

EFFECT OF BOWLING SPELLS IN CRICKET ON INFORMATION PROCESSING OF COGNITIVE FUNCTION

Sports Science

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ABSTRACT

The aim of the study was to examine the effect of two bowling spells (Four and Eight over) on information processing speed. Twenty (20) male pace bowlers aged 19.55 ± 1.61 years were purposively selected and were assessed for processing speed under the conditions of rest (pre-test), immediately after four over (post-test1) and immediately after eight over (post-test2). The data were obtained by computerized neurocognitive test CNS Vital Sign (VS4). The mean score of processing speed in pretest 87.25 ± 9.486 , post-test1 91.35 ± 8.659 and post-test2 96.5 ± 8.432 . Repeated measure ANOVA revealed that there was significant effect of both the bowling spells on processing speed of cognitive function. The improvement may be due to the nature of the bowling protocol and attentional approach that is more strategic. From the result of the study, it can be concluded that bowling spells of four and also eight over are beneficial for processing speed of cognitive function.

KEYWORDS

Cognitive Function, Processing Speed, Bowling Spell, Pace Bowling

INTRODUCTION

Pace bowling is a specialized area of cricket that has been impressed the sports with its aesthetic and technical representation. The technical aspect of bowling fast, accurate ball pitching, ball swinging and repeated conditional approach for a batsman make high order activity in cricket. The intermittent activity required running, jumping and sprinting abilities (Webster et al., 2020) in repeated manner for six legal deliveries in match set up. This specialized area possesses larger workload and the pace bowlers are very much prone to various injuries (Noakes & Durandt, 2000) that's why the many of elite pace bowlers had very short career span. The workload of the bowlers defined with the bowling spell of specific overs. In the shortest format of cricket, a bowler gets maximum of four over spell. The researchers investigate a lot in technical, biomechanical, physiological and performance measure aspects for establishing the effect of bowling spell. To develop higher performance in open skill sport activities, cognitive function plays an important role. Cognitive functioning helps in making strategies along with motor performance. Processing speed (PS) is the ability to accomplish higher order cognitive task deals with the rapid information processing in the brain (Ebaid et al., 2017). It can be measured as the speed with which an individual execute cognitive task (Takeuchi & Kawashima, 2012). PS helps to build up other cognitive functions while performing tasks (Turken et al., 2008) and also it has a strong association with gross motor skills (Klupp et al., 2021) where large muscles of the body are in application of an activity (Gonzalez et al., 2019).

Kamijo et al. (2004) explained Exercise intensity is a factor to improve processing speed and moderate intensity serves the best result (Kamijo et al., 2004). Pace bowlers pay highest workload than any other specific role of cricket (McNamara et al., 2017). There is need to examine the workload of bowling that measures with bowling spell on various cognitive aspects of brain. So that in specific training a specific workload can be used to train the bowlers for improving and developing their potentials with technical perspective.

Aim of the study

The aim of the study was to examine the effect of two bowling spells (Four and Eight over) on information processing speed.

Methodology

Twenty (20) male pace bowlers aged 19.55 ± 1.61 years, represented Kolkata Division Cricket League through recognized clubs of Cricket Association of Bengal and played at least twenty matches were selected for the study. Processing Speed was measured by using computerized neurocognitive assessment; CNS Vital Sign VS4. The assessment was first administered in resting condition (Pre-test), second time it was administered after seven day and immediately after four over of bowling spell (Posttest1) and third time again after seven days and immediately after eight over of bowling spell (Posttest2). The test was administered in a laboratory set up. The bowling protocol was adopted from Novel Pace Bowling protocol by Simon A. Feros (2017).

The test followed specific targets to bowl on and different intensities to maintain the ecology of match scenario.

Data Analysis

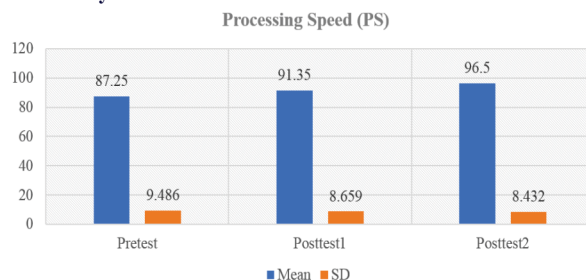


Figure No.1- Mean and SD of Processing Speed (PS) in three different conditions (Pre-test, Posttest1 and Posttest2)

Table No.1- Descriptive Statistics of Processing Speed (PS) in three different conditions (Pre-test, Posttest1 and Posttest2)

Conditions	N	Mean	SD	Skewness	Kurtosis	Max	Min
Pre-test	20	87.25	9.486	1.201	2.025	114	74
Posttest1		91.35	8.659	0.827	-0.157	110	79
Posttest2		96.5	8.432	0.533	0.334	115	82

Table No.1 showed that the mean of PS was in pre-test 87.25 ± 9.486 , posttest1 91.35 ± 8.659 and posttest2 96.5 ± 8.432 . The scores of PS increases overtime in compare with pre-test.

Table No.2- Shapiro-Wilk test for the assumption of normality of PS in different conditions (Pre-test, Posttest1 and Posttest2)

Conditio ns	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pre-test	0.144	20	.200*	0.923	20	0.114
Posttest1	0.192	20	0.051	0.908	20	0.058
Posttest2	0.139	20	.200*	0.957	20	0.485

Table No.2 showed the analysis for normality of the data. Shapiro-Wilk test showed non normality of the scores of PS in all three conditions as the significance value is more than 0.05.

Table No.3- Mauchly's Test of Sphericity of PS in different conditions (Pre-test, Posttest1 and Posttest2)

Within Subject Effect	df	Approx. Chi- square(χ^2)	sig	Epsilonb		
				Greenhouse- Geisser	Huynh- Feldt	Lower- bound
POS	2	1.75	0.42	0.92	1	0.5

Table No.3 showed the Mauchly's Test of sphericity that described that the sphericity was met as the significance value as the significance value is more than 0.05. This analysis allowed to obtain the result of

Repeated measure ANOVA with sphericity assumed.

Table No.4- Repeated Measures ANOVA (Sphericity Assumed) to determine the Effect of Bowling Spells on Processing Speed

Variables	Sphericity Assumed	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
POS	Time	859.3	2	429.65	31.36	0.00*	0.62
	Error	520.7	38	13.7			

Table No.4 showed that there was significant difference in all three measurements of Pre-test, Posttest1 and Posttest2 with $F=31.36$, $p<0.05$ and effect size of 62% of the bowling spells.

Table No.5- Pairwise Comparisons of Pre-test, Posttest1 and Posttest2 for the effects of Bowling spells on Processing Speed

Variables	(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	Sig.
POS	Pre-test	Posttest1	-4.1	1.1	0.00*
	Pre-test	Posttest2	-9.25	1.34	0.00*
	Posttest1	Posttest2	-5.15	1.06	0.00*

Table No.5- showed Bonferroni post hoc test to find the differences between the pairs of scores of PS. The test revealed that there was a significance difference between Pre-test and Posttest1 (Mean Diff.=4.1, $p<0.05$), Pre-test and Posttest2 (Mean Diff.=9.25, $p<0.05$), Posttest1 and Posttest2 (Mean Diff.=5.15, $p<0.05$).

Discussion on Findings

The result of the study revealed that as the bowling spell progress from four over to eight over, the Processing Speed of cognitive function also increases. The activity of these bowling spell might influence physiologically and psychologically as well to the subjects. The activity carried explosive in nature and sustain for more than twenty-four minutes for the four over spell whereas in case of eight over spell, it prolonged for forty-eight minutes as prescribed in the bowling protocol. The bowling protocol carried instructions to attain particular targets with different intensities and under conditions of left and right-handed batsman. The approach was quite ecological and presenting the scenario of match with giving activity between two overs. The bowling spell had an effect of 62% that had shown in Partial Eta square. The intensity of the activity was moderate in nature. The moderate intensity aerobic activities are very much influential to activate various physiological functioning that may elicit the processing speed in the brain. Moderate intensity activities induce the increased concentration of neurotransmitters such as dopamine and norepinephrine that faster information processing and also optimal state of arousal (Stranda et al., 2019). Whereas the p300 amplitude of event related potential shows inverted U relationship with the intensities of exercise that denotes a moderate intensity exercise is in favor of increased information processing speed (Kamijo et al., 2004). The bowling protocol designed with strategic approach to bowl particular line and length to attain the targets in the target sheets. Strategic sports practice also influence faster information processing as of efficient allocating attention in rapid changes in visual information (Yu et al., 2019). The attention to attain the targets may also be an influential factor to cognitive approach to motivate. (Yu et al., 2019). Sports persons possessed with larger amount of neural attention and faster stimuli evaluation speed (Aly et al., 2019; Hernández-Mendo et al., 2019; Yu et al., 2019).

CONCLUSION

From the result of the study, it can be concluded that the bowling spells of four over and eight over are beneficial to improve processing speed of cognitive function while using it in strategic task approach.

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