International Journal of Physical Education
Volume 6 | Issue 1 | April, 2013 | 14-16

Research Article

Analysis of body heat and perspiration of squash players before and after match

■ **GAURAV SINGH KUSHWAH AND** PRADEEP ASTEYA

Received : 27.09.2012; **Revised :** 12.02.2013; **Accepted :** 13.03.2013

■ **ABSTRACT**

In the modern competitive scenario, sports and sportspersons are striving continuously to excel over the other, so we must understand that it is important to maintain the performance of a player at top level while, at the same time eliminating the dangers of heat illness. We should realize first the basic physiological mechanism prevailing in heat illness and second, how the environmental or weather conditions can significantly contribute to heat illness. This paper investigates to compare the effect of squash racket game on the body temperature and sweating rate on university level squash players before and after the match. The study was restricted to eight male subjects aged 20.7±2.3 years. All were university level sportsmen from Lakshmibai National University of Physical Education, Gwalior. The data were recorded before and after the matches played in league pattern. A total of 28 matches were conducted and each individual played 7 matches. In all, the average score of all 7 performances were considered as the final data of the individuals. The data were collected on the body temperature and sweat rate. In order to analyze the data obtained, paired't' test was employed and the level of significance was set at 0.05. The results revealed that the group lost significant amount of sweat, which is related to increase in body temperature and decrease in body weight.

See end of the article for authors' affiliations

GAURAV SINGH KUSHWAH
Lakshmibai National University of Physical Education, GWALIOR (M.P.) INDIA

■ **Key Words :** Body heat, Perspiration, Squash players

■ **How to cite this paper :** Kushwah, Gaurav Singh and Asteya, Pradeep (2013). Analysis of body heat and perspiration of squash players before and after match. *Internat. J. Phy. Edu.*, 6 (1) : 14-16.

In the modern competitive scenario sports and sportspersons are striving continuously to excel over the other, so we must understand that it is important to maintain the performance of a team at top level while, at the same time eliminating the dangers of heat illness. We should realize first the basic physiological mechanism prevailing in heat illness and second, how the environmental or weather conditions can significantly contribute to heat illness. Like most other aerobic sports, squash requires a high level of physical fitness, fluent bodily movement, sound gross and fine motor control (Todd *et al.*, 1996). Squash, like any other sport, at a high level, might be challenging to the human body and all the physiological bodily systems, because of the high intensity it is played at. The conditions within a squash court may be hot and humid, and continuous movement for both players on a squash court may increase the challenge on the body, especially the thermoregulatory system (Brown and Winter, 1998). There are no clear and descriptive guidelines for fluid replacement in squash, even with the high number of players participating in the game of squash. It has been difficult to characterize the physiological responses to a sport like squash, due to laboratory settings not lending themselves to examining activities, which require variation in movement and the use of space (Doherty and Howe, 1978). Khanna *et al.* (2005) suggested that sweat loss in high intensity, short duration exercise are small, but exercise capacity is impaired if there is a pre - exercise fluid deficit.

Body temperature elevations elicit heat loss responses

of increased skin blood flow and increased sweat secretion (Sawka *et al.,* 1985). Body fluid losses have been measured at a variety of temperatures in football (Shirreffs *et al.,* 2006), along with American football (Fowkes *et al.,* 2005), basketball (Boatwright *et al.,* 2003; Osterberg *et al.,* 2005), and ice hockey (Palmer and Spriet, 2008). However, none have addressed squash players. So, due to this reason, query has been raised in the mind of the researcher. Hence, research was conducted to find out the analysis of body heat and perspiration of squash players before and after match.

Objectives:

- To know about the changes in body weight before and after the match.
- To understand the increase of body temperature due to competition.
- To find out the exhaustion level and sweating occuring owing to the match.

■ METHODOLOGY

The study was conducted in Lakshmibai National University of Physical Education, Gwalior, during summer in the year 2012. The subjects for the study were 8 students aged 20.7±2.3 years of the same university and they had voluntarily participated in the study. Students were informed that all data were kept confidential and would only be used by the researcher for the purpose of this study. The variables selected were body temperature and sweat rate. For the collection of the data, robin round was played among the subjects, a total of 28 matches were conducted and each individual played 7 matches. The data were recorded before and after the matches played as per league pattern. In all, the averages of 7 tests were considered as the final data of the individuals. The sweat rate was measured with the help of body weight. The subjects were weighed before and after the match with minimum possible cloths and asked to wipe out all the sweat from the body with the help of towel and then weighed after the match. The subjects were asked to drink water only from the bottle given by the researcher. No any other sources were allowed to ingest the water or food. Total fluid loss was measured with the formula *i.e.*

Total fluid loss = BW (pre-exercise, kg) - [BW (post-exercise, kg) - Fluid ingested (L)] (Kovacs, 2006).

Body temperature was measured through digital temperature indicator. The subjects were asked to sit on a chair, the channel of the digital temperature indicator was set and the rod was placed under the tongue of the subject, when the temperature on the digital temperature indicator became constant, the reading was noted. The readings were taken before and immediately after the match and recorded in degree Celsius.

Paired 't' test was used to determine the significant changes in body temperature and perspiration of squash players before and after the match. The level of significance was set at 0.05.

■ OBSERVATIONS AND DISCUSSION

The data collected were analyzed statistically and the outcome generated has been given in Table 1 and 2.

Table 1 reveals that mean and standard deviation of sweat rate and body temperature before matches were 61.12 ± 6.49 and 36.35 ± 0.29 and after matches was 60.87 ± 6.52 and 37.16 ± 0.33, respectively.

It is evident from Table 2 that obtained p-value (0.000) is lesser than 0.05 thus indicating that there was significant difference among squash players before and after the match in terms of sweat rate and body temperature.

The analysis of data clearly reveals that there were significant differences in body temperature and sweat rate before and after the match.

The result attributed due to increase in metabolic rate since the mechanical efficiency varied from 25 per cent depending upon the work and at least 75 per cent of the energy produced was converted into heat. Sweating was more after the exercise than during the exercise which caused an increase in oral temperature. To keep the body temperature

Table 1: Descriptive statistics of squash players before and after match on sweat rate and body temperature

Variables	Mean	S.D.
Pre-sweat rate (Before match)	61.12	6.49
Post-sweat rate (After match)	60.87	6.52
Pre-body temperature (Before match)	36.35	0.29
Post-body temperature (After match)	37.16	0.33

Table 2 : Comparison of mean difference of sweat rate and body temperature between before and after match among squash players

Variables	d.f.	Mean difference	't'	Sig.
Sweat rate	7	0.25	13.229	0.00
Body temperature	7	-0.81	-13.308	0.00

control, heart pumps the heat in blood from the muscles to the skin through which the body sweats and evaporates to keep body cool.

Maron *et al.* (1977) have shown increase in body temperature in their study which was conducted on marathon runners.

The analysis of the data collected on sweating clearly reveal that the group lost significant amount of sweat, which is related to increase in body temperature. During muscular work, blood vessels of the skin dilate and more blood is directed to the periphery. The sweat glands of the skin are then activated and sweat is absorbed from blood and excreted. It is a response of thermoregulatory mechanism to maintain normal body temperature. Sweating is controlled by the temperature of the blood flowing to the part of the brain called hypothalamus. Whenever the temperature rises, the body starts sweating more. During exercise, heart beats increase rapidly to pump blood to bring oxygen to the muscles and hot blood from the muscles to the skin where the heat can be dissipated. When the body stops working, heart immediately slows down and decreases the amount of blood pumped to the skin due to which body temperature rises higher and sweating increases.

Sweating rates vary substantially among athletes, due not only to the inherent biological variability in the human sweating response, but also to variability in factors such as exercise intensity, environmental temperature and humidity, fitness level, extent of heat acclimation, amount and type of clothing and equipment, and hydration status (Casa *et al.*, 2005).

Authors' affiliations:
PRADEEP ASTEYA, Lakshmibai National University of Physical Education, GWALIOR (M.P.) INDIA

■ REFERENCES

Boatwright, D., Strickland, G., Smith, C. and McCraw, J. (2003). Status of hydration: a college basketball team after practice. *Appl. Res. in Coaching & Athletics*, **18**: 111-116.

Brown, D. and Winter, E.M. (1998). Fluid loss during international standard match - play in squash. Edited by A. Lees., M. Hughes., I.W. Maynhard. *Science and Racket Sports II*. E & FN Spon, LONDON (UNITED KINGDOM).

Casa, D.J., Clarkson, P.M. and Roberts, W.O. (2005). American College of Sports Medicine roundtable on hydration and physical activity: consensus statements. *Curr. Sports Medicine Reports*, **4**:115–127.

Doherty, D. and Howe, B. (1978). Heart rate response of squash players relative to their skill level. *Australian J. Sports Medicine*, **10**: 90-92.

Fowkes, Godek. S., Bartolozzi, A.R. and Godek, J.J. (2005). Sweat rate and fluid turnover in American football players compared with runners in a hot and humid environment. *British J. Sports Medicine*, **39**(4): 205-210.

Khanna, G.L., Manna, I. and Dhara, P.C. (2005). Age associated change in plasma lipids and lipoproteins of Indian football players. *Indian J. Sports Sci. & Physical Edu.*, **14**: 63 -73.

Kovacs, Mark S. (2006). Hydration and temperature in tennis – a practical review. *J. Sports Sci. & Medicine*, **5**: 1-9.

Maron, M.B., Wagner, J.A. and Horvath, S.M. (1977). Thermoregulatory responses during competitive marathon running. *J. Appl. Physiol.*, **42**(6): 909–914.

Osterberg, K.L., Sperber, T.E., Lacambra, M., Baker, L.B. and Murray, R. (2005). Fluid balance, hydration status, and sweat electrolyte concentrations in NBA basketball players during summer league games. *J. Sports Sci.*, **40**: S39.

Palmer, M.S. and Spriet, L.L. (2008). Sweat rate, salt loss, and fluid intake during an intense on-ice practice in elite Canadian male junior hockey players. *Appl. Physiology, Nutrition & Metabolism*, **33**: 263-271.

Sawka, M.N., Young, A.J., Francesconi, R.P., Muza, S.R. and Pandolf, K.B. (1985). Thermoregulatory and blood responses during exercise at graded hypo-hydration levels. *J. Appl. Physiol.*, **59**(5):1394-401.

Shirreffs, S.M., Sawka, M.N. and Stone, M. (2006). Water and electrolyte needs for football training and match play. *J. Sports Sci.*, **24**(7): 699-707.

Todd, M.K., Mahoney, C.A. and Wallace, W.F.M. (1996). Portable telemetry as a method of measuring energy cost in high level squash, in contemporary ergonomics. In: *Science and Racket Sports II.* Taylor & Francis Limited, LONDON (UNITED KINGDOM).

*****