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EFFECT OF WARM-UP ON 100M SWIM PERFORMANCE – A PILOT STUDY

Meriline Gogoi[1] and Dr. Kallol Chatterjee[2]

Affiliations:

[1] Assistant Professor, L.N.I.P.E, NERC Guwahati

[2] Assistant Professor, Visva Bharati University, West Bengal Email: merilinegogoi@gmail.com

ABSTRACT

Warm-up has always been an integral part before any physical activity. Although there is a lack of scientific evidence based on the enhancement of performance, the use of warm-up is very prominent among the coaches and athletes. The study was undertaken to investigate the effect of warm-up on 100m swim performance. Ten male swimmers age ranging between 18-21 years with 5 years of minimum experience in competitive swimming (National Level) were randomly selected for the present study from L.N.I.P.E., NERC, Guwahati. Each swimmer performed 100m freestyle at their maximum effort as an individual time trial in two different days with the use (UWP) or no use (NUWP) of warm-up which was counter-balanced by a gap of 24 hours between the experiments. The t-score of 100m Swim Performance was significant as the p-value (.009) is < 0.05 level of significance. Faster time was observed in UWP condition which suggests that the usual warm-up procedures followed before a performance is beneficial for the swimmers. But, the result showed to be insignificant in blood lactate accumulation in either of the conditions. The performance of the participants also depends on the individual variability of the participants.

Key words: Males, warm-up, Freestyle, swimming, performance, blood lactate

1. INTRODUCTION

Warm-up has always been an integral part before any physical activity. Although there is a lack of scientific evidence based on the enhancement of performance, the use of warm-up is very prominent among the coaches and athletes. A lot many physiological changes could be observed when different exercises are performed during warming-up, which are believed to be beneficial for better performance. Warm-up is generalized to result in muscle dynamics, reduce the risk of injury and prepare the athlete for the main task **(Woods, 2007).** The hyperthermia resulting from physical activity increases muscle blood flow, stimulating increased aerobic energy contribution during a particular task. Besides, it increases the muscle glycogenolysis, glycolysis and high energy phosphate degradation during exercise.

The literature also claims that warming up via physical activity might have effects added to the increase in temperature, particularly an elevation of the baseline of oxygen consumption (VO2) and the amplitude of the primary VO2 response in the subsequent exercise. Nevertheless, although these metabolic responses appear to indicate a positive effect of warm-up on athletic performance, current evidence is still inconclusive

Specifically, in swimming, different physiological changes and conflicting benefits to performance have been reported. **Houmard (1991)** described increments in distance per stroke (DPS) during an intensely paced 368.5-m swim and decreased post-exercise blood lactate concentration with the warm-up. On the contrary, others found that warm-up procedures did not change performance and led to higher blood lactate after a 2-minute high-intensity swimming trial. Studies regarding shorter distance performance have shown that proper warm-up was effective in reducing 100-yd time trial compared with performance without prior warm-up, but (Bobo, 1999)is study failed to find significant differences in 100-yd performance between 3 conditions (warm-up exercises in water and on dry land and without warm-up). Research has focused on even shorter distances (50 yds and 50 m), but results are inconclusive; no favourable effects of warm-up on 50-m front-crawl performance, either in the lactic acid [La–] or perceived exertion (RPE), were observed and reported better performances on 50-yd freestyle after a warm-up, although no effects on RPE and stroke frequency (SF) were detected **(Neiva, et.al., 2012 & Balilionis, et.al., 2012).** .

As no conclusive shreds of evidence are present to determine the influence of warm-up on swim performance, the optimal structure and its specificity to the sport, the present study is undertaken to verify if warm-up has any significant effect on 100m swim performance.

2. METHODOLOGY

2.1 Sample

Ten male swimmers age ranging between 18-21 years with 5 years of minimum experience in competitive swimming at National Level were randomly selected for the present study from L.N.I.P.E., NERC, Guwahati, on their consent. All tests procedures were performed in a 25m swimming pool of LNIPE, NERC.

2.2 Testing Protocol

Upon arrival at the pool, the participants were acquainted with the testing protocols. The experiments took place at the peak of their practice sessions. Each swimmer performed 100m freestyle at their maximum effort as an individual time trial in two different days with the use (UWP) or no use (NUWP) of warm-up which was counter-balanced by a gap of 24 hours between the experiments. In the UWP condition, the swimmers perform their usual pre-competition warm-up (total- 1200m volume) comprising of swim, drills, pull, kick and few max-repeats. After 10 minutes of rest the swimmers the 100m time trial. In NUWP condition, no

exercises were recommended to the swimmers before the 100m time trial. Standard starts were used. The times clocked by the swimmers were taken and recorded by two experienced coaches using standard digital stopwatches (Casio). Capillary blood samples were collected from the fingertiputilizing lactate analyser (Stat-Strip Xpress Lactate Meter, lancing needles and Lactate Strips manufactured by Nova Biomedical)after each maximal effort (within 1st 2 mins of recovery) to access the appropriate value of blood lactate.

2.3 Statistical Analysis

. The normality of the distributions was determined by the Shapiro-Wilk test . To findout the significant difference amog male swimmers, Mean, Sd and t-ratio were computed and data pertaining to this has been presented in Table 1 to 3.

3. RESULTS

To compare the data obtained in the two trials Student's Paired t-test was employed. The level of significance was set at 0.05. The statistical analyses were performed using SPSS version 20.

TABLE 1
TEST FOR NORMALITY

	Shapiro-Wilk		
	Statistic	df	Sig.
Difference	.942	10	.580

The score presented in Table 1 shows that the p value (.580) > 0.05, which depicts that the data collected were normal.

TABLE 2
PAIRED SAMPLES TEST

Part	Contents	N	Mean	SD	Std Error Mean	Paired Difference	df	t-ratio
1	100m swim performance without warm-up	10	65.43	3.12	0.99	1.35	9	3.28
	100m swim performance after warm-up	10	64.63	3.22	1.02			
2.	Blood Lactate Without warm-up	10	9.54	1.60	0.51	0.56	9	0.55
	Blood Lactate after Warm-up	10	9.72	1.37	0.43			

Table 2 displays the descriptive statistics (Mean, SD and Std. Err of mean) of the 100m swim performance (Pair 1) and blood lactate (Pair 2) of the both the selected conditions (NUWP and UWP) respectively.

Table 2 also displays the t-score of 100m Swim Performance to be significant as the p-value (.009) is < 0.05 level of significance. This determines that there is a significant difference in100m Swim Performance in both the conditions of NUWP and UWP. But, the result showed to be insignificant in blood lactate accumulation in either of the conditions.

4. DISCUSSION

The study was conducted to investigate the effect of warm on 100m swim performance. Faster time was observed in UWP condition which suggests that the usual warm-up procedures followed before a performance is beneficial for the swimmers. Although, 3 participants in NUWP condition clocked faster time than in UWP condition which determines the

individualistic approach of a particular swimmer. Warming-up led to significant improvement but the physiological variable did not seem to be very effective.

Warm-up has always been an integral part in swimming, the positive effect of it was first presented by **(De Vries, 1959).** On the other hand, studies conducted by **Huston (1993); Bobo (1999); & Neiva, (2012).** They did not find positive effect of warm-up on performance. However, it should be noted that in actual competition scenario, a time lapse between the in water warm-up and the performance is experienced by the swimmers which negotiates the positive effect of warm-up on performance, yet, the swimmers perform at their paramount effort. Although, psychological changes might also add to improved performance of the participants **(Woods, 2007).** Researches done earlier have shown that warm-up increases preparedness and provides time to concentrate before the race **(Balilionis, 2012).** In parallel, some participants might be discouraged and have lack of motivation to race with no warm-up or a short warm-up **(Balilionis, 2012).**

Limited studies are available that examined swimming performances using different warm-up protocols. The results of the present study supports (Romney, 1993) who found a significantly faster 100-yard swim time after 15 minutes of swimming warm-up compared to no warm-up and also supports **(Balilionis, 2012)** who found faster 50m mean time after regular warm as compared to no warm-up and short warm-up. **King (1979)** instead found no significant difference in 50m swim time between a 400m swim warm-up and no warm-up. This might be due large age variability of the participants and a 400m warm-up might not be sufficient enough to raise the muscle and core temperature. **Bobo (1999)** found no significant differences in 100-yard swim time between 800-yards swim warm-up and no warm-up. Also, **Mitchell, et al. (1993)** found no significant difference in 183-meter (200-yard) swim time between no-, low-intensity (365 meters), and high-intensity (365 meters) warm-ups. Low-intensity, 365-meter (400-yard) warm-up may not be sufficient to raise muscle and core temperature, thus resulting in no significant difference between no- and 365-meter warm-up protocols

Although regular warm-up regulates to get better performance, there is a need to observe the individual performance of the swimmers to know the individual variability. Not every individual respond similar to the warm-up protocols. Some might perform better after a regular warm-up while some might not require a warm-up or a short warm-up might be beneficial for that individual. In the present study 3 out of the 10 participants performed better in no warm-up condition which determines the individuality of the participants.

5. CONCLUSION

From the present study it can be concluded that swimmers gave faster times after a regular warm-up in comparison to the no warm-up condition. However, the blood lactate showed to have no difference in both the conditions. The performance of the participants also depends on the individual variability of the participants. Moreover, it is recommended that swimmers and coaches should experiment to determine each individual's optimal warm-up to maximize swim performance.

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