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EFFECTOFYOGASANASANDSURYANAMASKARON PERFORMANCE IN BADMINTON PLAYERS

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ABSTRACT: Badminton is considered as one of the most popular sports over the world, in which two or four opposing playersstrike the shuttlecock over adividing net betweenthemtoscore apoint.Badminton players need to conduct various movement patterns during the game including specialized twists, jumps, footwork and strike the shuttle cock and to keep it back and forth in the court. Hence, balance has its dynamicity in badminton. The purpose of this article is to find out the effect of yogasanas and Surya namaskar Exercises on Badminton players. Yogic Practices with Physical Exercises (YPPE) and some participated in Yogic Practices with Specific Skill Exercises (YPSSE) done for a period of 12 weeks. This experiment conducted between groups of yoga, control and physical exercises. This result suggested that yogic asanas with suryavnamskara gives confidence level, capability and reduces side effects.

Keywords:Suryanamaskara,Balance,Flexibility,Badminton

I. INTRODUCTION

Outdoor and recreational sports participation is increasing in adolescents and an increase in the frequency or duration of recreational sports participation is leading to proportional increase in the incidence of activity induced musculoskeletal injury. In this changingscenario, fitness training and injury prevention, programs incorporating spinal muscular training, including core strengthening and suryanamskara exercises have become popular because the core is considered to be the anatomic and functional centrepiece and the power house ofthe body[1]. Badminton is considered as one ofthe most popular racket sportsover the world, in which two or four opposing players strike a shuttlecock over a dividing net betweenthemto score apoint.Theoverhead technique is oneofthethree maincategories of badminton strokes, which divided into three strokes drop, clear and smash. In addition, the forehand and backhand overhead strokes commonly are a fundamental demand to play badminton. Thus, the game is characterized by a changing temporal structure with actions of short period and high or medium intensity coupled with a short resting time.

Badminton requires a specific physical conditioning in terms of motor and action controls; coordinative variables such as reaction time, foot stepping and static or dynamic balances, which are essential motor demands in this sport [2]. Therefore, badminton players need enough strength and a high level of dynamic balance during the rapid postural movements around the court.

Postural control or balance is defined as an ability to maintain a base support with minimal movement actions and dynamically to perform a motor task while maintaining a stable position. Indeed, balance istheabilitytomaintain dynamic integrationofinteriorandexterior forces during motor action tasks. Balance is a complex process involving the reception and integration ofsensory inputs, and the planning and execution of movement; to achieve a goal requiring upright posture; itis the ability to control theCentre of Gravity (COG) over the base of support in a given sensory environment.

Balance is an integral component of most of the daily activities. As a complex sensorimotor function, balance control requires the integration of multiple systems such as vestibular, visual, and somaesthetic information into the central nervous system (pyramidal, extrapyramidalandcerebellarsystems)inordertomaintainantigravityposturesandto

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produce a suitable response to any perturbation. Balance is usually considered a staticprocess, and in fact is acomprehensive, dynamic three-dimensionalprocesscontains multiple neural pathways. Badminton is a dynamic equilibrium process which involves loss ofbalance. Thus, players need body coordination and dynamic balance [3]. In context of impaired trunk control and weak balance ability, previous studies have confirmed that efficient neuromuscular control of trunk stability and a perfect trunk muscle recruitment patterns are vital factors for the control of spinal load in relation to given task or position during the body movement.

Suryanamaskara called sun salutation is an integral part of yogic approach. Surya namaskara includes 12 asanas (postures) organized in a specific pattern. In other words it is an ancient technique of yoga, performed in sequence while facing the rising sun. Asanas or postures are to stabilize body and mind through static stretching. In Suryanamaskara, the alrternating pattern of backward and forward bending strengthen spinal cord and limbs to a maximum range [4].

According to Kibler, corestability isdefined as “theabilityto controlthepositionand motion of the trunk over the pelvis to allow optimum transfer and control of force and motion to the terminal segment in integrated athletic activities. The function of core musculature is better explained by dividing the trunk muscles into local and global categories. Local muscles are defined as those attaching to the lumbar vertebrae and influencing inter-segmental motion, whileglobalmusclesattachtothehipsandpelvis andprovide mobilityandproperorientation of the spine. The abdominal muscles, consisting of the transverse abdomenis, rectus abdominis, and internal and external obliques, are involved primarily in controlling the position of the spine and pelvis [5].

Normalpracticesofasana keep up the physical bodyin an idealconditionand advance health even in an unhealthy body. Through asana practice, the torpid vitalitypotential is discharged and experienced as expanded trust in all everyday issues, yogasna have a more profound criticalness esteem in the advancement ofthe physical, mental, and otherworldly personality, through unadulterated exercise just have physical impact on muscles and bones Physical exercises are performed rapidly and with a great dealof overwhelming breathing, yogasan is performed gradually with unwinding and focus. The advantages of different yoga methods have been pronounced to improve body muscular quality, execution, stress decrease, achievement of internal harmony and self-acknowledgment [6].

Inthe course ofthe most recent two decades, sport brainresearch has added to the exhibition of first class athletes through the usage and practice of mental methods and strategies, for example, unwinding, objective setting, mental rehearsal, visualization and self-talk. Generally, this emphasis on mental methods has been all the more broadly considered by looking at mental skills got from different personality traits and mental miens of world class athletes. There has been a lot of enthusiasm for understanding the relationship of personality variables to sports execution, most contended mental and complex wonders. James-Lange hypothesis is one of the early depictions which clarify the model. "The substantial changes pursue straightforwardly the view of the current certainty, and that one’s sentiment of indistinguishable changes from their occurring is the feeling".
It is believed that the core is important because of its anatomical location in the body where centre of gravity is located, thus where the movement stems. It functions to maintain the posturalalignment and dynamic posturalequilibriumduring functional activities, which help

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avoid serial distortion patterns. The core musculature involves the muscles of the trunk and thepelvisthat areresponsible for maintainingthe stabilityofthespineand pelvis[7]. Thus, it acts as a base for motion of the distal segments, or "proximal stability for distal mobility". Hence, it can be said that the stability of the core musculature is responsible for optimizing the functioning/performance of lower extremity and improved balance.

II. LITERATURESURVEY

T. K. K. Maddala, P. V. V. Kishore, K. K. Eepuriand A. K. Dande, et.al[8] Representing 3- D motion-capture sensor data with 2-D color-coded joint distance maps (JDMs) as input to a deep neural network has been shown to be effective for 3-D skeletal-based human action recognition tasks. However, the joint distances are limited by their ability to represent rotational joint movements, which account for a considerable amount of information inhuman action classification tasks. Moreover, for the subject, view and time invariance in the recognition process, the deep classifier needs training on JDMs along different coordinate axes from multiple streams. To overcome the above shortcomings of JDMs, we propose integrating joint angular movements along with the joint distances in a spatiotemporalcolor-coded image called a joint angular displacement map (JADM). In the literature, multistream deep convolutional neural networks (CNNs) have been employed to achieve invarianceacross subjects and views for 3-D human action data, which is achieved by sacrificingtraining time for accuracy. To improve the recognition accuracy with reduced training times, we proposetotestourJADMswitha single-streamdeep CNN model.Totest and analyze the proposed method, we chose video sequences of yoga. The 3-D motion-capture data represent a complex set of actions with lateral and rotational spatiotemporal variations. We validated the proposed method using 3-D traditional human action data from the publicly available datasets HDM05 and CMU. The proposed model can accurately recognize 3-D yoga actions, which may help in building a 3-D model-based yoga assistant tool.

F. Rishan, B. De Silva, S. Alawathugoda, S. Nijabdeen, L. Rupasinghe and C. Liyanapathirana, et.al [9] Popularity of yoga is increasing daily. The reason for this is the physical, mental and spiritual benefits that could be obtained by practicing yoga. Many are following this trend and practicing yoga without the training of an expert practitioner. However, following yoga in an improper way or without a proper guidance will lead to bad health issues such as strokes, nerve damage etc. So, following proper yoga postures is an important factor to be considered. In this proposed system, the system is able to identifyposes performed by the user and also guide the user visually. This process is required to be completed in real-time in order to be more interactive with the user. In this paper, the yoga posturedetectionwasdone ina vision-based approach.The InfinityYogaTutorapplication is able to capture user movements using the mobile camera, which is then streamed at a resolutionof1280 ×720 at 30framesper second to thedetectionsystem.Thesystemconsists of two main modules, a pose estimation module which uses OpenPose to identify 25 keypoints in the human body, using the BODY_25 dataset, and a pose detection module which consists of a Deep Learning model, that uses time-distributed Convolutional Neural Networks, Long ShortTermMemoryand SoftMax regression in order to analyze and predict user poseor asanausingasequenceofframes.This modulewastrainedto classify6different asanasandtheselectedmodel whichusesOpenPoseforpose estimationhasanaccuracy of

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99.91%.Finally,thesystemnotifiestheusersontheirperformancevisuallyintheuser interface of the Mobile application.

S. Patil, A. Pawar, A. Peshave, A. N. Ansari and A. Navada, et.al [10] describe a project which is used to help naïve users to perform this ancient Indian art correctly in order to maximize the benefits. It makes use of the SURF algorithm to detect the `asana' that the user/practitioner isperformingandcompares it witha video ofthesame `asana'performed by an expert. Thus, it helps to detect and eventually correct errors induced in practicing the art using only a webcam and an expert video as aides for the user.Yoga is an ancient Indian art which helps to distress and purge the mind, bodyand soul. It is known to be a complete cure for various illnesses without the use of medicines.

J. Li and G. Lv, et.al [11] analyzes the basis of badminton special feature, energy supply characteristics, relationship between physical fitness and special quality, and evaluation theory to establish special quality evaluation index architecture, which can provide better distinction and reliability for badminton players. We adopt standard percentage method and deviation method to establish representative index score standard of sports quality based on original data. Then it is integrated with factor weight to make single scoring and comprehensive scoring. After theoretical and actual test, the special sport quality evaluation index architecture of badminton players are proved to be reliable to be taken as reference for current evaluation for special sport quality training level of badminton players.

E. W. Trejo and P. Yuan, et.al [12] recognition of poses is a field of investigation that takes incredible significance for oneself preparing in different sports. Kinect offers a low-cost solution for the recognition of Yoga poses due to body tracking and depth sensor. In this research, we propose an interactive system for perceiving a few postures for learning Yoga that will be characterized by a level of trouble and coordinated with command voices to envision the guidelines and pictures about the stances to be execution. Likewise, posture correction instructions will be displayed for the user in real time made by an expert yoga trainer. Besides, the recognition algorithm is based on Adaboost algorithm in order to get a robust database for detecting 6 Asana Yoga poses. All data were obtained and analyzed according to the confidence which showed a maximum average value of 92%.

H. -T.Chen, Yu-ZhenHe, C. -L. Chou, S.-Y.Lee,B. -S.P.LinandJ. -Y.Yu,et.al[13] Self-training plays an important role in sports exercise. However, if not under the instruction of a coach, improper training postures can cause serious harm to muscles and ligaments of the body. Hence, the development of computer-assisted self-training systems for sports exerciseis a recently emerging research topic. In this paper, we propose a Yoga self-training system, entitled YogaST, which aims at instructing the user/practitioner to perform the asana (Yoga posture) correctly and preventing injurycaused by improper postures. Involving professional Yogatrainingknowledge,YogaSTanalyzesthepractitioner'sposturefromboth frontandside views using two Kinects with perpendicular viewing directions and assists him/her in rectifying bad postures. The contour, skeleton, and feature axes of the human body are extracted as posture representation. Then, YogaST analyzes the practitioner's posture and presents visualized instruction for posture rectification so that the practitioner can easily understand how to adjust his/her posture.

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D. Hernando, et.al [14] benefits of yoga have been studied in different fields, from chronic health conditions to mental disorders, showing that it can help to improve the overall health. In particular, it has been proven that yoga also improves the autonomic function. Heart rate variability (HRV) at rest is commonly used as a non-invasive measure of autonomic regulation of heart rate. Alternatively, pulse rate variability (PRV) has been proposed as a surrogate of HRV. VoluMetrix has developed a novel technology that captures venous waveforms via sensors on the volar aspect ofthe wrist, called NIVAband. This studyaims to assess the effect of yoga in the autonomic nervous system by analyzing the PRV obtained fromtheNIVAsignal.Temporal(statisticsofthe normal-to-normalintervals),spectral(power in low and high frequency bands) and nonlinear (lagged Poincaré Plot analysis) parameters are analyzed before and after a yoga session in 20 healthy volunteers. The PRV analysis shows an increase in parameters related to parasympathetic activity and overall variability, and a decrease in parameters related to sympathetic activity and mean heart rate.

A. Ghosh, S. Singh and C. V. Jawahar, et.al [15] propose an end-to-end framework for automatic attributes tagging and analysis of sport videos. We use commonly available broadcast videosofmatchesand, unlikeprevious approaches, doesnot relyonspecialcamera setupsoradditionalsensors. Our focus is onBadmintonas the sportofinterest. We propose a method to analyze a large corpus of badminton broadcast videos by segmenting the points played, tracking and recognizing the players in each point and annotating their respective badmintonstrokes.We evaluatethe performance on10 Olympic matcheswith20 playersand achieved 95.44% point segmentation accuracy, 97.38% player detection score (mAP@0.5), 97.98% player identification accuracy, and stroke segmentation edit scores of 80.48%. We further show that the automatically annotated videos alone could enable the gameplay analysis and inference by computing understandable metrics such as player's reaction time, speed, and footwork around the court, etc.Sports video data is recorded for nearly everymajor tournament but remains archived and inaccessible to large scale data mining and analytics. It can only be viewed sequentially or manually tagged with higher-level labels which is time consuming and prone to errors.

III. METHODOLOGY

The subjects, numbering 72, were divided into three equal groups consisting of 24 degree college badminton players ranging in age from 18 to 25. Two experimental groups, designated as "A" and "B," and a control group, designated as "C," were allocated to the groups. Subjects were instructed to wear lightweight clothing, and should be with bare foot. They were instructed to stand in the centre of the star and await further instruction. When usingtheright foot asthereaching foot,andthe left legto balance,thesubject isinstructedto complete the circuit in a clockwise fashion. Likewise, when balancing on the right leg, the subject was instructed to perform the circuit in an anti-clockwise fashion.

Subjectswereasked to placetheir hands firmlyon their hipsand then instructedto reachwith one foot as far as possible and lightly touch the line before returning back to the starting upright position. With a chalk piece, the spot was marked where the subject touched the line with their toe. Pre-test results on mental health were collected for each group's subjects. The Mental Health Inventory, created by Drs. Jagadish and Srivastava, was used to examine mentalhealth, and the resultswere scored.There are 54items inthis inventory.Alower score denotes better mental health. For a duration of 12 weeks, GroupAengaged in yoga practices

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combined withphysicalexercises (YPPE), and Group B engaged in yoga practices combined with badminton-specific skill exercises (YPSSE).

IV. RESULTANALYSIS

Theperformanceanalysisof Effectof YogasanasandSuryanamaskaronperformancein badminton players is observed in this section.

Table.1:PerformanceAnalysis

Parameters	Physical	Control	Yoga
Confidence level	90.6	89.8	98.5
Sideeffects	87	91	75
Capability	83	76	95

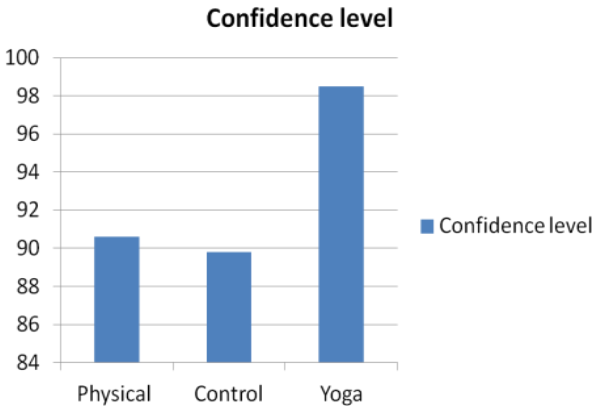

Fig.1:ConfidenceLevelComparisonGraph

In Fig.1 confidencelevel comparison graphis observedbetween physical exercises group, Yoga group and control group.

Side effects comparison graph is observed in Fig2 between physical exercises group, Yogagroup and control group.

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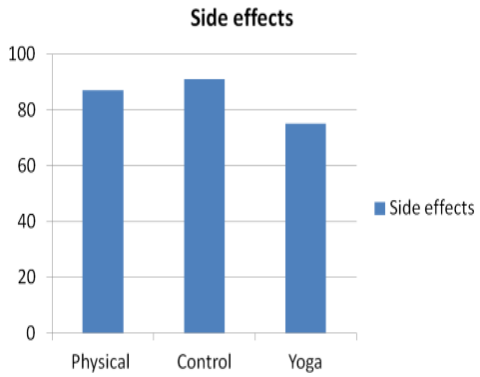

Fig.2:SideEffectsComparisonGraph

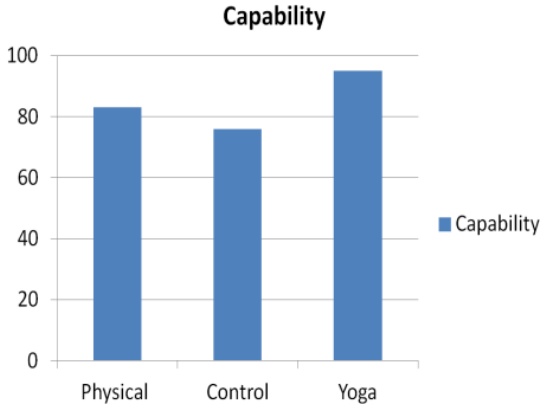

Fig.3:CapabilityComparisonGraph

In Fig.3 capability comparison graph is observed between physical exercises group, Yoga group and control group. Yoga group shows higher capability.

V. CONCLUSION

There was significantimprovement on back strength due to the effect of yog asana with Surya Namaskar practices among badminton players. However, this shows a better improvement amongtheplayersthanthecontrolgroup. Thisresult showsthat yogicpractices with suryavnamskara achieves confidence level, capability and reduces side effects.

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