activation, and stability exercises, and cardiovascular exercises with or without football. The experimental group participants were told to stop their usual warm-up exercises and start FIFA 11+ Shoulder Injury Prevention Programme (Table 1) which took 20 to 25 minutes to complete. These exercises were introduced to the football goalkeeper's training regimen and were done three times a week for eight weeks.

Figure 1
CONSORT Diagram Showing the Flow of Participants Through Each Stage of the Study



Exercises from Part I, which included running at a moderate pace for 5 minutes, throwing the ball with a partner in the chest line, and hand spinning movements, were performed as a general warm-up. The duration of this session was 7 minutes. To increase strength and local muscle endurance, Part II exercises should be done for nine to ten minutes with high repetitions (three sets of 15-20 repetitions) and moderate resistance (light tubing strength or 2-3 kg). These exercises include push-ups, biceps curls, wrist curls, external/internal rotation of the shoulders in the scapular plane, etc. Workout modifications should be made based on the athlete's tolerance.

In part III, performance of five or six sets of 15-20 repetitions in a time limit of no more than nine to ten minutes was scheduled. The purpose of these exercises is to improve local muscular endurance. This section consists of jumping and tossing the ball over the head, tossing

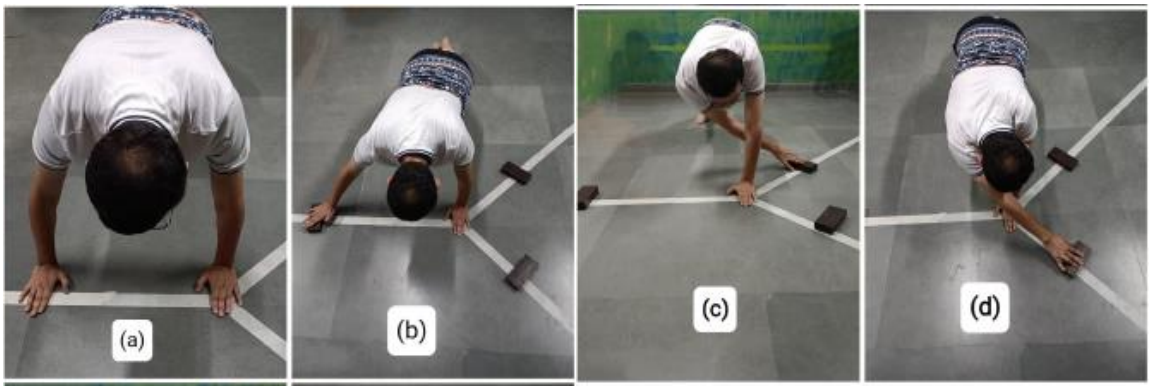
the ball with an arm over the head, walking on hands, jumping with your hands on the mini trampoline, external rotation plyometric with flexed elbow at 90°, and external rotation plyometric with flexed and abducted arm at 90°.

Table 1
Protocol of FIFA 11+ Shoulder Injury Prevention Program (Al Attar et al., 2021)

EXERCISES	DURATION
PART 1: Warm-up exercises 1. Run relaxed walking or running. 2. Throw the ball in the chest line 3. Spinning movements with the hands.	7 mins
PART 2: Strength and Balance of The Shoulder, Elbow, Wrist, And Finger Muscles 4. External rotation 5. Internal rotation 6. Scaption 7. Push-up-plus 8. Inferior and mid trapezius 9. Biceps 10. Wrist flexors 11. Wrist extensors 12. Finger flexors 13. Finger extensors	9-10 mins 3 sets of 15 reps
PART 3: Core Stability and Muscle Control with Advanced Exercises 14. Jump and throw the ball over the head 15. Throw the ball over the head with an arm 16. Throw the ball to the sides 17. Jump with your hands on the mini-trampoline 18. Walking on hands 19. Plyometric external rotation	9-10 mins 5-6 sets of 15-20 repetition

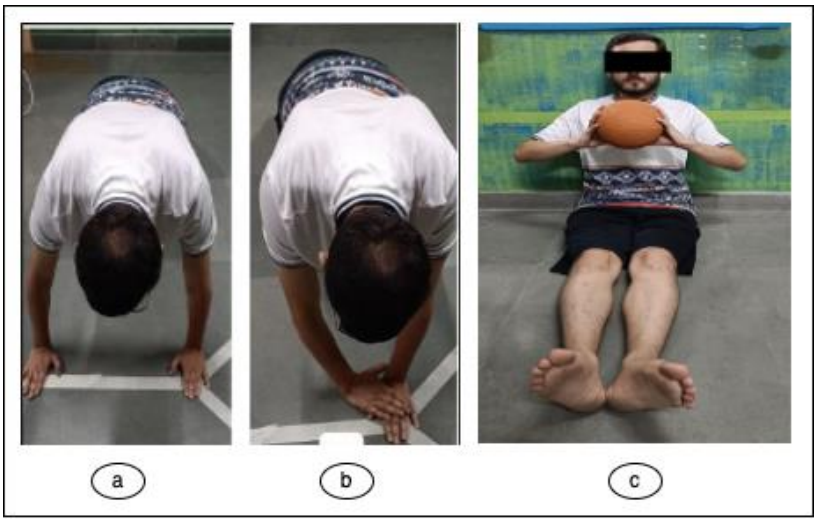
Three outcomes were measured prior to beginning of the training and post completion of the intervention at eight weeks. The dynamic stability of the shoulder was evaluated using the modified Upper Quarter Y Balance Test (Figure 2). The Seated Medicine Ball Throw (Figures 3a & 3b), a functional screening test that uses an open kinetic chain was used to measure bilateral upper body power and strength. Closed Kinetic Chain Upper Extremity Stability Test was also utilized to measure bilateral upper body power along with strength (Figure 3c).

Figure 2
Modified Upper Quarter Y-Balance Test- Direction of Reach is Named Relative to Stationary Upper Extremity



Note. a- starting position, b- medial reach direction, c- inferolateral reach direction, d- superolateral reach direction

Figure 3
(a) CKUEST Starting Position, (b) CKUEST End Position (c) Seated Medicine Ball Throw Measurement



Data Analysis

IBM SPSS Statistics 26 was used to analyse the data. The Shapiro-Wilk test was used to verify that the baseline data in both groups were normal. An independent t-test was used to evaluate the baseline measurements of both groups to see whether they are comparable. Following the intervention, changes in the criterion measures were compared within the group using paired t test and between groups using independent t-test. The significance threshold was set at $p< 0.05$. Effect sizes were calculated using *cohen's d.*

RESULTS

The descriptive data of the study's subjects are shown in Table 2. The data for both the control and the experimental group was found to be normally distributed using the Shapiro

Wilk test. The pre- intervention data of the control and the experimental group was similar at baseline ($p>0.05$). Data analysis among the groups in the current study showed that for both the control and the experimental groups, there occurred a significant improvement in dynamic balance ($p<0.05$), which was substantially stronger in the dominant leg than in the non-dominant extremity (Table 3 and 4). According to data analysis of power within the group, both groups' upper extremity power improved statistically significantly ($p<0.05$).

The closed kinetic chain upper extremity stability test (CKCUEST) showed significant improvement in the data analysis of dynamic stability of the upper limb within the groups ($p<0.05$), which is significantly greater in the dominant limb than contralateral limb for both groups. Additionally, when mean differences (Post-Pre values) were compared between the experimental and control groups, between group analysis showed a significant difference in the closed kinetic chain upper extremity stability test (CKCUEST) ($p<0.05$), dynamic balance ($p<0.05$), and power ($p<0.05$) in the upper extremity.

Table 2
Anthropometric Data of Soccer Players (Goalkeepers)

Parameters	Experimental Group (n=18)	Control Group (n=18)
AGE (in years)	19.39 ± 1.94	18.94 ±3.08
HEIGHT (in centimeters)	175.94 ±5.90	174.39 ± 5.71
WEIGHT (in kilograms)	62.39 ± 8.23	62.11 ± 8.73
BMI (kilograms/meter^2)	20.10 ± 2.03	20.39 ± 2.29
Training Years	4.56 ± 1.63	4.78 ± 1.63
Training Volume (hours/week)	16.28± 1.18	16.11 ± 1.97

Table 3
Comparison of Parameters within the Control Group

Outcome Measures	PRE		POST		t	p value
	MEAN	SD	MEAN	SD		
CKUEST (R)	24.52	2.08	28.41	2.12	17.75	**<0.01***
CKUEST (L)	23.94	2.39	27.55	2.20	10.84	**<0.01***
SMBT (cm)	526.89	46.60	558.44	59.25	5.51	**<0.01***
Y-M (R) (cm)	91.19	9.38	101.50	9.07	14.16	**<0.01***
Y-M (L) (cm)	89.20	9.84	100.80	9.65	20.07	**<0.01***
Y-IL(R) (cm)	73.69	11.56	83.81	11.75	28.01	**<0.01***
Y-IL(L) (cm)	70.78	11.42	80.20	11.51	17.10	**<0.01***
Y-SL(R) (cm)	57.76	9.33	66.74	9.90	17.78	**<0.01***
Y-SL(L) (cm)	56.28	11.29	64.98	10.80	15.92	**<0.01***
YCOM(R) (cm)	82.25	5.58	93.16	5.58	28.91	**<0.01***
YCOM(L) (cm)	79.91	7.65	90.93	7.32	28.84	**<0.01***

Note. CKUEST: Closed Kinetic Chain Upper Extremity Stability Test; SMBT: Seated Medicine Ball Throw; Y-M = Y balance Test Medial reach Direction; Y-IL= Y Balance Test inferolateral reach direction; Y-SL= Y Balance Test superolateral reach direction; YCOM: Y Balance Test Composite; R= Right Shoulder; L= Left Shoulder
* denotes significant p-value at 0.05 level

Table 4
Comparison of Parameters within the Experimental Group

Outcome Measures	PRE		POST		t	p value
	MEAN	SD	MEAN	SD		
CKUEST(R)	25.94	1.80	33.07	2.34	28.69	**<0.01***
CKUEST(L)	24.76	1.80	31.78	2.05	26.47	**<0.01***
SMBT (cm)	534.38	47.65	638.28	55.54	17.25	**<0.01***
Y-M (R) (cm)	94.58	9.22	118.94	7.31	24.43	**<0.01***
Y-M (L) (cm)	93.19	9.66	116.14	7.68	19.52	**<0.01***
Y-IL(R) (cm)	73.18	6.73	92.59	7.76	15.60	**<0.01***
Y-IL(L) (cm)	70.61	7.28	90.30	7.48	15.90	**<0.01***
Y-SL(R) (cm)	55.06	6.07	73.11	6.57	18.1	**<0.01***
Y-SL(L) (cm)	53.11	6.69	70.12	6.92	21.08	**<0.01***
YCOM(R) (cm)	80.97	6.69	103.43	5.84	31.30	**<0.01***
YCOM(L) (cm)	78.80	6.97	100.50	6.41	32.09	**<0.01***

Note. CKUEST: Closed Kinetic Chain Upper Extremity Stability Test; SMBT: Seated Medicine Ball Throw; Y-M = Y balance Test Medial reach direction; Y-IL= Y Balance Test infero-lateral reach direction; Y-SL= Y Balance Test supero-lateral reach direction; YCOM: Y Balance Test Composite; R= Right Shoulder; L= Left Shoulder
* denotes significant p-value at 0.05 level

Table 5
Comparison of Change Scores between Control and Experimental Group

VARIABLES	CONTROL		EXPERIMENTAL		Cohen's d	t	p-value
	MEAN	SD	MEAN	SD			
CKUEST (R)	3.89	0.93	7.13	1.05	11.11093	-9.78	**<0.01***
CKUEST (L)	3.31	1.41	7.02	1.23	7.807631	-8.01	**<0.01***
SMBT (cm)	31.56	24.31	103.89	25.56	5.430418	-8.70	**<0.01***
Y-M (R) (cm)	10.31	3.09	24.36	4.23	9.35985	-11.37	**<0.01***
Y-M (L) (cm)	11.59	2.45	22.96	4.99	8.789528	-8.67	**<0.01***
Y-IL(R) (cm)	10.13	1.50	19.41	5.28	7.610925	-7.16	**<0.01***
Y-IL(L) (cm)	9.43	2.34	19.69	5.25	7.164714	-7.57	**<0.01***
Y-SL(R) (cm)	8.98	2.14	18.05	4.20	8.109478	-8.17	**<0.01***
Y-SL(L) (cm)	8.70	2.31	17.02	3.43	8.795797	-8.53	**<0.01***
YCOM(R) (cm)	10.91	1.60	22.46	3.05	13.70197	-14.25	**<0.01***
YCOM(L) (cm)	11.02	1.62	21.70	2.87	14.04066	-13.75	**<0.01***

Note. CKUEST: Closed Kinetic Chain Upper Extremity Stability Test; SMBT: Seated Medicine Ball Throw; Y-M = Y balance Test Medial reach Direction; Y-IL= Y Balance Test infero-lateral reach direction; Y-SL= Y Balance Test supero-lateral reach direction; YCOM: Y Balance Test Composite; R= Right Shoulder; L= Left Shoulder
* denotes significant p-value at 0.05 level

DISCUSSION

The goal of the present study was to establish effects of FIFA 11 + Shoulder Injury Prevention Program's on shoulder performance variables, if any. This study reports significant enhancement of bilateral upper limb power, strength and dynamic balance in both the experimental and the control groups. Though there were significant improvements in all outcome variables with use of FIFA protocol in experimental group and with use of customary

warm up routine in the control group, yet the mean differences in all the variables were found to be higher in the experimental group than the control group post 8 weeks of adhering to the respective protocols. Previous studies have reported the impact of FIFA protocol in helping reduce the injury incidence in soccer players.

The Closed Kinetic Chain Upper Extremity Stability Test (CKCUEST) and Upper Quarter Y Balance Test in the current investigation showed statistically significant enhancement ($p<0.05$) in both groups. The closed kinetic chain upper extremity stability test (CKCUEST) and Upper Quarter Y Balance Test also showed a significant improvement in the dominant limb than the non-dominant limb. Replacing the customary warmup routine of soccer goalkeepers with FIFA 11+ Shoulder Injury Prevention Program in the experimental group led to improvement in the outcome variables i.e., the physical performance tests to a greater extent than in the control group. This improvement in physical performance tests is a result of a concomitant improvement in the shoulder musculature strength. This can be corroborated by the results of the study conducted by Guirelli et al. (2021) in which they reported that in both male and female individuals, there occurred a positive correlation between the strength of the scapular, shoulder, and spine muscles and tests of physical performance of the upper limbs namely Closed chain upper extremity stability test (CKUEST) and Upper Quarter Y Balance Test, demonstrating that increasing the strength of these stabilisers improves physical performance in the corresponding tests and directions.

The current study's explanation for the gain in dynamic balance is that one of the elements of the Shoulder Injury Prevention Program FIFA 11+ is core strengthening which further helps in the improvement of shoulder performance variables in soccer goalkeepers. Imai et al. (2014), found similar findings and concluded that trunk stabilisation exercises have an immediate impact on dynamic balance and exhibit a very high correlation in the posterolateral and posteromedial direction, providing evidence in support of this claim (Imai et al., 2014). Furthermore, Ahmed et al. (2022) found a substantial positive link between dynamic balance and core stability in both the limbs, dominant and non-dominant (Ahmed et al., 2022).

The ability to execute tasks safely by soccer goalkeepers requires a certain level of physical endurance, balance, and power as well as enough neuromuscular coordination, joint flexibility, and training to minimise the risk of injuries. This warm up protocol places a strong emphasis on developing muscle groups like the shoulder rotator cuff (Ejnisman et al., 2016). Serratus anterior and lower and middle trapezius are additional key muscles to focus on in order to prevent scapular dyskinesis. The superior trapezius and these muscles' strength work

together to maintain the proper scapulohumeral rhythm. In addition to closed kinetic chain workouts included in FIFA 11+ protocol that replicate falls and movements on the ground, open kinetic chain exercises with ball-throwing motions are also featured. In both scenarios, core activation is necessary to transfer and dissipate energy in the kinetic chain as well as to maintain the proper muscle activation sequence. Additionally, activities that include the diagonal are advised to build muscle. The rotator cuff, scapular waist, and deltoid muscles are all engaged during a diagonal motion that alternates between a flexor pattern (acceleration) and an extension pattern (deceleration). The intra-articular power couples' coactivation may be enhanced by this motion. The workouts in the FIFA 11+S programme are designed to develop the muscles in the shoulder, elbow, wrist, and finger as well as to train core stability (Al Attar et al., 2021).

The improvement in Y balance test score was reported in our study. Saberian Amirkolaei et al. (2019) found that eight weeks of Swiss ball training boosts the Functional Movement Screening (FMS) and Y scores of the lower and upper limbs in their investigation of the impact of Swiss ball training on the integration of functional movements and balance in adolescent badminton players. They consequently believed that the improvement in reach scores following this training was crucial in helping badminton players avoid injuries. They employed exercises like the plank, press-up, and others that, in terms of function and muscle activation, are quite comparable to a number of drills of 11+ shoulder exercises, which may have contributed to the improvement of the Y balance scores in the current study.

The neuromuscular and plyometric exercises used in the 11 + S programme are responsible for the research participants' considerable improvement in stability. The neuromuscular workouts increase the nervous system's capacity to generate a quick and pleasurable muscle stimulus pattern, which improves dynamic joint stability, lowers joint forces, and releases movement patterns (Granacher et al, 2018).

As one of the most widely used techniques for measuring power, the sitting medicine ball throw (SMBT) was performed in this study to assess the changes in strength of the upper extremities. SMBT is a reliable instrument for evaluating upper body explosiveness in the athletic population (Beckham et al., 2019). The increased power in the current study is likely the result of stronger muscles. These exercises can enhance agility, eccentric rotator strength, muscle coordination, strength, and neuromuscular activation. They might have a big impact on improvements in upper extremity strength and balance.

On the other hand, the findings of our study are not in tandem with the study done by Kyranoudis et al. (2020) who found that pre-warm-up activities do not improve

performance in the ranges of hip flexion and countermovement jumps with arm swings over a standard soccer warm-up (Kyranoudis et al., 2020). The reason for this mismatch can be due to different regions studied in both the studies.

The FIFA 11+ S protocol was far more effective than standard warm-up routines at improving upper limb performance, as evidenced by the fact that mean differences were larger in the experimental group in comparison to the control group and large effect sizes have been obtained when post-intervention values of all parameters were compared (Cohen's d >1) (Table 5). Therefore, FIFA 11 + Shoulder Injury Prevention Program is more effective in enhancing the performance variables of upper limb i.e. stability, dynamic balance and power than the customary warm up routines followed by soccer goalkeepers of Delhi-NCR region.

There is, however, a paucity of data describing how the warm-up regimen affects the dynamic stability of the upper extremities. We recommend that more research be done in order to assess and determine the impact of the FIFA 11+ S programme on dynamic stability in football goalkeepers belonging to different regions and performing different customary warm-up routines.

This study has some limitations namely, study duration was less and intensity can be varied to see better effects. Secondly, the study has evaluated only male soccer goalkeepers.

CONCLUSION

The present study draws the conclusion that, when compared to the conventional warm-up routine, the FIFA 11+ Shoulder Injury Prevention programme is more effective at improving upper extremity performance, dynamic balance, and dynamic stability in male soccer goalkeepers over an 8-week period. This study also suggests that soccer goalkeepers should incorporate the FIFA 11+ Shoulder Injury Prevention programme into their normal warm-up routines. Future research is necessary to identify the age variance among groups and gender-specific differences. Along with its effects on other performance indicators, FIFA 11+ S is also suggested for goalkeepers who play in other overhead sports and who wear protective gear, such as hockey.

The present study will enhance the effects produced by FIFA 11+ Shoulder Injury Prevention Program on upper extremity performance. The study will help in globalising the FIFA 11+ Shoulder Injury Prevention Program as a regular warm-up program done by soccer goalkeepers.

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Author contributions

All authors contributed in study design, statistical analysis and manuscript preparation.

Declaration of conflict interest

Authors declare no conflict of interest.

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