

## COMPARATIVE EFFECT OF WORK-OUT IN DIFFERENT PLAYING SURFACES ON SELECTED PHYSIOLOGICAL VARIABLES

<sup>1</sup>Anil Saha <sup>2</sup>Dr. Chetna Choudhary <sup>3</sup>Mukesh Chandra Bisht

<sup>1&2</sup>M.P.Ed student, LNIPE, Gwalior, M.P., India

<sup>2</sup>PGT, PET, Step-by-Step School, Jaipur, Rajasthan, India

### ABSTRACT

The aim of the study was to compare the effect of work-out in different playing surfaces on selected physiological variables. Five male basketball players of age group 18 to 25 were selected randomly from Lakshmibai National Institute of Physical Education, Gwalior as subjects for the study. The surfaces used in the study were cemented, synthetic and wooden surfaces. The selected physiological variables respiratory rate and saturation of peripheral oxygen were used in the study. A high intensity workout program was administered to the subject on different basketball surfaces and the data were collected immediately after the work-out was over. To test the significance of the mean difference Repeated Measures of Analysis of Variance (rANOVA) was used. Statistical analysis did not reveal significant difference on mean respiratory rate ( $48.8 \pm 7.69$ ,  $41.6 \pm 10.13$  and  $46.00 \pm 12.16$ ;  $p > 0.05$ ) and mean peripheral oxygen saturation ( $95.6 \pm .54$ ,  $95.2 \pm .83$  and  $95.00 \pm .70$ ;  $p > 0.05$ ) among any of the cemented, synthetic and wooden surfaces respectively. So, it can be concluded that playing surfaces is not the potential factor which affect respiratory rate and saturation of peripheral oxygen.

**Key Words:** Respiratory rate, saturation of peripheral oxygen, Basketball, Playing surfaces.

### INTRODUCTION:

Different sports are played on different surface and even the same sports can be played on different surface like basketball is played on wooden surface and concrete; tennis on grass clay and hard court; volleyball on clay and wooden. This selection of surface can be by rule or law of game or sometime by the feasibility of organizer. Basketball players especially at university level in India eventually could find different basketball surfaces during competition. As a player or as a coach it is important to know the nature of different playing surface and its effect on body and performance.

There are different kinds of surfaces on which the subjects play sports, e.g. Natural grass, asphalt and wooden parquet. Besides, synthetic surfaces for sports and recreational usage have been manufactured. One of the important aspects in construction of sports surfaces is to improve athletic performances. Changes and challenges are twin's law of nature and they affect every aspect of life. Changes are taking place all around and because of these changes, new challenges have excelled previous performance every time.

Technological advances have multiplied the flooring options for basketball and other sports. Previous generation of players competed indoors on wood, tile or tartan surfaces and outdoors on either concrete or asphalt, but new synthetic surfaces and sports court technologies have created a whole new range of choices. Some surfaces present greater performance, some offer greater player safety and some offer a solid combination of both. Players and coaches encounters different playing surface in different tournament and consider it as a potential factor which effect physiological parameters and ultimately the performance. Despite of a number of previous studies on playing surfaces, there are still limited study and evidence on effect of work-out on physiological variables in different surfaces.

*Objective:* The objective of the study was to compare the effect of work-out in different Playing surfaces on selected physiological variables.

#### METHODOLOGY:

*Selection of subjects:* For the purpose of the study five male University level basketball players of age group 18 to 25 from Lakshmibai National Institute of Physical Education, Gwalior were selected as subjects for the study. The subjects were randomly selected and the same workout was administered in all three surfaces.

*Criterion measures:*

Breathing rate: Equipment: Digital stop watch

**Procedure:** The subjects were asked to rest in supine lying position and the respiratory rate was felt by placing the hand just below the thoracic cavity. The research scholar used digital stop watch for counting the respiratory rate. The total number of exhalation or inhalation per minute was recorded for each of the subject.

**Saturation of Peripheral Oxygen: Equipment:** Fingertip Pulse Oximeter (Ishnee in 111A)

**Procedure:** The subjects were asked to rest in supine lying position. Place the probe into the finger and turn the oximeter on. Note the reading from the oximeter screen.

*Workout Protocol:*

*High intensity workout:* This program was designed to simulate the skills and recruited muscle in a real game. There are four marked points: Free throw line (5.8m), mid-line (14m), back court free throw line (22.2m) and back court end line (28m). This program includes the dribbling, sprint, slide, jump shooting and three point shooting.

There are four stages in this testing program:

- I. Player ran and dribbled along a line to free throw line, then back to lay up (stage 1).
- II. Player ran and dribbled along a line to mid line, then back to free throw line to jump shot. And sprint to the front court end line (stage 2).
- III. Player ran and dribbled along a line to backcourt end line, and then back to three point line to jump shot. And then sprinted to the frontcourt end line (stage 3).
- IV. After slide to the backcourt end line, player sprinted back to the frontcourt end line (stage 4).

In each stage, assistant passes the ball to the subject behind the backboard, outside the front court end line. Subject receives the ball and performs the stages. The players had to do these four stages for five trials (time). During the first trial, the players need to do their best and record their seconds. This data was their maximal performance. Every player must finish the four stages within 90% of the maximal performance (seconds). The resting time was the same as their best record at each trial.

*Statistical technique:* In order to compare the mean respiratory rate and mean saturation of peripheral oxygen in different basketball playing surfaces, Repeated Measures of Analysis of

Variance (rANOVA) with the use of the SPSS statistical software package, version 20.0 (IBM SPSS Statistics) was used. The level of significance was set at 0.05.

## RESULTS:

Results pertaining to selected physiological variables on different playing surface [cemented, synthetic(indoor), wooden(indoor)] were presented below in the following tables:

TABLE 1  
DESCRIPTIVE STATISTICS FOR THE DATA ON RESPIRATORY RATE AFTER  
WORKOUT AT SELECTED PLAYING SURFACES

	Mean	Std. Deviation
Respiratory Rate on Cemented Surface	48.8000	7.69415
Respiratory Rate on Synthetic Surface	41.6000	10.13903
Respiratory Rate on Wooden Surface	46.0000	12.16553

Table 1 shows the descriptive statistics for the data on respiratory rate after workout at selected playing surfaces. The mean and standard deviation after the workout at cemented, synthetic and wooden surface was found to be  $48.8 \pm 7.69$ ,  $41.6 \pm 10.13$  and  $46.00 \pm 12.16$  respectively.

TABLE 2  
MAUCHLY'S TEST OF SPHERICITY<sup>a</sup>

Measure: Respiratory Rate

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon <sup>b</sup>		
					Greenhouse-Geisser	S Huynh-Feldt	Lower-bound
Playing surface	.549	1.799	2	.407	.689	.933	.500

Table 2 reveals that the assumption of sphericity has been fulfilled as the Mauchly's W for the data on respiratory rate after workout at selected playing surfaces was found insignificant (Sig. value > 0.05). As Mauchly's statistic was found insignificant, Test of within-subjects effect has been employed to see the differences in respiratory rate after the workout at selected playing surfaces.

TABLE 3  
TESTS OF WITHIN-SUBJECTS EFFECTS

Measure: respiratory Rate

Source		Type III Sum of Squares	Df	Mean Square	F	Sig.
Playing Surface	Sphericity Assumed	131.733	2	65.867	3.059	.103
	Greenhouse-Geisser	131.733	1.378	95.567	3.059	.133
	Huynh-Feldt	131.733	1.866	70.592	3.059	.109
	Lower-bound	131.733	1.000	131.733	3.059	s.155

Table 3 reveals that the F-value was found to be insignificant for the variable respiratory rate as the significance value was more than 0.05.

TABLE 4

DESCRIPTIVE STATISTICS FOR THE DATA ON SATURATION OF PERIPHERAL  
OXYGEN AFTER WORKOUT AT SELECTED PLAYING SURFACES

	Mean	Std. Deviation
SpO2 on Cemented Surface	95.6000	.54772
SpO2 on Synthetic Surface	95.2000	.83666
SpO2 on Wooden Surface	95.0000	.70711

Table 4 shows the descriptive statistics for the data on saturation of peripheral oxygen after workout at selected playing surfaces. The mean and standard deviation after the workout at cemented, synthetic and wooden surface were found to be  $95.6 \pm .54$ ,  $95.2 \pm .83$  and  $95.00 \pm .70$  respectively.

TABLE 5

MAUCHLY'S TEST OF SPHERICITY<sup>a</sup>

Measure: Saturation of Peripheral Oxygen

Within Subjects Effect	Mauchly' s W	Approx. Chi- Square	df	Sig.	Epsilon <sup>b</sup>		
					Greenhou se-Geisser	Huynh- Feldt	Lower- bound
Playing_Surfac e	.536	1.872	2	.392	.683	.917	.500

Table 5 reveals that the assumption of sphericity has been fulfilled as the Mauchly's W for the data on saturation of peripheral oxygen after workout at selected playing surfaces was found insignificant (Sig. value > 0.05). As Mauchley's statistic was found insignificant, Test of within-subjects effect has been employed to see the differences in saturation of peripheral oxygen after the workout at selected playing surfaces.

TABLE 6  
TESTS OF WITHIN-SUBJECTS EFFECTS

Measure: Saturation of Peripheral Oxygen

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Playing Surface	Sphericity	.933	2	.467	1.000	.410
	Assumed					
	Greenhouse-Geisser	.933	1.366	.683	1.000	.391
	Huynh-Feldt	.933	1.833	.509	1.000	.406
	Lower-bound	.933	1.000	.933	1.000	.374

Table 6 reveals that the F-value was found to be insignificant for the variable saturation of peripheral oxygen as the significance value was more than 0.05.

## DISCUSSION:

The present research work has been conducted with the purpose to test the effect of workout on selected physiological variables in different playing surfaces. The result of the study reveals that both the variables (respiratory rate and saturation of peripheral oxygen) were found to be



insignificant after workout in different playing surfaces. The insignificance of the differences may be attributed to the less number of subjects or it may be due to the fact that verbal communication was used to encourage the subject to give their best. Even the recovery time which was set between the trails in the workout may be insufficient to bring the significance difference as far as respiratory rate and saturation of peripheral oxygen were concerned. The number of trails administrated during the workout, may be insufficient to bring the significance difference or may be due inadequately controlled work-out which was administered leads to insignificant result.

### CONCLUSIONS:

Playing surface does not affect the respiratory rate and saturation of peripheral oxygen as there was no significance difference found between playing surface and selected variables after workout. Thus, it can be concluded that playing surfaces are not the potential factors which affect respiratory rate and saturation of peripheral oxygen and ultimately to performance. So, on the basis of the results of the present study, coaches and players need not to bother about the playing surfaces as far as selected variables are concerned rather they should concentrate on the other factors which could bring significant differences to the performances.

### References

1. Antonio Tessitore, Fabrizio Perroni, Romain Meeusen, Cristina Cortis, Corrado Lupo, Laura Capranica, "Heart Rate Responses and Technical-tactical Aspects of Official 5-a-side Youth Soccer Matches Played on Clay and Artificial Turf", The Journal of Strength and Conditioning Research, 2012, vol. 26(1), pp.106-12
2. Binnie Martyn J, Dawson Brian, Pinnington Hugh, Landers Grant, Peeling Peter, "Effect of Training Surface on Acute Physiological Responses After Sport-Specific Training", Journal of Strength & Conditioning Research, 2013, vol.27(4), pp.1057-1066



3. Fernandez-Fernandez Jaime, Kinner Vanessa, Ferrauti Alexander, “The Physiological Demands of Hitting and Running in Tennis on Different Surfaces”, *Journal of Strength & Conditioning Research*, 2010, vol.24(12),pp.3255-3264
4. Jean-Bernard Fabre, Vincent Martin, Julien Gondin, François Cottin and Laurent Grelot, “Effect of Playing Surface Properties on Neuromuscular Fatigue in Tennis”, *Med Science Sports Exercise*, 2012, vol.44(11), pp.2182-9
5. Kimberlly DeAnna Dahl, “External factor and Athletic Performance”, A Senior Thesis In The Honours Program”, Liberty University, 2013
6. M Juan Murias, Damián Lanatta, R Carlos Arcuri, A Fernando Laino, “Metabolic and Functional Responses while Playing Tennis on Clay and Hard Courts”, *Journal of Strength & Conditioning Research*, 2007
7. Martin Caroline, Thevenet Delphine, Zouhal Hassane, Mornet Yoan, Delès Romain, Crestel Tanguy, Ben Abderrahman Abderraouf, Prioux Jacques, “Effects of Playing Surface (Hard and Clay Courts) on Heart Rate and Blood Lactate During Tennis Matches Played by High-Level Players”, *Journal of Strength & Conditioning Research*, 2011, vol.25(1),pp.163-170
8. Michael G. Hughesa, Laurence Birdseye, Rob Meyersa, Daniel Newcombe, Jon Lee Olivera, Paul M. Smitha, Michael Stembridgea, Keeron Stonea & David George Kerwina,” Effects of playing surface on physiological responses and performance variables in a controlled football simulation”, *Journal of Sports Sciences*, 2013, vol.31(8), pp. 878-886
9. Chi-Yang Tsai, Wei-Hua Ho, Yun-Kung Lii, Chin-Lin Huang, “The Kinematic Analysis of Basketball Three Point Shoot After High Intensity Program” Institute of Sports Science , Taipei Physical Education College, Taipei, Taiwan, 2006