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Normative Values of Functional Movement Screening Score FMS to Predict Injury Risk and Level of Fitness among Domestic Cricket Players in Twin Cities Pakistan

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Abstract

Normative values of Functional Movement Screening To Predict Injury Risk and Level of Fitness Among Domestic Cricket Players in Twin Cities, Pakistan.Background:-Injury risk is a common concern among domestic cricket players, particularly those with poor functional movement patterns. Previous research suggests that players with Functional Movement Screen (FMS) scores below 14 are at a higher risk of injury, which may negatively affect their performance during matches and training. Predict injury risk and Level of Fitness Using Normative values of FMS scores among domestic cricket players in the Twin cities,Pakistan.The FMS protocol includes the following seven movement

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assessments:-Deep Squat,Hurdle Step,In-Line Lunge,Shoulder Mobility,Active Straight Leg Raise,Trunk Stability,Push-Up,Rotary Stability. A cross-sectional survey was conducted using a convenient sampling method at various cricket academies in Rawalpindi and Islamabad. A total of 170 male cricket players participated in the study. Data were collected using the Functional Movement Screening tool, and statistical analysis was performed using SPSS software. Players scoring below 14 on the FMS were considered at higher risk for injury. Out of the 170 participants, 6 cricket players (3.53%) scored below 14 on the FMS, indicating a heightened risk of injury. A statistically significant association was found between FMS scores below 14 and an increased incidence of reported injuries ($p < 0.05$), suggesting that inadequate functional movement patterns correlate strongly with injury risk. The findings highlight that a small but significant proportion of domestic cricket players in the twin cities are at increased risk of injury due to low FMS scores. Regular functional movement screening should be incorporated into training routines to identify at-risk athletes early, enabling the implementation of corrective exercise programs aimed at reducing injury risk and enhancing overall athletic performance.

Keywords: Functional Movement Screening, Injury Risk, Fitness Level, Domestic Cricket Players, Pakistan

INTRODUCTION

Cricket is a Well-known Sport that is Widely Played all over the World including Countries of South Asia like Pakistan, India etc . In Pakistan, Karachi, Islamabad, Lahore, are the center for producing Domestic talent.Cricket is a highly demanding game both physically and mentally. It require certain strength, endurance, agility, and flexibility depending on the role of cricketer as Batsmen, Bowlers or All - Rounders.(et al Khan . 2025).

It is a Well known game and has global recognition.The three most common formats are T20's consist of 20 overs game,ODI consist of 50 overs and Test cricket of 5 days.The demands and requirements of all three formats are different. So,Cricket is associated with high prevalence of injuries varying from acute injuries (caused by traumas) to chronic injuries that are caused by overuse or repetitive movements.(Constable . 2021)

Cricketers perform asymmetrical movement patterns such as bowling,batting,and fielding which results in muscular imbalances as time passes.Bowlers perform highly repetitive movements with pace and batters are more likely to master balance during movement and stability to play a stroke effectively.As compared to batsmen and fielders,

fast bowlers are at higher likelihood of injury risk due to their Pace and Impact full nature of their movements.(Dr.B Prabakar . 2025c)

Cricket is a well known sport that is ranked second in the world most popular sports and is started by British as the national game of England has the three major aspects batting,bowling(Fast or spin),fielding.Pace bowlers deliver the ball at high speed and different variations to deceive the batsman to get a wicket.The study of biomechanics of Pace bowler is important for two major reasons:-

- To highlight injury and injury risk among pace bowlers due to the effect of their high speed and faulty techniques on joints.
- To highlight key performance attributes needed to bowl fast to deceive batsman and getting successful in taking wicket.

There are many key factors that are required by different bowlers in order to deliver a effective pace ball.Bowlers skills vary from player to player but most of the pace bowlers use their pace as an agent to dodge a batsman and gets his wicket.The speed of the ball is the main component of pace bowling that should be executed well from first foot contact to release of the ball.Initially Pace bowlers focus on running technique and then on running length and speed.(Kaushal Manawadu . 2022).

The second type of bowlers are Spin bowlers that are further divided into two types Finger spin bowlers(that use fingers to spin ball) and Wrist spin bowlers(that uses wrist to spin the ball).The Finger spin bowler perform flexion of fingers around the ball to rotate it and Wrist spin bower causes wrist movement to rotate the ball mainly differ in ball release.They use different techniques to get wickets.The spin bowlers rotate the ball so propel the ball to move away from their original direction when comes in contact with ground.(Apurva Mathankar . 2021).

The Biomechanics of bowling has taken two points into consideration:Identify potential factors that increases likelihood of injury in bowlers especially low back region and the relationship of kinematic variables with pace bowlers.While bowling,bowlers create a particular set of joint torque to relate limb movements to create an effective bowling action (Ali et al., 2025). Fast Bowlers need to control kinematics of bowling hand to deliver ball with high velocity and precision (Nabi et al., 2025). Therefore,bowling is a highly coordinated work as it involve run up to create momentum.Bowling not only involve kinematic analysis but also technical analysis and require an overall integrated analysis of bowling kinetics.(Ferdinands, 2015).

In Cricket,Batting is the job to hit the ball with bat to score runs and avoid his dismal.Biomechanics is focused on how to help and guide coaches to facilitate player development program.Batsman is a term used to describe players that have speciality in

batting or anyone whose turn to bat and the job of hitting a ball is known as shot or stroke. The literature reviews showed that there is a lot of research work done on cricket batting skill that analyze specific cricket test.Some researchers worked on the position of bat hitting a ball and some worked on batting skills.Researches develop batting skill test to assist in players development.Research and practice are used to enhance cricket batting skills by using Bio mechanical analysis.Many researches worked to study the kinetics of foot work in batting with different gripping forces and they worked on kinetics as well as on kinematics.The centre of mass and position of head are the main difference in skilled and less skilled cricket batsman.(MD. ALI IMAM HOSSAIN, 2015).

In Cricket,Fielding is an important component of cricket and the aim of fielding is to restrict opponent team to minimum score.This is gain through:quickly catching the ball with safe hands and throwing it to right side either Wicket keeper side or bowler side,running out the batters by throwing the ball to strike the wickets,restricting boundaries by active fielding.Fielding require certain physical fitness characteristics that can be developed through strength and conditioning program.It is suggested to develop a well design program for fielders that include certain characteristics like Physical and aerobic fitness,strength,power and Coordination.(Lim, 2023).

Cricket is popular sport that require physical fitness,talent,hard work,skill and tactics.Cricket is a physical activity So,Repetitive, non-contact and impact injuries are most commonly known to occur.Bowlers(41.3%) are more likely to be injured followed by fielders and Wicket keepers(28.6%) and batter the least.Acute injuries(64-76%) are most likely to occur then acute-chronic injuries(16-28.6%) and then chronic injuries(8-22%).The most common injury among cricketers in this modern cricket is hamstring strain and lumbar stress fractures in Pace bowlers.(Dinshaw N.Pardiwala . 2017). Injury risk factors in Fast Bowlers are Faulty bowling action,lack of proper physical characteristics,flexibility insufficiency,High repetitive and overuse activities and lack of warm up and return to play exercises immediately after injury.Injury risk factors in batsmen are overuse injuries,impact injuries,lower limb injuries due to running between wickets,lack of cricketers attributes and sports related training.Injury risk factors in Fielders are Contact injuries,impact injuries and muscle strains.(Lee Pote, 2018a).

Injury can cause Substantial effect on Cricketer professional and personal life therefore, early detection of injury is essential. This is Achieved by developing effective screening and rehabilitative strategies.(et al Khan . 2025a). Injury is the physical damage to body caused by either external force or internal force.(J Langley, 2025).

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The type of injuries are either Acute or chronic.Acute injuries occur suddenly e.g, Trauma,Impact injury. Chronic injuries gradually progresses over time.The Common sites of Injury among cricketers are:-
Upper limbs,lower limbs,lower back and Abdominal regions.
Upper limb injuries are mostly acute in nature occur in Fielders and Wicket keepers.Lower limb injuries are either acute and chronic in nature occur in batsmen.Lower back injuries are mostly chronic in nature and occur in Fast bowlers.Abdominal region injuries occur in Fast bowlers and chronic in nature.(Lee Pote, 2018b)

Domestic cricket is defined as any cricket that is played below international level such as at regional level,intercity level and even at club and academy level.(Law insider . 2025).

Functional movement screening is a vital tool used in sports that helps clinician and healthcare professions to screen individual for risk of injury and limitation in movement pattern.(et al Khan . 2025b). The FMS was formulated to monitor athlete performance maintaining balance while performing fundamental movements.FMS examined athletes in Postures and positions in which movement restrictions and asymmetries may be detected and thus act as a indicator for injury.(Warren . 2018a). Functional movement screening is a standardized assessment tool utilized to identify impairments and asymmetries , limitations, impaired fundamental movement pattern that result in injuries among sportsmen.It is important to assess body proportions(weight and height) during training and sports performance.(Singh . 2023).

FMS score consist of Raw score,final score,composite score,symmetrical and asymmetrical movement patterns and movements related with pain. FMS score consists of seven basic movement.

LITERATURE REVIEW

The study showed that due to the increase in workloads in New Zealand International and domestic cricket players has increased the risk of injury.The overall new match injury incidence rates between 2009- 2015 were 37.0 injuries per 10,000 player hours in domestic cricket and 58.0 injuries per 10,000 player hours in international cricket.Most injured body sites were hamstring (8.2%) in domestic players and groin (13.5%) in international players.the conclusion made was that the New Zealand Cricket players internationally and domestically were most injured during 2009- 2015 due to increase in 20-20 matches.It is suggested that workload interventions may positively influence injury incidence rates in future.(Dovbysh T . 2021).

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The study was done to identify that score of 14 or less have been found to predict injury among various sport groups The study determines in-season injuries among adolescent paces bowlers The mean FMS score for sample was 16.44 (2.41).The non injured group 16.55 (2.57) score slightly higher than the injured 16.1 (2.07) group So the total FMS score of 14 does not provide sensitivity (0.2) needed to assess injury risk among adolescent pace bowler. (Martin, 2015).

This study was written to identify movement inefficiency, preventing injury, and enhancing athletic performance.Cricket is a combination of asymmetrical movements,repetitive actions, and high physical demands.FMS proves to be a trans formative tool in Advancing the Health and Performance of cricketers.The study highlights the effectiveness of FMS in reducing injury incidence, improving movement efficiency, and enhancing key performance metrics such as agility and accuracy.FMS was used through multidisciplinary approach for cricketers benefit. Its integration into cricket training programs, despite certain challenges, promises significant benefits for athletes at all level.(Dr.B Prabakar . 2025a).

The Study demonstrated that FMS was used to assess an individual movement quality, stability and balance .The purpose of this study was to evaluate the existence of composite FMS score proficiency barrier of predict injury risk and find out association between proficiency barrier for injury and psychometric qualities among cricket players.Total 120 participants completed the study in Ahmadabad city.The mean age participants was 13.83 ± 2.90 yrs 88% boys 12% girls participated after calculating mean functional movement screening among recreational cricket players.Total FMS score is 18.86. FMS score of 18 is gold standard for assessing risk of injury in all population.The study had suggested good FMS cut score for assessment .The conclusion stated that addressing movement dysfunction may aid in injury reduction and potentially improve sport performance (Neha P Patel . 2024).

The study was written to describe relationship between FMS score and sports injury risk among sportsmen. The objective was to highlight athletic gender, age,type of sport,injury description and mechanism related to the different findings. FMS composite score meta-analysis was based on 29 studies. There was low likelihood to occur in juniors and males as compared to seniors and female. FMS score showed greater injury risk in rugby players then followed by American football and Ice hockey players. Specificity values were higher as compared to sensitivity values for FMS composite score.FMS asymmetry meta-analysis included 11 studies. Sensitivity values were higher in comparison to specificity values for FMS asymmetry.Out of this only four studies provided related details about FMS pain and injury risk and had smaller effect in

senior.FMS composite scores and asymmetry were beneficial for measuring injury risk in senior compared to junior athletes and their effect sizes tended to be small except for FMS composite scores in rugby, ice hockey and American football athletes(Emma Moore, 2019).

The Study stated the usefulness of FMS in identifying injury risk in sports.The FMS is standardize screening tool that was used to measure scores by raters with different scenario and history.FMS is a highly valid and sensitive tool.Irrespective of usefulness of FMS ,there is lack of evidence related to injury prediction.Previous researches showed flawed relationship between FMS and injury.A well planned,effective prospective cohort studies are required to permit final investigation of FMS as a Screening tool to highlight those who had high chances of injury risk and requirement of treatment protocol(Warren . 2018c).

This study showed the strength of association between FMS composite scores and subsequent injury risk,taking into consideration methodological quality and diversity.The 24 studies were studied with the help of this tool.This study showed a strong evidence of association in male military personnel and a moderate evidence to recommend against the use of FMS composite score as injury prediction tool in football.In other populations (including American football,college athletes,basketball,running)the evidence was "limited"and "conflicting".So the strength of association between FMS composite scores and subsequent injury does not support its use as an injury prediction tool (Robert W Moran, 2017).

This study showed the association between FMS composite score and movement pattern scores and acute non contact and overuse musculoskeletal injuries in division 1 college athletes.The study included 167 injury-free college basketball, football, volleyball, soccer, golf and tennis athletes.The FMS was conducted before participation examination.FMS CS was not different between those injured and non-injured.Incline lunge was the only movement pattern that was associated with injury. Those Scoring 2 were less likely to have an injury VS those who scored 3.FMS CS movement patterns and asymmetry were poor predictors of non contact and overuse injury in this cohort of division 1 athletes.(Warren . 2015).

This study showed that the assessment of dysfunctional movement and asymmetries in children and youth using FMS.Using the FMS to assess asymmetries is important because having asymmetrical movement patterns in two or more individual tests items increases the risk of injury.In this study 86 of the 94 (92%) children had a dysfunction on at least one FMS test item which is in agreement with 93% of male cricket players and 85% of 7th and 8th grade physical education students previously

reported.The consensus of the literature is that the total FMS score is not a good predictor of risk for injuries in youth.We do not recommend the use of a threshold FMS score established in adults (FMS=14) to identify increase in risk injury (Pat R Vehrs, 2021).

This study evaluated the accuracy of the FMS for predicting injury in National Collegiate Athletic Association Division 2 Athletes and to evaluate how an injury definition may affect the prognostic values.The athletes were prospectively screened with the FMS and monitored for injury.It was used to predict MSK injury ,overall injuries and severe injuries.The characteristics curve provided the FMS cut score of ⩽15 for the study sample. Sensitivity was 0.63 and specificity was below 0.50 for all 3 injuries definition of MSK injury overall injury and severe injury.Relative risk was 1.25 for MSK injuries .1.24 for overall injuries ,1.45 for severe injuries .The overall prognostic accuracy of the FMs offered a slightly better than 50/50 chance of correctly classifying those most at risk of injury.FMS does not provide prediction of injury only use it for assessment tool for movement quality rather than injury prediction tool(Bryan Dorrel, 2018).

The study told us that functional movement screening is valid screening tool for identifying the injury among athletes. They performed the FMS on Bowlers before start of season. The student T-test and Fisher's test were used to compare the FMS score of injured and non injured bowler who scored 14 or above and they concluded that there was no difference between non injured (16.5+-2.57) and injured (16.1+-2.07) according to FMS.(Candice Martin, 2017).

The study reported the measurement capabilities and predictive validity of FMS for injury. The study showed that the FMS was carried out with scores recorded by an experienced Assessor and then Assessor scores were compared with Photographic system to determine measurement validity and predictive validity and assessor scores matched the photo gram metric score awarded for one of participant.(Fraser Philp, 2018). The study showed that cricket is a well known sport played all over world but the causes and reason behind injury are not yet cleared that are necessary to develop preventive measures in order to avoid any hindrance in on going game.This study included 13 studies out of which results of 8 studies are ambiguous ,one having high and remaining three having low likelihood of bias.The study showed that the mean score for completeness of data against the consensus statement was 3.5/10(95%C.I.2.8-4.2) and the mean score for completeness of data against the ASIID was 4.4/6(95%C.I.3.9-5.0).The included studies inconsistently addressed recommended items for injury surveillance in community sport and cricket.Most studies focused on junior

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levels or adolescent bowlers,with bruising/inflammation and stress fractures being most common,respectively.(Geordie Mcleod, 2020).

The Study showed that Cricket is becoming more popular, but there is limited research on fitness and training for specific roles like spin bowlers. Most studies focus on how the ball behaves like swing and spin but not on what spin bowlers need physically to perform well.Spin bowlers play a key role in confusing batters by spinning the ball to make it change direction. To help teams perform better, it's important to focus on improving the fitness and skills of spin bowlers.There is a lack of detailed studies on the physical demands, movement patterns, injuries, and training methods for spin bowlers. This article reviews the current research in these areas and provides practical tips for creating better strength and conditioning programs for them.(Apura mathankar et al., 2021).

The Study showed that Fast bowling in cricket relies more on the speed and length of the delivery than on spin, and it can disrupt a batter's timing through changes in speed, axis, and spin. Most research so far has focused on ball release speed and its relationship with kinematic and kinetic changes during the bowling action.However,there is limited understanding of how fast bowlers adjust their technique to deliver different pitch lengths such as Yorkers, bouncers, and stock balls. While some studies have examined muscle activity and ground reaction forces, few have analyzed how body movements change across delivery types. Recent findings show that joint angles, especially at the wrist, shoulder, and thoracic regions, play a key role in determining pitch length.Overall, there is a need for more research into the bio-mechanical and kinetic adjustments bowlers make to control delivery length.Understanding these changes can help improve training methods and bowling performance.(Kaushal Manawadu et al., 2022)

This study showed that Recreational cricket players' injury risk is evaluated using the Functional Movement Screening (FMS), which gauges a person's mobility. It examines the relationship between damage barriers and psychometric qualities, however there is little evidence that it can predict outcomes. A small positive correlation between characteristics and injury barriers was found in a study involving 120 Ahmadabad players ($r = 0.253$, $p < 0.005$). The ideal criterion for injury risk is determined to be an FMS score of 18.(Neha P Patel et al., 2024)

The study was written to check the association between Functional movement screening and injury risk among domestic cricket players .They took sample of 150 male players and by using FMS tool and identify the deficiency in movement pattern. If the score of FMS will low then it means the risk of injury among cricketers are high and vice

versa.The functional movement screening tool plays very important role in sports population and helps in injury prevention by improving our functional movement screening (FMS) score.(Khan et al., 2025)

This study shows FMS as a screening instrument that evaluate selective fundamental movement patterns.The Study included one hundred physically active students, between 18 and 25 years of age with no recent (<6 weeks) history of musculoskeletal injuries were recruited. Out of 100 subjects 35 suffered an acute lower extremity (ankle =20 , knee =15)injury in practice or competition. An odd ratio of 4.70 was calculated meaning that an athlete had an approximately 4.7 times greater chance of suffering a lower extremity injury during a regular competitive season If they scored, 17 on the FMS . This study provides FMS references values for physically active students which will assist in interpretations of individual scores when screening athletes for MSK injury and performance factors. More research is still necessary before implementing FMS Pre Participation physical examination for athletes, due to low cost and its simplicity to implement it should be considered by clinicians and research it for factor.(Amir Letafatkar et al., 2014)

The Study showed that the FMS is used to identify movement deviations. Limited research has been conducted to verity the predictive value of the FMS test to identify injury risk. The purpose of this study was to investigate the predictive usefulness of FMS. FMS scores of 144 national collegiate athletic association division 1 football athletes were obtained during preseason. A cut off score was determined using a receiver operator characteristic curve. A maximized odds ratio of 1.4 2595% confidence interval (0.6-3.2) and a positive likelihood ratio of 1.154 were fond for individuals that scored 17 or below on the FMS results were contrary to previous research and indicate that the FMS is not useful for predicting MSK injuries.(Brian William Wiese et al., 2014).

The Study was conducted to review,evaluate and synthesize the scientific literature of FMS driven research for scientist and strength and conditioning specialists. 34 articles were read obstruct and coded for this review.Thirteen descriptive studies explored the main tasks in test development like factor structure objecting reliability.12 studies covered ability of FMS to predict sporting performance and injury risk. 7 studies investigated the effectiveness of the FMS in designing programs. Results suggest that the FMS is reliable screen.If the rater is educated and has solid experience. Factor analysis describes the FMs as a unitary construct which is an argument against FMS total score. Studies clearly illustrate its limited ability to predict athletic performance on the contrary to predict injuries risk team ports the FMs total score is supported by moderate scientist evidence the majority of FMs based intervention programs showed an

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improvement on general motor quality, however randomized trial do not confirm results.(Kraus, 2014).

The research showed that the FMS is used to evaluate the movement quality of an individuals,however the FMs composite score used to predict sports injuries is currently ambiguous.This study investigate whether FMS scores could accurately predict sports injuries in college students with different levels if physical activities and sport performance.187 college student age 18-22 were prospectively screened by the FMS test.The FMS composite score exhibited a fair association with sports injuries.Those with a FMs cut off point of 17.5 were more likely to acquire sports injuries.The FMS cut off score successfully identified individuals who reported sports injuries at a higher rate in the low (PA,84.62.SP,90.48%) and moderate (PA, 93.75% SP 77.78%) groups than in (PA 65.52%. SP.57.89%) the FMS composite score could be used to predict sports injuries in college students with an FMS cut off value of 17.5 population stratification by the levels of PA and SP seems to influence the predictive accuracy of the FMS.(Hua Liu, 2023).

The purpose of the study was to ascertain the prevalence of musculoskeletal issues among male club cricket players. The Modified Nordic Musculoskeletal Questionnaire was used to survey 125 players. According to the findings, 61% of cricket players said they had musculoskeletal problems within the previous 12 months. The knee, ankle, and lower back were the most impacted. Problems were more common among all-rounders (70%) than among bowlers (60%) and batsmen (42%). The most frequent injury kinds were sprains and strains. According to the study, all-rounders mostly experienced ankle issues, while bowlers and batters were most likely to get lower back injuries.Overall, sprains and strains were shown to be the most common injury types.(P. Sathya et al., 2017).

Cricket is a bat-and-ball game that requires high physical fitness and skills. There has been little research on injuries in community-level cricket players, highlighting the need for more studies to understand and prevent such injuries. A study examined the frequency and causes of injuries during one season, involving 96 participants from two cricket boards. Findings showed that 90. 6% reported musculoskeletal pain or injury. Injuries predominantly affected the upper limbs (51%) and lower limbs (45. 8%), with common sites including the hand, thigh, ankle, and shoulder. Key injury types were sprains, strains, bruises, and overuse injuries. The main causes included overuse and fast movements. Most players indicated that primary healthcare services were lacking in their clubs. Prevention and access to early healthcare are crucial for community cricket players.(S Zondo, 2023).

The Study was conducted to review existing literature on the FMS and its relevance in sports settings.They concluded that while FMS can help to identify athletes at risk of injury, its predictive reliability is influenced by variables such as the athletes age , gender and the nature of sport.The review suggested that FMS tends to be more effective among older athletes and those involved in contact sports.(Taylor R. Niles et al., 2021).

The editorial explored the growing application of clinical movement screening tools in sports medicine,particularly in their role in forecasting injuries and shaping preventative training strategies.FMS tool has received considerable attention.However ,its effectiveness remains under debates due to inconsistent findings across various studies . while some components of the FMS ,like the deep squat and push-up, have been linked to injury risk, other research has failed to confirm these associations ,highlighting the need for additional study.(Nicole J Chimera et al., 2016).

The Study investigated the relationship between FMS scores and injury risk among active male military personnel .Their finding showed that individuals scoring 14 or lower on FMS were significantly more likely to experience MSK injuries including overuse and traumatic types. The result highlighted that lower FMS scores were strongly linked to an increased risk of injury , suggesting the FMS may serve as a valuable screening tool to identifying individuals at higher risk.(Timothy T. Bushman, 2015).

The study was written to Conduct a study revealing that rugby players who reported pain and demonstrated asymmetrical movement pattern during the Pre-season and were nearly three times more likely to experience severe injuries during matches. Additionally,lower FMS scores correlated with significantly higher injury burden across the season.(M J Attwood 2019).

The study was done to investigate incidence of musculoskeletal injury and injury risk factor in elite domestic cricket player.The study showed that the participants had the highest sustained 42.2% strain injury and the rate of 42.9%was reported for risk factors in running excluding body mass index and ground condition initially..Batsmen were most likely to sustain strain injuries mostly on upper limb.(Muhammad Forhadul Hoque, 2020).

METHODS AND MATERIALS

STUDY DESIGN

Cross Sectional Study

SAMPLING TECNIQUE

Convienient Sampling

SAMPLE SIZE

OPEN EPI Tool

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The Proposed Sample size is 170 with Confidence Interval 95% calculated by Open EPI Tool.

STUDY DURATION

Data was Collected from Synopsis Acceptance to 3 Months Onward.

SELECTION CRITRIA

INCLUSION CRITERIA

Male Players of Age Above 16 years.
Players who have participated at least 2 years of experience in domestic cricket.
Currently active and training with their respective teams.
Willing to participate and provide informed consent .

EXCLUSION CRITERIA

Players with current open injuries that prevent participation in functional movement screening assessment.
History of neurological and systemic disorders.
Players who have undergone major surgery (orthopedic or otherwise) in past 6 months.
Ex cricketers or Cricketers who are not playing are not included in this study.

TOOL USE

Functional Movement Screening Score
VALIDITY OR RELIABILITY OF FUNCTIONAL MOVEMENT SCREENING.

Ethical Considerations:

The Study didn't cause any Physical,Emotional or Psychological toll to any Player.
Privacy and Confidentiality is fully considered while taking and maintaining data.

DATA ANALYSIS

The data was analyzed using SPSS version 26.

RESULTS AND DISCUSSION

AGE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	16-20	133	78.2	78.2	78.2
	21-25	33	19.4	19.4	97.6
	26-30	4	2.4	2.4	100.0
	Total	170	100.0	100.0	

Table shows that Participant of Age 16-20 has frequency 133 and percentage of 78.2% and Cumulative Percentage is 78.2,Participants of Age 21-25 has frequency of 33 and Percentage of 19.4 and Cumulative percentage of 97.6%,Participants of Age 26-30 has frequency of 4 and Percentage of 2.4 and Cumulative percentage of 100%,Total participants has frequency of 170 and percentage of 100%.

HEIGHT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	5.1-6	151	88.8	88.8	88.8
	6 Above	19	11.2	11.2	100.0
	Total	170	100.0	100.0	

Table Shows Participants of Height 5-6ft has frequency of 151 and Percentage of 88.8% and cumulative percentage of 88.8%,Participant of age 6ft and above has frequency of 19 and percentage of 11.2% and Cumulative percentage of100%.

WEIGHT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	35-45	7	4.1	4.1	4.1
	46-55	34	20.0	20.0	24.1
	56-65	84	49.4	49.4	73.5
	66-75	32	18.8	18.8	92.4
	4	13	7.6	7.6	100.0
	Total	170	100.0	100.0	

Table shows that the Participant of weight 35-45kg has frequency of 7 and percentage of 4.1% and cumulative percentage of 4.1%,Participants of weight 46-55kg has frequency of 34 and percentage of 20% and cumulative percentage is 24.1%,Participants of weight 56-65kg has frequency of 84 and percentage of 49.4% and cumulative percentage of 73.5%,Participants of weight 66-75kg has frequency of 32 and percentage of 18.8% and cumulative percentage of 92.4%,Participants of weight 75 and above has frequency of 13 and percentage of 7.6% and cumulative percentage of 100%.

PRIMARY SPORT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Batsman	89	52.4	52.4	52.4
	Bowler	55	32.4	32.4	84.7
	All rounder	26	15.3	15.3	100.0
	Total	170	100.0	100.0	

Table shows that the participant who are batsman has frequency of 89 and percentage of 52.4% and cumulative percentage of 52.4%,Participants who are bowler has frequency of 55 and percentage of32.45 and cumulative frequency of 84.7%,Participants who are all-rounders has frequency of 26 and percentage of 15.3%and cumulative frequency of 100%.

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PRIMARY POSITION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Standing	170	100.0	100.0	100.0

zable shows all Participants are in Standing position has frequency of 170 and Percentage of 100%and cumulative frequency of 100%.

HAND/LEG DOMINANCE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Left	30	17.6	17.6	17.6
	Right	140	82.4	82.4	100.0
	Total	170	100.0	100.0	

Table shows that Participant with Left Hand/leg dominance has frequency of 30 and percentage of 17.6% and cumulative frequency of 17.6%,Participants with right Hand/leg dominance has frequency of 140 and percentage of 82.4% and cumulative percentage of 100%.

DEEP SQUAT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Unable to perform without significant compenstation	2	1.2	1.2	1.2
	Able to perform with minor compensation	43	25.3	25.3	26.5
	Able to perform perfect movement without pain	125	73.5	73.5	100.0
	Total	170	100.0	100.0	

Table shows that Participants who are unable to perform without significant compensation has frequency of 2 and percentage of 1.2% and cumulative percentage of 1.2%,Participants who are able to perform with minor compensation has frequency of 43 and percentage of 25.3% and cumulative percentage of 26.5%,Participants who are able to perform with perfect movement without pain has frequency of 125 and percentage of 73.5% and cumulative percentage of 100%.

HURDLE STEP LEFT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Unable to perform without significant compensation	1	.6	.6	.6

	Able to perform with minor compensation	49	28.8	28.8	29.4
	Able to perform perfect movement without pain	120	70.6	70.6	100.0
	Total	170	100.0	100.0	

Table shows That the Participants who are unable to perform without significant compensation has frequency of 1 and percentage of 0.6% and cumulative percentage of 0.6%,Participants who are able to perform with minor compensation has frequency of 49 and percentage of 28.8% and cumulative percentage of 29.4%,Participants who are able to perform perfect movement without pain has frequency of 120 and percentage of 70.6% and cumulative percentage of 100%.

HURDLE STEP RIGHT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Unable to perform without significant compensation	2	1.2	1.2	1.2
	Able to perform with minor compensation	35	20.6	20.6	21.8
	Able to perform perfect movement without pain	133	78.2	78.2	100.0
	Total	170	100.0	100.0	

Table shows that the Participants who are unable to perform without significant compensation has frequency of 2 and percentage of 1.2% and cumulative percentage of 1.2%,Participants who are able to perform with minor compensation has frequency of 35 and percentage of 20.6% and cumulative percentage of 21.8%,Participants who are able to perform perfect movement without pain has frequency of 133 and percentage of 78.2% and cumulative percentage of 100%.

INLINE LUNGE LEFT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Unable to perform without significant compensation	1	.6	.6	.6
	Able to perform with minor compensation	42	24.7	24.7	25.3

	Able to perform perfect movement without pain	127	74.7	74.7	100.0
	Total	170	100.0	100.0	

Table shows that Participant who are unable to perform without significant compensation has frequency of 1 and percentage of 0.6% and cumulative percentage of 0.6%,Participants who are able to perform with minor compensation has frequency of 43 and percentage of 24.7% and cumulative percentage of 24.7%,Participants who are able to perform movement without pain has frequency of 127 and percentage of 74.7% and cumulative percentage of 100%.

INLINE LUNGE RIGHT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Unable to perform without significant compensation	2	1.2	1.2	1.2
	Able to perform with minor compensation	26	15.3	15.3	16.5
	Able to perform perfect movement without pain	142	83.5	83.5	100.0
	Total	170	100.0	100.0	

Table shows that Participant who are unable to perform without significant compensation has frequency of 2 and percentage of 1.2% and cumulative percentage of 1.2%,Participants who are able to perform with minor compensation has frequency of 26 and percentage of 15.3% and cumulative percentage of 16.5%,Participants who are able to perform movement without pain has frequency of 142 and percentage of 83.5% and cumulative percentage of 100%.

SHOULDER MOBILITY LEFT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Unable to perform without significant compensation	13	7.6	7.6	7.6
	Able to perform with minor compensation	50	29.4	29.4	37.1
	Able to perform perfect movement without pain	107	62.9	62.9	100.0

	Total	170	100.0	100.0

Table shows that Participant who are unable to perform without significant compensation has frequency of 13 and percentage of 7.6% and cumulative percentage of 7.6%,Participants who are able to perform with minor compensation has frequency of 50 and percentage of 29.4% and cumulative percentage of 37.1%,Participants who are able to perform movement without pain has frequency of 107 and percentage of 62.9% and cumulative percentage of 100%.

SHOULDER MOBILITY RIGHT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Unable to perform without significant compensation	7	4.1	4.1	4.1
	Able to perform with minor compensation	42	24.7	24.7	28.8
	Able to perform perfect movement without pain	121	71.2	71.2	100.0
	Total	170	100.0	100.0	

Table shows that Participant who are unable to perform without significant compensation has frequency of 7 and percentage of 4.1% and cumulative percentage of 4.1%,Participants who are able to perform with minor compensation has frequency of 42 and percentage of 24.7% and cumulative percentage of 28.8%,Participants who are able to perform movement without pain has frequency of 121 and percentage of 71.2% and cumulative percentage of 100%.

IMPINGEMENT CLEARING TEST

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Able to perform with minor compensation	13	7.6	7.6	7.6
	Able to perform perfect movement without pain	157	92.4	92.4	100.0
	Total	170	100.0	100.0	

Table shows that Participants who are able to perform with minor compensation has frequency of 13 and percentage of 7.6% and cumulative percentage of 7.6%,Participants who are able to perform movement without pain has frequency of 157 and percentage of 92.4% and cumulative percentage of 100%.

ACTIVE STRAIGHT LEG RAISE LEFT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Unable to perform without significant compensation	4	2.4	2.4	2.4
	Able to perform with minor compensation	58	34.1	34.1	36.5
	Able to perform perfect movement without pain	108	63.5	63.5	100.0
	Total	170	100.0	100.0	

Table shows that Participant who are unable to perform without significant compensation has frequency of 4 and percentage of 2.4% and cumulative percentage of 2.4%,Participants who are able to perform with minor compensation has frequency of 58 and percentage of 34.1% and cumulative percentage of 36.5%,Participants who are able to perform movement without pain has frequency of 108 and percentage of 63.5% and cumulative percentage of 100%.

ACTIVE STRAIGHT LEG RAISE RIGHT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Unable to perform without significant compensation	5	2.9	2.9	2.9
	Able to perform with minor compensation	53	31.2	31.2	34.1
	Able to perform perfect movement without pain	112	65.9	65.9	100.0
	Total	170	100.0	100.0	

Table shows that Participant who are unable to perform without significant compensation has frequency of 5 and percentage of 2.9% and cumulative percentage of 2.9%,Participants who are able to perform with minor compensation has frequency of 53 and percentage of 31.2% and cumulative percentage of 34.1%,Participants who are able to perform movement without pain has frequency of 112 and percentage of 65.9% and cumulative percentage of 100%.

TRUNK STABILITY PUSHUP

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Unable to perform without significant compensation	2	1.2	1.2	1.2
	Able to perform with minor compensation	9	5.3	5.3	6.5
	Able to perform perfect movement without pain	159	93.5	93.5	100.0
	Total	170	100.0	100.0	

Table shows that Participant who are unable to perform without significant compensation has frequency of 2 and percentage of 1.2% and cumulative percentage of 1.2%,Participants who are able to perform with minor compensation has frequency of 9 and percentage of 5.3% and cumulative percentage of 6.5%,Participants who are able to perform movement without pain has frequency of 159 and percentage of 93.5% and cumulative percentage of 100%.

PRESSUP CLEARING TEST

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Unable to perform without significant compensation	2	1.2	1.2	1.2
	Able to perform with minor compensation	12	7.1	7.1	8.2
	Able to perform perfect movement without pain	156	91.8	91.8	100.0
	Total	170	100.0	100.0	

Table shows that Participant who are unable to perform without significant compensation has frequency of 2 and percentage of 1.2% and cumulative percentage of 1.2%,Participants who are able to perform with minor compensation has frequency of 12 and percentage of 7.1% and cumulative percentage of 8.2%,Participants who are able to perform movement without pain has frequency of 156 and percentage of 91.8% and cumulative percentage of 100%.

ROTARY STABILITY LEFT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Unable to perform without significant compensation	13	7.6	7.6	7.6
	Able to perform with minor compensation	75	44.1	44.1	51.8
	Able to perform perfect movement without pain	82	48.2	48.2	100.0
	Total	170	100.0	100.0	

Table shows that Participant who are unable to perform without significant compensation has frequency of 13 and percentage of 7.6% and cumulative percentage of 7.6%,Participants who are able to perform with minor compensation has frequency of 75 and percentage of 44.1% and cumulative percentage of 51.8%,Participants who are able to perform movement without pain has frequency of 82 and percentage of 48.2% and cumulative percentage of 100%.

ROTARY STABILITY RIGHT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Unable to perform without significant compensation	15	8.8	8.8	8.8
	Able to perform with minor compensation	63	37.1	37.1	45.9
	Able to perform perfect movement without pain	92	54.1	54.1	100.0
	Total	170	100.0	100.0	

Table shows that Participant who are unable to perform without significant compensation has frequency of 15 and percentage of 8.8% and cumulative percentage of 8.8%,Participants who are able to perform with minor compensation has frequency of 63 and percentage of 37.1% and cumulative percentage of 45.9%,Participants who are able to perform movement without pain has frequency of 92 and percentage of 54.1% and cumulative percentage of 100%.

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POSTERIOR ROCKING CLEARING TEST

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Unable to perform without significant compensation	3	1.8	1.8	1.8
	Able to perform with minor compensation	24	14.1	14.1	15.9
	Able to perform perfect movement without pain	143	84.1	84.1	100.0
	Total	170	100.0	100.0	

Table shows that Participant who are unable to perform without significant compensation has frequency of 3 and percentage of 1.8% and cumulative percentage of 1.8%,Participants who are able to perform with minor compensation has frequency of 24 and percentage of 14.1% and cumulative percentage of 15.9%,Participants who are able to perform movement without pain has frequency of 143 and percentage of 84.1% and cumulative percentage of 100%.

TOTAL SCORE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	12	2	1.2	1.2	1.2
	13	2	1.2	1.2	2.4
	14	6	3.5	3.5	5.9
	15	6	3.5	3.5	9.4
	16	13	7.6	7.6	17.1
	17	27	15.9	15.9	32.9
	18	31	18.2	18.2	51.2
	19	36	21.2	21.2	72.4
	20	31	18.2	18.2	90.6
	21	16	9.4	9.4	100.0
	Total	170	100.0	100.0	

Table shows Out of 170 Participants 12 have frequency 2 and percentage 1.2% and cumulative frequency 1.2%,13 have frequency 2 and percentage 1.2% and cumulative frequency 2.4%,14 have frequency 6 and percentage 3.5% and cumulative 5.9%,15 have frequency 6 and percentage 6% and cumulative percentage 9.4%,16 have frequency 13 and percentage 7.6% and cumulative percentage 17.1%,17 have frequency 27 and

percentage 15.9% and cumulative percentage 32.9%,18 have frequency 31 and percentage 18.2% and cumulative percentage 51.2%,19 have frequency 36 and percentage 21.2% and cumulative percentage 72.4%,20 have frequency 31 and percentage 18.2% and cumulative percentage 90.6%,21have frequency 16 and percentage 9.4% and cumulative percentage 100%.

RESULTS

Table 4.1.1 shows that participants aged 16 to 20 have a frequency of 133, accounting for 78.2% of the total, with a cumulative percentage of 78.2%.Table 4.1.2 shows that participants with a height between 5.1 and 6 feet have a frequency of 151 (88.8%), with a cumulative percentage of 88.8%.Table 4.1.3 shows that the most common weight range, 56 to 65 kg, has a frequency of 84 (49.4%) and a cumulative percentage of 73.4%.Table 4.1.4 indicates that the peak value for primary sport is "batsman," with a frequency of 89 (52.4%) and a cumulative percentage of 52.4%.Table 4.1.5 shows that the peak primary position among participants is "standing," with a frequency of 170 (100%) and a cumulative percentage of 100%.Table 4.1.6 shows that the dominant hand/leg among participants is "right," with a peak frequency of 140 (82.4%) and a cumulative percentage of 100%.Table 4.1.7 shows that the peak value for the deep squat test is a frequency of 125 (73.5%), with a cumulative percentage of 100%.Table 4.1.8 indicates that for the hurdle step (left), the peak performance able to perform the movement perfect without pain has a frequency of 120 (70.6%) and a cumulative percentage of 100%.Table 4.1.9 shows that for the hurdle step (right), the peak performance able to perform the movement perfect without pain has a frequency of 133 (78.2%) and a cumulative percentage of 100%.Table 4.1.10 shows that for the inline lunge (left), the peak performance able to perform the movement perfect without pain has a frequency of 126 (74.1%) and a cumulative percentage of 100%.Table 4.1.11 shows that for the inline lunge (right), the peak performance able to perform the movement perfect without pain has a frequency of 142 (83.5%) and a cumulative percentage of 100%.Table 4.1.12 shows that the peak value for shoulder mobility (left) is "able to perform the movement perfect without pain," with a frequency of 107 (62.9%) and a cumulative percentage of 100%.Table 4.1.13 indicates that for shoulder mobility (right), the peak value is also "able to perform the movement perfect without pain," with a frequency of 121 (71.2%) and a cumulative percentage of 100%.Table 4.1.14 shows that for the impingement clearing test, the peak performance able to perform the movement perfectly without pain has a frequency of 157 (92.4%) and a cumulative percentage of 100%.Table 4.1.15 shows that for the active straight leg raise (left), the peak performance has a frequency of 108 (63.5%) and a cumulative percentage of 100%.Table

4.1.16 indicates that for the active straight leg raise (right), the peak performance has a frequency of 112 (65.9%) and a cumulative percentage of 100%.Table 4.1.17 shows that for the trunk stability push-up, the peak performance able to perform the movement perfectly without pain has a frequency of 159 (93.5%) and a cumulative percentage of 100%.Table 4.1.18 shows that for the press-up clearing test, the peak performance able to perform the movement perfectly without pain has a frequency of 156 (91.8%) and a cumulative percentage of 100%.Table 4.1.19 indicates that for rotary stability (left), the peak performance able to perform the movement perfectly without pain has a frequency of 81 (47.6%) and a cumulative percentage of 100%.Table 4.1.20 shows that for rotary stability (right), the peak performance able to perform the movement perfectly without pain has a frequency of 92 (54.1%) and a cumulative percentage of 100%.Table 4.1.21 shows that for the posterior rocking clearing test, the peak performance able to perform the movement perfectly without pain has a frequency of 140 (83.5%) and a cumulative percentage of 100%.Table 4.1.22 indicates that the peak value for the total score is 19, with a frequency of 36 (21.2%) and a cumulative percentage of 72.4%.

DISCUSSION

Prior publications that identify asymmetric repetitive movement as a risk factor in cricket are backed up by these patterns. This study's practical insights support the value of FMS for injury screening as well as performance improvement, especially in grassroots domestic cricket where organized preventative programs are few.An examination of demographic factors revealed that the majority of participants were between the ages of 16 and 20, suggesting a younger demographic actively involved in cricket at the household level. The distribution of total FMS scores, in which a large number of athletes (82.9%) received a score of 17 or higher, demonstrating a high level of functional movement quality and a lower risk of injury, was one of the most important results. But according to FMS standards, 5.9% of players had scores of 14 or lower, indicating a greater risk of injury. In particular, when interpreting FMS scores, factors such as age, weight, and dominant side were taken into account. For instance, 82.3% of players were found to have right-handed dominance, and the majority of players had a weight distribution in the 56–65 kg range (49.1%), which may have an impact on movement asymmetries and injury risks. Different levels of compensation and asymmetry were seen in important movement components such as deep squat, hurdle step, inline lunge, and trunk stability push-up, which served as predictors of potential musculoskeletal dysfunction.Specifically,25.29% of subjects exhibited minor compensation in the deep squat, while 28.8% did so in the left hurdle step, suggesting moderate movement deficiencies. Rotary stability, particularly on the right side, only

achieved a perfect score of 54.1%, indicating possible core control problems. Similarly, moderate asymmetries in shoulder mobility and active straight leg raise may be related to particular cricket positions, such as fast bowling and fielding.

LIMITATIONS

Some participants were unable to perform well as they were wearing their full cricket kits, which restricted movement.

The behavior of some participants was not cooperative, which affected the consistency of data collection.

Fatigue after returning from cricket matches negatively impacted the performance of certain participants.

Some cricketers were unavailable to participate due to their commitment to ongoing practice matches.

CONCLUSION

Our study highlights the significance of FMS in assessing injury risk among domestic cricket players.the finding suggest that FMS scores have a positive impact on identifying potential injury risk Pre Performance by incorporating FMS in training protocols cricket players can reduce there likelihood of injury and optimize performance.

RECOMENDATONS

Cricketers should receive proper coaching education and equipment to minimize injury risk and optimize performance

Future studies should be perform on large sample size to increase generalization.

Develop cricket specific FMS norms allowing for more accurate interpretation of results.

Consider other variables like psychological stress, training load and nutrition.

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