



## SEARCH ARTICLE



## JOURNAL MENU

[Home \(/\)](#)[Aim & Scope \(/about-us\)](#)[Editorial Board \(/editorial-board\)](#)[Special Issue \(/special-issues\)](#)[Contact Us \(/contact-us\)](#)

## AUTHOR MENU

[Instructions to Authors \(/instructions-authors\)](#)[Call for papers \(/call-papers\)](#)[Publication Ethics \(/publication-ethics\)](#)[Submit Article \(/submit-article\)](#)[Copyright Policy \(/copyright-policy\)](#)

## DOWNLOADS

[Copyright Form \(/sites/default/files/COPYRIGHT%20FORM\\_0.pdf\)](#)[Cover Image \(/sites/default/files/Cover%20Image%20copy.jpg\)](#)[Model Paper](#)

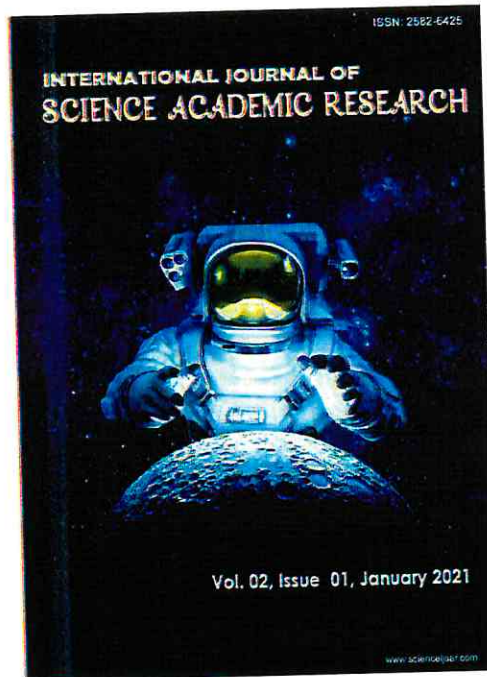
## IJSAR EXPLORE

[Current Issue \(/current-issue\)](#)[Past Issue \(/archive\)](#)

## EDITOR-IN-CHIEF

**Dr. Majida Ali Abed Meshari Alasady**  
Professor  
Iraq

## COVER IMAGE



## International Journal of Science Academic Research

**International Journal of Science Academic Research (IJSAR) (ISSN: 2582-6425)** is an international, open-access monthly online Refereed journal that accepts research works from scholars, academicians, professors, doctorates, lecturers and corporate in their respective expertise of studies. The aim of IJSAR is to publish peer reviewed research and review articles fastly without delay. The mission of this journal is to publish original contributions in its field to promote research in various disciplines. IJSAR aims to bring pure academic research and more practical publications.

IJSAR is a online open access journal that publishes articles in the field of Computer Science, Engineering, medical science, social science, economics, clinical research, mathematics, education, bio science, science, Management & Arts . It is an international journal to encourage research publication to research scholars, academicians, professionals and students engaged in their respective field. The journal also provides an international forum to disseminate their knowledge.

Our mission is to advance research by working to develop and maintain competence, ethics and integrity and the highest professional standards in the specialty for the benefit of the public. The Faculty seeks, through its activities, to bring about an improvement in research of the public.

### Important notice

Authors can now directly send their manuscript as an email [editor@scienceijsar.com](mailto:editor@scienceijsar.com) (<mailto:editor@scienceijsar.com>)

All manuscripts are subject to rapid peer review. Those of high quality (not previously published and not under consideration for publication in another journal) will be published without delay.

### Benefits of publishing in IJSAR

- IJSAR is an International, Monthly, Peer reviewed, Open Access Journal.
- Research findings will publish immediately in current issue after thorough review process.
- IJSAR accepts high quality research and technical papers in the areas of Multidisciplinary Science.
- Rapid Publication after the article is peer reviewed through eminent reviewers.
- Acceptance and Publication of papers with excellence, novelty and originality.
- Authors can download their full length articles at any time.

... LAWANI Mohamed Mansourou, HOUETO Vignon Gratien, YESSOUFOU Lafiou, HOUNZANDJI Sèhou Tomah Anne-Marie, TIGRI Tertulie Nawal and KORA Zaki ...

journal - 08/11/2020 - 20:32

3. **Effect of massage before warm-up on the vertical relaxation of 57 basketers from the zou department in Benin**  
(<https://www.scienceijsar.com/article/effect-massage-warm-vertical-relaxation-57-basketers-zou-department-benin>)

Author: YESSOUFOU Lafiou, DOSSOU Sèmako Gérard, LAWANI Mohamed Mansourou, KORA Zaki Salifou, ...

journal - 09/20/2021 - 11:56

Indexing



Copyright © 2020 International Journal of Science Academic Research (IJSAR) . All Rights Reserved.

Research Article

EFFECT OF MESSAGE BEFORE WARM-UP ON THE VERTICAL RELAXATION OF 57 BASKETERS FROM THE ZOU DEPARTMENT IN BENIN

<sup>1</sup>YESSOUFOU Lafiou, <sup>1,\*</sup> DOSSOU Sèmako Gérard, <sup>2</sup>LAWANI Mohamed Mansourou, <sup>1</sup>KORA Zaki Salifou, <sup>3</sup>TIGRI Tertutie Nawal, <sup>3</sup>HOUETO Vignon Gratien and <sup>3</sup>AGASSOUNON Mahougnon Méschac

<sup>1</sup>Doctor in Biomechanics at INJEPS, University of Abomey Calavi, Benin

<sup>2</sup>Full Professor in Biomechanics at INJEPS; University of Abomey Calavi, Benin

<sup>3</sup>Laboratory of Biomechanics and Performance (LaBioP) INJEPS / Porto-Novo University of Abomey Calavi, Benin

Received 20<sup>th</sup> July 2021; Accepted 25<sup>th</sup> August 2021; Published online 20<sup>th</sup> September 2021

Abstract

The use of sports massage as part of passive warm-up is a practice that has been trivialized by many clubs, which consider that massage is only useful in the context of recovery or rehabilitation. The aim of this study is to check if the massage before warming up further increases the vertical relaxation in basketball players from Zou. 57 players were selected including 13 players from Flambeau Abomey; 15 Lumière players from Abomey and 29 players from Olympic of Bohicon using the simple random method by reasoned choice. Our players are aware of the existence of massage but not as passive warm-up. Without warming up or massage our subjects have on average 43.19 cm of relaxation. After the players warmed up without being massaged we observed an increase in relaxation of an average of 48.96cm and 50.61cm when the players massaged and warmed up. The results of our study reveal that massage before heating further increases the vertical relaxation of basketball players from Zou, Benin.

**Keywords:** Massage, Warm-up, Vertical relaxation, Zou, Benin.

INTRODUCTION

Basketball is today one of the most popular team sports in the world with more than 450 million players. It is a very demanding sport in terms of speed, strength, power and flexibility with relentless repetition of effort throughout the game. To play at the highest level players must develop optimal physical capacities and cannot afford to simply rely on their natural abilities. Which leads basketball players to intense training. In training basketball players prioritize vertical relaxation because improving vertical relaxation is an important element in the athletic preparation of the basketball player. Triggering is essential because it allows basketball players to stay in the air as long as possible in order to achieve perfect shooting angle and timing. In basketball, having good vertical relaxation is also essential. A long shot or a double step, taken with more trigger, allows you to move away from the defender. Jumping high means increasing your chances of rebounding, both offensive and defensive. What causes in these players a thirst for performance in vertical jump. Massage provides very interesting benefits in the preparation of an effort, in the prevention of injuries and in post-exercise recovery (Moraska *et al.*, 2005). According to Peck (Peck *et al.*, 2014), massage helps maintain athlete health and increase performance. In Benin and in many other countries, athletes and coaches, based on their personal experiences, believe that the massage performed before the warm-up has beneficial effects on vertical relaxation. And it is to verify this claim that we have decided to undertake this study. To achieve this, we set ourselves the goal of studying the effect of the pre-warm-up massage on the vertical relaxation of 57 Zou basketball players.

METHODS

Nature of the study and implementation framework

This is a cross-sectional comparative study that was carried out on the municipal basketball court in Abomey and on the basketball court at the Bohicon youth center. The Biomechanics and Performance Laboratory (LaBioP) of the National Youth Institute of Physical Education and Sport (INJEPS) served as a venue for the analysis of the data collected. The study was carried out in the Zou department located in central Benin. It is subdivided into nine (9) municipalities which are Agbangnizoun, Bohicon, Covè, Djidja, Ouinhi, Zangnanado, Za-kpota and Zogbodomey, and Abomey the capital. These municipalities are subdivided into 76 districts, 427 villages and city districts. Covering an area of 5,243 km<sup>2</sup>, the Zou department occupies the southern zone of the former Zou department (INSAE, 2016).

TARGET POPULATION AND SAMPLING

Target population

This study concerns players who are in basketball clubs in the ZOU district.

**Study sample size:** The size of the study sample is 57 players, including 13 players belonging to Flambeau d'Abomey; 15 players belonging to Lumière d'Abomey and 29 players belonging to Olympique de Bohicon

Inclusion criteria

To use our study sample, the following conditions must be met:

\*Corresponding Author: DOSSOU Sèmako Gérard  
Doctor in Biomechanics at INJEPS, University of Abomey Calavi, Benin

- Be at least 18 years old and at most 30 years old;
- Have a sports license in a club;
- The club must be affiliated with the Beninese Basketball Federation (FBBB) and belong to the ZOU department.

### Criteria for non-inclusion

Not included in our study sample:

- The player under the age of 18 or over 30;
- Players who do not have a license in the clubs in good standing;
- Clubs not affiliated with the Beninese Basketball Federation (FBBB);
- The club that is not in the Zou department;
- Players who presented or who present a week before the study, health problems or musculo-tendon or ligament pathologies (a sprain, contracture, tendonitis, etc.).

### Exclusion criteria

Excluded from our study:

- subjects with health problems during the experiment
- subjects who missed an experimentation session

## SAMPLING TECHNIQUE AND METHODS

### Sampling technique

We used the reasoned choice sampling technique in identifying players for our study.

### Sampling methods

The non-random method allowed us to choose players from clubs in the Zou district. According to the texts of the Beninese Basketball Federation, the three affiliated clubs in Zou can only constitute a basketball district. These clubs are: LUMIERE d'Abomey, FLAMBEAU d'Abomey and OLMPIQUE de Bohicon

## MATERIAL AND TECHNIQUE

The material below was used during the experiment:

- A SECA brand wall chart (France) graduated to the nearest millimeter;
- A 5m / 16ft Lacoste made in china centimeter was used to measure the relaxation of the players;
- A FUJIFILM ZOOM LENS brand camcorder, 3xf = 5.7-17.1mm 1: 2.9-5.2, digital camera, made in China, was used to photograph the experiments;
- A techwood (China) personal scale accurate to 100g was used to take the body mass of the players;
- A data collection sheet.

## DATA COLLECTION PROTOCOL

### Data collection plan

We had done the data collection once in two days for each club but in three stages. The first step was to contact the club coaches, to have the training program in order to have the

informed written consent of the coaches and players when making contact. As for the second step, we explained the progress of the experiments, the conditions and then proceed to fill in the identification and knowledge part of the data collection sheet on the massage by the players.

The third stage was the actual conduct of the experiments.

### Procedures

**Standing waist measurement:** For this measurement, the subject is standing barefoot, heels tight, toes slightly apart, body erect, shoulders lowered, back pressed against the wall, head straight and gaze horizontal. We read in centimeters on the graduation the point that corresponds to its vertex and we write it at the same time on the individual data collection sheet.

**Measuring body mass:** The subject, with his only underwear without shoes, climbs on the scale, feet together, arms at his sides and gazing horizontal. Once the needle has stabilized, the value indicated by it is read on the dial of the device.

**Measurement of vertical relaxation (SARGENT test):** For the measurement, the subject is asked to position himself in profile in relation to the graduated wall, on a line located 30 cm from the wall. The fingertips of the hand on the side of the wall are chalked; the heels remain glued to the floor, the subject raises his arm in full extension and makes a mark on the wall with the tip of his middle finger. This height, which represents the standing waist plus arm raised is called mark A. Then the subject bends the knees and jumps as high as possible to print the mark B on the wall. The subject's relaxation D is therefore obtained by making the difference between mark B minus mark A. For the jump to be valid, the subject must descend to the same place. For the collection, after taking the size, the body mass we carried out three experiments:

### FIRST EXPERIENCE

We had taken the relaxation without jumping and with jumping subjects not heated or massaged.

### SECOND EXPERIMENT

We asked the subjects that after the first experiment to take a 05 minute break before performing the individual active warm-up exercises for 12 minutes then the fingers in the chalk powder, then come and perform three (03) jumps in trying to increase the height on each try spaced 45 seconds apart.

### THIRD EXPERIENCE

We asked the subjects to have their lower limbs massaged more specifically the extensor muscles, namely the quadriceps, lateral peroneus, triceps surae and glutes (see appendix) for 12 minutes then to do individual active warm-up exercises during 12 minutes, after putting your fingers in the chalk powder. They finally come to perform three (03) jumps, trying to increase the height with each attempt at a 45 second interval. The 1st day consisted of carrying out the first and the second experiment. The 2nd day, 72 hours later, consisted of carrying out the first and third experiments

NB: the three (3) experiments were repeated over 2 other weeks in order to retain the best data.

Warm-up exercise and massage technique used: see appendix

## STUDY VARIABLES

Two main groups of variables are studied in the context of this study. These are therefore dependent variables and independent variables.

### Independent variables

The independent variables retained for this study:

- The identity of the subject;
- the size of the subject;
- the subject's age;
- the subject's body mass;
- the vertical relaxation of the subject.

### Dependent variables

The dependent variable retained for this study is:

- The type of warm-up;
- Warm-up exercises;
- The duration of the warm-up;
- The type of massage;
- Massage techniques;
- The duration of the massage;
- The duration of the break between the jump attempts.

## STATISTICAL ANALYSIS

Recorded data was analyzed and processed with Stat Soft Inc. Statistica software version 7.1. For each variable, the means and standard deviations were calculated after checking the normality of the distribution and the homogeneity of the variances for each subject with the Kolmogorov Smirnov test and the Student's t test. The significance level for the various statistical tests was set at  $p < 0.05$ .

## RESULTS

Our study brought together 57 basketball players aged 18 to 30 (average age =  $20.35 \pm 7.32$  years). 100% of the players are male, and play in the first division championship. The body mass of our subjects varies between 22 kg and 81 kg with an average value of  $63.77 \pm 13.28$  kg. The size is between 1.55cm and 1.90cm with an average of  $1.71 \pm 0.07$ cm).

Table 1 reveals that the values of vertical relaxation of players warmed up without massage show a significant difference at  $p < 0.05$  ( $p = 0.03$ ) compared to those of players without warm-up and massage.

Table 2 shows that the values of the vertical relaxation of the massaged and warmed up players are significantly higher than that of the warmed up players only at  $p < 0.01$ .

## DISCUSSION

### Comparison of the measurements of the vertical relaxation of the first experiment compared to the second

Experiment 1 on players "without warm-up or massage" reveals that the values of vertical relaxation evolve from a minimum of 28 centimeters (cm) to a maximum of 68 cm with an average of 43.19 cm and a difference type of 9.80 cm. After the players "warmed up without being massaged" (experiment 2) we raised their vertical trigger, the value of which changes from a minimum of 30 cm to a maximum of 68 cm with an average of 48.96 cm and a gap Typical 9.06 cm with a significance level  $p < 0.05$ . So the vertical relaxation of the players has significantly increased. We therefore deduce that the warm-up increases the vertical relaxation of the players. This is in accordance with the results of Shellock (Shellock *et al.*, 2015) who showed that warming up improves performance in vertical jumps. Moreover, these results corroborate the conclusions of the work of Creekmur (Creekmur *et al.*, 2016). When you first warm up the blood flow to the muscles increases as the small vessels open up.

**Table 1. Comparison of the measurements of the subjects' vertical relaxation**

	m±s	Min	Max	P
Experiment 1 without warm-up or massage Vertical relaxation (cm)	43,19±9,80	28	66	-
Experiment 2 warm-up without massage Vertical relaxation (cm)	48,96±9,06	30	68	0,03

m ± s: mean ± standard deviation; Min: Minimum value; Max: maximum value

**Table 2. Comparison of the vertical relaxation measurements of subjects**

	m±s	Min	Max	P
Experiment 1 without warm-up or massage Vertical relaxation (cm)	44,01±9,75	28	67	-
Experiment 3 Subjects massaged and heated Vertical relaxation (cm)	50,61±9,15	30	69	0,001

m ± s: mean ± standard deviation; Min: Minimum value; Max: maximum value

**Table 3. Classification of the level of performance according to the importance of the vertical relaxation of the players**

		Excellent	Very good	Good	Average	Poor
Subjects without warming up no massage	Effective	00	2	30	22	3
	Percent	00%	3,5%	52,6%	38,6%	5,3%
Subjects heated without massage	Effective	00	4	45	8	00
	Percent	00%	7%	78,9%	14%	00%
Subjects massaged and heated	Effective	00	10	40	7	00
	Percent	00%	17,5%	70,2%	12,3%	00%

When all the blood vessels of the muscle are open and filled, the muscle can perform the best possible performance, it is also for the extensor muscles, namely the quadriceps, lateral peroneus, triceps sural and of course the glutes which intervene. In the realization of a jump therefore by raising the general temperature of the body increases the performance in vertical relaxation (Danion *et al.*, 2006). So following the above we can say that warming up is the basis for improving performance insofar as it affects the various variables mentioned above.

### Comparison of the measurements of the vertical relaxation of the first experiment compared to the third experiment

Experiment 1 on players "without warming up or massaging" shows us that the values of vertical relaxation evolve from a minimum of 28 cm to a maximum of 67 cm with an average of 50.61 cm and a standard deviation of 9, 75. Experiment 3, which was to measure the vertical relaxation of players "massaged and warmed up" tells us that the values of the vertical relaxation of players evolve from a minimum of 30 cm to a maximum of 69 cm with an average of 50.61cm and a standard deviation of 9.15 cm with a significance level of 0.01 less than 0.05 ( $p < 0.05$ ) therefore presents a significant difference. We deduce that the massage with the warm-up significantly increases the vertical relaxation of the players. This confirms the results of Drust (Drust *et al.*, 2003) and Moraska (Moraska *et al.*, 2005) who showed that one of the first goals of toning massage is to raise muscle temperature to recover the effects of active heating and that it increases skin and intramuscular temperature of the quadriceps up to 2.5 cm deep after a light touch, but this remains much lower during active heating.

### Comparison of performance level between the second and third experience

We can see that after comparing the two experiences that 6% of players increased performance in vertical relaxation after being massaged and warmed up (Weerapong *et al.*, 2005). At the end of the experiment, we noticed a very significant increase in the vertical rebound values in the heated and massaged players compared to the lower vertical rebound values in the warmed up players without being massaged. The massage further increases the vertical relaxation of the players (Kilicet *et al.*, 2006).

### Conclusion

The aim of this study was to verify whether massage before warming up further increases vertical relaxation among basketball players in the Zou district in Benin.

From the results we have achieved, it should be noted that:

- Active warm-up increases the vertical relaxation of Zou basketball players
- The massage associated with the warm-up increases the vertical relaxation of Zou basketball players by 31.57%, or 6% more than the active warm-up alone.

Thus our initial hypothesis is verified because the massage before the warm-up had a surplus effect on the vertical relaxation.

**Acknowledgments:** We extend our sincere thanks to Mr DOSSOU Assogba Nicolas, ZINSOU Honorine and to the heads of the Sport-Health-Service Center and the team of Laboratory of Biomechanics and Performance (LaBioP). Moreover, we thank all the subjects who accepted to participate in this study.

**Disclosure of conflict of interest:** The authors declare no conflicts of interest.

### REFERENCES

- Creekmur, CC, Haworth, J., Cox, RH, Walsh, MS. 2016. "Effects of plyo-metrics performed during warm-up on 20 and 40 meter sprint performance", *J Sports Med Phys Fitness*, 16(3),24.
- Danion, H. 2006. "Les étirements musculaires : résultats d'une enquête de pratique auprès des étudiants de Licence 1 en sciences et techniques des activités physiques et sportives", *Kinesither Rev*, 6,19-23.
- Drust, B. 2003. "The effects of massage on intra musculaire temperature in the vastuslateralisin humains", *Int J Sport Med*, 24(6),359-399.
- Institut National de la Statistique et de l'Analyse Economique(INSAE). 2016. "Cahier des villages et quartiers de ville du département de Zou : Situation géographique", INSAE; Benin, 37.
- Kilic, A. 2005. "The effects of massage on delayed onset muscle soreness and physical performance in female collegiate athletes", *PhysTher Sport. Févr*, 7(1), 5-13.
- Moraska A. 2005. "Sports massage. A comprehensive review", *J Sports Med Phys Fitness*, 45,370-380.
- Peck, E. 2014. "The Effects of Stretching on Performance: Current Sports", *Medicine Reports. Revue*, 13(3),179-185.
- Shellock, F. 2015. "Warm-up strategy and high-intensity endurance performance in trained cyclists" *Int J Sports Physiol Perform*, 10, 353-360.
- Weerapong, P., Hume, PA, Kolt, GS. 2005. "The mechanisms of massage and effects on performance, muscle recovery and injury prevention" *Sports Med.*, 35, 235-256.

\*\*\*\*\*