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Productive load management and periodization of fast bowlers (During the season)

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Abstract

Around 12 permanent and 92 Associate countries participate in the worldwide sport of cricket, where quick bowlers play an important part in a cricket squad. The most crucial factor is to discuss how to effectively manage a fast bowler's load by emphasising on his biomechanical tendencies and injury avoidance strategies. This study seeks to provide the physiological literature with regard to fast bowlers in cricket as well as a useful and periodized training programme for them during their off-season preparation. Additionally, it provides us with the limits of earlier study as well as potential directions for future studies. The primary objective of this review is to provide the evidence in this area a place to start.

Keywords: Elastic strength, bio-banding, training routine, performance, range of Motion (ROM), front foot contact, periodization, effective load, slingshot, enhanced recovery, speed training

Introduction

Fast bowlers play a major role in cricket, although they often have shorter careers than batsmen and spinners. A fast bowler may travel 1.9 kilometres with 5.3 minutes of sporadic bowling activity and around 60 bowling episodes of high-intensity lower and upper body activities during a 10 over session. Therefore, it's crucial to split the ideal load needed for a fast bowler to function effectively based on the statistics above. Elite level fast bowlers deliver balls between 126 to 147.8 km/h, according to different studies. Therefore, it is crucial to have productive load managements and a periodized programme to follow (In-season) during the increasing number of matches and varied forms in cricket like T20, ODIs and Test cricket. Therefore, in this situation, evidence-based intervention options are crucial when it comes to fast bowling.

Factors affecting load management of fast bowlers

The following are some of the variables that influence how fast bowlers manage their load: A bowler must complete a certain number of overs during a net session while maintaining its bowling motion, avoiding physical exhaustion, and paying attention to the precision of their deliveries to the target. It is crucial to keep in mind that a pacer may have to bowl a 12 over spell or two 6-over spells. According to the study, the pacer is a bit inconsistent. For this, if an S&C coach examines match performance data for evaluating how many overs a fast bowler must bowl while also taking into account his training regimens, it will produce more reliable outcomes. Therefore, it's crucial for an S&C coach to create a periodized programme that incorporates the development of lower body eccentric strength by supramaximal loading, isometric pauses or raising eccentric muscle tension at operative joint angles. A front knee that is stretched more effectively transfers kinetic energy. Therefore, eccentric exercise of the lower body is a successful approach to treat lower back and ankle ailments. Therefore, eccentric lower body conditioning is a successful strategy to extend the range of overs for a fast bowler. The range of overs for a fast bowler also relies on the run-up. The ball release speed is influenced by the bowler's run-up speed. The run-up velocity and ultimately the speed of the ball will both be impacted by an uneven or jerky run-up. Bowlers that have a quicker last 5 m run-up may achieve greater speed. Fast bowlers need to have regulated rhythmic linear speed, which may be achieved by training on a specific fast

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bowler's motor abilities to increase their neuromuscular effectiveness. A fast bowler's speed measurements will improve after receiving strong progressive loads from fast twitch muscle fiber. ECC: Overload training stimuli that cause the ankle and knee to become stiff are useful for improving speed. Acceleration may be developed via Olympic lifts. Therefore, in order to maximize a fast bowler's endurance so that he can bowl more overs with less physiological strain and a greater rate of accuracy, we must build an efficient periodized program with an optimal load for him.

Another factor to consider for fast bowlers is heart rate measurements and rest periods related to the bowling activity. One-day matches are more action-packed than Test encounters because of this. Therefore, it's crucial to take note of how an S&C would create a periodized schedule that is successful for a fast bowler who plays first either a One Day International first or a Test match. Based on the type of matches and match condition, acceleration and heart rate are analyzed. Elite fast bowlers had lower resting heart rates (RHR) than medium-fast bowlers. When you are bowling, your heart rate increases, which triggers the production of more catecholamines and raises your blood pressure all around. Rest intervals are crucial, and they depend on the surrounding circumstances. When the temperature is cold, a pacer can bowl more overs with shorter rest breaks between spells and longer spells, but when the temperature is hot and muggy, the fast bowler can switch to shorter spells, which makes his overall workload more effective and ideal in the environment.

The bowler's run-up affects the blood pressure levels. Lactate levels were found greater in bowlers who had long or fast run-ups. The fact that blood pressure levels do not rise throughout bowling spells suggests that bowlers do recover metabolically in the time between deliveries and long spells. To maintain high levels of bowling spell performance, blood glucose levels must be kept stable. It mainly depends upon the type of nourishment he or she is consuming in between bowling sessions. Subject to environmental factors, medium-fast bowling up to 12 overs does not result in a loss in bowling speed or accuracy.

Environmental factors

When creating a periodized bowling routine for a fast bowler, the temperature is the most crucial factor to be kept in mind. Shorter bursts of high-intensity exercise should be incorporated into the training regimen in hot, muggy weather, and the usage of energy drinks and electrolytes will restore the body's lost salts, increasing the likelihood of good performance and lowering the rate of weariness. Longer stints of 10 to 12 overs may be given to a fast bowler in cold weather since the rate of exhaustion is very low, and longer spells can be given to a medium fast bowler.

Over the years it has come to notice that a fast bowler's effective load during such a time period is greatly influenced by the kind of format he or she is playing. If a fast bowler is required to compete for the entire IPL season, which entails more than 16–18 games (Including semi-finals and finals), then the study claims that mean heart rates are identical but peak heart rates are greater in T20s. Utilizing techniques that improve a fast bowler's performance becomes crucial.

Bio-banding for fast bowlers

Fast bowlers' workload management throughout their competitive training period depends on their developmental phases. Synergistic adaptations refer to this. In order to develop a comprehensive and well-balanced structure of training stress that will maximize strength, lower the chance of injuries, and enhance overall performance, synergistic methods of training should be implemented. By reducing imbalances, synergistic training enhances mobility. It uses a range of training techniques to raise the body's overall peak performance. Synergistic training should be implemented when creating an efficient periodized program for a fast bowler to fix his strength and postural imbalances. Injury results from repetitive motions made by the body. A training program's implementation of different kinds of movement patterns can assist in minimizing the negative consequences of repetitive motion and lower the chance of accidents.

The following exercises, which I have incorporated in my program, are part of synergistic training for fast bowlers:

Table 1: Following exercises for synergistic training for fast bowlers

Core Tri set (Russian Twist, sideways KB plank crunches, Alternate Plank hold changes)	One set	90 Seconds
Banded Isometric Lunge (2.5 kgs each side)	Three sets	15 seconds on each side
Banded underhand grip shoulder shrugs	Three sets	6-8 reps
One arm medicine ball vertical throw	Three sets	4-6 reps
Banded Balanced Military Press	Three sets	6-8 reps
Banded unbalanced military shoulder press	Three sets	6-8 reps

Physiological Analysis for Successful Periodization of Fast Bowlers

Isometric exercises that result in the highest levels of activation should be a part of a successful periodization. It implies that more muscular motor units will be engaged. A fast bowler may activate 5% more motor units and muscle fibers at a maximal isometric phase than during a peak concentric or eccentric phase, according to research. So, as part of RAMP warm-up, ISO training may be employed before training or before a tactical bowling session. Raise, Activate, Mobilise, and Potentiate are referred to as RAMP. Oscillatory training increases the likelihood that training will be successfully transferred. Following the desensitization of the GTO (Golgi Tendon Organ) via ISO

exercises, these exercises are excellent ending exercises. It is a more sophisticated form of training that recognizes the muscles' mutual inhibition of one another. Training in OC increases tissue resistance. In the push-pull execution of a movement, adopting OC techniques maximizes the total amount of signals sent in a specific place as high pressures are used, increasing the selection of high motor units.

Another crucial factor for successful periodization for a pacer is Triphasic training techniques. By altering the loading factors, such as the exercises, weight on the bar, motion pattern, and the number of training sessions per week, one may control the amount of stress on the athlete. To witness consistent improvements in the training impact, the athlete must constantly be subjected to new or higher

levels of stress. A fast bowler could speed up its run-up and follow-through, for instance. So, here is an example

programme for a fast bowler falling in the age bracket of 18-21 years, when their season is on.

Banded Step-ups	Three sets	6 reps	Light/Medium/heavy depending upon the resistance.
Medicine ball slams	Three sets	6 reps	6-8 kg slam ball
Rear elevated split squat jumps	Three sets	4 reps	
Banded Chest Toss	Three Sets	10-12 reps	2-3 Kg Medicine Ball
Medicine ball slams followed by 3 balls bowling with the full run-up	Three sets	3 reps	3 Reps with Medicine ball followed by bowling 3 balls of 250g in 1st set. 3 Balls with 2 reps with medicine ball in 2nd set. 3 balls with no rep. with a medicine ball in 3rd set.

The aforementioned program had a beneficial effect on a fast bowler. The training plan increased his general elastic strength, improved his range of motion, and benefited from swift trunk movements, which assisted him in producing higher surface speed during practice sessions. I have shared this sample program of a fast bowler with whom I worked for 8 weeks during his training routine.

Adding extra skill-specific programs is another efficient strategy for controlling the workload of fast bowlers during their seasonal matches. The overall consistency of a fast bowler will increase as he works to improve his neuromuscular efficiency. Working on extensibility is one of these skill-specific training programs. Front foot contact (FFC) ISO holds enhance fascia remodeling, structural integrity, and pattern remapping. Flexibility is not necessary for front-leg compliance; extensibility is. Less elastic capacity comes from flexibility that places more of a focus on static stretching. On FFC with extended ground contact, SSC (Stretch Shortening Cycle) becomes crucial. Therefore, it becomes crucial that we distinguish between loaded flexibility or ISO holds and stretching. There may be a cause why you don't comprehend the differences between flexibility and extensibility while preparing a schedule for a fast bowler. Excellent flexibility in a fast bowler does not necessarily translate into good extensibility. He must be as tight and adaptable according to different conditions. So, adding isometrics and skill stability routines will help pacers bowl quicker overall.

Speed: the most powerful weapon for fast bowlers

The amount of distance a fast bowler travels in a given format determines how well they may be periodized to prepare for the season. A pacer usually bowls quite a lot of overs in brief bursts in a multi-day format.

A fast bowler's training regimen should take into account environmental factors and recuperation times between stints. I'm using the overs peed training from the speed development course here. In particular, overs peed training encourages the vestibular system to move more quickly throughout your run-up or sprint. It is an indication to run as quickly as you can. The body always looks for protection and safety when we run faster. A high-octane ability like running fast is restricted if the vestibular system isn't taught that it's okay to do so without any issues. Running at maximum speed during your run-up without pausing will therefore aid fast bowlers in achieving overs peed. When we bowl consistently at a similar pace in practice, competitions and first-class matches, we build up a speed barrier that is very challenging to overcome once it becomes ingrained in our muscle memory. As a result, our bodies become accustomed to the 70–80% zone, where they no longer sense the need to break the barrier. The body will get accustomed to applying that 70–80% energy when bowling

and it will also work in a game setting. To bowl at a fast pace, strive to surpass the 80% mark. The pacers require speed and more speed.

There can be different methods that bowling coaches can apply to fast bowlers to enhance their performance and increase their speed:

The goal is to move as quickly as possible without considering our first run-up. Bowl with a more strenuous strategy (sprint as fast as possible and bowl without any targets). Simply begin running at full speed from a distance and bowl with no restrictions on a direction. Try to place a pad at the front foot which lands first if you are still in the beginning stages of your routine to lessen joint tension.

Children's assisted bands with a light or medium resistance will attempt to draw you across the crease. This will help you swiftly transition from your rear foot to your front foot by applying force there. Additionally, this allows a fast bowler's GRF and total RFD (Rate of Force Development) to grow.

Slingshot bowling method

In this method, the bowler receives additional resistance assistance at the beginning of his run-up or momentum; no extra bands or resistance are applied throughout the delivery to alter the kinematics of a pacer.

Misconceptions surrounding speed training

1. The improvement of running speed is a useful conditioning strategy to supplement the speed development programme. Stride length and cadence are two variables that affect running tempo. Stride length and stride cadence describe the number of steps taken per second and the distance covered by each step, respectively.
2. Running speed will increase if one of the parameters improves while keeping the other constant, enabling the fast bowler to generate powerful force productions when delivering the ball. Avoid trying to prolong the athlete's stride artificially since this will distribute the athlete's COM (Centre of Mass), which puts the foot in front of the COM and increases the risk of injury.
3. The emphasis should be on the effective length of the stride. Step cadence is determined by contact time as well as flight time, or the time duration spent on the ground and in the air with each step. Instead of focusing on moving the legs quicker, stride cadence can be enhanced, which may be done by reducing ground contact times. Therefore, we must concentrate on increasing our lateral impulse by using vertical forces to defy gravity in order to provide enough time for the legs to be repositioned for the following strides.
4. In order to dispel illusions about the biomechanics of speed training, an effective work-to-rest ratio with

enough training sessions to supplement is needed to enhance the fast bowler's total gait analysis. As a result, the fast bowler has less chance of picking up an injury and may get faster and sharper.

The following is an example of a program I've used to help a fast bowler improve his running speed and all-around speed (Age: 21 years)

I timed the pacer's final 30 meters with a stopwatch to help him with his initial acceleration, mid acceleration and deceleration.

First set reading are as follows

1 st Sprint	4.32 sec
2 nd Sprint	4.36 sec
3 rd Sprint	4.43 sec
4 th Sprint	4.34 sec
5 th Sprint	4.36 sec

After the first session got over, the athlete was given a rest period for 5 minutes and to improve the running speed again and see the difference, the second set was conducted where the bowler had to complete a task of running 60 meters in not more than 7-8 seconds. The focus was only on producing high-level sprinting sessions. The results I got during the second session were much more satisfying.

Second set of reading are as follows

1 st Sprint	7.21 sec
2 nd Sprint	7.38 sec
3 rd Sprint	7.34 sec
4 th Sprint	8.13 sec
5 th Sprint	7.78 sec

Constraints in determining effective load and periodization

Each fast bowler has a specific workload. Whether a fast bowler is side-on, semi-side-on, or front-on depends on the type of fast bowler. A pacer's periodization and effort load levels may be different according to the various formats. There are different components that the training programs do not classify as in-game events. For instance, a pacer bowls one over at the net session, then another one, and so on. However, in a game, after bowling one over, the bowler fields in a different area where he or she must work hard to stop the boundary, which affects the intensity of both the in-game and net session situations. For this period, there is either little or no data available from competitive matches published. To allow the fast bowlers to recuperate from their previous over's exhaustion, they are positioned after each over where there will be the least amount of fielding action. Therefore, taking this into account in connection to recovery might be a crucial study subject for S&C coaches to further examine with respect to the physical tiredness and management of workloads during match days. Additionally, efficient workloads are simpler to access when we talk about shorter forms (like T20 and ODIs), however, they are unknown for longer formats (Test matches) as the number of spells may vary based on game conditions, weather, and surroundings. Additionally, the effort of top-level pacers varies based on their degree of fitness and the overall matches they play every year. The amount of workload management that can be carried out for elite fast

bowlers who are bowling over 145-150 km/h is unknown at the moment since S&C coaches can only create a periodized program to reduce the injuries in future; they cannot prevent injuries from happening to fast bowlers. Therefore, at this stage of the investigation, nothing is known.

In conclusion, various game forms, elite and medium-fast bowlers, a lack of data availability, and variations in bowling speeds shown in studies may influence the training techniques that should be used to create a periodized routine for fast bowlers. A major goal of the study should be to understand how the several new formats and their fluctuations will affect a fast bowler's preparation, performance, recuperation, and workload distribution.

Practical implementation

The impact of studies on the professional elements of fast bowlers is significant. In order to create more skill-based programs for fast bowlers, more research is needed to understand the training models and workload productivity. S&C coaches could look at other sports that offer players with quick bowling abilities like those in cricket. These kinds of programs would be helpful in developing quick bowlers who can play for extended stretches of time without suffering injuries.

According to the research that is now accessible, fast-bowling is a variable, high-intensity exercise that is largely anaerobic in character, where we see a rise in heart rates and a fall in RHR. Although fast bowlers have some time to recover in certain game settings. For this intermittent vigorous exercise pattern to be maintained, pacers need a well-trained anaerobic metabolic system. S & C coaches must create certain regimens to strategically plan those recuperation intervals after non-bowling periods and the time after delivering the ball.

S&C coaches should create their training plans on the basis of information they have at their disposal from various research projects conducted or studies that have previously been done. According to those findings, efficient utilization of workload should be prepared for pacers with various biomechanical characteristics. Additionally, for optimum performance, both on and off-match workloads should be checked. Therefore, S&C coaches should work to create training strategies that might improve abilities, lower the risk of injuries, boost player performance, and lengthen recovery times for bowlers.

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