International Journal of Yoga, Physiotherapy and Physical Education
ISSN: 2456-5067; Impact Factor: RJIF 5.24
Received: 09-04-2020; Accepted: 10-05-2020; Published: 19-05-2020
www.sportsjournal.in
Volume 5; Issue 3; 2020; Page No. 32-36

Effects on dynamic capacity of basketball players after practising suryanamaskar

Iona Buthello[1*], Dr. Kriti Singh[2]
[1] Intern, DY Patil University, School of Physiotherapy, Navi Mumbai, Maharashtra, India
[2] Assistant Professor, DY Patil University, School of Physiotherapy, Navi Mumbai, Maharashtra, India

Abstract
Basketball is a contact sport in which speed agility and aerobic capacity are important factors for an athlete. The objective of the study was to find the effects of suryanamaskar in male basketball players on their speed, agility and aerobic capacity. To achieve the study 51 district level male basketball players were selected between the age of 16-25. They performed suryanamaskar for 5-6 days a week for 4 weeks. They performed suryanamaskar once a day and there were no any other changes in the practice routine of the players. 30 yards sprint test for speed, t-test for agility and pacer test for aerobic capacity was performed pre and post the study. The results showed significant changes in the aerobic capacity of players after performing suryanamaskar and showed no significate changes in speed and agility of players after performing suryanamaskar.

Keywords: suryanamaskar, basketball players, yoga, speed, agility, aerobic capacity, dynamic capacity

Introduction
Yoga is a discipline, aimed at integrating mind, body and spirit [1]. India is very rich in yogic practice [2]. There are different branches of yoga prescribed for different approaches and techniques. Ideal body strives for balanced development of the body, mind, and spirit to achieve perfection. Suryanamaskar or sun salutation is a great tool to reach this goal. Suryanamaskar is a well-devised mixture of yoga asanas and breathing.
Suryanamaskar reduces visceral fat, brings flexibility to the spine and limbs
and enables us to breathe right [1]. A full round of Suryanamaskar is considered to be two sets of the 12 poses with a change in the second set to moving the opposite leg first through the series [4]
Basketball is a contact sport which lasts for approximately 48 minutes [5]. Sports like basketball require specific skills that are under dynamic conditions, they require a high amount of speed, strength, power, agility, aerobic capacity and endurance [6]. A study done in Uttar Pradesh showed how Suryanamaskar helps in increasing speed, endurance, flexibility and strength in players, it helps the player in overall development in his game and increases fitness [7]. one of the studies also showed that if a person performs suryanamaskar frequently there is less expenditure of energy and increased cardiorespiratory performance [8].
It is a dynamic sport, speed and agility is very crucial for improving footwork skill. It requires constant changing of direction in different planes, changing different motion from jogging to sprinting to jumping [20]. The ability to defend, grabbing the ball from the opponent and rapidly decelerating to shoot a basket. Hence speed and agility become one of the crucial components for a player to train [14].
Basketball players often begin their exercise with warm up and dynamic stretches. During Suryanamaskar, muscles of the body experience stretch and pressure alternatively [2]. Suryanamaskar also claims to be beneficial for general health and fitness of a person [1]. Hence, we want to find out how suryanamaskar can be beneficial for basketball players with respect to speed, agility and aerobic capacity.

Hypothesis
- **Alternate Hypothesis:** There would be significant improvement in speed, agility and aerobic capacity post Suryanamaskar.
- **Null Hypothesis:** There will be no significant difference in the pre and post values of speed agility and aerobic capacity post Suryanamaskar.

Material and Methods
51 healthy males of the age 16-25, who are professional basketball players (for 2 or more years) were chosen from YMCA Ghatkopar. After getting consent from them, they were involved in the study.
PACER, T-test and 30 yards sprint test was performed before the start of the study.
- **PACER**

This test required the basketball players to run as many laps as they can, within the pace. This was to test for the aerobic capacity of the players.
- The 20-meter (21-yard, 32-inch) course was marked with marker cones to divide lanes and used chalk lines

at each end.

- a 5-second countdown was given and the player told when to start.
- Each player being tested should run across
- the 20-meter distance and touch the line with a foot by the time the beep sounds.
- The player took full weight on the foot that is touching the line.
- At the sound of the beep, the player turned around and ran back to the other end.
- If some player gets to the line before the beep, they must wait for the beep before running the other direction.
- Player continued in this manner until they failed to reach the line before the beep for the second time
- They were allowed to miss one beep, if they missed the second beep the test ended there itself.
- The score was noted in the individual scoring sheet.
- **30 yards sprint test**

Fig 1

This test required the basketball players to maximally sprint for 30 yards. This was to test the speed of the players.

- The player had completed an adequate warm up of around 10 minutes duration
- The player lined up at the start mark (0m)
- The Player started when ready or on "GO" command from a coach/ researcher.
- The players sprinted from 0 meters to 30 yards between the cones.
- The time was recorded when the players crosses the finish line at 30 yards
- The test was completed 2 times with a 5-minute break between runs.
- **T-test for Agility**

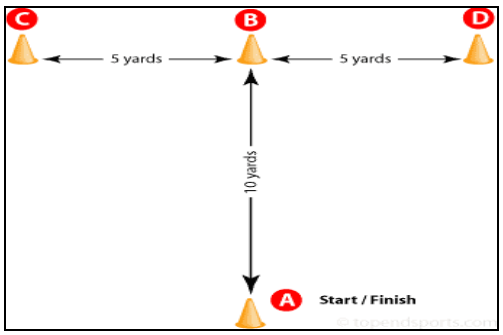


Fig 2

- **Procedure:** we set out four cones as illustrated in the diagram above (5 yards = 4.57 m, 10 yards = 9.14 m). The player started at cone A. On the command of the timer, the player sprinted to cone B and touched the base of the cone with their right hand. They then turned left and shuffled sideways to cone C, and also touched its base, this time with their left hand. Then shuffling sideways to the right to cone D and touching the base with the right hand. They then shuffled back to cone B touching with the left hand, and ran backwards to cone A. The stopwatch is stopped as they pass cone A.
- **Scoring:** The trial was not counted if the subject crossed one foot in front of the other while shuffling, failed to touch the base of the cones, or failed to face forward throughout the test. We Took the best time of three successful trials to the nearest 0.1 seconds.

Then the players had to perform suryanamskar for 6 days per week for 4 weeks. The suryanamaskar was performed in the presence of the author. The players started with 8 rounds of suryanamaskar on the first day slowly progressing to 24 rounds.

Suryanamaskar (Salutation of sun)
In reference with S-vyasa yoga university

Pranamasana (Prayer pose) 1st and 14 th pose
Stand erect with legs together. Bring the palms together to namaskar mudra.

Hasta uttanasana (Raised arms pose) step 2nd and 13th pose
Inhale and take the hand above the head while inhaling and bend the trunk backwards.

Padahastasana (Hand to foot pose) 3rd and 12th pose
Exhale and bend the body forward while exhaling. Touch the forehead to the knee.
Keep the palm on the floor on either side of the foot and inhale.

Ashwa Sanchalanasana (Equestrian pose) 4th and 11th pose
In this step breathe in and kick the right leg back
Push the buttocks forward and downwards so that the left leg is perpendicular to the ground and look up.

Fig 3

Chaturanga Dandasana (Stick pose) 5th pose
In this step, exhale and take the left leg also back resting

only on palm and toes keep the body straight from head to toes inclined to the ground at about 30 degrees.
Take care to keep the neck in line with the back.

Fig 4

Sasankasana (the hare pose) 6th pose and 10th
While inhaling, bend the legs at the knees and rest them on the floor with buttovkd resting on the inside surface of the feet with heels touching the sides of hips without altering the position of the palm and toes.
Exhale as you rest the forehead on the floor. Then relax in normal breathing.

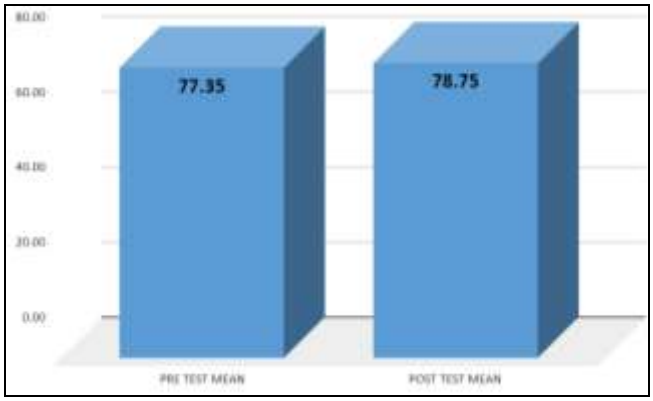
Ashtanga Namaskara (Salute with eight parts or points) 7th pose
While exhaling without shifting the positions of hands and toes, glide the body forward and hold the breath (Bahya Kumbhaka) and rest your forehead, chest, hands, knees and toes on the ground. Raise the buttocks off the ground.
Note that eight points of the body are in contact with the ground- hence the name Ashtanga Namaskara (Salutation with 8 parts)

Bhujangasana (Cobra pose) 8th pose
Inhale, raise the head and trunk making the spine concave upwards without lifting the position of the hand and feet.
Arch the back as far as you can until the elbows are straight
Keep the knee off the ground.

Fig 5

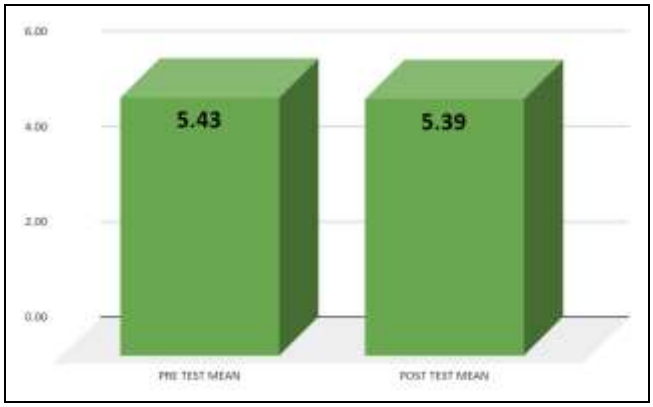
Parvatasana (Mountain pose) 9th pose
While exhaling, raise the buttocks and push the head down until the heel touches the ground without shifting the position of the hand and feet.
Repeat 10th 11th 12th 13th 14th pose as mentioned below
Repeat the round using another leg which will complete one round of suryanamaskar.
Whole round of suryanamaskar should ideally get completed within a minute.
The athletes performed PACER, T-test and 30 yards sprint test after 4 weeks of study. Data was then analysed using T-test and mean was calculated.

Results



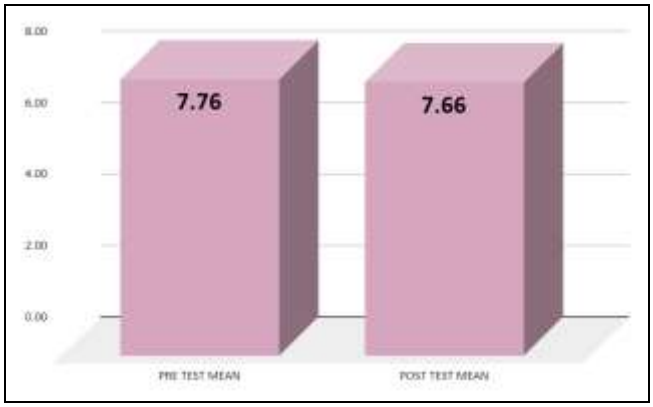
Garph 1: PACER

The mean of the pacer to record aerobic capacity of the basketball players after practicing suryanamaskar is 77.35 pre suryanamaskar and 78.75 post suryanamaskar. The p value is <0.05 thus we reject the null hypothesis and conclude that there is a significant difference between pre and post-test.



Graph 2: 30 YARDS SPRINT TEST

The mean of the 30 yards sprint test to record the speed of the basketball players after practicing suryanamaskar is 5.43 pre suryanamaskar and 5.39 post suryanamaskar. The p value is >0.05 thus we reject the hypothesis and conclude that there is no significant difference between pre and post-test.



Graph 3: T-Test for Agility

The mean of the T-test to record the agility of basketball players after practicing suryanamaskar is 7.76 pre suryanamaskar and 7.66 post suryanamaskar. The p value is >0.05 thus we reject the hypothesis and conclude that there is no significant difference between pre and post-test.

Table 1

Parameter	Mean+/- SD (Before)	Mean+/- SD (After)	p value
Pacer	77.35 +/- 53.17	78.75 +/- 52.27	< 0.05

Table 2

Parameter	Mean+/- SD (Before)	Mean+/- SD (After)	p value
Sprint test	5.43 +/- 0.55	5.39 +/- 0.47	> 0.05
t test	7.76 +/- 1.36	7.66 +/- 1.35	> 0.05

Table 1 shows all changes in PACER in basketball players and table 2 shows all the changes in speed and agility during sprint and T-test. The group shows statistically significant improvement in pacer (p value <0.05). There weren't significant changes seen in speed (p value >0.05) and agility (p value >0.05) of the players.

Discussion

The present study demonstrates that there is significant improvement in aerobic capacity of players pre-test and post-test (p value <0.05) after the practice of suryanamaskar (ref to table 1) f0r 6 days a week for 3 weeks. A study showed significant increase in muscle power [p value < 0.0001], aerobic capacity (P value < 0.0001)8. Surya Namaskar can be considered as an integral part of muscle strengthening as well as aerobic conditioning programme. Another study showed that the Systolic blood pressure, PEFR and FVC increased significantly and RR, HR and diastolic blood pressure decreased significantly in school students after the practice of suryanamaskar3. The study showed there is no significant difference between results of pre-test and post-test in speed. Agility is the ability to stop quickly and accelerate or decelerate whenever needed, change directions in any plane, to left, right, front and behind smoothly. There were no significant changes noted in the agility of the players pre-test and post-test after practicing suryanamaskar.

The main factors needed to increase speed and agility are vo2max, lactate threshold, maximum heart rate etc. A study showed improvement in vo2max after practicing yoga for 12 weeks18. However, there were no significant differences in these players. All the limitations can be the causes of such results in speed and agility.

One study showed improvement in basketball skills of a group of school children who practised yoga for 12 weeks21. One of the studies also showed improvement in terms of speed, agility and other basketball skills of novice basketball players after practicing yoga for six weeks19. The fact that these players are district players who regularly play basketball can be one factor. Players already practice speed and agility drills apart from suryanamaskar and players already had good speed and agility from the beginning hence even though there was improvement in speed and agility it wasn't significant enough.

Limitation

The factors like diet, lifestyle, habits etc. of human subjects that could not be controlled and might have an effect on the result of the study was considered a limitation of the study. The duration of the study was 4 weeks which is a limitation. Number of participants is also a limitation to the study. Surya namaskar can be performed twice a day but in this study suryanamaskar was only performed once hence it is considered as a limitation Specific motivational technique was not applied on the subjects was considered as the limitation of the study. The previous experience of the subjects regarding the tests were considered as limitations of the study.

Conclusion

Our study suggested that suryanamaskar showed significant improvement in aerobic capacity (p value <0.05). There was no significant improvement in the speed (p value >0.05) and agility (p value >0.05) of the players practicing suryanamaskar.

Acknowledgments

The author thanks the Young Men's Christian Association (YMCA) for letting us conduct the research in their association.

References

1. Certification of yoga profession- official guidebook for level 1 & 2 by quality council of india.
2. Bhutkar PM, Bhutkar MV, Taware GB, Doijad V, Doddamani BR. Effect of suryanamaskar practice on cardio-respiratory fitness parameters: A pilot study. Al Ameen J Med Sci. 2008; 1(2):126-9.
3. Kumar S. Effects of suryanamaskar on cardiovascular and respiratory parameters in school students. Recent Research in Science and Technology, 2011; 3(10).
4. Dribble and the ball https://dribbletheball.com/how-long-does-a-basketball-game-last/
5. Ransone J. Physiologic Profile of Basketball Athletes. Nutrition & Recovery Needs of the Basketball Athlete, 2016, 10.
6. Cramer H, Lauche R, Langhorst J, Dobos G. Is one yoga style better than another? A systematic review of associations of yoga style and conclusions in randomized yoga trials. Complementary therapies in medicine. 2016; 25:178-87.
7. Sinha B, Ray US, Pathak A, Selvamurthy W. Energy cost and cardiorespiratory changes during the practice of Surya Namaskar. Indian Journal of Physiology and Pharmacology. 2004; 48(2):184-90.
8. Phadke SS, Joshi RS, Yardi S. Effect on Muscle-Power, Aerobic Capacity and Emotional State after Practice of Suryanamaskar. International Journal of Physiology. 2014; 2(1):35-8.
9. Erculj F, Blas M, Bracic M. Physical demands on young elite European female basketball players with special reference to speed, agility, explosive strength, and take-off power. The Journal of Strength & Conditioning Research. 2010; 24(11):2970-8.
10. Chandrasekhar M, Ambareesha K, Nikhil C. Effect of pranayama and suryanamaskar on pulmonary functions in medical students. Journal of clinical and diagnostic research: JCDR. 2014; 8(12):BC04.
11. Manna C. Effect of stretching and dynamic suryanamaskar of bowling performance in cricket.
12. Miller TA. NSCA's Guide to Tests and Assessments. Human Kinetics, 2012.

13. Hovsepian V, Marandi SM, Kelishadi R, Zahed A. A comparison between yoga and aerobic training effects on pulmonary function tests and physical fitness parameters.
14. Lucett S, NASM-CPT PE. Speed and Agility Training for Basketball. Journal of Strength and Conditioning Research. 2013; 12(2):212-6.
15. Mayorga-Vega D, Aguilar-Soto P, Viciana J. Criterion-related validity of the 20-m shuttle run test for estimating cardiorespiratory fitness: a meta-analysis. Journal of sports science & medicine. 2015; 14(3):536.
16. Fatouros IG, Laparidis K, Kambas A, Chatzinikolaou A, Techlikidou E, Katrabasas I, *et al*. Validity and reliability of the single-trial line drill test of anaerobic power in basketball players. Journal of sports medicine and physical fitness. 2011; 51(1):33.
17. Pauole K, Madole K, Garhammer J, Lacourse M, Rozenek R. Reliability and validity of the T-test as a measure of agility, leg power, and leg speed in college-aged men and women. The Journal of Strength & Conditioning Research. 2000; 14(4):443-50.
18. Doijad VP, Kamble P, Surdi AD. Effect of Yogic exercises on aerobic capacity (VO2 max). International Journal of Physiology. 2013; 1(2):47-50.
19. Chaudhari PR. Effect of yoga training on fitness components and skill abilities among basketball players.
20. Agility for basketball
21. https://functionalbasketballcoaching.com/agility-basketball/
22. Akila S. Research article Effect of Basketball Skill Training and Yoga Training on Playing Ability of School Basketball Players.