

Reversing the dry spell with Hydration strategies: A Science for instinct to reliable Bowling performance

P. Alagarsamy¹, C. Sugumar²

¹Research Scholar, ²Director of Physical Education,
The Gandhigram Rural Institute (Deemed to be University), Gandhigram,
Tamil Nadu, India – 624 302

¹sugumargri@gmail.com, ²palagar.swamy@gmail.com

ABSTRACT

Aim: This study assessed the dehydration's impact on Cricket bowling performance. **Methodology:** To achieve the purpose, eight bowlers were selected from Gandhigram Rural Institute (GRI), Tamil Nadu. Their age ranged between 18 and 22 years. 48 deliveries bowled by the eight male bowlers before and after the controlled 30-over Cricket match organized at 24-27°C conditions. Body weight, urine specific gravity (USG), ball speed and accuracy was tested prior to and after the treatment. The data were analysed with simple correlation, coefficient of variation and Friedman two way analysis of variance test. **Results:** The influence of treatment, the bowlers were moderately dehydrated despite hydration efforts. Bowlers' ball speed and accuracy was decreased by 2.04km/h and 19.27 points respectively. Correlation analyses showed there was some association between ball speed-accuracy. **Conclusions:** The bowlers accomplished the state of dehydration at the end of 30-over play which remarkably decline the bowling speed and accuracy..

Keywords: Dehydration, Body mass loss, Urine specific gravity, Cricket Bowling accuracy, bowling speed

INTRODUCTION:

Cricket is one of the popular international sport and widely played by students of all ages and gender in our country. The coaches normally train to sharpen skills of cricketers and tend to polish their talents to advance from district to international level. It is an accepted fact by Maunder et al., 2017, that physical and mental development is crucial for young cricketers to progress effectively, building strength, vision, and resilience. To play cricket, it is good to have good mental strength, physical strength, health, spirit, performance, visionary thinking and teamwork. Cricketers should pay special attention to develop themselves to face five-day Test cricket match, 50-over match and the T20 match. The nutrients, strength, momentum, force, endurance and speed, biomechanical and kinanthropometric aspects needed by the bowlers remarkably differ to different format of Cricket. Based on the prospective, the bowler should focus exclusively every day practice session which enable the bowlers to delay the onset of fatigue and consequently to prevent injuries likely to be in the subsequent training sessions and matches. The necessity of the bowlers to exert force depends on the collective works of the organs and functional coordination of the joints from toe to head. Burnett et al., 1995 suggested that, rigorous daily training, improves motor fitness, mental toughness and bowling skill and accuracy which are the prerequisite for success in Cricket.

The movement of bowling naturally comprises of running, jumping, landing and release the ball with arm rotation. This moment occurs with the support of all big muscles of

the bowler thereby the expenditure of energy is enormously more than the other players on the field. The bowlers realize the possibility of getting tired as they have to bowl maximum of seven overs continuously other than T20 match. In addition to bowling, the bowler is needed to field the ball and running in between wickets while batting. To sustain the consistency of the bowlers, handle the pressure situation and to ensure their energy, accuracy and speed vital for wicket taking ability, the captain of the team usually position the bowlers, in particular, at long-on / long-off / third-man / fine leg / deep mid-wicket. Most of the bowlers are seen tall with better lean body mass (Alagar et al., 2025) they appear with strong composed mind express aggression while playing.

In spite of having potential qualities and specific allotment of position on the field, the bowlers mostly feel dehydrated and reach exhausted stage at crucial condition of the final overs of the match. To overcome the state of dehydration and loss of electrolytes, the bowlers often drink enough amount of water suitable supplements and it could be noticed by the spectators during the match. Duffield et al., 2008 explained that, a bowler sustains his performance without fatigue across long match durations with inclusion of proper training and intake of nutritional supplements to manage fatigue, prevent injury, stay aggressive and calm. The fatigue state of pace bowlers commonly reported through, muscle soreness and mental fatigue Cooke et al., 2019, Duffield et al., 2008, Maunder et al., 2017, and Portus et al., 2000 used physiological measures such as creatine kinase, blood lactate, heart rate and, subjective ratings like RPE, and performance metrics including accuracy, ball velocity, and run-up speed to quantify fatigue. Burnett et al., 1995

research suggested internal fatigue might not immediately impair output during 12-over spells without significant performance decline.

Fatigue is mainly linked to acute muscle damage from rather than classical cardiovascular models. **Noakes and Durandt, 2000; Johnstone et al., 2014** insighted that, muscle's repeated eccentric contractions results in fatigue rather than physiological response of the cardiovascular system. **Cooke et al., 2019** confirmed that Seam bowlers were more accustomed to extensive workloads with more fatigue resistant than non-seamers. They added that professional crickets are assessed for fatigue with isokinetic method of peak jumping force instead of traditional countermovement jump. **Maunder et al., 2017** differentiated that fatigue affect the consistency in ball velocity due to reduced lateral trunk flexion whereas, young bowlers seem for inadequate fatigue management that prone to overuse injuries. Wearable technologies could a suitable mean for tailored fatigue detection to sustain the fast bowlers' performance and health **Maunder et al., 2017; Burnett et al., 1995; Noakes and Durandt, 2000; Cooke et al., 2019; Johnstone et al., 2014**.

The insights from the above-stated facts enabled the researchers to apprehend that dehydration leads to reduced energy, increased fatigue, and diminished performance. Hydration plays a vital role in maintaining concentration and physical functions. This versatile approach in sports coaching and strength and conditioning provided a platform for sustaining top-class bowling performance and minimising bowlers' injury risk throughout their careers. The researchers attempted to address the following objectives to bridge the gap between previous research findings and current needs.

Study Objectives:

To find out the effect of dehydration on;

Accuracy of medium bowlers

Bowling speed of medium bowlers

Methodology

Subjects

This study assessed dehydration among medium bowlers of Gandhigram Rural Institute, Gandhigam. Eight (08) medium bowlers were involved, aged eighteen (18) to twenty-two (22). They participated in intercollegiate and District league tournaments in 2025 and 2026. **Study Design**

The testing protocol was administered at the Gandhigram Rural Institute, Gandhigam, on 19-11-2025. The climatic conditions on the test day ranged from 24°C to 27°C, typical of hot, humid South Indian weather. To achieve the study's purpose, a 30-over match was organised between Gandhigram Rural Institute, Gandhigam, and Manzoor Cricket Club, Dindigul, in accordance with the ICC's new rules and regulations at the test venue 12 hours before the scheduled time of the match. Participants were instructed to remain hydrated and to obtain adequate rest before undergoing the test protocol. Participants were thoroughly instructed on the study procedure and were

permitted to bring their own water containers; the amount of water they consumed was recorded.

Assessments

Age, height and body composition profile of the bowlers were assessed a day before the test day.

Body Composition

Body composition profile of the bowlers was assessed by (OMRON Karada Scan HBF 362, India) Body Fat Analyzer.

Height

Height was measured to the nearest 0.1 cm using a (EASYCARE, China.) wall mounted manual height measuring scale.

Body Mass

Body mass was measured prior to and after the treatment by using a calibrated digital weighing machine (SAMSO, India.). After emptying the bowl, the body Mass were obtained in minimal clothing.

Urine specific gravity

To recognize the hydration status of the bowlers, prior to and after the treatment, Urine samples obtained from the bowlers were assessed for urine specific gravity (U_{SG}) by using a Refractometer (Erma Inc, FG-301, Japan).

Performance tests

At the early morning of the test day and after the 30 over match, participants were tested on body weight, U_{SG}, bowling speed and accuracy and were presented in table no -1.

Table 1

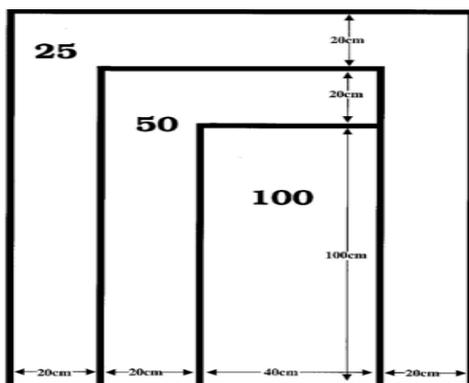
Variables	Test/ Instrument	Unit of Measurement
Age	Chronological age	Years
Height	Easycare (Wall Mounted)	CMS
Body Composition	Karada Scan	%
Body Weight	Weighing Machine	Kgs
Urine Specific Gravity	Refractometer (Erma Inc, Japan)	Brix (Apparent SG)
Accuracy	Target Bowling (Portus et al., 2010)	In points
Ball Speed	Pocket Radar Gun	Km/h

Testing protocol

Bowling Accuracy Performance Test

Before the treatment protocol, the purpose of the test, assessment procedure, and importance were familiarised with the bowlers. In addition, they were instructed to bowl six deliveries at match intensity with consistent speed, line, and length. To ensure their readiness and prepare participants for the assessment, the researcher provided adequate warm-ups. Prior to and after the treatment, the bowler performed six deliveries with maximum speed and aimed towards the target. To assess the bowling accuracy of the participants, target bowling test was administered by using target board suggested by **Portus et al., 2010**. The target board is positioned 30 cm in front of the stumps and 50 cm above the ground. The target had three distinct scoring zones, marked with a black line on the white mat, with specifications as illustrated in figure 1. Depending on where the ball hit on the target, the bowler scored 100, 50 and 25 points. Balls missing the target and passing under the board scored zero.

Figure 1



All participants used a white Kookaburra four-piece Cricket ball to create an impact point on the white target sheet, enabling the two judges to identify it clearly. The ball impacted the target line, marking the boundary between the two zones; the higher score was awarded.

Ball Speed

Ball speed was assessed by a Pocket radar gun (Smart Coach \pm 0.2 km/h, USA) located behind the target board to record the ball speed of every delivery of the bowler.

Scoring

Ball speed and accuracy of the each and every delivery of the bowler were accountable for scoring.

Analysis of the Data

Kinanthropometric, body composition profile and approach run distance of the bowlers were presented in table 2.

TABLE 2

Bowler	Age	Height	Weight	Approach Run Distance	Whole Body		Trunk		Legs		Arms	
					Fat	Sk.m	Fat	Sk.m	Fat	Sk.m	Fat	Sk.m
1	18	176.1	58	17.9	11.5	36.9	8	30.3	17.2	53.5	18.1	40.9
2	22	168	78	15.8	19.2	31	17.5	23.2	27.9	48.3	27.9	37.2
3	18	170.6	47	15.51	9	38.2	7.2	32.5	14.5	55.3	15.7	44
4	19	164.9	81.4	14.3	19	31.1	17.6	23.6	26.5	48.5	26.6	36.9
5	19	176	63.9	13.5	9.6	37.6	8.3	32.2	13.9	54.7	15	41.8
6	18	180	84.2	13.8	16	34.1	14.5	26.9	22	51.3	22%	38.5
7	19	173.4	64	13.8	12.2	35.7	10.6	29.5	18.2	52.8	19	41.1
8	21	178.6	68	18.3	8.8	38.1	7.5	32.8	12.7	55.1	13.9	42

Sk.m. denotes skeletal muscle mass.

Table 3 exhibits the bowlers’ water consumption during the treatment, variation in body weight and U_{SG} of the bowlers in pre and post treatment.

Table 3

Bowlers	Water consumption (Litters)	Body weight		U _{SG}	
		Pre	Post	Pre	Post
1	1.25	58.6	56.1	1.00117	1.00272
2	1.25	77.6	75.8	1.00117	1.00194
3	1.25	47.4	45.8	1.00078	1.00233
4	1.25	79.5	77.4	1.00078	1.00272
5	1	62.8	60.7	1.00039	1.00117
6	0.75	83.8	81.9	1.00117	1.00233
7	0.75	64.3	62.1	1.00156	1.00272
8	0.75	70	67.5	1.00117	1.00233

Table 3 clearly absorbed that the eight bowlers' water consumption ranges from 0.75 to 1.25 liters due to the effect of treatment. Differences in body weight and USG are evident among the eight bowlers. In terms of bowlers' weight, the observed differences between pre and post are 2.5, 1.8, 1.6, 2.1, 2.1, 1.9, 2.2, and 2.5, and for USG, they are 0.00155, 0.00077, 0.00155, 0.00194, 0.00078, 0.00116, 0.00116, and 0.00116.

Before and after the 30-overs match treatment, each bowler bowled six deliveries the ball speed and accuracy of each delivery were measured. Measured data were statically analysed by descriptive statistics and presented in table 4.

Table - 4

Descriptive data on ball speed and accuracy of bowlers

Bowlers	Speed		Accuracy	
	Pre test M±S.D.	Post test M±S.D.	Pre test M±S.D.	Post test M±S.D.
1	98.17±0.98	98.83±2.32	83.33±25.82	91.67±20.41
2	92.83±1.17	93.00±2.76	70.83±45.87	33.33±40.82
3	91.00±3.52	92.17±3.13	54.17±40.05	25.00±41.83
4	99.67±2.80	94.67±2.80	54.17±40.05	62.50±44.20
5	96.17±1.33	84.67±14.65	83.33±25.82	45.83±29.23
6	87.67±1.63	89.67±2.58	25.00±38.73	33.33±37.64
7	96.50±1.22	95.67±1.63	62.50±44.02	29.17±40.05
8	101.00±1.90	98.00±2.19	66.67±37.64	25.00±38.73
Mean	95.37625	93.335	62.5	43.22875

Pre- and Post – Match Bowling Speed and Accuracy Coefficients of Variation and Correlation were presented in table 5.

Table 5

Bowler	CV				r	
	Ball Speed		Bowling Accuracy		Pre speed vs Pre accuracy	Post speed vs Post accuracy
	pre	post	pre	post		
1	1	2.34	30.98	22.27	0.131	0.176
2	1.26	2.96	64.76	122.47	0.544	0.355
3	3.87	3.39	73.94	167.33	0.815*	-0.268
4	2.81	2.96	73.94	70.43	-.920**	-0.729
5	1.38	17.3	30.98	63.77	0.68	0.755
6	1.86	2.88	154.92	112.92	-0.632	0.292
7	1.27	1.71	70.43	137.32	-0.325	-0.051
8	1.88	2.24	56.5	155	0.63	0.766

* $r_{(0.05)4} = 0.811$

Table 5 reveals that the pre-test coefficient of variation among the six ball speeds from eight bowlers is 1, 1.26, 3.87, 2.81, 1.38, 1.86, 1.27 and 1.88. Moreover, the variation observed in the post-test is 2.34, 2.96, 3.39, 2.96, 17.3, 2.88, 1.71, and 2.24. The pre-test coefficient of variation on accuracy among six balls from eight bowlers is 30.98, 64.76, 73.94, 73.94, 30.98, 154.92, 70.43 and 56.5. Moreover, for the post-test, the values are 22.27, 122.47, 167.33, 70.43, 63.77, 112.92, 137.32, and 155.

Four positive and three negative correlations are observed from Table -5 between the pre-test of speed and accuracy. Among the eight bowlers, a significant positive

correlation exists for one bowler. Five positive and three negative correlations are observed between the post-test of speed and accuracy.

Further, researchers attempted to determine the treatment effect on ball speed and accuracy of bowlers using a 2 (pre & post) × 6 (number of deliveries) factorial experiment. The researcher did not meet the assumption by using the Shapiro-Wilk test. Afterwards, the researcher uses the Friedman two-way analysis of variance test. A summary of the analysis was presented in Table 6.

Table 6

Variables	X_r^2
Ball Speed	328.98*
Bowling Accuracy	325.76*

* $X^2_{0.05(5)} = 11.07$

Form the table 6 it is observed that, there exists significant difference between the deliveries of the bowlers on ball speed and accuracy.

Discussion on findings:

The analysis of the data indicates that the quantity of water consumed by each bowler ranged from 0.75 to 1.25 litres, reflecting the effects of bowling and playing both innings of a 30-over match. Differences in body weight and USG (Urine Specific Gravity) among the bowlers were also identified pre- and post-treatment. Due to treatment, the bowlers' body weight decreased, and the USG level increased. The observed percentage of body mass loss was 3.15. Further, it was understood that bowlers were moderately dehydrated.

The experiment by **Portus et al., 2010** used a radar gun (± 0.2 km/h), to measure the ball release speed. In the present study also the researcher measured the bowlers' ball speed by using a radar gun. The descriptive analysis

revealed by the present study indicated that, bowlers' ball speed and accuracy was decreased by 2.04km/h and 19.27 points respectively. It could be the effect of 30overs Cricket match. The outcomes of the present research substantiated by the following researchers and in line with their findings. According to the observation of **Delvin et al., 2001**, 2.8% body mass loss among the fast bowlers, confirmed significant impairments in bowling accuracy and minimal effect on ball speed. Impact of dehydration in impairments of skill performance were also observed in different sports discipline i.e. Soccer by **McGregor et al., 1999**, Basketball **Baker et al., 2007** and Hockey **MacLeod et al., 2012** and **Gamage et al., 2016**, studied that, the body mass of Cricketers under hot and humid conditions decreased 3.7% loss and impairs motor skill performance significantly. Further stated that, Fluid ingestion strategies typically maintained body mass loss which prevented 1% decline in skill performance.

Numerous studies have demonstrated a strong association between dehydration-induced body mass loss and a decline in player performance. The rural-specific insights of the study emphasizes the tailored hydration protocols, scheduled breaks, and wearable devices to monitor the players and climatic conditions which assists to enhance cricket performance.

CONCLUSIONS:

This study focused on understanding the effect of dehydration on Cricket bowling performance. The core analysis of the study was to assess the dehydrated state of the bowler and their performance across 48 deliveries before and after the 30-over match, played under the rules and regulations of Cricket.

The impact of a 30-over match troubled the bowlers to attain the state of dehydration.

The state of dehydration among the bowlers is deep-rooted, with the loss of body mass and increased USG.

Bowling speed declined sharply due to dehydration among the bowlers.

The bowlers reached a state of dehydration at the end of 30-over play, which remarkably reduced bowling accuracy.

The bowlers' bowling consistency in terms of speed and accuracy was highly variable due to dehydration.

Opening and death over consistency could be stabilised with the aid of hydration strategies across the format of Cricket.

The findings provide an insightful opening for enthusiastic Cricketers and physiologists to utilise the essence of hydration strategies.

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