



# IMMEDIATE EFFECT OF KINESIO TAPING ON PERFORMANCE OF 100m SPEED SKATING SPRINTERS USING 100m TIME TRIAL.

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## Abstract:

**Introduction** – Inline speed skating is very famous in western countries but at the same time its growing popularity in India cannot be denied. Inline Speed Skating is a competitive sport, and it involves various events ranging from short sprints to long marathons. 100m speed skating sprint involves explosive strength and may result into early fatigue of muscles which can hamper the performance of Skater, during the competitive phase the skater needs to sprint multiple times to qualify and secure higher rank, hence it is important to ensure that the skater is at his/her optimal performance during each of these sprints. K- Taping is widely accepted and proved therapeutic technique for treating different musculoskeletal disorders. Literature also suggested that Kinesiology tape improves performance not only through its ability to help relieve stress and inflammation in injuries, but by supporting the muscles. When wearing the tape, athletes have reported a better sense of their muscles, helping them to keep from overextending or further straining prior injuries. For skater acute performance is very important to excel in their field. Hence it is necessary to find out if there are any acute effects of K Taping on performance of 100m speed skating sprinters.

**Method** - Ethical approval taken. The 28 subjects were selected. Informed consent of 28 subjects was collected. Selected skaters are prepared for test, after warmup 100m sprint was conducted without application of Kinesio Tape. Day 2, 100m sprint was conducted after application of Kinesio Taping and 100m timing were recorded. The results were compared and analysed using paired t-test.

**Result** - The change in performance was noticed using recorded timing of 100m time trial after application of kinesio tape. The time significantly reduced after application of kinesio tape i.e from  $14.5 \pm 1.8$  seconds to  $14.4 \pm 1.8$  seconds ( $p < 0.05$ ).

**Conclusion** - Application of kinesio tape has improved performance of 100m speed skating sprinters by significantly reducing timing of 100m time trial.

*Index Terms* – Speed Skating, Kinesio Taping, Immediate effects, Time Trial, Facilitation.

## I. INTRODUCTION

“Roller skating, is an ice sport in the land auxiliary training process gradually evolved in the formation of sport.” With the continuous development and growth of sports, roller skating has also been flourishing, and the new projects of modern roller skating have emerged and diversified, developing different forms of sport such as speed skating (10)

Inline skates or roller skates, are hybrid cross between traditional roller skates and ice skates. Instead of a metal skate blade, there are three to five wheels lined up. In line, skating is different from roller skating. The skating technique more closely resembles ice skating, while many of the turning motions are similar to skiing. Today, skating is one of the fastest growing recreational activities. Several specialized disciplines exist including recreation/fitness skating, roller hockey, aggressive skating, and racing/speed skating. (11)

Inline speed skating is very famous in western countries but at the same time its growing popularity in India cannot be denied. (4) As one of the 11 sports disciplines of the World Skating Federation, World Skate, inline speed skating has experienced a considerable boom over the last decade with an ever-increasing number of skaters. As a result, the competitive level has evolved constantly in all continents. (1) Skating is one of the popular games which nowadays is gaining more of a professional rather than recreational importance.

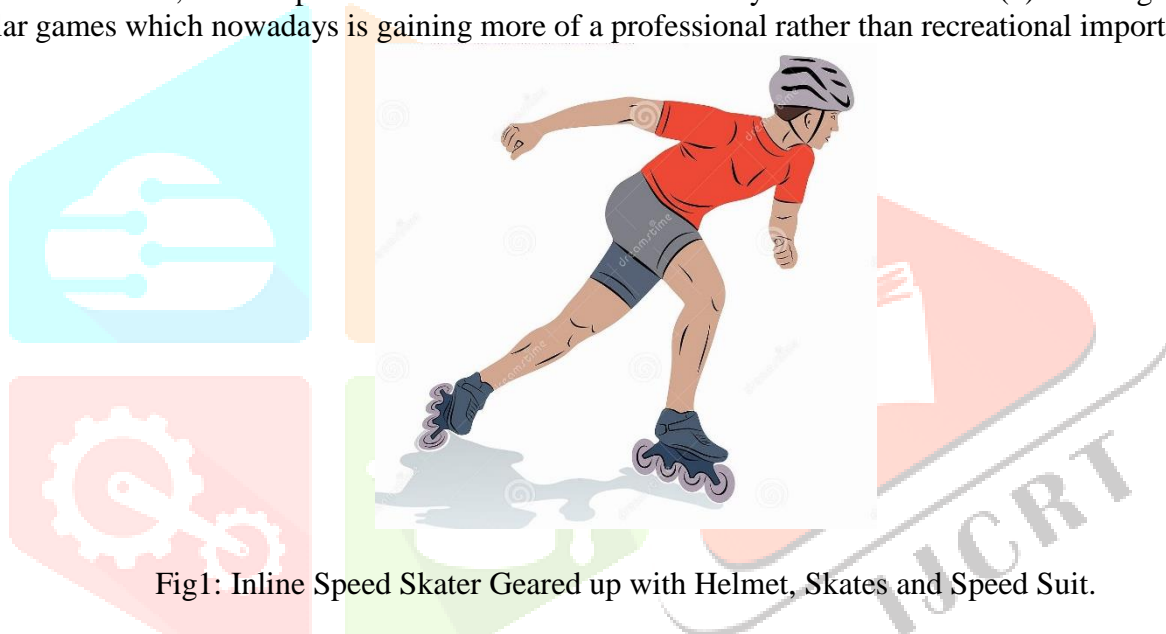


Fig1: Inline Speed Skater Geared up with Helmet, Skates and Speed Suit.

The correct technique for roller speed skating is based on achieving maximum effectiveness and efficiency of the forces applied to the skate during the push, slide and recovery phases. (2)

This sport requires efficient speed, balance, coordination and agility. (6)

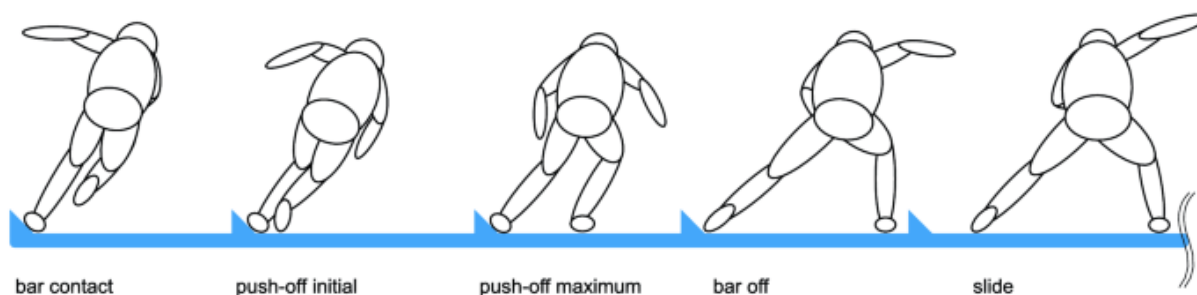


Fig2: Demonstration of Push, Slide and Push-Off Phase Performed by Skater.

The 100m time trial of speed skating is a highly competitive sport, finishing time of top three finishers of 100m time trial of senior men 100m sprint finals at speed skating world championship Colombia 2021 were 9.88, 10.01, 10.28 respectively, with this study the objective will be to check immediate improvement in performance of speed skater using 100m time trial which can eventually allow the skater to finish at better position.

Kinesio taping is a treatment approach using kinesiology tape, and was developed by Kase Kenzo. In this approach, kinesiology tape is applied directly to the skin to treat musculoskeletal injuries. (7)

Kinesio Tapes follow the path of a muscle or nerve, can be freely applied to any part of the body, and do not limit the patient's freedom of movement. Lymphatic applications, which improve the lymph and blood circulation, are also included in The K-tape application options. Whereas classic taping is predominantly used for immobilizing or stabilizing joints. (4)

Kinesiology taping has been reported to be effective in preventing injuries, aiding with rehabilitation and performance improvement, improving pain, facilitating joint exercises, increasing muscle activation and enhancing muscle strength. (7)

In a tonus-increasing muscle application, the elastic stretch tape exerts tension via the restoring force in the direction of origin (punctum fixum) to the fixed base, and thus displaces the skin in the same direction. This brings about support of the muscle contraction. (4)

In this study the Quadriceps muscle is the prime muscle for testing the performance by application of k-taping. (5) young-seok lee, Chang- soo kwak, Chung-II lee, Tae- gyu kim conducted study on "Effects of lower extremity stability by kinesio taping method in elite speed skating athletes' one-leg jumping" in this study they have chosen quadriceps as the prime muscle for testing the performance. And found that there is improvement in one leg jump performance using kinesio taping. (5)



Fig3: Official Track for 100m Speed Skating Sprint

## METHODOLOGY

In this study 28 Speed skaters volunteered to participate, out of which 15 were male and 13 were female (mean age  $11.57 \pm 3.44$  years). Ethical committee clearance was obtained and permission was taken from the department. Written consent was taken from the subjects who fulfil the inclusion criteria and exclusion criteria. The subjects were informed about the test and intervention.

On Day 1, after warmup of 5 laps of 1200m road track, 100m sprint was conducted without application of kinesio taping and results were recorded using stopwatch

On Day 2, in similar training condition and using the same equipment that were used on first day while recording the time. 100m sprint was conducted after application of kinesio tape.

Patient preparation was done, area was exposed and part was cleaned. Kinesio tape was applied in direction origin to insertion for 3 muscles of quadriceps including vastus medialis, rectus femoris and vastus lateralis, base was applied with 0% of stretch at origin and rest of the tape was applied over the muscle till the insertion (7) and results was recorded using stopwatch. (9)

Data was collected and analyzed using paired t test to obtain results for recorded 100m time before and after application of kinesio tape. Similarly, unpaired t- test was done to compare effectiveness of k-tape application on 100m male and female speed skating sprinters.

**II.A INCLUSION CRITERIA**

- Age between 6-25 years
- Players under regular training
- Professional Inline speed skaters

**II.B EXCLUSION CRITERIA**

- Person with allergy towards kinesio tape
- Skaters with any musculoskeletal or neurological injury
- Quads and recreational skaters

**II.C OUTCOME MEASURES**

100m time trial <sup>(9)</sup>

Measured using stop watch in seconds (s)

0-100m

**III. STATISTICAL ANALYSIS**

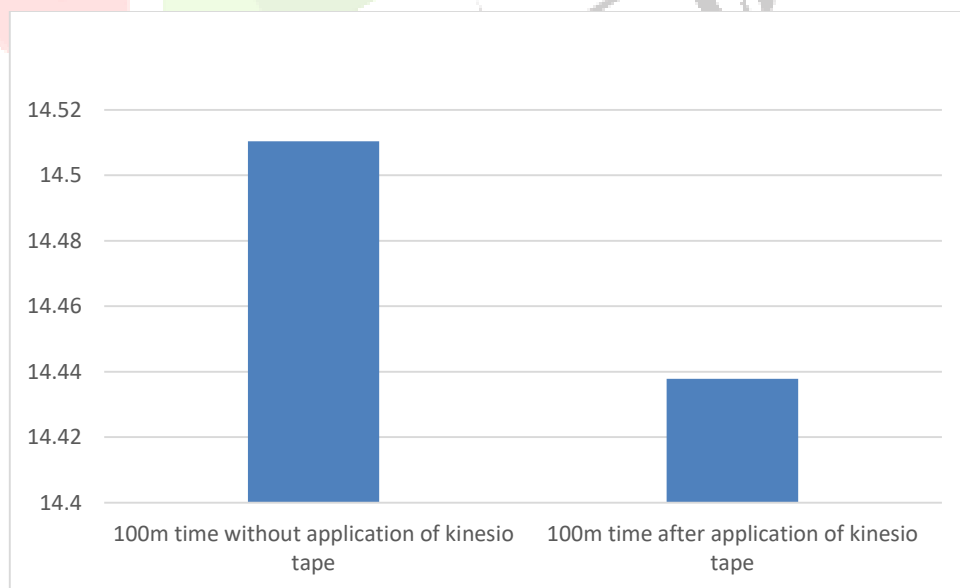
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**IV. RESULTS**

|      | 100m time before application of kinesio tape | 100m time after application of kinesio tape |
|------|--|---|
| MEAN | 14.51  | 14.43                                       |

**Table 1**

Interpretation- Table no. 1 and Chart no.1 indicates mean value of 100m time before and after application of kinesio tape i.e 14.51 and 14.43 respectively.



**Chart 1**

| Male                                       |   | Female                                     |   |
|--|---|--|---|
| 100m time with application of kinesio tape | 100m time without application of kinesio tape | 100m time with application of kinesio tape | 100m time without application of kinesio tape |
| 14.206                                     | 14.26267                                      | 14.70538                                   | 14.79615                                      |

Table no.2

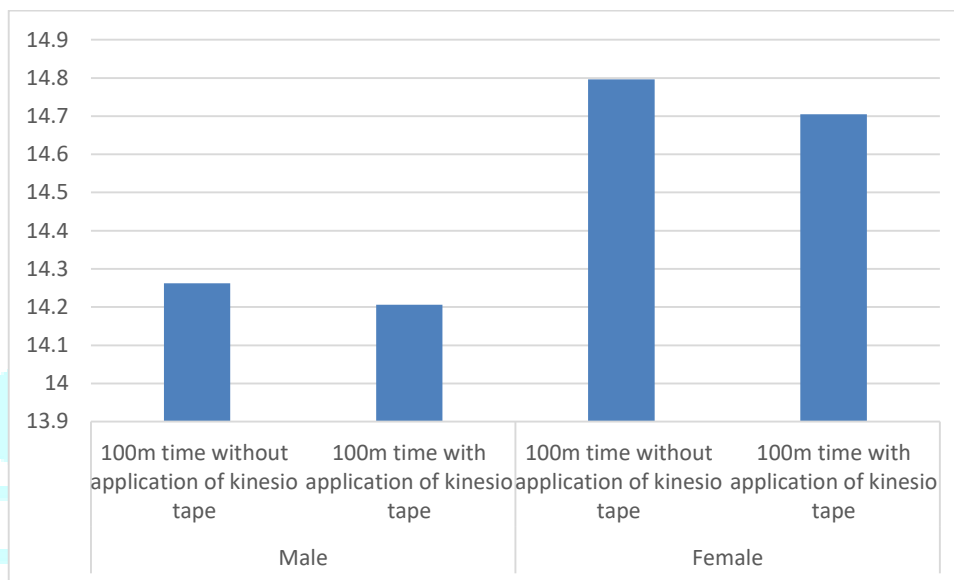


Chart no. 2

Interpretation- table no.5 and chart no.5 indicates the values and graphical representation of 100m time before and after application of kinesio tapes in males and females.

In this study 28 Speed skaters volunteered to participate, out of which 15 were male and 13 were female (mean age  $11.57 \pm 3.44$  years, mean training hours  $11.37 \pm 7.33$  hours, mean years of experience  $4.12 \pm 2.95$  years) 20 speed skaters were between age group of 6 to 12 years, 6 speed skaters were between age group of 13 to 17 years and 2 speed skaters were between age group of 18 to 25 years.

After conducting this study, the change in performance was noticed using recorded timing of 100m time trial after application of kinesio tape. The time significantly reduced after application of kinesio tape i.e from  $14.5 \pm 1.8$  seconds to  $14.4 \pm 1.8$  seconds ( $p < 0.05$ ). Results of paired t test indicate that there is a significant difference between 100m time of speed skaters before and after application of kinesio tape.

Effect of Kinesio Tape on performance of male and female speed skaters was compared Using unpaired t-test and the mean time of male and female speed skaters was  $14.20 \pm 2.27$  seconds and  $14.70 \pm 1.13$  seconds respectively ( $p > 0.05$ ). According to unpaired t- test the difference between both is not big enough to be statistically significant.

## V. DISCUSSION

Inline Speed Skating is a competitive sport, and it involves various events ranging from short sprints to long marathons. 100m speed skating sprint involves explosive strength and may result into early fatigue of muscles which can hamper the performance of Skater, during the competitive phase the skater needs to sprint multiple times to qualify and reach till finals and it is important to ensure that the skater is at his/her optimal performance during each of these sprints.

The correct technique for roller speed skating is based on achieving maximum effectiveness and efficiency of the forces applied to the skate during the push, slide and recovery phases. (2)

The push phase involves strong extension of knee along with hip abduction. The phases of push, slide and recovery are demonstrated above in figure 2.

In this study 100m time was recorded using stopwatch to determine effect of kinesio tape on performance of speed skater, lesser the recorded time greater will be the improvement in performance of speed skater, similar study was conducted by Kistler, Brandon M; Walsh, Mark S; Horn, Thelma S; Cox, Ronald H on topic “The Acute Effects of Static Stretching on the Sprint Performance of Collegiate Men in the 60- and 100-m Dash After a Dynamic Warm-Up” and used 100m time trial using stop watch to determine improvement in performance.

It was noticed that after application of kinesio tape for vastus medialis, rectus femoris and vastus lateralis. the performance of 100m speed skating sprinters improved, as the time of 100m sprint recorded after application of kinesio tape was significantly reduced as compared to the time of 100m sprint before application of kinesio tape. Application of kinesio tape was from origin of muscle towards the insertion.

Kinesio tape’s traditional purpose has been that of injury treatment, pain reduction and joint stabilization. One theorized mechanism by which kinesio-taping affects biological function includes, that the taped area forms convolutions, which lift the skin from the muscle, providing more space between muscle and skin. This further promotes an increase in blood flow and lymphatic fluid as well as an increased mechanoreceptor stimulation. As such, these factors would impact on muscle strength, explosive muscular power, movement control and could have a beneficial effect on performance in sports. (12)

Proprioceptive information from mechanoreceptors in the skin, articular capsule, ligament, a semilunar valve, and muscles provides dynamic stability for each joint during dynamic motion of a joint through a muscular reflex from the spinal cord level and arthrokinetics. The proprioceptive sense offers information about muscle length, muscle tone, and joint position, which participates in motor control. (13)

Kinesio tape, which is placed on the skin, provides a greater cutaneous nociceptive signal and improves balance and gait ability by not only stimulating proprioceptive sense but also identifying the right position of the joint even in a comfortable posture with no weight loaded. Furthermore, KT is well-known to be effective for increasing functional movements by improving muscle strength and endurance. (13)

The initial mechanism with regard to the enhancement of muscle strength and muscle control is that cutaneous fusimotor reflex increases fiber tension, resulting in excitation of primary and secondary nerve endings, thus, helping afferent sensory nerve activity. The mechanism of taping is improvement of muscle strength by excitation of gamma motor nerves in skeletal muscle, as the taped part raises the tension of the fiber. In addition, spatial summation makes neurotransmitter isolated and postsynaptic potential is generated without action potential of pre-synaptic nerve. In other words, an additive effect occurs by stimulating many nerve fascicles that compose synapses simultaneously through taping. Finally, an irradiation phenomenon occurs in the area of increased reaction strength. (13)

In a study conducted by Im-Rak Choi, PT and Jung-Hoon Lee, PT, PhD, vastus medialis, rectus femoris and vastus lateralis were applied kinesio tape and concluded that there was increased muscle tork regardless of application of kinesio tape. Also in the same study it was noticed that application of kinesio tape in direction of origin to insertion has larger muscle tork value as compared to the opposite direction of application. (7)

Similar study was conducted by Athos Trecroci, Damiano Formenti, Alessio Rossi, Fabio Esposito & Giampietro Alberti and concluded that there is significant increase in peak power output and total work with application of k-taping as compared to non-application on k-tape for 6s cycle sprint. (8)

## VI. CONCLUSION

From this study, we can conclude that application of kinesio tape has improved performance of 100m speed skating sprinters by significantly reducing timing of 100m time trial.

## VII. LIMITATION OF STUDY

1. Time was measured using stop watch, which can lead to human error.
2. Number of speed skaters above 18 were less in number.

## VIII. RECOMENDATION AND FUTURE SCOPE OF STUDY

1. Study can be done to check effectiveness of kinesio tape for endurance events such as marathon, 10,000m, 5,000m, etc.
2. Study can be done for age groups of above 25 years.
3. Similar study can be conducted using laser timer to wave off human error of recording time.

## IX. REFERENCES

1. Jesús L. Lozada-Medina, José R. Padilla-Alvarado Body composition profile of young inline speed skaters Arch Med Deporte 2020;37(6):398-405
2. Sandra Pinzón-Romero, José A. Vidarte-Claros, Juan C. Sánchez-Delgado Effects of a proprioceptive physical exercise program on balance in young skaters aged between 11 to 15 years archivos de medicina del deporte volume 36(3) page no. 166-172 may –june 2019.
3. Birgit Kumbrink k-taping an illustrated guide page no.2, 14.
4. Dr Basavraj Motimath MPT, Prasannajeet P Nikam, Dr Dhaval Chivate MPT Sport Specific Muscle Imbalance in Roller Skaters-An Observational Study Journal of medical Science and clinical research Volume 5 issue 8 Page no. 26949-26955 August 2017
5. young-seok lee, Chang- soo kwak, Chung-II lee, Tae- gyu kim conducted study on “Effects of lower extremity stability by kinesio taping method in elite speed skating athletes’ one-leg jumping” journal of digital convergence August 2015 13(08) Page no.495-502
6. Sonakshi Sehgal and Vandana Esht Talent development of roller skating using an exercise program in young males: a study protocol for randomized controlled trial Physical Therapy Reviews Page no. 308-313
7. Choi IR, Lee JH. Effect of kinesiology tape application direction on quadriceps strength. Medicine (Baltimore). 2018 Jun; volume 97 issue 24: e11038.
8. Athos Trecroci, Damiano Formenti, Alessio Rossi, Fabio Esposito & Giampietro Alberti “Acute effects of kinesio taping on a 6 s maximal cycling sprint performance” international journal – Research in sports medicine volume 25, 2017 issue 1
9. Kistler, Brandon M; Walsh, Mark S; Horn, Thelma S; Cox, Ronald H “The Acute Effects of Static Stretching on the Sprint Performance of Collegiate Men in the 60- and 100-m Dash After a Dynamic Warm-Up” The Journal of Strength & Conditioning Research 24(9):2280-2284, September 2010
10. Shaolou Duan, Lingfeng Meng, Delong Ma, and Liangyu Mi “Application Research on Roller Skater Detection, Tracking, and Trajectory Prediction Based on Video Stream” Scientific Programming, vol. 2021, Article ID 2702272, 9 pages, 2021
11. Nabeel Ahammed, Basavaraj Motimath, Dhaval Chivate “Effect of core muscle strengthening on roller skating speed in competitive teenage skaters: An experimental study” Saudi journal of sports medicine volume 18, issue 3, page no. 113-118, 2018.
12. Gerda Strutzenbergerab, Joseph Moorea, Hywel Griffithsa, Hermann Schwamederb & Gareth Irwina “Effects of gluteal kinesio-taping on performance with respect to fatigue in rugby players” European Journal of Sport Science volume 16 issue 2, page no. 165-171, 2016
13. Woo-II Kim, Yong-Kyu Choi, Jung-Ho and Young-Han Park “The Effect of Muscle Facilitation Using Kinesio Taping on Walking and Balance of Stroke Patients” Journal of physical therapy science volume 26, issue 11, page no.1831-1834, 2014