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Importance of Strength and Conditioning in Young Indian Athletes: A Pilot Experimental Study

Pratyush Mohan Pal
Independent Student Researcher | India | 2026

ABSTRACT: Strength and conditioning training is a crucial element in the athletic development of young athletes. Proper training programmes help improve endurance, strength, stamina, speed, flexibility, power, and overall physical fitness and may contribute to better injury prevention. However, there are very few experimental studies on the importance of strength and conditioning in young athletes in India. Therefore, this study was conducted to analyse the effects of a structured strength and conditioning programme on young Indian athletes. This study used a small experimental research design with the participation of seven young athletes who completed a six-week strength and conditioning programme consisting of basic bodyweight strength and endurance exercises performed three times per week. Their performance was analysed before and after the training period using the vertical jump, 20 m sprint, push-ups, plank hold, and V-shaped agility test. After the six-week programme, significant improvements were observed in all the selected performance parameters. Overall, the experiment was successful, and the findings suggest that a structured strength and conditioning programme can play an important role in improving the physical performance of young athletes.

KEYWORDS: Strength, Injury Prevention, Young Athletes, Resistance Training, Conditioning.

I. INTRODUCTION

Strength and conditioning refer to the exercises and training methods used to improve the physical abilities of athletes. It is one of the most important parts of sports science, especially for young athletes, and is considered the foundation of athletic development. A proper strength and conditioning programme help improve strength, endurance, stamina, speed, agility, flexibility, power, balance, and overall fitness while it may also reducing the risk of sports-related injuries.

It is difficult for athletes to improve their technical and tactical skills without first developing the physical qualities needed to perform them. Therefore, strength and conditioning coaches play an important role in preparing athletes for the physical and technical demands of their sport. [10,11]

However, in the current scenario, strength and conditioning is still not given the importance it deserves in many sporting environments. More attention is usually given to technical and tactical
training, while physical preparation is often ignored. In recent years, organisations such as the BCCI, RFYC, SAI, and many professional academies have started including strength and conditioning in their training programmes, and the results have been positive.

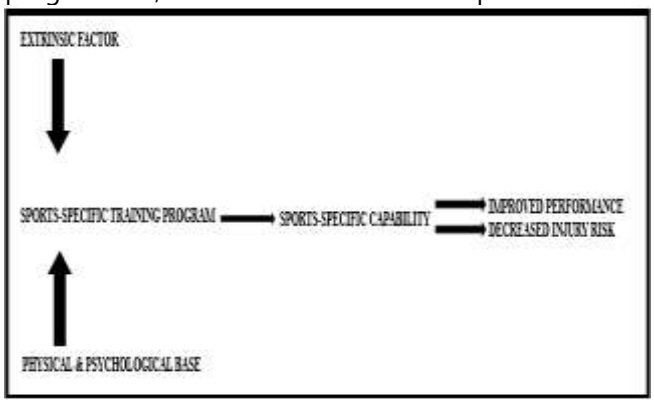


Figure 1. Relationship between sport-specific training, physical and psychological development, and athletic performance.

Even then, many parents and coaches in India still believe that young athletes do not need structured strength training. A common belief is that gym training can affect height growth, because of which many young athletes do not get proper exposure to scientific training methods. [4,11]

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The aim of this study was to investigate whether a structured strength and conditioning programme can improve the physical performance of young athletes and also help in injury prevention. This study also aimed to determine the difference in performance before and after a six-week strength and conditioning programme.

An experimental research method was used in this study. Seven young athletes participated in a six-week strength and conditioning programme consisting of bodyweight strength and endurance exercises. Their performance was tested before and after the programme using the vertical jump, 20 m sprint, push-ups, plank hold, and V-shaped agility test to determine the improvements.

This study is important because there are still different opinions among parents, coaches, and athletes regarding strength and conditioning training for young athletes in India. It also helps create awareness about the importance of scientific training methods and shows how a structured strength and conditioning programme can improve strength, speed, agility, endurance, confidence, and overall athletic performance while also helping in injury prevention. [10,11]

II. METHODOLOGY

2.1 Study Design*:* This study followed an experimental pre-test and post-test research design to determine the effectiveness of a six-week strength and conditioning programme. Before the start of the six-week programme, all seven participants completed the pre-test to assess their baseline physical performance. After completing the six-week strength and conditioning programme, the participants completed the post-test using the same performance tests. The data collected from both the pre-test and post-test were then compared, analysed, and reviewed to determine the improvements in the selected physical performance parameters and evaluate the effectiveness of the training programme.

2.2 Participants: A total of seven participants voluntarily took part in this research study after written parental consent was obtained. All participants were actively involved in local sports programmes and were recruited from local sports organisations and training facilities. The participants were selected based on their willingness to complete the six-week strength and conditioning intervention and participate in both the pre-test and post-test assessments.

The criteria for participant recruitment were:

- Age between 12 and 18.
- Free from any injury at the start of the study.
- Written parental consent.
- Regular participation in sports training.
- No medical condition that could prevent them from completing the six-week intervention.

The baseline characteristics of the participants are presented in Table 1.

Table 1. Participant Characteristics

Participant	Age (years)	Gender	Height (cm)	Weight (kg)	BMI (kg/m^2)	Sleep (hrs/day)	Water Intake(L/day)	Previous Injury
A1	16	Male	159.2	49.5	19.5	7	1.7	No
A2	14	Male	164	44	16.4	8	2–3	No
A3	14	Male	170	48	16.6	8	3–4	No
A4	13	Male	154	41	17.3	9	3	No
A5	16	Male	164	51	19.0	6–7	2–3	No
A6	14	Male	156	52	21.4	6–7	1–2	No
A7	15	Male	162	47	17.9	7–8	2–3	No

1. Ethical Considerations

Before participation, all athletes and their parents received detailed information about the purpose, procedures, benefits, and potential risks of the study. Written informed consent was obtained from parents. Participation was voluntary, and participants were free to withdraw from the study at any stage without any consequences.

Participant confidentiality was maintained by assigning identification codes (A1–A7), and all collected data were used solely for research purposes.

2. Strength And Conditioning Intervention

The participants followed a structured six-week strength and conditioning programme which focused on improving their strength, stamina, endurance, agility, and speed. The strength and conditioning intervention included a structured warm-up, which was performed before each training session, as presented in Table 2.

Table 2. Warm-up (Performed Before Every Training Session)

Exercise	Volume
Arm Rotations	30s each direction
Hip Rotations	30s
High Knees	45s
Walking Lunges	5 reps each leg
Leg Swings	30s each leg

Table 3. Weekly Training Programme

Week	Monday (Lower Body Power)	Wednesday (Upper Body & Core)	Friday (Agility)
1	Jump Squats (3×8) Frog Jumps (3×8) Squats (3×10) Standing Calf Raises (3×10) Walking Lunges (3×10)	Push-ups (3×10) Decline Push-ups (2×10) Incline Push-ups (2×10) Russian Twists (3×10) Crunch Toe Touch (3×10)	Walking High Knees (3×10) Lateral Hops (3×10) Side Lateral Hops (3×10)
2	Walking Lunges (3×12) Squats (3×12) Standing Calf Raises (3×12) Jump Squats (3×10) Frog Jumps (3×10)	Push-ups (3×12) Decline Push-ups (2×12) Incline Push-ups (2×12) Russian Twists (3×12) Crunch Toe Touch (3×12)	Walking High Knees (3×12) Lateral Hops (3×12) Side Lateral Hops (3×12)
3	Walking Lunges (3×15) Squats (3×15) Standing Calf Raises (3×15) Jump Squats (3×12) Frog Jumps (3×12)	Push-ups (3×15) Decline Push-ups (3×12) Incline Push-ups (3×12) Russian Twists (3×15) Crunch Toe Touch (3×15)	Walking High Knees (3×15) Lateral Hops (3×15) Side Lateral Hops (3×15)
4	Walking Lunges (4×12) Squats (4×12) Standing Calf Raises (4×12) Jump Squats (3×12) Frog Jumps (3×12)	Push-ups (4×12) Decline Push-ups (3×12) Incline Push-ups (3×12) Russian Twists (3×15) Crunch Toe Touch (3×15)	Walking High Knees (3×15) Lateral Hops (3×15) Side Lateral Hops (3×15)
5	Walking Lunges (4×15) Squats (4×15) Standing Calf Raises (4×15) Jump Squats (4×12) Frog Jumps (4×12)	Push-ups (4×15) Decline Push-ups (3×15) Incline Push-ups (3×15) Russian Twists (3×20) Crunch Toe Touch (3×20)	Walking High Knees (4×15) Lateral Hops (4×15) Side Lateral Hops (4×15)
6	Walking Lunges (4×15) Squats (4×15) Standing Calf Raises (4×15) Jump Squats (4×12) Frog Jumps (4×12)	Push-ups (4×15) Decline Push-ups (4×12) Incline Push-ups (4×12) Russian Twists (3×20) Crunch Toe Touch (3×20)	Walking High Knees (4×15) Lateral Hops (4×15) Side Lateral Hops (4×15)

Training sessions were conducted three times per week (Monday, Wednesday, and Friday). Each session was approximately 60–75 minutes and consisted of adynamic warm-up (Table 2), strength exercises, plyometric exercises, core stability training, movement, and agility drills. The training programme followed the

principle of progressive overload, with the difficulty of the exercises gradually increasing throughout the intervention while maintaining proper technique and participant safety. [10,11] Videos of the participants performing the exercises were recorded and reviewed by the researcher to monitor their form and technique. The researcher provided guidance and corrections whenever required. The complete training programme is presented in Table 3.

3. Outcome Measures

To evaluate the effectiveness of the intervention, participants completed physical performance assessments before and after the training programme. The assessments are presented in Table 4.

- **Vertical Jump Test:** The participant's vertical jump performance was recorded before and after the intervention in centimetres. [1,3,6,7] 20 m Sprint: The participant's speed was assessed by recording the time taken to complete the 20 m sprint in seconds.
- **Push-up Test:** This test was conducted to assess the participants' upper-body strength by recording the number of repetitions completed.
- **Plank Test:** The participants held the plank position to assess their core endurance, and the time was recorded in seconds.
- **Agility Test:** The V-shaped agility test (Figure 2) was conducted to assess the participant's ability to change direction and their overall agility.

Table 4. Physical Performance Tests Conducted

Test	Purpose
Vertical Jump Test	Assess lower-body power
20m Sprint Test	Assess sprint speed
Push up Test	Assess upper-body muscular endurance
Plank Test	Assess core muscular endurance
Agility Test	Assess change-of-direction speed and agility

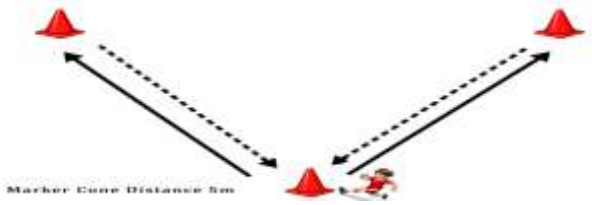


Figure 2. V-Shape Agility Drill for Test

4. Data Collection Procedure

Baseline testing was conducted one week before the start of the strength and conditioning intervention. After completing the six-week strength and conditioning programme, the same tests were conducted again. The tests used in both assessments were the same and were performed under the same environmental conditions.

To improve measurement reliability:

- The same testing equipment was used during both assessments.
- All participants completed the same warm-up before testing.
- The tests were administered in the same order.
- Adequate rest was provided between tests to minimise fatigue. [2,9]

All data were recorded immediately after each assessment and maintained in a physical copy. The recorded data were later transferred to Microsoft Excel for organisation and analysis.

2.7 Statistical Analysis*:* Descriptive statistics were used to summarize the participant characteristics and performance results. Mean values and standard deviations were calculated for each performance variable. [8]

The pre-test and post-test scores for vertical jump height, 20 m sprint time, push-up repetitions, plank duration, and agility were compared to see the changes after the six-week intervention. Percentage improvement was calculated for each participant for each performance variable, and the mean percentage improvement across participants was then calculated to see the relative change from the pre-test to the post-test.

For tests where a higher score represented better performance, the following formula was used:

$$\text{Percentage Improvement} = \frac{\text{Post-test} - \text{Pre-test}}{\text{Pre-test}} \times 100$$

For tests where a lower score represented better performance, such as the 20 m sprint and agility test, the following direction-adjusted formula was used:

$$\text{Direction-adjusted Percentage Improvement} = \frac{\text{Pre-test} - \text{Post-test}}{\text{Pre-test}} \times 100$$

A paired-samples t-test was also used to compare the pre-test and post-test scores and determine whether the changes were statistically significant. Statistical significance was set at $p < 0.05$. [8]

2.8 Use of Artificial Intelligence Tools*:* ChatGPT was used as a supporting tool during the research process. It was mainly used to help organise research information, sort participant data, check the structure of the research paper, improve grammar and clarity, and assist with the presentation of tables and results. It was also used to help identify suitable ways of presenting and explaining the collected data. All participant data, test results, training records, observations, and research decisions were collected and determined by the researcher. ChatGPT was not used to create, change, or fabricate any participant results. The statistical results were calculated from the collected data, and the final interpretation and decisions were reviewed by the researcher.

The use of ChatGPT was therefore limited to providing assistance with organisation, writing, and presentation, while the researcher remained responsible for the accuracy, originality, and final content of the study.

III. RESULTS

3.1 Pre-test Results: The pre-test assessments were taken before the start of the six-week strength and conditioning intervention. All seven participants completed the five selected physical performance tests: vertical jump, 20 m sprint, push-up, plank, and V-shaped agility test. The individual data collected from the pre-test assessments are presented in Table 5.

Table 5. Individual Pre-test Performance Results

Participant	Vertical Jump (cm)	20 m Sprint (s)	Push-ups (reps)	Plank (s)	Agility (s)
A1	21	6.67	10	78.52	45
A2	20	7.65	8	40	40
A3	12	7.35	10	35	53
A4	15	6.77	15	60	42
A5	14	9.74	35	102	63
A6	12	8.53	3	60	44
A7	18	7.18	8	55	47

The pre-test results provided the baseline performance values of the participants before the intervention. These results were used as the baseline for comparison with the post-test results after completing the six-week strength and conditioning programme.

3.2 Post-test Results: After completing the six-week strength and conditioning programme, all seven participants completed the same five physical performance tests. The individual post-test results are presented in Table 6.

Table 6. Individual Post-test Performance Results

Participant	Vertical Jump (cm)	20 m Sprint (s)	Push-ups (reps)	Plank (s)	Agility (s)
A1	35	4.38	15	122.51	41
A2	23	5.40	21	50	25.40
A3	21	6.87	15	58	41
A4	19	5.82	23	80	35.20
A5	31	5.60	40	116	39.23
A6	20	6.10	13	50	36.60
A7	20	6.14	12	72	33

The post-test results showed changes in the physical performance variables after the six-week intervention. The post-test results were compared with the baseline results to determine the changes following the training programme.

3.3 Pre-test and Post-test Comparison*;* The individual pre-test and post-test results were combined to examine the changes in physical performance after the six-week strength and conditioning intervention. The complete comparison is presented in Table 7.

Table 7. Individual Pre-test and Post-test Performance Comparison

Participant	Vertical Jump (Pre)	Vertical Jump (Post)	Sprint (Pre)	Sprint (Post)	Push-ups (Pre)	Push-ups (Post)	Plank (Pre)	Plank (Post)	Agility (Pre)	Agility (Post)
A1	21	35	6.67	4.38	10	15	78.52	122.51	45	41
A2	20	23	7.65	5.40	8	21	40	50	40	25.40
A3	12	21	7.35	6.87	10	15	35	58	53	41
A4	15	19	6.77	5.82	15	23	60	80	42	35.20
A5	14	31	9.74	5.60	35	40	102	116	63	39.23
A6	12	20	8.53	6.10	3	13	60	50	44	36.60
A7	18	20	7.18	6.14	8	12	55	72	47	33

Overall, the comparison showed improvements in the measured physical performance variables after the intervention. Vertical jump height and push-up repetitions increased, while the 20 m sprint and agility times decreased, which represents better performance in these tests. Plank duration also showed an overall increase.

3.4 Mean and Standard Deviation: The mean and standard deviation were calculated for the pre-test and post-test results of each performance variable. The results are presented in Table 8.

Table 8. Mean and Standard Deviation of Pre-test and Post-test Results

Performance Variable	Pre-test Mean ± SD	Post-test Mean ± SD
Vertical Jump (cm)	16.00 ± 3.70	24.14 ± 6.28
20 m Sprint (sec)	7.70 ± 1.09	5.76 ± 0.77
Push-ups (reps)	12.71 ± 10.45	19.86 ± 9.77
Plank (sec)	61.50 ± 22.88	78.36 ± 30.09
Agility (sec)	47.71 ± 7.91	35.92 ± 5.52

The mean results showed an increase in vertical jump height, push-up repetitions, and plank duration after the intervention. A reduction in the mean completion time was observed in both the 20 m sprint and agility tests, where a lower completion time represents better performance.

1. Percentage Improvement

The percentage improvement for each performance variable was calculated using the formula mentioned in Section 2.7. The percentage improvements are presented in Table 9.

Table 9. Percentage Improvement in Physical Performance

Performance Variable	Mean Individual Percentage Improvement
Vertical Jump	54.65%
20 m Sprint	24.26%
Push-ups	101.92%
Plank	29.72%
Agility	24.08%

The greatest percentage improvement was observed in push-up performance, followed by vertical jump height. Improvements were also observed in plank duration, 20 m sprint performance, and agility performance.

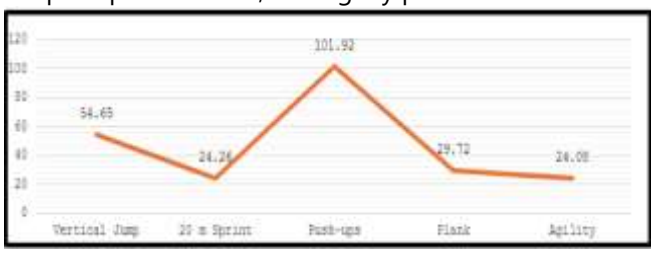


Figure 3. Percentage improvement in physical performance variables after the six-week strength and conditioning intervention.

3.6 Paired-Samples t-test: A paired-samples t-test was conducted to compare the pre-test and post-test scores for each performance variable. The results are presented in Table 10.

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Table 10. Paired-Samples t-test Results

Performance Variable	Mean Difference	t-value	p-value
Vertical Jump	+8.14 cm	3.78	0.009
20 m Sprint	−1.94 s	−4.14	0.006
Push-ups	+7.14 reps	5.66	0.001
Plank	+16.86 s	2.77	0.033
Agility	−11.80 s	−4.73	0.003

Note: Statistical significance was set at ***p < 0.05****.*

The paired-samples t-test indicated statistically significant differences between the pre-test and post-test results for all five performance variables. Vertical jump height, push-up repetitions, and plank duration increased after the intervention, while 20 m sprint and agility times decreased, indicating better performance in these tests.

3.7 Summary of Results: The results showed improvements across all five selected physical performance measures after the six-week strength and conditioning intervention. Improvements were observed in lower-body power, sprint performance, upper-body muscular endurance, core endurance, and agility. The percentage changes and paired-samples t-test results showed measurable improvements in the physical performance of the participants following the intervention.

IV. DISCUSSION

4.1 Main Findings: The main purpose of this study was to understand whether a structured strength and conditioning programme could improve the physical performance of young athletes. After six weeks of training, improvement was seen in all five tests used in the study. Vertical jump, push-ups, and plank performance increased, while the time taken to complete the 20 m sprint and V-shaped agility test decreased. The paired-samples t-test also showed statistically significant differences in all five tests, with p-values below 0.05. These results show that regular and structured strength and conditioning training can help young athletes improve different areas of physical performance. [10,11] The participants trained three times a week and followed a planned programme that included strength exercises, plyometric exercises, core exercises, and movement and agility drills. The number of sets and repetitions was also increased during the programme. Therefore, the improvement was not only because the participants were exercising, but also because the training followed a structured progression.

4.2 Improvement in Lower-Body Power; The vertical jump results showed a clear improvement after the six-week programme. The mean vertical jump increased from 16.00 cm before the programme to 24.14 cm after the programme. The paired-samples t-test showed a statistically significant difference ($p = 0.009$).

The programme included exercises such as squats, walking lunges, jump squats, and frog jumps. These exercises were performed regularly, and their volume was gradually increased throughout the programme. This combination of strength and jumping exercises helped the participants improve their ability to produce explosive movement. [7,10,11]

This improvement can be useful in many sports because jumping is involved in various situations. [1,3,6] However, this study only measured vertical jump performance. It did not directly measure changes in muscle strength or other physiological factors. Therefore, the result should be understood as an improvement in the vertical jump test rather than proof of a specific physical adaptation.

4.3 Improvement in Sprint Performance: The 20 m sprint results also showed a clear improvement after the six-week programme. The mean sprint time decreased from 7.70 seconds before the intervention to 5.76 seconds after the intervention. The paired-samples t-test showed a statistically significant difference ($p = 0.006$). Since a lower sprint time represents better performance, this result indicates that the participants became faster over the 20 m distance.

The programme included squats, walking lunges, jump squats, frog jumps, and movement-based exercises. These exercises were performed progressively throughout the six weeks. The combination of lower-body exercises and plyometric movements may have contributed to the improvement in sprint performance because sprinting requires the athlete to produce force quickly and move efficiently. [7,10,11] However, the improvement in sprint performance cannot be attributed to one specific exercise because the

participants completed several different exercises during the intervention. The study also did not separately measure acceleration, maximum running speed, or running technique. Therefore, the result should mainly be understood as an improvement in the 20 m sprint test.

4.4 Improvement in Upper-Body Muscular Endurance: Push-up performance showed the largest improvement among the five selected tests. The mean number of push-ups increased from 12.71 repetitions before the intervention to 19.86 repetitions after the intervention. The paired-samples t-test showed a statistically significant difference ($p = 0.001$).

The Wednesday sessions mainly focused on upper-body and core exercises. Push-ups, decline push-ups, and incline push-ups were included in the programme, and the number of repetitions and sets was gradually increased. The progressive increase in training volume may have contributed to the participants being able to perform more push-ups during the post-test. [10,11]

The improvement in push-up performance suggests better upper-body muscular endurance in the participants. However, the push-up test measures performance in a specific movement and should not be considered a complete measurement of overall upper-body strength. Other strength tests would be required to understand changes in different muscle groups.

4.5 Improvement in Core Endurance*:* The plank test showed an overall improvement after the intervention. The mean plank duration increased from 61.50 seconds before the intervention to 78.36 seconds after the intervention. The paired-samples t-test showed a statistically significant difference ($p = 0.033$).

Core exercises such as Russian twists and crunch toe touches were included in the Wednesday training sessions. These exercises were progressively increased during the programme. The participants also performed other exercises that required them to maintain body control and stability. Therefore, the regular inclusion of core exercises may have contributed to the improvement in plank performance. [10,11] It is important to note that not every participant improved in the plank test. For example, participant A6 decreased from 60 seconds to 50 seconds. Therefore, the overall improvement in the group mean does not mean that every participant improved individually.

4.6 Improvement in Agility: The V-shaped agility test also showed a significant improvement after the intervention. The mean completion time decreased from 47.71 seconds before the intervention to 35.92 seconds after the intervention. The paired-samples t-test showed a statistically significant difference ($p = 0.003$). Since a lower completion time represents better performance, the results indicate an improvement in change-of-direction performance.

The Friday sessions focused mainly on movement and agility exercises, including walking high knees, lateral hops, and side lateral hops. These exercises were performed progressively, with an increase in sets and repetitions during the programme. The regular practice of lateral and movement-based exercises may have contributed to the participants becoming more efficient during the V-shaped agility test. However, the agility test involved a specific movement pattern, so the results cannot automatically be applied to every type of agility performance in sport. Agility in football, for example, can also involve reacting to an opponent, the ball, or a changing game situation. Therefore, the present result mainly shows an improvement in performance on the selected V-shaped agility test.

4.7 Overall Effect of the Training Programme: When all five performance measures are considered together, the results show a positive change after the six-week strength and conditioning programme. The participants improved in lower-body power, sprint performance, push-up performance, core endurance, and agility. The paired-samples t-test showed statistically significant differences in all five measures.

One important reason for these improvements may have been the structure of the programme. The participants trained three times per week, and different physical qualities were targeted on different training days. The programme also followed progressive overload, with increases in repetitions and sets across the six weeks. This approach is consistent with the idea that youth training should be appropriately planned and progressed according to the developmental needs of young athletes. [10,11]

At the same time, the results should be interpreted carefully because this was a small pilot study with only seven participants. There was also no separate control group for comparison. Therefore, factors such as

normal physical development, previous training experience, motivation, or other activities outside the intervention may have contributed to some of the changes observed. The findings should therefore be considered as evidence of positive changes within this group rather than as proof that the programme alone caused all of the improvements. [4,11]

***4.8 Implications and Limitations*:** The findings of this study suggest that structured strength and conditioning training can be useful for young athletes when it is planned according to their abilities and progressed gradually. The results may be particularly relevant in sporting environments where young athletes receive technical training but have limited exposure to structured physical preparation. The study provides an initial indication that even a relatively simple bodyweight-based programme can produce measurable changes in selected physical performance tests. [10,11]

However, this study has several limitations. The sample size was very small, with only seven participants, and all participants were male. The study also did not include a control group, which makes it difficult to determine whether all improvements were caused only by the intervention. The intervention lasted for only six weeks, so the long-term effects of the programme could not be determined.

Another limitation is that injury prevention was not directly measured in this study. Although strength and conditioning may have a role in supporting athletic development and injury prevention, this study did not record injury rates or compare injuries before and after the programme. Similarly, confidence was not measured using a formal psychological scale. Therefore, future studies should include specific measures for injury occurrence, psychological factors, and longer-term athletic development.

Overall, the findings provide useful preliminary evidence from a small group of young Indian athletes. Larger studies with more participants, a control group, longer intervention periods, and a wider range of physical and psychological measures would provide stronger evidence about the role of strength and conditioning in young athletes in India. [4,10,11]

V. CONCLUSION

The purpose of this study was to investigate the effects of a structured six-week strength and conditioning programme on the physical performance of young Indian athletes. The results showed statistically significant improvements in all five selected performance tests. Vertical jump performance increased, push-up repetitions increased, and plank duration showed an overall improvement. At the same time, the time taken to complete the 20 m sprint and V-shaped agility test decreased, indicating better performance. The findings suggest that a structured strength and conditioning programme can improve different areas of physical performance in young athletes. The progressive nature of the programme, with regular training three times per week and gradual increases in exercise volume, may have contributed to these improvements. The study also shows that a basic bodyweight-based programme can be used to develop important physical qualities without requiring advanced training equipment.

However, the findings should be considered preliminary because the study included only seven participants and did not have a separate control group. In addition, injury prevention and confidence were not directly measured using specific assessment tools. Therefore, the results cannot be used to directly conclude that the programme reduced injuries or increased confidence.

Overall, this pilot study provides preliminary evidence that structured strength and conditioning training may be beneficial for improving physical performance in young athletes. Further research with a larger number of participants, a control group, longer training periods, and additional physical and psychological measures is required to better understand the role of strength and conditioning in young athletes in India. [4,10,11]

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