

Effects of a single floss band intervention session on power and agility in basketball players

YASHAVI BHARDWAJ¹, MOHD ASIF², MOHD DANISH³, IFRA AMAN⁴

Abstract

Introduction. Basketball is a high-intensity sport that requires agility and explosive power. Agility, influenced by neuromuscular coordination and proprioception, enables quick directional changes, while power supports vertical jumps. Tissue flossing, a myofascial compression technique, has gained attention for its potential to enhance neuromuscular efficiency and mobility. While its effects on range of motion (ROM) and strength have been studied, its impact on agility and power in basketball remains unclear. This study investigates the effects of a single session of floss band intervention on these performance variables. **Aim of Study.** The aim of this study was to determine the effect of a single session of floss band intervention on power and agility in basketball players. **Material and Methods.** This observational study included 51 college-level basketball players aged 18-24 years, each with at least three years of competitive experience and a BMI of 18.5-24.9 kg/m². The intervention involved wrapping a floss band around a quadriceps, followed by 20 deep squats. Agility (T-test) and power (vertical jump test) were assessed pre- and post-intervention. Data were analyzed using a paired t-test in IBM SPSS. The materials used included a floss band, cones, a stopwatch, and colored chalk powder. **Results.** Statistically significant improvements in agility and power were observed immediately after the intervention. Although performance declined slightly after 15 minutes, it remained above baseline. **Conclusions.** A single floss band session can temporarily boost performance. It shows promise as a quick, low-resource strategy for warm-ups and pre-competition routines.

KEYWORDS: power, athletic performance, agility, tissue flossing, floss band.

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Introduction

Basketball is a sport characterized by moments of intense energy, demanding a combination of quickness, explosive power, and coordination of the nervous and muscular systems. Athletes frequently make rapid directional changes, undertake vigorous movements, and carry out dynamic actions that require outstanding agility and strength. These physical traits are vital for athletic performance, particularly in executing quick transitions, implementing offensive and defensive strategies, and demonstrating effective jumping techniques [1–5].

Agility in basketball is influenced by various biomechanical and physiological factors, including neuromuscular coordination, proprioception, and ground reactive forces. According to Newton's Third Law of Motion, an athlete must generate sufficient ground reaction force in the opposite direction of their movement to optimize speed and changes in direction. The interaction between the foot and the

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playing surface, encompassing factors like traction and banking, plays a vital role in generating lateral forces that enhance agility. Appropriate footwear design and effective training techniques can enhance these attributes [6].

Performance of basketball entails occasional high intensity activities that involve strength, power, agility, balance and neuromuscular control. The anaerobic capacity, lower-limb strength, and reactive agility are highly demanding in elite and 3 × 3 basketball because of numerous acceleration moves, deceleration moves, and shorter recovery time [7, 8]. Repeated changes of direction, lateral defensive actions and explosive transitions are the key factors affecting technical-tactical performance in international basketball and expose the lower-extremity kinetic chain to high mechanical loads [9]. Also, balance and proprioceptive control are critical predictors of agility and movement effectiveness, and comparative analyses in team sport have shown that athletes with multidirectional sports, such as basketball, have better balance profiles, both in terms of static and dynamic balance [10]. Contextualizing floss-band-assisted exercises within sport-specific physiological and neuromuscular demands reinforces their relevance to basketball performance preparation.

In basketball, power is primarily evaluated by how high a player can jump, which is affected by muscle activation, stretch-shortening cycles, and the force produced during take-off. The ability to generate power in the lower body is mainly reliant on the quadriceps, gastrocnemius, and soleus muscles. The ability to produce explosive force impacts various aspects of the game, including rebounding, dunking, and shot blocking [11, 12].

Tissue flossing, a technique related to myofascial treatment, has garnered attention for its potential to enhance mobility, neuromuscular function, and athletic performance. Initially introduced by Starrett and Cordoza in 2013, the method involves tightly wrapping a latex band around a muscle or joint to create local vascular occlusion. The subsequent release is believed to enhance blood circulation, increase fascial mobility, and boost neuromuscular activation. While previous studies have explored the impact of flossing on joint range of motion and muscle recovery, there is insufficient research on its effects on agility and power among basketball players. This study intends to address this gap by evaluating the immediate effects of a single session of floss band intervention on these performance factors [13–16].

Basketball athletes continually seek to enhance performance in order to gain a competitive advantage. Common methods such as strength conditioning, plyometric exercises, and dynamic warm-up routines have been extensively studied and utilized. Nevertheless, emerging techniques such as tissue flossing are becoming viable alternatives that can supplement traditional training methodologies. This study seeks to investigate the potential benefits of floss band application, offering insights into a novel intervention that may enhance on-court performance without requiring significant time or resources.

Additionally, investigating the immediate effects of flossing on agility and power could have wider repercussions beyond basketball. Other sports with comparable movement dynamics, such as soccer, volleyball, and tennis, might also gain from this practice. If it is shown to be effective, the use of floss band could be incorporated into warm-up routines and rehabilitation programs to enhance athletic performance and minimize injury risks. Considering the limited studies on the influence of flossing on agility, this research provides significant insights into the domains of sports science and athletic conditioning.

Aim of Study

The aim of the study was to examine the effect of a single session of floss band intervention on power and agility in basketball players.

Material and Methods

This study employed an observational design to assess the effect of floss band intervention on power and agility in basketball players. The study was approved by the ethical committee of Banarsidas Chandiwalla Institute of Physiotherapy Ethical Committee, BCIP/R&D/MPT/S/002. All procedures involving human participants were conducted in accordance with the ethical standards of the institutional research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. The study was conducted on collegiate basketball players who had at least three years of playing experience at the school and/or college level. Participants were recruited from the North Campus colleges of Delhi University. A total of 51 athletes were included in the study after providing written informed consent. Participants were selected based on specific inclusion and exclusion criteria. The inclusion criteria were: college basketball players aged 18 to 24 years, with a body mass index (BMI) between 18.5 and 24.9 kg/m², and of either gender. Exclusion

criteria included a self-reported history of neurological or cardiovascular conditions within the last six months, musculoskeletal problems in the upper or lower limbs during the same period, open wounds on the thigh, knee, or ankle, systemic diseases, and known latex allergies [17, 18].

The floss band was applied with the participant seated on a staircase or chair, maintaining a knee angle of 90°. The starting point for floss band wrapping was approximately 4.5-5 cm above the proximal edge of the patella. The floss band was wrapped from the distal to the proximal end with 50% stretch and 50% overlap. Upon completion of the wrapping, the participants were asked to perform 20 hip-width deep squats, during which they were permitted to hold a pole for support. The total intervention lasted approximately 120 seconds, with each squat taking 6 seconds - 3 seconds to get into a squat position and 3 seconds to return to upright standing position.

Data were collected using two tests: the T-test for agility and the vertical jump test for power. Participants were given explanations and demonstrations of both tests. Prior to the intervention, the tests were administered to obtain baseline values. Following the intervention, the tests were repeated at two time intervals: immediately after completion (0 minutes) and again at 15 minutes. Each participant completed three trials for each test, and the mean of the three trials was used for analysis. Data analysis included normality testing to determine whether the distribution of the data was normal, and paired t-tests were used to assess the significance of the intervention. All analyses were conducted using IBM SPSS software.

Results

Demographics

The mean age of the participants was 19.47 ± 1.97 years, the mean height was 177.11 ± 13.15 cm, the mean weight was 67.06 ± 15.65 kg, and the mean BMI was 21.46 ± 1.97 (Table 1).

Between-group results

An immediate increase in power was observed following the intervention ($M = 54.13$ cm, $SD = 3.68$), compared with the pre-intervention measurement ($M = 51.69$ cm, $SD = 4.01$), $t(50) = 104.99$, $p < 0.001$. Power showed a slight decrease 15 minutes after the intervention ($M = 53.10$ cm, $SD = 3.85$), yet remained significantly elevated compared with baseline values. Refer to Table 2 and Figures 1-2.

Table 1. Descriptive statistics

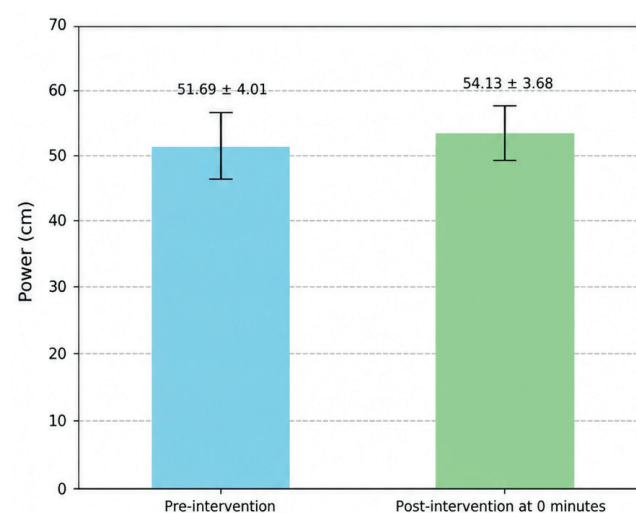
	Minimum	Maximum	Mean	Std. deviation
Age (years)	18.0	24.0	19.475	1.9740
Gender	0.0	1.0	0.225	0.4229
Height	157.00	210.00	177.1190	13.15921
Weight	26.0	98.0	67.068	15.6483
BMI	16.20	23.70	21.4663	1.97359

Agility also improved, with post-intervention times decreasing from 11.31 s ($SD = 0.56$) to 10.72 s ($SD = 0.69$), $t(50) = 11.22$, $p < 0.001$. Fifteen minutes later, agility showed a minor decline ($M = 11.0$ s, $SD = 0.63$) but remained significantly better than pre-intervention performance. Refer to Tables 1-2 and Figures 3-4.

Table 2. Paired T-test results

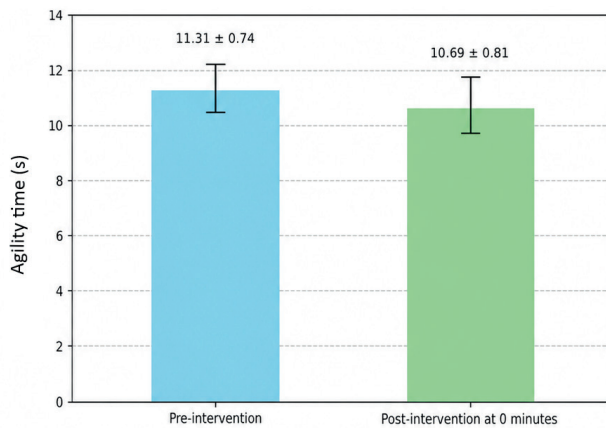
	Power	Mean diff	T	df	p-value
Pre vs. post (0 min)		2.44	104.99	50	<0.000*
Pre vs. post (15 min)		1.40	98.40	50	<0.000*
Agility					
Pre vs. post (0 min)		-0.59	11.22	50	<0.000*
Pre vs. post (15 min)		-0.28	6.96	50	<0.000*

Note: SD – standard deviation; df – degree of freedom; significance at $p < 0.05$



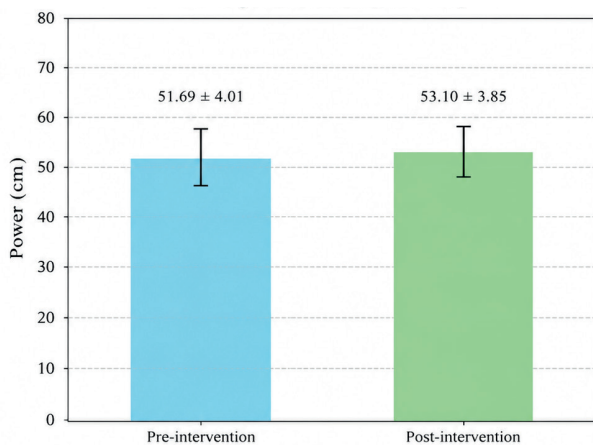
Values represent mean $\pm$ standard deviation (SD) of power measurements taken before and immediately after the intervention.

Figure 1. Mean power at 0 min: pre- vs. post-intervention (mean $\pm$ SD)



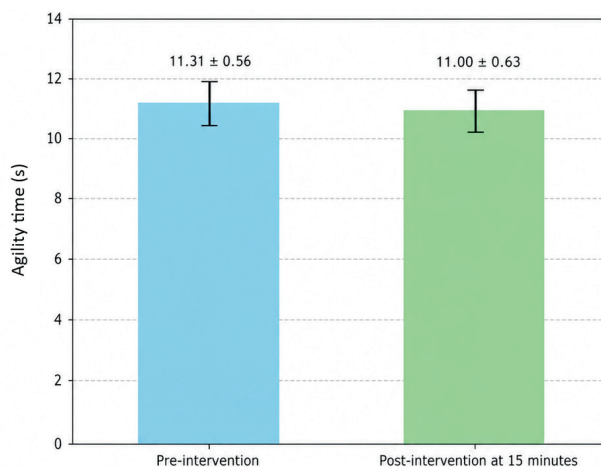
Values represent mean $\pm$ standard deviation (SD) of agility times measured before and immediately after the intervention.

Figure 2. Mean agility at 0 min: pre- vs. post-intervention (mean $\pm$ SD)



Values represent mean $\pm$ standard deviation (SD) of power measurements taken before and 15 minutes after the intervention.

Figure 3. Mean power at 15 min: pre- vs. post-intervention



Values represent mean $\pm$ standard deviation (SD) of agility measurements taken before and 15 minutes after the intervention.

Figure 4. Mean agility at 15 min: pre- vs. post-intervention

Discussion

Research indicated that the use of floss band can temporarily boost power and agility. This rise in power corresponds with earlier studies regarding the effects of flossing on neuromuscular activation and improved blood circulation. The gains in agility may stem from enhanced proprioceptive feedback and increased joint mobility. While earlier research primarily focused on strength and mobility, this study specifically values agility.

The mechanisms underlying the observed enhancements are likely multifactorial. The brief ischemic preconditioning induced by applying and subsequently releasing the floss band may increase localized blood flow, improving the delivery of oxygen and nutrients to the working muscles. This enhances muscle contraction and force output, which is reflected in the notable increase in vertical jump performance. Furthermore, the fascial-shearing effect produced by flossing might enhance soft-tissue flexibility, leading to improved force transmission and overall movement efficiency [19].

Previous studies have shown that flossing improves muscle elasticity and flexibility [21] potentially leading to better agility. The increased proprioceptive awareness from the practice may result in faster neuromuscular reactions, which can facilitate swift changes in direction. Research has suggested that proprioceptive training plays a key role in boosting agility, and the findings of this study support this idea by demonstrating immediate improvements in agility performance following the intervention.

The present study demonstrated an increase in power among basketball players following the application of the floss band intervention. [11], who observed significant improvements in both jump height and power among professional skateboarders after floss band application. This reinforces the idea that floss band can enhance explosive movements, which are crucial in sports requiring rapid bursts of strength, such as basketball.

Our findings showed that the application of floss band improved agility in basketball players, particularly in terms of quick directional changes and maintaining balance during movement. These results align with those of Wu et al. (2022) [21], who observed improvements in hamstring flexibility and static balance in female college students without compromising landing stabilization. While Wu et al. focused on static balance, our findings suggest that the benefits of floss band extend to dynamic agility tasks, which are especially critical in high-movement sports like basketball.

The findings from this research indicate that the application of floss band can significantly enhance power and agility—both critical for basketball performance. These outcomes build upon the work of Chang et al. (2021) [18], who found notable improvements in quadriceps and hamstring flexibility immediately and up to 20 minutes after a single feedback session in young adults. Although their focus was on adaptability and strength, the present results indicate that feedback might also play a role in enhancing more dynamic performance factors.

While the improvements observed were statistically significant, they were temporary, as gains in performance started to wane just 15 minutes after the intervention. This suggests that using a floss band might be more beneficial as a pre-competition or warm-ups strategy rather than a method for long-term adaptation. The noted decrease indicates that either multiple applications or the addition of dynamic exercises could be necessary to sustain these benefits for a longer period.

Several methodological elements deserve further investigation. It would be beneficial to study how different levels of compression, varying lengths of application, and location-specific applications influence the effectiveness of floss band intervention. Additionally, comparing these methods to other performance-enhancing techniques, such as dynamic stretching or plyometric training, could provide valuable insights into the relative benefits of flossing.

Although these elements are significant, the results have real-world implications for athletes, coaches, and professionals in sports rehabilitation. Due to its ease of use and immediate performance benefits, flossing can be incorporated into training sessions to provide a rapid and effective neuromuscular stimulus before competitions or high-intensity activities. Future studies should explore the long-term effects of floss band use and its potential roles in injury prevention and recovery support.

Clinical implication

From both a clinical and sports-performance perspective, the findings indicate that floss band use can serve as a practical addition to warm-up routines or pre-competition preparation for basketball players. Floss band techniques may be incorporated into performance-preparation strategies due to their low cost, ease of use, and minimal need for professional supervision. Clinicians and coaches should, however, use these findings with caution and ought not to view the use of floss bands as an alternative to an evidence-based

training or rehabilitation intervention. It can be used on an individual basis and as part of a complete conditioning program.

Limitations and future recommendations

Several limitations were identified. First, the observational design and absence of a control group prevent isolation of the specific effects of the floss band intervention from other sources of variation, including learning, motivation or warm-up influences. Second, the sampling strategy – limited to collegiate players from a single geographic region – restricts the generalizability of the findings to other athletic populations or competition levels. Third, measurement and performance biases cannot be fully ruled out, as repeated testing may have influenced participants' outcomes. Future studies would benefit from employing randomized controlled designs with an appropriate comparison group, allowing clearer attribution of effects to the floss band intervention. Moreover, larger sample sizes and assessor blinding, combined with longitudinal follow-up, would strengthen the evidence base and provide deeper insight into the role of floss band techniques in sports performance.

The current research employed an observational design with a single intervention group, which represents a notable methodological limitation. There was no control group performing the same squat protocol without the floss band; therefore, it is not possible to attribute any specific effects of the floss band intervention, as opposed to general warm-up or neuromuscular activation resulting from repetitive squatting. As a result, the observed changes cannot be fully attributed to the floss band intervention. Although the results suggest that short-term associations may exist between the use of floss bands and the measured outcomes, they need to be interpreted with caution and not regarded as evidence of a causal influence.

The intervention program consisted of 20 deep-squat exercises performed with a floss band, selected to provide a uniform and controlled lower-body activation stimulus across participants. Although this approach enhances consistency and reduces variability, it does not fully replicate the sport-specific mechanical and neuromuscular demands of basketball, such as lateral shuffling, high-speed deceleration or jumping. Consequently, the protocol has weak ecological validity in extrapolating the results to basketball-specific performance. Instead, this general exercise was selected to identify the fundamental lower-extremity movement patterns and to ensure participant safety during the

initial investigation. Nevertheless, future studies should include basketball-specific functional exercises, such as defensive sliding, cutting exercises or low-intensity plyometric movements under floss band condition, to more accurately evaluate sport-specific neuromuscular adaptations and the practical implications for basketball athletes.

Conclusions

In conclusion, this study indicates that a single application of floss band considerably boosts power and agility in basketball players, though the effects are temporary. While these results endorse the potential of floss band techniques as a pre-performance strategy, additional research is necessary to refine application protocols, explore long-term effects, and assess its effectiveness compared to other warm-up and conditioning methods. By addressing these issues, future research can offer a more comprehensive understanding of the influence of floss band application on enhancing sports performance.

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Conflict of Interest

The authors declare no conflict of interest.

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