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The ***IJPEAES Journal*** is an annual interdisciplinary peer reviewed journal of Physical Education and Applied Exercise Sciences in North East India, published by the Lakshmibai National Institute of Physical Education, Department of Sports Biomechanics. North East Regional Centre, Guwahati, Assam

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Original Research Articles

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Women in Sports : Need for Introspection

***Dr. R. Chakravarty*[1]**

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Abstract

A lot of studies show that there are cultural, biological, school sizes, ethos, over emphasis to competition, comparing with others and other related and diverse issues that put girls to disadvantage while taking up sports and physical education. There are small differences in sports performance among the girls and boys in cognitive, affective and motor performance during early childhood but these differences are exaggerated later over time due to differential by the teachers, parents and coaches and peers. These issues become more prominent during adolescence with increased awareness and sensitivity.

Introduction

The ancient Greek games (776 BC) were strictly for men. Let alone competing, women were not even allowed to see the men participating in the Olympics in Greece as it was considered unethical and against gods. The ancient Olympic Games were banned by the Roman Empire after Greece was invaded. The modern Olympic Games were revived in 1896 but the status of women remained unaltered even then. The father of modern Olympic Games Baron Pierre de Coubertin had stated that women's sports were against the laws of nature and the most unaesthetic sight to human eyes one can contemplate. However it has been reported that one woman named Melpomene did participate, against all odds, as unofficial runner in 1896 Olympics. She spent three weeks training in secret and ran 40 kms from Marathon to Athens in 4.5 hours, ahead of many of the male contestants. Officially women (22 numbers) participated for the first time in 1900 Paris Olympics. In 1789, the educational committees of the French Revolution considered the intellectual, moral, and physical education for both boys as well as girls. Physical education and sports was reduced to military preparedness for boys and men only during Napoleon's reign 20 years later. In 1793, GutsMuths, a German educator and thinker included physical education for girls. This involved the measurement of sports performances of girls which led to women's sport being more actively pursued in Germany than in most other countries in that period. Prior to 1870, activities for women either

ceremonial dances or for fun only rather than sport-specific or competitive in nature. Women's qualities were attributed to her beauty, chastity, modesty, obedience, and inconspicuous behavior. Meek and weak wife was the status symbol of that era. Women were allowed to participate in mild exercises because it was believed that tough exercises would lead to hysteria besides sweating was considered unhealthy for women and other factors like sports was socially unacceptable for girls, it would cause damage to the uterus and so on. Some accepted sports for upper class women were archery, croquet, bowling, tennis and Golf.

The period from 1920 to 1970 saw substantial progress for women in sports. Female athletes made their presence felt despite resistance from the society. Helen Wills Moody reigned as women's tennis champion from 1920 to 1930. Gertrude Ederle swam the English Channel 2 hours faster than anyone ever had in 1926. In 1928 Amsterdam Olympics, several women competitors fell exhausted in 800m race. Keeping this incident in view, the International Olympic Committee (IOC) voted that women should not be allowed to compete in races longer than 200 meters leading to a 32 year long ban in these races for women in Olympics.

World War II witnessed a mass massacre of men that compelled the women to do strength and endurance related jobs which were previously not recommended for them because the women and children had to fend for themselves and survive. Women sports participation grew much faster as 390 women participated in 5 games in the first post war Olympic Games in 1948, London. In 1952, Helsinki Olympics 519 women participated with women gymnastics and equestrian events were added to the list of sports in the same Olympics. 1059 women participated in the 1972 summer Olympics at Munich. 1260 women participated in 1976 Montreal Olympics.

A major boost was seen when Nadia Elena Comăneci of Romania won a perfect 10 in Gymnastics in 1976 Olympics in Montreal. So there was steady increase in women's participation and sponsorship of the elite women as well in the Olympic Games. More and more games were being added for the women that further acted as a catalyst for the women to take up sports. Synchronized swimming and rhythmic gymnastics were added to the list of disciplines in the 1984 Los Angeles Olympic Games in which a lot of women participated and large number of spectators appreciated the combination of beauty and the physical perfection displayed during the events. Women were allowed to participate in the marathon and 3000 meter races as well. Women heptathlon comprising of 7 track and field events was added in 1984 Olympics and women badminton was added in Olympics in 1992 Barcelona Olympics. In the last 3 years, Indian sportswomen have been making the nation proud in world events in their respective sports. In spite of them not getting enough support from the fans and the media back home, the women have somehow managed to show outstanding performances in the International competitions including Olympics. Latest names are Hima Das and Dutee Chand who are doing extremely well at the international level despite all odds that they

had to face from discrimination to poverty and public apathy.

Unlike ancient Greece, as per Indian scriptures of Vedic times, women were not treated as inferior or subordinate but equal to men in all matters of life. It is mentioned in the Vedas that the women had an honorable place in the society. They freely participated in public life like attending assemblies, state functions etc. They used to study the Vedas and composed hymns. They also distinguished themselves in knowledge of science and arts as they were considered integral part of a family and played an important role in the journey of life of their partners, in their religious duties. They were given equal opportunity for education and had a voice in the selection of their husband. A woman was regarded as Ardhangini (better-half). However the condition of women was not same in post-Vedic period. It gradually got degraded in the Puranic and Smriti periods. The description of women's status in the society before BC 300 shows that she enjoyed a fairly high status, though not to the extent that she enjoyed in Vedic period. Several drastic changes that took place in the Indian society from about BC 300 to the beginning of the Christian era that led to the restriction of freedom of women. The so called champion of religion imposed certain gender specific rules and code of conduct that were very rigid probably due to caste system and joint family system that were the main reasons for lowering of women's status in this period. A daughter began to be regarded as curse. They were denied the right of inheritance and ownership of property. Pre puberty marriages were widespread. Women were forbidden to go to the temples and pray and undertake pilgrimages.

The widow was asked to devote herself to an ascetic life at home and marriage became an irrevocable union for the wife but not the husband. Men could marry more than once while it was strictly forbidden for the women. Men were honored as "Mizazee Khuda" who will have the last say in all matters pertaining to family and property etc. The period between 11th century to 18th century witnessed further deterioration in the position of women due to the impact of cultural diversity becoming more complex. In this period, female infanticide, child marriage, purdah system, sati and slavery were some common social evils affecting women. The girl child abortions became common. There was further curbing of freedom of women in matters of education, mate selection, public appearances, etc. Women education was almost banned. During the period of British rule of about 200 years (early 18th century to the first half of 20th century), the British authorities noted some major problems in the Indian society and brought in some substantial reforms in eliminating inequalities between men and women in matters of education, employment, social and property rights and so forth. Sati, purdah, female infanticide, child marriage, inheritance, slavery, prohibition of widow remarriage and the lack of women's rights in different fields were some of the problems which were eradicated by the Britishers. Though initially the British rulers did not interfere with the traditional Indian social fabric. It was only in the latter half

of the 19th century and the first quarter of the 20th century that they took some steps to abolish or change some social customs officially. Raja Ram Mohan Rai, Ishwar Chandra Vidyasagar, Dayanand Saraswati, Keshab Chandra Sen, Swami Vivekanand, Maharashi Karve, Justice Ranade, Mahatma Gandhi and others played a pioneering role in removing the obstacles in the progress of women. Not only this, it had helped in eliminating inequalities between men and women and giving proper respect to the other-half of the society. Abolition of Sati Act in 1813, The Hindu Widow Remarriage Act, 1856, Married Women's Property Act, 1874, The Child Marriage Restraint Act (Sharda Act), 1929 are some examples. Although a lot of women were participating in sports and other adventurous activities but still there were certain myths and misconceptions prevalent regarding safety and security of woman. Women began to slowly break the barriers and started working in the offices, going to gyms, multitasking and take up their hobbies besides taking care of families and obeying some social customs but the gender discrimination was still prevalent in most of the lower and middle class families.

Rajkumari Amrit Kaur, former Health Minister in India in early 1900's was the first one to set an example for North Indian women by taking to competitive tennis. Several Indian women have participated in the Olympics in the recent past. Karnam Malleswari is the first women to have won a bronze medal at the Sydney Olympics in the Women's 69 kg category in Weightlifting. Other women who have made India proud are Mary Kom (5 times world champion), Saina Newhwal, P.V. Sindhu & Sakshi Malik. Sakshi is a Freestyle Wrestler who won a Bronze in the Rio 2016 summer Olympics, PT Usha, Sania Mirza. Anju Bobby George made history when she won the bronze medal in Women's long jump at the 2003 World Championships in Athletics in Paris. With this achievement, she became the first Indian athlete ever to win a medal in a World Championships in Athletics jumping 6.70 m.

In the Rio summer Olympics, 2016 among 117 athletes that represented the country - 63 men and 54 women - only 2 players went on to finish on the podium, both of them women, namely PV Sindhu (badminton) and Wrestler Sakshi Malik. Indian Women's Cricket team reached the final of ICC Women's World Cup 2017 in England. Yet, there are very few female athletic icons who are given due attention by the media and glamour world. Most of the time family pressures, biased attitude of coaches, customs and traditions, peer pressure etc. are some of the factors that are deterrents for the young girls to participate in sports rather than strong encouragement to participate in sports and healthy physical activity because of which we have a very small pool of budding female athletes in comparison to the males. The outcome is that most of the talented girls either does not dare to even start and others tend to drop out after some time. The above said barriers to sports participation for women and girls are much higher than for boys and men. This is also covered in detail by the gender critics who see huge gender discrimination in sports even in European countries. Unfortunately even today a number of factors

ensure that sportswomen stay two steps behind. Though the Indian culture looks up to a woman as a mother of a race, the Indian society is firm with the belief that women are naturally inferior to men and her main responsibilities lie with giving birth and taking care of her family. The level of physical education and sports for females has been hampered because of the endless limitations as we see in the case of Hima Das and Dutee Chand. Their road to glory is a fight against prejudice, inferiority and gender discrimination, poverty and lack of resources

Some of the Important Observations Regarding Women's Participation in Sports are as Follows:

- **Policy Barriers:** Given that sports is equally beneficial for both men and women not only from health point of view but also in terms of psychological and social perspective, the sports policy makers and implementers are to be blamed for gender discrimination in sports in favor of men. There is a serious lack of encouragement that enables women and girls to participate besides lack of opportunity & lack of childcare facilities. There should be a mandatory requirement to provide crèche facilities or classes for toddlers and children, so that the women can bring their children along when they go to exercise or compete. The Wimbledon tennis prize money was being raised at par with that of men after a lot of hue and cry. Similarly the requirement of female coaches has always been less in the backdrop of less girls participating in sports. Media pays less attention to when it comes to covering women cricket or hockey.
- **Money Barriers:** Women's sport attracts less funding than men's. Women tend to earn less than men and therefore it is important to consider different payment options and be as flexible as possible. Nominal or free gym memberships, accessibility to stadiums for females, swimming pools, subsidies or other help (for instance free equipment hire) can also encourage girls to take up exercise and sports. Lack of transportation facilities is a very common problem for women and girls with disabilities and for women and girls living in rural areas. The family members find it very difficult to pick and drop for sports and they prefer to do so for tuitions etc instead of sports. A proper public transport system in the villages, share-a-ride systems shall be useful to promote physical activity.

Local walking and running groups that require very less investment can be beneficial for women to take part in easily accessible physical activity in a friendly, supportive manner and for lifetime.

Indian sports women like Deepa Malik, Hima Das, M.C. Mary Kom, Sania Mirza, etc. are excellent role models for the budding athletes. Sports and games help women to overcome hormone dysfunction, menstrual disorders, and eating disorders, osteoporosis. Recent Indian Government initiatives like "swasth bharat abhiyaan", "Khelo India" "beti bachao, beti padhao" campaigns are very encouraging

but it is important to work at the grass root level specifically for women sports and empowerment in school, colleges and in universities. Conducting awareness programme for women sports participation, more incentives in those states where religion is becoming a constraint should come up with some alternatives so that their women can also participate in sports and live a better and healthy life.

Recommendation and Further Suggestions

The Indian Constitution has conferred equal rights to all irrespective of cast creed, color and gender. Women have shown better performances in some sports like Javelin throw, swimming, gymnastics etc than men. Biologically or physiologically the women can master anything and everything. Sometime back triple jump and hammer throw was banned for women but scientists have found that gender has no differences on effect of throwing. But still due to certain constraints we are still unable to produce more good quality sports women Some.

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Effect of Pranayam on Selected Physiological Variables with 492 AQI of Delhi

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Abstract

The purpose of the study was to determine the effect of pranayam on selected Physiological variables. Thirty male students of B.P.E. first year of IGIPESS, Delhi were randomly selected as subjects for this study. Subjects were divided into two groups i.e. one experimental group and one control group. The quantitative measurements of each subject were taken with the help of standard equipment, before and after the treatment period of twelve weeks. The selected physiological Variables were Body Fat (%), Lean Body Mass (Kg), Body Water Content (%) and Basal Metabolic Rate (Kcl). All the test were administered in the Yoga Laboratory of the Institute. Paired 't' test was applied to determine the effect of Pranayam on selected PHYSIOLOGICAL Variables. The Paired 't' test revealed that practice of Pranayam pranayama had significant effect on Body Fat Percentage (t = 5.47), Lean Body Mass (t = 9.65), Body Water Content (t = 17.24) and Basal Metabolic Rate (t = 9.410) against required tabulated value of 1.761 which showed significant effect of practice of Pranayam pranayama. On the basis of results following conclusions were drawn: 1.Significant effect was found on Body Fat Percentage 2. Significant effect was found on Lean Body Mass . 3. Significant effect was found on Body Water Content. Significant effect was found on Basal Metabolic Rate.

Introduction

Today yoga being a subject of varied interests, has gained worlds wide popularity. Recent research trends have shown that it can serve as an applied science in a number of fields such as education, physical education and sports. Health and family welfare, psychology, medicine and also one of the valuable means for the development of human resources for better performance and productivity. However, there exists controversy in accepting yoga as medicine and therapy because it has generally been believed that yoga is spiritual science having emancipation as it goals and hence cannot be treated only as a therapy.

Yoga exercise are scientific means for strengthen of all living or atrophying

muscle fibers and tissues. This system teaches how to awake new life pulsation in active tissues. In this context it is different from other system of exercise in as much as it is different from other system of exercise in as much as it teaches one how to concentrate his attention on the awakened energy which is the direct gives of power, strength and vitality of all the parts of the body. It develops will power alongwith bodily strength. This aspect of yoga is technically known as "asanas" which was developed by the latin hatha yogic into a well organised system of physical culture.

Pranayama is a science of Respiration. It consists of three phases Purack, Kumbhak, Rechak. High abdominal pressure created in pranayama by the action and counter action of the different anatomical parts together with the upward pull of the crura, is responsible for wakening of Kundalini.

The word Pranayam is a compound consisting of two members: Kapal and Bhati. In Sanskrit Kapal means the skull and Bhati is derived from a Sanskrit rot meaning to shine. Hence Pranayam means an exercise that makes the skull shining. Pranayam is one of the six cleansing processes, known in Hatha yoga as shat kriysa, and is intended to clear the nasal passages contained in the skull, along with the remaining parts of the respiratory system. As the exercise necessarily cleanses a part of the skull, the name Kapalabhati is appropriately given to it.

The assessment of Physiological is generally performed in order to determine and monitor one's health and fitness status, and to aid in planning training programs for athletes. It has been well established that a high percentage of body fat (low lean body mass) is associated with a higher risk of heart disease, diabetes, hypertension, cancer, hyper lipidemia and a variety of other health problems. On the other hand, a high percentage of lean body mass and low-fat mass is associated with athletic prowess and good health.

Objectives of the Study

1. To know the effect of Pranayam on Body Fat Percentage
2. To know the effect of Pranayam on Lean Body Mass.
3. To know the effect of Pranayam on water content
4. To know the effect of Pranayam on Basal Metabolic Rate.

Methodology

Subjects

Thirty male students were randomly selected from B.P.E. I Year of IGIPESS, Delhi. The age group was from 17-22 years, duering the AQI of 492 in Delhi. Further two groups i.e. one experimental group and one control group (each of 15 students) were randomly selected from the selected subjects.

Variables

The following PHYSIOLOGICAL Variables were chosen for the study. Body Fat Percentage, Lean Body Mass, Water Content and Basal Metabolic Rate

Criterion Measures

The criterion measures chosen for testing hypothesis were: Body Fat Percentage (%tage.), Lean Body Mass (Kilogram),Water Content (%tage) and Basal Metabolic Rate (Kilo calories).

Training of Pranayam

There were two groups i.e. control group and experimental group. Control group was not given any kind practice of panayama however experimental group was exposed to training of Pranayam pranayama for the duration of twelve week. Both the groups were performing their regular practice of the game. For the experimental group the duration of training session was half-an-hour and the training was conducted in the afternoon 3:00 to 3:30 pm from Monday to Friday.

Pranayam

It consists of active puraka and passive recheka. In every Recheka during Pranayam as much air was expelled or driven out of the lungs as a sudden and vigorous inward stroke of the front abdominal muscles. At the end of Recheka abdominal muscles are contracted. But in puraka one had to simply withdraw his control from these muscles and they were relaxed. Relaxation of muscles is a passive act. Time duration was for first two weeks was 10 minutes. In Pranayam the rest of two minutes was allowed after every five minutes. After two weeks time it was increased gradually.

Design of the Study:

Random group design was utilized for the purpose of the study.

Administration of Tests

The tests for Body Fat Percentage, Lean Body Mass, Water Content and Basal Metabolic Rate were administered in the Yoga Research Laboratory of Lakshmibai National Institute of Physical Education, Gwalior with the help of a team of tester and research assistant under the guidance and supervision of the experts using PHYSIOLOGICAL Analyzer with following standard procedure:

- ❖ Measure the exact height.
- ❖ Step on the equipment.
- ❖ Track the exact weight minus the additional weight.
- ❖ Feed the built of an individual (Standard/Athletic)
- ❖ Feed in the gender.
- ❖ Feed the age of an individual.

- ❖ Feed the height in cms.
- ❖ Enter n wait for the process to complete.
- ❖ Take out the analyses from print out.

Statistical Technique

In order to find out the effect of Pranayam on selected PHYSIOLOGICAL variables, paired 't' test was applied at 0.05 level of significance.

Analysis of Data and Result of the Study

The statistical analysis of data and results of the study are presented from table 1-4.

Table – 1

Body Fat Percentage

Groups	D	S	't' ratio
Experimental Group	3.68	2.60	5.47*
Control Group	0.007	0.0764	0.354

**** Significant t0.05(14) = 1.761***

Since the calculated t (5.47) is more than tabulated t (1.761) at 0.05 level of significance, thus it may concluded that the Body Fat Percentage shown the significance effect of Pranayam.

Table 1 reveals that the significance effect not shown in the control group. Calculated 't' value of control group is t (0.354) which is below the required value of 0.05 level of significance (t=1.761). It has no effect on Body Fat Percentage of Control Group.

Table – 2

Lean Body Mass

Groups	D	S	't' ratio
Experimental Group	1.01	0.405	9.65*
Control Group	0.64	1.417	1.747

**** Significant t0.05(14) = 1.761***

Since the calculated t(9.65) is more than tabulated t(1.761) at 0.05 level of significance, thus it may concluded that the Lean Body Mass shown the significance effect of Pranayam.

Table 2 reveals that the significance effect not shown in the control group.

Calculated 't' value of control group is t (0.354) which is below the required value of 0.05 level of significance (t=1.761). It has no effect on Lean Body Mass of Control Group.

Table – 3

Water Content

Groups	D	S	't' ratio
Experimental Group	1.25	0.287	17.24*
Control Group	0.69	1.810	1.475

**** Significant t0.05(14) = 1.761***

Since the calculated t (17.24) is more than tabulated t (1.761) at 0.05 level of significance, thus it may concluded that the Body Water Content shown the significance effect of Pranayam.

Table 3 reveals that the significance effect not shown in the control group. Calculated't' value of control group is t (0.354) which is below the required value of 0.05 level of significance (t=1.761). It has no effect on Body Water Content of Control Group.

Table – 4

Basal Metabolic Rate

Groups	D	S	't' ratio
Experimental Group	139.7	57.45	57.45
Control Group	0.533	1.45	1.422

**** Significant t0.05(14) = 1.761***

Since the calculated t (9.410) is more than tabulated t(1.761) at 0.05 level of significance, thus it may concluded that the Basal Metabolic Rate shown the significance effect of Pranayam.

Table 1 reveals that the significance effect not shown in the control group. Calculated 't' value of control group is t (0.354) which is below the required value of 0.05 level of significance (t=1.761). It has no effect on Basal Metabolic Rate of Control Group.

Recommendation and Further Suggestions

Within the limitations of the present study the following conclusions were drawn:

- Significant effect was found on Body Fat Percentage and no change was found in Control group.

- Significant effect was found on Lean Body Mass and no change was found in Control group.
- Significant effect was found on Body Water Content and no change was found in Control group.
- Significant effect was found on Basal Metabolic Rate and no change was found in control group.

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Comparative Effect of Training with Sled, Parachute and Weight Jacket on the Performance of A Selected Sprinting Ability

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Abstract

The purpose of the study was to find out the comparative effects of sled, equipment and parachute trainings on selected acceleration speed of' L.NIPE NERC athletes. To achieve the purpose of the study, thirty two (n-32) I.NIPE NERC athletes were selected from Guwahati. India. The selected subjects were randomly assigned into four groups of eight n8) Each, Such as experimental and control groups.

Among the physical training, the dependent variables were selected for this study was acceleration speed. As per the available literatures, the standardized tests were used to collect relevant data on the selected dependent variables. The following independent variables were selected for this study such as sled. i weight jacket and parachute training programmes. The level of significance was fixed at .05 levels. This was considered to be appropriate. The pre and post test randomized control group design was use as experimental design.

No attempt was made to divide the groups in any manner. The collected data from the four groups prior to and immediately after the training programme on selected criterion variables were statistically analyzed with analysis of covariance (ANCOVA) was used to find out the significant difference between experimental and control groups. Whenever the 'F' ratio for adjusted test was found to be significant, the LSD test was applied as post-hoc test to find out paired mean difference. In all the cases 0.05 level of significant was fixed to test the hypothesis.

Keyword: Training, Sled, Parachute, Weight Jacket, Sprinting Ability.

1. Introduction

Running is one of the simplest competitions in the history of mankind. It's one person against at least one other competitor. That's why running, especially sprinting, has been part of the Olympics since their inception. Sprinting is

running over a short distance in a limited period of time. It is used in many sports that incorporate running, typically as a way of quickly reaching a target or goal, or avoiding or catching an opponent. Human physiology dictates that a runner's near-top speed cannot be maintained for more than 30-35 seconds due to the depletion oi phosphocreatine stores in muscles, and perhaps secondarily to excessive metabolic acidosis as a result of anaerobic glycolysis. The ability to achieve a high maximum sprinting velocity is an important determinant of success in sports such as athletics, soccer, rugby, and American Football. High-intensity strength training exercises with free weights and machines can improve the strength of the musculature of the hips, quadriceps, and hamstrings and so increase an athlete's acceleration and maximum sprint velocity. However, many coaches believe that a sprint training program should also include strength-specific exercises, where the athlete uses the sport movement with an added resistance as the training exercise. For sprint training. Such strength-specific exercises include towing a tire or weighted sled. Towing a parachute, wearing a weighted belt or vest. Sprinting on a sand surface, and uphill sprinting. To achieve the greatest exercise specificity, the athlete's movement patterns should remain similar to l those observed in unloaded sprinting.

2. Materials and Methods

2.1 Participants

A group of thirty two (32) athletes of LNIPE nerc were selected to the study. The participants were active competitive athletes who specialized in either the sprint or long jump. They were ranging in age from 18-26. Four groups were divided for the training eight athletes in each group, group one for sled training. Group two for parachute. Group three for weight jacket and group four is a control group.

2.2 Statistical Analysis

In order to find out the Comparative effect of training with Sled. Parachute and Weight jacket on the performance on acceleration the t-test was used to identify any significant differences between the groups at the pre and post test data. ANCOVA (Analysis of co-variance) was used to compare the sprinting ability among the groups. The proposal hypothesis was tasted at 0.05 level of significant.

2.3 Instruments

The following instruments used for collection of data were Stop watch, Clapper, Red & white Flag, Weight sleds, Parachute, Weight Jackets.

3.Results

Comparisons of means of experimental groups and control group of the sprinting ability.

In order to compare the pre and post test means of all the experimental group and control group, the't' rations were calculated. The results are given in table 3.1

Table 3.1

Comparison of mean values between pre and post test for 40 meters dash (Acceleration ability) of the experimental Groups and Control group

Groups	Test	Mean	S.D	't' - ratio
A (Sled)	Pre	3.99	0.023	5.27*
	Post	3.94	0.022	
B (Weight)	Pre	4.10	0.016	1.91
	Post	4.08	0.019	
C (Parachute)	Pre	4.13	0.049	1.83
	Post	4.1	0.031	
D (Control)	Pre	4.18	0.049	-0.82
	Post	4.21	0.034	

****Significant at 0.05 level***

Tab t.05 (7) = 2.36

The result as show in table 3.1 have exhibited that only the experimental groups (A) have shown the significant improvement in the performance of the subjects in the test of acceleration by forty meter dash however the control group did no exhibit the significant improvement. Since the means of experimental group (Sled) shown significantly, therefore, the data were subjected to analysis of co-variance. The results of analysis of col variance are given in table 3.2

Table 3.2

Analysis of co-variance on speed among experimental and control groups

Test	Adjusted Post Test Means				Source Of	Sum of	Df	Mean	F-ratio
	A	B	C	D	Vari-ance	Square		Squares	
Pre test mean	3.99	4.10	4.13	4.18	Be-tween	0.149	3	0.049	1.507
					Within	0.927	27	0.033	
Post test mean	3.94	4.08	4.1	4.21	Be-tween	0.288	3	0.960	3.601*
					Within	0.746	27	0.026	
Adjusted Post Test mean	4.04	3.22	4.07	4.14	Be-tween	0.040	3	0.013	6.695*
					Within	0.054	26	0.002	

****Significant at 0.5 level Tab. F.05 (3, 27) = 2.96***

F.05 (3, 26) = 2.98

A-Sled, B-Weight, C-Parachute, D-Control

The obtained values were lower than the required value for the selected degree of freedom and the significant level. The data were further subjected to LSD post hoc test. The result of the Post hoc analysis and the difference between the means among the four groups are shown in table 3.3

Table 3.3

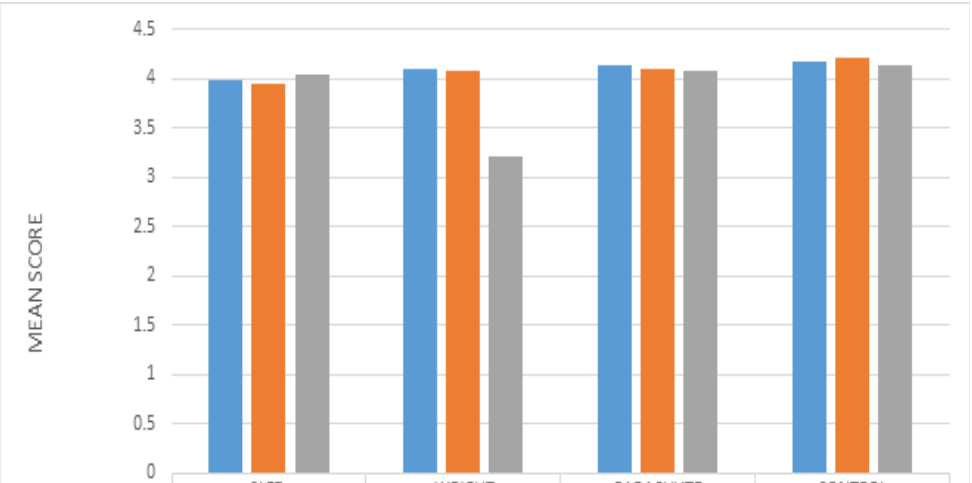
Paired adjusted final means and differences between means among the experimental groups and control Group of 40 meters dash (seconds)

Sled (A)	Weight(B)	Parachute(C)	Control(D)	Adjusted mean difference	CD AT 5% LEVEL
4.041142	3.226755154			0.814*	
4.041142		4.077061758		-0.035	0.046
4.041142			4.146724997	-0.105*	
	3.226755154	4.077061758		-0.850*	
	3.226755154		4.146724997	-0.919*	
		4.077061758	4.146724997	-0.069*	

Required value of critical difference is 0.046 A- Sled training, B- Weight vest training. C- Parachute training, C- Control Group. The results in table 3.3 have shown that the mean differences of experimental groups when compared with the control group have exhibited the significant values of critical difference at the selected level of 0.05.

All the experimental group trained with Sled. Weight jacket and Parachute respectively did not show significant difference in sprinting ability (acceleration) Reason may be that 6 weeks of training period might not be sufficient to bring about significant differences in (acceleration) of subject belonging to the experimental groups.

The graphical representation of pre test, post test means and paired adjusted means of the three experimental groups and the control group of the sprinting ability is shown in figure-1



	SLED	WEIGHT	PARACHUTE	CONTROL
PRE-TEST	3.99	4.1	4.13	4.18
POST-TEST	3.94	4.08	4.1	4.21
ADJUSTED-TEST	4.04	3.22	4.07	4.14

4. Discussion

The result indicates that the control group does not show any significant improvement on any selected physical variable. The results of acceleration in sprinting had shown significant improvement due to training effects of interval training programme of sled, weight and parachute training programme. The effect of sled training programme was much greater than weight and parachute training on acceleration among the LNIPE NERC athletes.

5. Conclusion

Keeping the results and discussion in view drawn that the control group did not showed any significant improvement on a selected physical training among the LNIPE NERC athletes. The sled training group had shown significant improvement on acceleration speed among the LNIPE NERC athletes. There was significant difference among sled, weight jacket and parachute training among the LNIPE NERC athletes. The effect of the sled training group was much greater than weight jacket and parachute training programme. The experimental groups namely sled, weight jacket and parachute training groups showed improvement in acceleration speed.

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Relationship of Selected Biomechanical Variables with the Performance of National Level Basketball in Hook Shot

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Abstract

The purpose of this study was to measure the relationship of selected biomechanical variables to the performance of National level Basketball in hook. The subjects for this study were 60 male basketball who had represented their respective states in national tournaments(12 subjects from each team). Their age ranged from nineteen to twenty five years. All the subjects were right handed throwers. The data was analyzed by use of Pearson's Product Moment Correlation. The level of significance chosen to test the hypothesis was .05. None of the selected angular biomechanical (kinematic) variables that is Ankle Joint (Right and Left), Knee Joint (Right and Left), Shoulder Joint (Right and Left), Elbow Joint (Right and Left) and Wrist (Right and Left), and Hip Joint (Left and Right) has significant relationship with the performance of Basketball in hook. In case of Linear A biomechanical (kinematic) variable that is height of center of gravity at moment contact does not have significant relationship with the performance of Basketball in hook.

Introduction

The history of basketball began with its invention in 1891 in Springfield, Massachusetts by Canadian physical education instructor James Naismith as a less injury-prone sport than football. Naismith was a 31-year old graduate student when he created the indoor sport to keep athletes indoors during the winters. The game became established fairly quickly and grew very popular as the 20th century progressed, first in America and then in other parts of the world. After basketball became established in American colleges, the professional game followed. The American National Basketball Association (NBA), established in 1946, grew to a multibillion-dollar enterprise by the end of the century, and basketball became an integral part of American culture.[1]

1. Daigo, Toshiro (2005), Kodokan Basketball Throwing Techniques, Tokyo, Japan: Kodansha International

The role that sports biomechanics can play is becoming more widely understood in sports community and the demand for service increasing, researchers in sports biomechanics will have to consider carefully how much time they can devote to the provision of scientific services without impairing their performance as scholar researchers. To develop programmers of study for the training of techniques in sports biomechanics, technicians who can provide the kind of services sought by sporting bodies.

In order to analyze the techniques o sports and games, photographic methods is probably the most popular methods. Although this is not a recent development, photography was formally limited to the filming of few sports only. It is now being applied to many sports at an increasing rate.

Recently videotapes have begun to replace conventional motion pictures for teaching and coaching purpose. Since videotape is erasable reusable and does not require any developing. It is more economical than film. The relatively inexpensive recorders are simple to operate and permit immediate play back.

Biomechanics and Basketball in hook practices described by some of the authors are as follows: -

Biomechanics

- A branch of physics concerns with the description of the motion of objects without considering the forces that causes or result from the motions. It is a study of motion that aims to provide a description of the spatial position of points in moving bodies. For the purpose of this study Biomechanical variables were represented by the selected angles of the various joints of human body and height of center of gravity at moment contact.

Kinematics

- Kinematics will be represented by the selected angles of the various joints of human body and height of center of gravity at selected moment.

Methodology

The subjects for this study were 48 male Basketball who had represented there respective states in National Basketball tournaments. Four teams were selected for this study namely: Uttar Pradesh, Uttarakhand, Delhi and Haryana (12 subjects from each team).There age ranged from Nineteen to Twenty Five years.

All the subjects were right handed Throwers.ollowing were the Kinematic variables which were constituted in the study: The selected kinematical variables were divided in two parts i.e.

a) Linear Kinematic Variable were:

i. Height of Center of Gravity at moment release.

b) Angular Kinematic Variables were represented by the angles at selected joints i.e.

i. Ankle joints
ii. Knee joints
iii. Hip joints
iv. Shoulder joints
v. Elbow joints
vi. Wrist joints

The scholar developed stick figures on the photographs, from which selected kinematical variables were calculated. The stick figures were developed by using Joint-point method. The center of gravity of each subject, at one selected moment.

Procedure for Location of Center of Gravity

The center of gravity of the body at moment release was determined by use of segmentation method.

Analysis of Data and Results of the Study

The data was analyzed by use of Pearson's Product Moment Correlation. The level of significance chosen to test the hypothesis was .05 and are presented in Table-I, Table-II, Table-III, Table-I, Table-IV.

Table-I

Relationship of Selected Angular Kinematical Variables at Moment Contact with the Performance of Uttar Pradesh Basketball in hook (N = 12)

S. No.	Variables	Coefficient of Correlation "r"
1.	Ankle Joint (Left)	0.189
2.	Ankle Joint (Right)	0.144
3.	Knee Joint (Left)	0.175
4.	Knee Joint (Right)	-0.123
5.	Hip Joint (Left)	0.118
6.	Hip Joint (Right)	0.305
7.	Shoulder Joint (Left)	0.420
8.	Shoulder Joint (Right)	-0.162
9.	Elbow Joint (Left)	0.137
10.	Elbow Joint (Right)	-0.036
11.	Wrist Joint (Left)	0.00
12.	Wrist Joint (Right)	-0.007

****Significant at 0.05 Level***

r .05 (10) = 0.576

Table –II

Relationship of Selected Angular Kinematical variables at Moment Contact with the Performance of Delhi basketball in hook (N = 12)

S. No.	Variables	Coefficient of Correlation "r"
1.	Ankle Joint (Left)	-0.151
2.	Ankle Joint (Right)	-0.127
3.	Knee Joint (Left)	0.070
4.	Knee Joint (Right)	-0.069
5.	Hip Joint (Left)	0.195
6.	Hip Joint (Right)	0.287
7.	Shoulder Joint (Left)	-0.206
8.	Shoulder Joint (Right)	-0.126
9.	Elbow Joint (Left)	-0.100
10.	Elbow Joint (Right)	-0.053
11.	Wrist Joint (Left)	------
12.	Wrist Joint (Right)	-0.407

****Significant at 0.05 Level r .05 (10) = 0.576***

Table – III

Relationship of Selected Angular Kinematical Variables at Moment Contact with the Performance of Uttarakhand basketball in hook (N = 12)

S. No.	Variables	Coefficient of Correlation "r"
1.	Ankle Joint (Left)	-0.208
2.	Ankle Joint (Right)	-0.274
3.	Knee Joint (Left)	-0.384
4.	Knee Joint (Right)	-0.267
5.	Hip Joint (Left)	-0.323
6.	Hip Joint (Right)	-0.402
7.	Shoulder Joint (Left)	0.553
8.	Shoulder Joint (Right)	-0.318
9.	Elbow Joint (Left)	-0.437
10.	Elbow Joint (Right)	-0.551
11.	Wrist Joint (Left)	-----
12.	Wrist Joint (Right)	0.033

****Significant at 0.05 Level r .05 (10) = 0.576***

Table – IV

Relationship of Selected Angular Kinematical Variables at Moment Release with the Performance of Haryana basketball Team in hook (N = 12)

S. No.	Variables	Coefficient of Correlation "r"
1.	Ankle Joint (Left)	-0.542
2.	Ankle Joint (Right)	0.384
3.	Knee Joint (Left)	0.046
4.	Knee Joint (Right)	-0.284
5.	Hip Joint (Left)	0.113
6.	Hip Joint (Right)	-0.034
7.	Shoulder Joint (Left)	-0.847*
8.	Shoulder Joint (Right)	0.605*
9.	Elbow Joint (Left)	0.065
10.	Elbow Joint (Right)	0.555
11.	Wrist Joint (Left)	-----
12.	Wrist Joint (Right)	0.056

****Significant at 0.05 Level r .05 (10) = 0.576***

As shown in Table- I, II, III, that the values of coefficient of correlation in case of all the selected Kinematic variables with the (Uttar Pradesh Under, Delhi , Uttaranchal) Basketball were found insignificant at the selected level of significance of 0.05. Since the required value of coefficient of correlation for 10 degree of freedom is 0.576 and the obtained values of coefficient of correlation of selected variables less than the required value. The correlation could not be calculated with the left wrist joint because the variable was constant in case of every subject. The correlations might have been insignificant because of the independent calculation but they must have a cumulative effect on the performance.

As shown in Table-IV that the values of Coefficient of Correlation in case of all the selected Kinematic variables with the Haryana Basketballwere found insignificant at the selected level of significance of 0.05. Since the required value of Coefficient of Correlation for 10 degree of freedom is 0.576 and the obtained values of coefficient of correlation of selected variables less than the required value, except in case of the both the shoulder joints of the subjects which showed significant relationship. As the basketball uses both his hands while executing the Hook and full extension of hands is required and the right hand is the bottom hand so as the angle would increase the shot would be better and vice versa the left shoulder joint angle is bound to decrease, so combination of both would produce a good Hook. The correlation could not be calculated with the Left Wrist Joint because the variable was constant in case of every subject. The correlations might have been insignificant because of the independent calculation but they must have

a cumulative effect on the performance.

The relationship of selected Linear Kinematic variables at the moment contact with the performance in Hook as presented in table-1.5, 1.6, 1.7, and 1.8.

Table - 1.5

Relationship of Selected Linear Kinematic Variables at Moment Contact with the Performance of Uttar Pradesh Basketballin Hook

S. No.	Variables	Coefficient of Correlation "r"
1.	Height of Centre of Gravity (Moment contact)	-0.172

****Significant at 0.05 Level r .05 (10) = 0.576***

Table - 1.6

Relationship of Selected Linear Kinematic Variables at Moment Contact with the Performance of Delhi Basketballin Hook

S. No.	Variables	Coefficient of Correlation "r"
1.	Height of Centre of Gravity (Moment contact)	0.304

****Significant at 0.05 Level r .05 (10) = 0.576***

Table -1.7

Relationship of Selected Linear Kinematic Variables at Moment Contact with the Performance of Uttaranchal Basketballin Hook

S. No.	Variables	Coefficient of Correlation "r"
1.	Height of Centre of Gravity (Moment contact)	-0.161

****Significant at 0.05 Level r .05 (10) = 0.576***

Table -1.8

Relationship of Selected Linear Kinematical Variables at Moment Contact with the Performance of Haryana Basketballin Hook

S.No.	Variables	Coefficient of Correlation "r"
1.	Height of Centre of Gravity (Moment contact)	0.019

****Significant at 0.05 Level r .05 (10) = 0.576***

As shown in Table-1.5, 1.7, 1.6, 1.8, that the values of coefficient of correlation in case of the selected Linear Kinematic variable (Height of Center of Gravity) with the (Uttar Pradesh, Delhi, Uttaranchal, Haryana) Under-19 Cricket teams was found insignificant at the selected level of significance of 0.05. Since the required value of coefficient of correlation for 10 degree of freedom is 0.576 and the obtained values of coefficient of correlation of selected variables less than the required value. This trend does not mean that Height of Center of Gravity does not play any important role in executing the Hook but the low value of correlation must have been because of the small sample size and the low value of the Height of Center of Gravity at moment contact.

Table-1.9

Analysis of Variance of the Mean Difference of the Four Groups for Height of Centre of Gravity at Moment Contact

Source of Variance	df	Sum of Square	Mean Sum of Square	'F' Ratio
Between Groups	3	3731	1243.06	9.48*
Within Groups	44	6295.92	131.66	

****Significant at .05 level. F.05 (3, 44) = 2.82***

It is evident from Table – 1.9 that variability exists among the four groups with respect to criterion variable namely Height of Centre of Gravity at moment contact. As each player has his own reach as per the flexibility of the groin muscle and leg length so the difference in the Centre of Gravity at moment contact must have been there.

Since there is significant difference in the result of 'One Way Analysis of Variance' therefore Post Hoc (LSD) test was applied to find out which of the mean difference amongst the group were statistically significant. The data relating to this is presented in Table -1.10.

Table-1.10

Least Significant Difference Post Hoc Test for Mean of the Four Groups for Height of Centre of Gravity at Moment Contact

Uttar Pradesh	Delhi	Uttaranchal	Haryana	M. D.	C. D.
	188.72		185.20	-3.52*	
		183.15	185.20	-2.05*	
166			185.20	-19.2*	0.2282
	188.72	183.15		-5.57*	
166		183.15		-17.15*	

****Significant at .05 level.***

The above table1.10 shows that there was significant difference between the means of Delhi and Haryana Under-1 9 teams in which as per the terms of means Delhi Basketballwas found to be superior.

Significant difference was also found between the means of Uttaranchal and Haryana Basketball in which as per the terms of means Haryana Basketballwas found to be superior. Significant difference was also found between the means of Uttar Pradesh and Haryana Basketball in which as per the terms of means Haryana Basketballwas found to be superior. Table – 4.26 also reveals that difference was found between the means of Delhi and Uttaranchal Basketballas per the means the Delhi Basketballwas found to be superior. Significant difference was also found between the means of Uttar Pradesh and Uttaranchal Basketball in which as per the terms of means Uttaranchal Basketballwas found to be superior. Difference between the means of four groups is shown in Fig. -1.

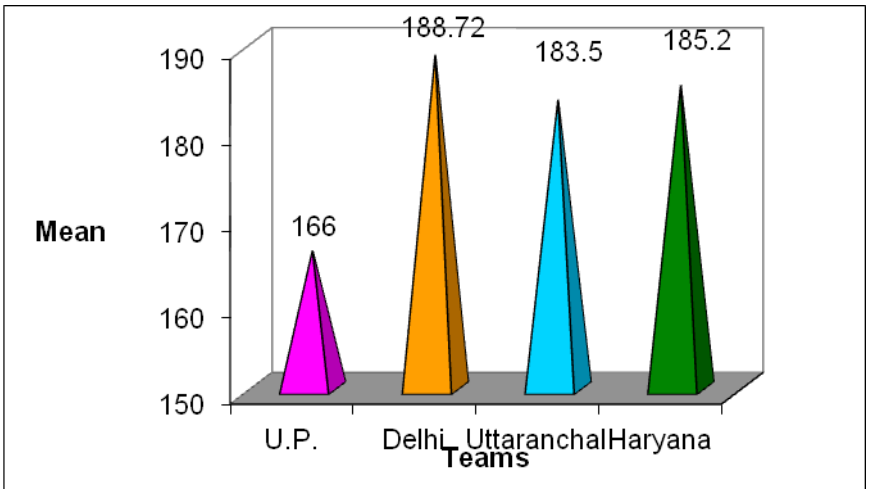

Fig.1 Bar Diagram Representing Means for Four Basketball for Height of Centre of Gravity at Moment contact

Discussion of Findings

- None of the selected Angular Kinematic variables that are Ankle Joint (Right and Left), Knee Joint (Right and Left), Shoulder Joint (Right and Left), Elbow Joint (Right and Left) and Wrist (Right and Left), and Hip Joint (Left and Right) showed relationship with the performance of Uttar Pradesh, Delhi, Uttaranchal, Haryana Basketballin Hook. This trend does not mean that these variables do not have any effect on the performance of the players but these variables' relationship was calculated independently but the variables must have a cumulative effect on the performance.
- In case of Linear Kinematic variable Height of Center of Gravity at moment contact none of the teams showed relationship with the performance of the subjects in Hook. As the study was about the moment contact of the Hook and the higher the subject is elevated from the ground which is Height of Centre of Gravity the better would be his performance. So it can be concluded that better performance is achieved by higher elevation.
- No variation was found between the groups in case of all the Basketball in terms of their performance in Hook but the mean of the performance of Haryana was a little high than the other teams. As the performance of the Basketball is more or less the same but in this age of cut throat competition even a little difference can win or lose matches but the skill tested was under controlled conditions and was also one in number so if a detailed study on each and every skill (Hook Shot, Pool Shot, Drive Shot etc.) may be done difference can found.
- No variation was found between the Basketball in terms of their Angular Kinematic Variables Ankle Joint (Right and Left), Knee Joint (Right and Left), Shoulder Joint (Right and Left), Elbow Joint (Right and Left) and Wrist (Left), and Hip Joint (Left and Right) apart from right wrist joint and Height of Centre of Gravity at moment contact which was the highest in case of Uttar Pradesh Under-19 state team. No significant difference was found between the means of Uttar Pradesh and Haryana, Delhi and Haryana, Uttaranchal and Haryana but the means of the Uttar Pradesh and Delhi, Delhi and Uttaranchal were found to be statistically significant as per the LSD test implemented which showed the mean difference 13.91 in case of Uttar Pradesh and Haryana,8.08 in case of Delhi and Haryana and 8.41 in case of the means of Uttar Pradesh and Haryana , Delhi and Haryana, Uttaranchal which was higher than the tabulated value of 3.59.The analysis of data clearly reveals that the Uttar Pradesh and the Uttaranchal Under-19 State team are better in terms of right Wrist Angle. In case of Height of The Center of Gravity the following state teams differed Uttar Pradesh and the Delhi State team as the mean difference was 22.49, Uttar Pradesh

and Uttaranchal Under-19 State team which was 15.34, Uttar Pradesh and Haryana was 16.62 which was higher than the tabulated value of 3.59 hence it could be said that Delhi and Uttaranchal Under-19 State team was better in terms of Height of Center of Gravity at moment contact.

Conclusions

None of the selected Angular Kinematic variables that are Ankle Joint (Right and Left), Knee Joint (Right and Left), Shoulder Joint (Right and Left), Elbow Joint (Right and Left) and Wrist (Right and Left), and Hip Joint (Left and Right) showed relationship with the performance of Uttar Pradesh, Delhi, Uttaranchal, Haryana Basketballin Hook.

In case of Linear Kinematic Variable Height of Center of Gravity at moment contact none of the teams showed relationship with the performance of the subjects in Hook.

No variation was found between the groups in case of all the National Teams in terms of their performance in Hook but the mean of the performance of Haryana was a little high than the other Basketball.

No variation was found between the Basketball in terms of their Angular Kinematic variables Ankle Joint (Right and Left), Knee Joint (Right and Left), Shoulder Joint (Right and Left), Elbow Joint (Right and Left) and Wrist (Left), and Hip Joint (Left and Right) apart from right wrist joint and Height of Centre of Gravity at moment contact which was the highest in case of Uttar Pradesh Under-19 state team. No significant difference was found between the means of Uttar Pradesh and Haryana , Delhi and Haryana, Uttaranchal and Haryana but the means of the Uttar Pradesh and Delhi, Delhi and Uttaranchal were found to be statistically significant as per the LSD test implemented which showed the mean difference 13.91 in case of Uttar Pradesh and Haryana,8.08 in case of Delhi and Haryana and 8.41 in case of the means of Uttar Pradesh and Haryana, Delhi and Haryana, Uttaranchal which was higher than the tabulated value of 3.59. The analysis of data clearly reveals that the Uttar Pradesh and the Uttaranchal Under-19 State team are better in terms of Right Wrist angle. In case of Height of the Center of Gravity the following state teams differed Uttar Pradesh and the Delhi Under-19 State team as the mean difference was 22.49, Uttar Pradesh and Uttaranchal State team which was 15.34, Uttar Pradesh and Haryana was 16.62 which was higher than the tabulated value of 3.59 hence it could be said that Delhi and Uttaranchal Under-19 State team was better in terms of Height of Center of Gravity at moment contact.

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2D Kinematic Analysis of Sprinting Skill at Start with the Performance in Sprinters

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Abstract

The purpose of the study was to assess the effect of 2D kinematical selected variables on sprint start with Sprinting Performance of Novice Athletes. Six (3 National and 3 State level) athletes of Sports Authority of India, Guwahati has been selected for this study. The mean (M) and standard deviation (SD) of sprinters were age (17.44, 1.55), height (1.74. m, .84 m), weight (62.25 kg, 4.55), arm length (65.00 cm, 3.72) and leg length (96.35 cm, 2.71). Biokin-2D motion analysis system V4.5 can be used for acquiring two-dimensional kinematical data/variables on sprint start with Sprinting Performance. For the purpose of kinematic analysis a standard motion driven camera which frequency of the camera was 60 frame/ second i.e. handy camera of Sony Company were used. The sequence of photographic was taken under controlled condition. The distance of the camera from the athletes was 12 mts away and was fixed at 1.2-meter height. The result was found that National and State level athletes significant difference in there, Trajectory Knee, Trajectory Ankle, Displacement Knee, Displacement Ankle, Linear Velocity Knee, Linear Velocity Ankle and Linear Acceleration Ankle whereas insignificant difference was found between National and State level athletes in their Linear Acceleration Knee joint on sprint start with sprinting performance. For all the Statistical test the level of significance was set at $p<0.05$.

KEYWORDS: 2D Kinematic Analysis, Sprinting Performance, Novice Athletes

Introduction

The most powerful nations of the world namely USA, Russia, France, Australia, China etc. are strong enough not only in World Economics, Army Strength or in science technology but they are also advanced in the field of sports, therefore it is quite apparent that to exist strongly in world map nation has to be advanced in the field of sports also. To achieve the same adoption of new techniques and methodology is highly required in Sports Sciences and Physical Education. Sciences of applied mechanism are fulfilling these demands of high technological knowledge for the enhancement of performance in the field of sports. Sprinting

includes a rapid acceleration phase followed by a maintenance pace (constant velocity). During the early stage of sprinting, the runners have their upper body tilted forward in order to get ground reaction forces more horizontally. Sprinters, whose events are based on power, differ greatly from more economical distance runners in both physical appearance and running biomechanics. Sprinting is product of stride length and frequency of stride that emphasizes speed and power. Sprinting events are divided into three main phases: acceleration, maintenance, and deceleration. The acceleration phase is characterized by aggressive, powerful running form used to build the momentum needed to overcome inertia and achieve maximum velocity. In the last few decades, much has been added to ours scientific knowledge of biomechanics, a science concerned with the internal and external forces acting on the human body and the effects produced by these forces and activity of the muscles. At the highest levels of sports in which techniques play a major role, improvement comes so often from careful attention to detail that no coach can afford to leave these details to chance or guesswork. For such coaches knowledge of biomechanics might be regarded as essential.

Methodology

Study Design and Participants

A total Six (3 National and 3 State level) athletes of Sports Authority of India, Guwahati has been selected for this study. The mean (M) and standard deviation (SD) of sprinters were age (17.44, 1.55), height (1.74. m, .84 m), weight (62.25 kg, 4.55), arm length (65.00 cm, 3.72) and leg length (96.35 cm, 2.71).

- **Collection of Data:** The data collected by the help of Biokin-2D motion analysis system V4.5 method and the sprinting performance of the subject during sprint start in athletic.
- **Filming Procedure:** Biokin-2D motion analysis system V4.5 can be used for acquiring two-dimensional kinematical data/variables on Sprint Start with Sprinting Performance. For the purpose of kinematic analysis a standard motion driven camera which frequency of the camera was 60 frame/ second i.e. handy camera of Sony Company was used. The sequence of photographic was taken under controlled condition. The distance of the camera from the athletes was 12 mts away and was fixed at 1.2 meter height. The performance of sprinters were measured manually hand timing with stopwatch for each subject. Before data acquisition subjects were asked to go for complete warm-up for at least 15 minutes by stretching all major muscle groups for better performing the sprint start. After warming up all the athletes have to perform 100 meters sprint and the time recorded in 1/1000 of the seconds for each athlete was selected for further analysis.
- **Data Analysis:** The data was collected with the help of digital photography, the photography were analysed (1/1000 sec) by standard analysis method.

With the help of Biokin-2D motion analysis computer software we can measure the dimension of each photograph with the help of which various kinematical variables were calculated during sprint start.

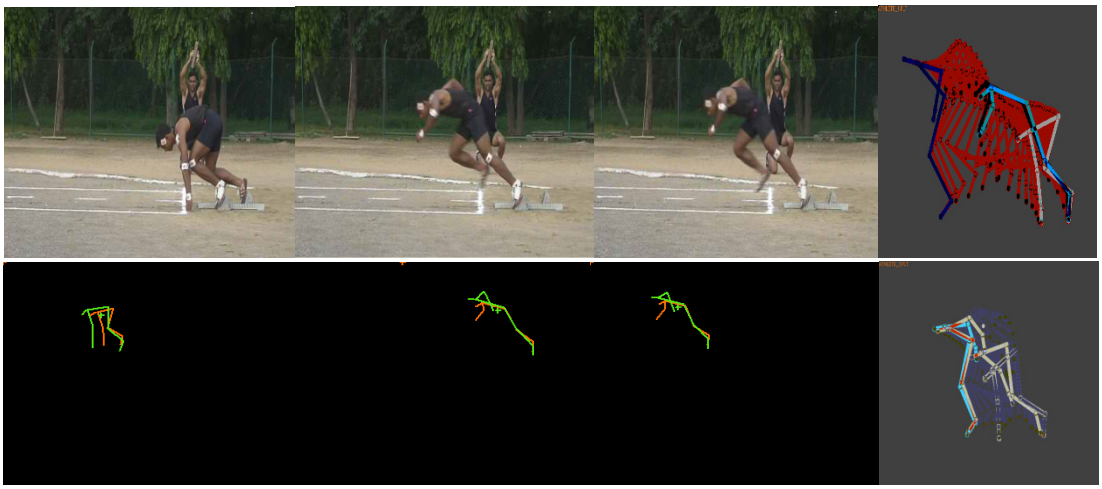

Figure 1 Photo and Stick Figure during Sprint Start

- **Statistical Analysis:** To determine the effect of selected kinematic variables on sprint start with the sprinting performance of subjects. The data of this study was analyzed by using a t-test to infer the difference between national and state level Sprinters. The level of significance was 0.05.

The purpose of this study was to determine kinematic difference between on sprint start with sprinting performance of sprinters of Sports Authority of India, Guwahati and find out those variables which are given positive contribution in sprinting ability and sprinting performance. The results and analysis of the data of the study have been presented on six sprinters. Independent t –test were used to find out differences and relationship between sprint start and sprinting performance.

As indicated in Table-1 National level athletes have longer trajectory Knee Joint (1.88 m) and Trajectory Ankle Joint (2.28) as compare to state level athletes (1.81 m) and (1.88 m), that might be the reason the Linear Velocity Knee (1.93 m/s), Linear Velocity Ankle (2.32 m/s), Linear Acceleration Knee (6.86 m/s2) and Linear Acceleration Ankle (10.84 m/s2) is greater than state level (1.32 m), (1.37 m), (0.49 m/s2) and (1.45m/s2) athletes. The Displacement of Knee joint and Displacement of ankle joint in grater in National level athletes respectively.

Table 1

Descriptive Statistics of selected kinematical parameters

Group	Mean/ SD	Kinematical Variables							
		TJK (m)	TJA (M)	DPK (M)	DDA (M)	LVK (m/s)	LVA (M/S)	LAK (m/s2)	LAA (m/s2)
State Level	Mean	1.81	1.88	0.033	0.035	1.32	1.37	0.49	1.45
	SD	0.52	0.59	0.09	0.09	2.32	2.17	17.13	30.11
National Level	Mean	1.88	2.28	0.035	0.003	1.93	2.32	6.86	10.84
	SD	0.55	0.46	0.22	0.12	2.86	2.82	24.31	37.16

TJK=Trajectory Knee, TJA= Trajectory Ankle, DPK= Displacement Knee, DDA= Displacement Ankle, LVK= Linear Velocity Knee, LVA= Linear Velocity Ankle, LAK= Linear Acceleration Knee, LAA= Linear Acceleration Ankle.

Table 2

Independent 't' value of selected parameters between national level and state level athletes

Parameters	Calculated 't' value
TJK	3.23*
TJA	5.71*
DPK	4.34*
DDA	3.59*
LVK	3.13*
LVA	3.34*
LAK	2.45
LAA	3.53*

****Significance at 0.05 level of confidence with 4 df Tab 't' = 2.77***

As showed in the Table 2 there were significant differences found between National level and State level athletes in there, Trajectory Knee, Trajectory Ankle, Displacement Knee, Displacement Ankle, Linear Velocity Knee, Linear Velocity Ankle and Linear Acceleration Ankle whereas insignificant difference was found between National level and State level athletes in their Linear Acceleration Knee joint.

Discussion

The main purpose of this study was to find out kinematical differences between National level and State level athletes of Sports Authority of India, Guwahati, Assam. The sequential photography technique was employed to record the kinematic variables. Result show that Trajectory, displacement linear velocity, linear acceleration of knee and ankle joints of the sprinters was is better position in quantitative evaluation. From the photographs, the stick figures were prepared by using Joint-point Method, and various kinematic variables were obtained at the moment start the sprinting.

The length and duration of acceleration was unwavering by the starting position of the knee and when the body is almost fully stretched. In other to attained quick acceleration sprinter adopts the correct knee bent angle during start at the beginning of the acceleration. In the case of National level and State level sprinters position of set was correct would have helped them to attain lower and lesser Trajectory, improved displacement and good velocity of the knee and ankle joint.

The National level athletes have longer trajectory Knee Joint (1.88 m) and Trajectory Ankle Joint (2.28) as compare to state level athletes (1.81 m) and (1.88 m), that might be the reason the Linear Velocity Knee (1.93 m/s), Linear Velocity Ankle (2.32 m/s), Linear Acceleration Knee (6.86 m/s^2) and Linear Acceleration Ankle (10.84 m/s^2) is greater than state level (1.32 m), (1.37 m), (0.49 m/s^2) and (1.45m/s^2) athletes. The Displacement of Knee joint and Displacement of ankle joint in greater in National level athletes respectively.

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Factors Related to Home Advantage in Sports

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Abstract

The existence of home advantage in sports is a well known and well documented fact. However the precise causes and the way in which they affect performance are still not clear. A comprehensive review is made of published research under the main hypothesized explanations for home advantage in sports which are: crowd effects, travel effects, familiarity, referee bias, territoriality, specific tactics, rule factors and psychological factors. Their interactions, and other factors that need to be taken into account when investigating home advantage, are considered. The present review summarizes the available scientific evidences about home advantage in sport and tries to identify the environmental and psychological causes of this phenomenon.

KEY WORDS: Home Advantage, Competition, Performance, Psychology.

Introduction

In team sports, the term home advantage – also called home ground, home field, home-field advantage, home court, home-court advantage, defender's advantage or home-ice advantage – describes the benefit that the home team is said to gain over the visting team. This benefit has been attributed to psychological effects supporting fans have on the competitors or referees; to psychological or physiological advantages of playing near home in familiar situations; to the disadvantages away teams suffer from changing time zones or climates, or from the rigors of travel; and in some sports, to specific rules that favor the home team directly or indirectly. In baseball, in particular, the difference may also be the result of the home team having been assembled to take advantage of the idiosyncrasies of the home ballpark, such as the distances to the outfield walls; most other sports are played in standardized venues.

Home advantage in sports has long been established as an important factor in determining the result of a game. Its existence is certain to affect the attitude of players, coaches, referees, fans and the media alike. Surprisingly, and despite over

25 years of research, the precise causes of home advantage and the way in which they operate are still not well understood. A review of the evidence for and against plausible explanations needs to be set against a background of the following basic facts. Home advantage has been in existence at least since the start of organized football at the end of the 19th century. It is a worldwide phenomenon, but varies considerably from country to country. It has declined in the major leagues in world over the last 15 years. It tends to be greater in cricket than in other team sports.

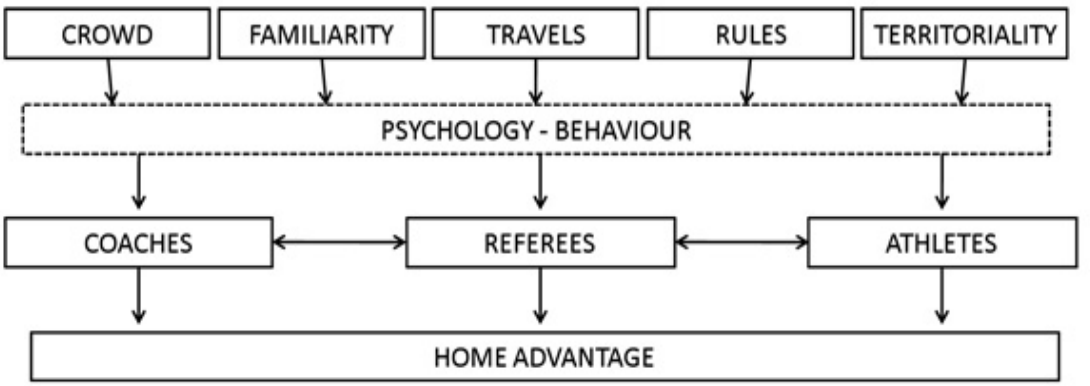

Figure 3. Conceptual framework of the home advantage.
Source: Own work.

Factors Related to Home Advantage in Sports

1. **Crowd Effects:** This is the most obvious factor involved with home advantage and one that fans certainly believe to be dominant [6,7]. However the precise way in which crowd support has an effect has been difficult to pinpoint [2,3]. For example the relationship with crowd size is unclear and the advantage has been shown to operate even with very small crowds [4,5,8]. In addition to the size of the crowd, its density, intensity of support and proximity to the field of play are all factors that need to be considered [9,10,11]. Likewise, it is not known whether the primary effect of the crowd is to give an advantage to the home team or a disadvantage to the away team and whether this is conveyed directly to the players or via referee decisions influenced by the crowd (see referee bias below). It is possible that the introduction of all-seater stadiums has modified the crowd effect.
2. **Travel Effects:** As with crowd support the evidence for a travel effect disadvantaging the away team is inconclusive. Distance traveled has been investigated within countries as well as internationally but with contradictory conclusions [2,3,12,13, 14,15,16]. However, one consistent finding is that home advantage is reduced in local derbies where no travel is involved [3,17,18].

3. **Familiarity:** When a team plays at home, it will be performing at a familiar stadium in familiar conditions amid familiar surroundings, all of which should provide an advantage. This concept has proved difficult to investigate, but some intriguing findings suggest that familiarity is a likely factor in home advantage. An advantage has been shown to exist on account of playing on artificial turf [19], on pitches with unusually large or small dimensions [3,12] and with a make of cricket specific to the home team [20]. In addition there is some evidence that familiarity with local climatic conditions and with altitude has an effect favoring the home team [16,18,21]. Loss of familiarity has been suggested as a cause of the drop in home advantage in England and in Italy immediately after the long interruption of play due to World War II [1,8]. It also should apply in the same way when a team moves to a new stadium.
4. **Referee Bias:** There is now overwhelming evidence that referee decisions favor the home team. This was first suggested by analyzing the frequency of disciplinary cards and other referee decisions [9,22-26]. The bias was then demonstrated in a laboratory setting [27,28] and subsequently by returning to referee decisions after carefully controlling for confounding variables [10,29-32]. However, caution in the interpretation of some of these results has been suggested [33]. The reason for apparent referee bias is thought to be a consequence of crowd support, but this has not yet been established, neither has whether the bias acts primarily on the home team, the away team, or both. An interesting study involving the ethnicity of the referee and of the competing teams also pointed to unequal treatment by the referee, suggesting that other factors might be at work [34].
5. **Territoriality Humans:** and animals are known to respond to a real or perceived invasion of their home territory and it seems reasonable to suppose this might be a factor in home advantage. The idea that this might be at work in games and sports was originally put forward by Morris [1]. Evidence was later produced showing that home players experience an increase in hormone activity before a game [35-38]. Subsequently it has been shown that teams playing in countries, or specific cities or regions within countries, often isolated and with a history of conflict, have increased home advantage perhaps due to a heightened sense of territoriality [14,17].
6. **Special Tactics:** Home and away teams may approach games differently from a tactical viewpoint. If the away team were to use a more caution and defensive approach this might be expected to hand a territorial and psychological advantage to the home team [3,5]. Although a study documenting increased home advantage in the second leg of European cup games suggested, among other things, tactical considerations as an explanation [39], there is still no firm evidence to link tactics with home advantage. Clear differences between home and away teams in terms of match performance indicators

have been shown, with implications on tactical strategies [18,40,41].

7. **Rule Factors:** In ice hockey, there are at least three distinct rule-related advantages for the home team. The first is referred to as "last change", where during stoppages of play, the home team is allowed to make player substitutions after the visiting team does. This allows the home team to obtain favorable player matchups. This rule makes the home team designation important even in games played on neutral ice. Traditionally, the second advantage was that when lining up for the face-off, the away team's centre always had to place his stick on the ice before the centre of the home team. However, in both the NHL and international rule sets, this now applies only for face-offs at the centre-ice spot; when a face-off takes place anywhere else on the ice, the defending centre has to place his stick first. The centre who is allowed to place his stick last gains the ability to time the face-off better and gives him greater odds of winning it. The third advantage is that the home team has the benefit of choosing whether to take the first or second attempt in a shootout.
8. **Psychological Factors:** Since players and coaches are well aware of the existence of home advantage, their mental attitude before and during a game is certainly going to be affected. One possibility is that although there may be real reasons for the advantage, these are being augmented by the beliefs of the players and those around them. Hence a self perpetuating phenomenon is being established [3,4,5]. A review of home advantage in football from a psychological and physiological viewpoint has been made by Neave and Wolfson [38]. Ultimately it is what goes on in the mind of players, coaches and referees that determine their actions and hence the result of a game and the role played by home advantage. A study of five players appears to be the only investigation into the psychological state of cricketers in relation to home advantage [45].
9. **Factors Related to the Location and the Venue :** There are many causes that attribute to home advantage, such as crowd involvement, travel considerations, and environmental factors. The most commonly cited factors of home advantage are usually factors which are difficult to measure and so even their existence is debated. Most of these are psychological in nature: the home teams are familiar with the playing venue; they can lodge in their homes, rather than in a hotel, and so have less far to travel before the game; and they have the psychological support of the home fans.

The stadium or arena will typically be filled with home supporters, who are sometimes described as being as valuable as an extra player for the home team. The home fans can sometimes create a psychological lift by cheering loudly for their team when good things happen in the game. The home crowd can also intimidate visiting players by booing, whistling, or heckling. Generally the home fans vastly outnumber the visiting team's supporters. While some visiting fans may travel to

attend the game, home team fans will generally have better access to tickets and easier transport to the event, thus in most cases they outnumber the visitors' fans (although in local derbies and crosstown rivalries this may not always be the case).

The weather can also play a major factor. For example, the February average temperature minimum in Tel Aviv, Israel is 50 °F (10 °C), while the average at the same time in Kazan, Russia is 10 °F (−12 °C), with snow being common.

10. **Officiating**: It has been suggested that the crowd may influence officials in subconsciously favouring the home team (Nevill & Holder, 1999). Dohmen (2008) concluded a study on the decision making of German professional referees by stating that referees tend to make home biased decisions when the home crowd has a stronger interest in decisions that favour their team, eg. When the margin is close and their team is behind in score. Dohmen (2008) however, also found that home bias is mitigated when the fraction of supporters of visiting teams rises. This provides further support for social forces having effects on individuals' decision making. Nevill, Balmer & Williams (2002) assessed whether decisions of qualified referees could be influenced by the noise of the crowd and discovered that the presence of crowd noise did have a dramatic effect on the decisions made by the qualified referees with further investigation into this effect finding crowd noise did not actually have an effect on penalising away players more; but rather penalising home players less. It was also found that when you silence crowd noise, home advantage is virtually eliminated, again suggesting that social factors play a part in influencing decision making of officials. Similar social forces were observed in the Dohmen (2008) study whereby referees displayed bias in stoppage time decisions and make fewer correct penalty kick decisions if the match is played in a stadium without a running track separating the stands from the pitch. This indicates that social pressure is more intense when the crowd is closer to the referee like Gymnastics, Diving, Boxing and Judo therefore creating a possibility of home advantage through subjective judging and crowd influences.
11. **Subjective Vs Objective Scoring** : With a clear display of social factors affecting the decision making of officials (Dohmen,2008; Nevill, Balmer & Williams, 2002; Nevill & Holder, 1999) questions arise of how home athletes may benefit from favourable judging. These biased effects will not be seen throughout every sport, as events such as swimming and weightlifting are objectively judged (using exact times and weights) and therefore cannot be affected by home bias. However in events that are subjectively judged, this home bias may serve as an advantage for athletes competing on 'home territory'. Subjective judging allows for an individuals' feelings, influences or opinions to be reflected upon the score they may assign to an athletes' performance. As discussed, Nevill, Balmer & Williams (2002) provided experimental evidence in soccer referees being influenced by crowd noise

with 15.5% fewer fouls against the home team when audio (crowd noise) was present. Since referees have to judge a situation based on a split second decision having very little time for deliberation; their decision making may be heavily influenced by cues picked up from influences such as the environment, atmosphere in the stadium or own opinions . Therefore events such as Gymnastics, Diving and Boxing amongst others, may actually be influenced by this home advantage phenomenon. Nationalistic and political bias has been Observed in subjectively judged sports such as Olympic Skating (Seltzer & Glass, 1991) gymnastics (Ansorge & Scheer, 1988; Whissell, Lyons, Wilkinson, & Whissell, 1993) and Olympic diving (Park & Werthner, 1977) whilst substantial evidence for home advantage within objectively judged sports have not been found (Balmer, Nevill & Williams, 2003).

12. **Natural Venues:** For certain sporting events, home advantage may be removed by use of a neutral venue. If the venue is chosen before the start of the competition however, it is still possible for one team to gain home field advantage. For example, in the European Cup/UEFA Champions League, there have been four instances where a club has managed to reach the final hosted in its own stadium (1957, 1965, 1984, and 2012). Most recently Bayern Munich played (and lost) the 2012 final at their home stadium of Allianz Arena, as it was chosen as the venue in January 2010. In the Champions League Final, however, if the "home" shirt colors of both teams conflict (e.g. both are red) then there is a draw which assigns one of the teams their "away" shirt. Not unlike the UEFA Champions League, the NFL's Super Bowl is played in a venue chosen years in advance of the game. It is possible for a team to reach the Super Bowl when it is played in their home stadium; this has never happened in the history of the game, though two games (XIV in 1980 and XIX in 1985) were played in neutral stadiums in the market area of one of the participating teams. Tickets are allocated equally between both competing teams in the Final, even if one side happens to be the home team.

13. **Other Considerations:** Although there are different ways of quantifying home advantage, team ability has been recognized as a factor that affects the magnitude of home advantage and needs to be taken into account, especially if individual teams are being compared. Several different approaches have been used [12,16,19,32,47]. In addition, the general recent decline in home advantage and the significant long-term fluctuations need to be incorporated into the analysis when basing a study on more than a few years of data [5,8,39,41,42,48]. Large differences in home advantage between countries must also be considered as a confounding variable, as well as having the potential to throw light on possible causes [14,17,49]. It has been suggested that game importance might also be a factor to consider [39]. Since cricket world governing body ICC is now making use of its world cricket rankings to seed

teams in World Cup championship, it is worth noting that home advantage is totally ignored in the procedure to calculate the rankings [50]. This is an astonishing omission given the importance that home advantage is known to have in determining the result of a game.

By Competetion

Baseball

- In the 2018 Major League Baseball regular season, the home team won 1,277 games (52.6%), and the away team won 1,149 games (47.4%). These totals do not include the six games played at neutral sites (though all of the neutral-site games had a designated "home" team).
- The team with the best overall record, the Boston Red Sox, finished 108–54, going 57–24 at home and 51–30 away. Of their wins, 52.8% were at home, and 55.6% of their losses were on the road.
- The team with the worst record, the Baltimore Orioles, went 47–115 (28–53 at home, 19–62 away). Of their total wins, 59.6% were at home, and 53.9% of their losses were away.
- The largest differential between home and road records was that of the Philadelphia Phillies, going 48–32 at home, 31–50 away, and winning their only neutral-site game as the designated home team. Exactly 60% of their wins were in their home park, and 61.0% of their losses were on the road.

Basketball

- In the 2017–18 NBA regular season, the home team won 712 games (58%), and the away team won 518 games (42%).
- The team with the best overall record, the Houston Rockets, finished 65–17, going 34–7 at home and 31–10 away. In all, 52% of their wins were at home, and 59% of their losses were on the road.
- The Toronto Raptors had the same home record as the Rockets, but went 25–16 away. This meant that 58% of their wins were at home, and nearly 70% of their losses were away.

Hockey

- In the 2019 Stanley Cup Playoffs, for the first time in NHL history all division winners (who had home-ice advantage) were eliminated in the first round as all the wild-cards advanced to the second round. The Columbus Blue Jackets won a playoff series for the first time, defeating the first-place Lightning in four games, and marking the first time in Stanley Cup playoff history that the Presidents' Trophy winners were swept in the opening round, and the first time since 2012 that the Presidents' Trophy winners were defeated in the opening round. They were soon followed by the Calgary Flames, who with

their five-game loss to the Colorado Avalanche, ensured that for the first time in NHL history ,neither of the conference number one seeds advanced to the second round. After that, the two remaining division winners, the Nashvil Predators and Washington Capitals, were each eliminated in an overtime game, the Predators in six and the Capitals in seven.

Association Football (Soccer)

In the 2016–17 Premier League, the home team won 187 matches (49%), the away team won 109 matches (29%), and teams drew in 84 matches (22%), however this is an aberration as Home advantage has been steadily declining for over a century.

In conclusion, the exact same words written at the end of my paper on home advantage in sports in 1986 are just as relevant over 20 years later: "Clearly, there is still much to be learnt about the complex mechanisms that cause home advantage, both in soccer and other sports. The topic remains a fruitful area of research for sports historians, sociologists, psychologists and statisticians alike" [3]. The existence and magnitude of home advantage has been established by several studies. However, scientists have failed to isolate a dominant factor that is responsible for this phenomenon. According to available scientific literature, it is likely that a number of individual factors interact with each other and influence the psychological and behavioural states of coaches, referees, and athletes in a manner yet to be established. Thus, home advantage is probably the result of their combined effect and the influence of other less explored factors such as competition pressure, athletes' salaries or even ticket prices. Coaches and managers could use the available information about home advantage to adopt strategies that would abrogate the negative influence of a hostile crowd; to create routines that generate a familiar ambience, to take into account a possible referee bias; to evoke territoriality; to promote positive psychological and behavioural states; and to make optimal coaching decisions to improve the performance level of their athletes.

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Effects of Exercise and Sleep on the Process of Learning

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Exercise is not a word to be unfamiliar to most of the people. It is known to impact various individuals in unique ways. Some of the most known benefits of exercise include weight control, lower chances of type-2 Diabetes, delayed ageing. Healthy sleep is vital for us to function better in the day. Our sleep consists of different sleep stages, each of them having its unique importance. For instance, most of the growth hormone secretion throughout the day occurs In stage 3 sleep. Stage 4 sleep, also known as the REM period(Rapid Eye Movement) involves the rapid movement of the eye. All the dreaming occurs in this stage. It is also known that most of the memory consolidation also takes place in the REM period.

While we sleep, some of the neurotoxic waste(like beta-amyloid)which gets accumulated in our brain also is removed otherwise accumulation of which causes various diseases like Alzheimer's disease. Good sleep also impacts our other primary body systems like the endocrine system, immune system, muscle system. Hence good sleep means better memory, health, and restoration of functions. Even after being a boon for us, sleep deprivation is a common phenomenon amongst all age groups.

It is being found that over 93% of the population in India is sleep deprived. However, more troubling information is that only 2% of those discuss their sleep-related problems with the physicians, which indicate that the majority of them underestimate sleep. Worldwide, approximately 50% of adults experience occasional symptoms of insomnia. Sleep deprivation has various downsides, including reduced concentration level the following day, bad temper, and feeling groggy the entire day. Apart from the physical disturbances, lack of sleep also causes increased inflammatory markers which do not come down by "compensating" the sleep on the next day. Disturbed sleep also comes with the risk of obesity and diabetes due

to malfunctioning of hormones responsible for alerting us when we need more food, and when we do not. Other studies have also provided a relationship between sleep and brain aging that is those who get inadequate sleep tend to lose more brain tissues than long sleepers.

Apart from this, the importance of sleep is also realized as it is also related to body aging. Studies have shown that less sleep leads to shortening of telomere length(the caps of the chromosomes). Due to this shortening, chromosomes reach a critical length after which they lose their replicative property leading to the death of cells(apoptosis).

This study also introduces BDNF(brain-derived neurotrophic factor), a growth factor known for survival and proliferation of neurons in the CNS. It is observed that BDNF aids in learning. Studies have shown that exercise improves the levels of BDNF. Apart from this, from the existing studies, it can be clearly inferred that there exists a inverse relation between depression and BDNF that is high stress levels corresponds to low BDNF levels. However, this relation is valid only unto some extent which we shall explore more in this study. Since we already can see, exercise and sleep are one of the most overlooked factors even though being so crucial for us. We also can already see an interdependent relation between exercise, sleep, and learning, which this article addresses the effects of exercise and sleep on learning.

Exercise and Learning

Exercise has shown positive effects on our brain, one of them being enhanced learning. Exercise tends to have a positive effect on BDNF production. It is being found that BDNF promotes the brain plasticity and in neurogenesis in the brain. This not only helps in Long Term Potentiating(LTP) but also in the formation of Long Term Memory (LTP). Exercising regularly as shown to have more increase in the BDNF levels (174% increase)and thus better learning as compared to intermittent exercising group (160% increase). This also implies that once a person stopped exercising, the BDNF levels go back to the baseline levels as if they never went up. It is believed that memory storage is done by neural growth and forming and modifying of new connections in the brain, and BDNF is known to perform precisely those functions. It is also found that there is an increase in the BDNF levels approximately 12 hours after the training, which can aid in the LTM storage. Experiments have also been conducted to test if BDNF injection after heavy exercise could produce more enhanced results. This was done by injecting BNDF in rats performing either, weak training or high-intensity training. It was clear that the BDNF did not affect memory persistence when injected 12 hours after exercise in the case of strength training experience. This is so because intense training is sufficient to self produce the BDNF in the late training period. To mention the specific forms of exercise that show the improvement, one research conducted found that endurance training resulted in an increase in visuospatial memory but

did not show significant differences in verbal memory and the concentration as compared to the control group which did not exercise at all. The study also found that there was an increase in positive thoughts through endurance training.

It might be a misconception among many that only the aerobic exercises provide the benefits of enhanced learning. This holds provided by research which showed that aerobic exercise improved planning scores in previously overweight individuals by aerobic exercise training intervention, which depicts to enhance the functions necessary for cognitive development. However, studies have shown that anaerobic exercises also do not fall behind in supplying the benefits. A study assessed divided healthy individuals into three groups: first performing high impact anaerobic sprints, the second performing low-intensity aerobic exercises, and the third at rest. The study found that the sprinters had 20% faster vocabulary learning as compared to the other two groups. BDNF levels in the sprinters were also found higher relative to the other two groups resulting in the more short term learning success.

Although we have so far shown the positive effects of BDNF on learning. However, examining the effects of overexpression of BDNF and learning, the researches show that overexpression of BDNF hinders with learning. One research found that overexpression of BDNF stimulates inhibitory pathways and hinders in learning. It also found that too little of the BDNF also negatively impacts learning. To validate this claim, several experiments were conducted. One of which was the passive avoidance test, testing short term and long term memory. This test included two types of mice, the wild type (WT) mice without the overexpression of BDNF, and the transgenic mice with overexpression of BDNF. In this test, the apparatus consisted of bright light room and the dark room. This test was done in two cases. The first consisted of a bright room with double the size of the darkroom, whereas in the second case, the size of the rooms was almost the same. Both the mice were left in the bright room, and the door to the dark room was opened. As the mice moved to a dark room, they experienced a small electric shock. Their latency to enter the dark room was assessed in 3 cases to test their short term and long term memory: In the initial condition when they first entered the dark room and experienced shock, 24 hours after the initial condition which meant the 24 hour recall, and after 10 days of the training, which corresponded to long term memory. The results showed that the wild type mice had higher latency before entering the dark room as compared to the transgenic mice proving that overexpression of BDNF hinders in learning. In order to see the effects of overexpression on the short term memory, the researchers of this study included one more cases consisting of equal sized rooms and tested their latency after 1 hour of training. The results again showed that overexpression of BDNF was the culprit in both short term and long term memory formation.

Also, we have earlier seen BDNF results in decreased body weight so that we

might assume its overexpression results in a significant decrement in the body weight. However, the study has also shown that overexpression of BDNF provides only a small contribution towards the overall weight loss. It has also been noted that decreased BDNF levels do not correspond to increased body weight. Hence overexpressed BDNF proves to be not so beneficial apart from acting as an anti-depressant as discussed in the exercise and sleep section.

Learning and Sleep

As discussed earlier, sleep is divided into different stages: Stage1, 2, 3(SWS), and 4(REM). According to the theory, stage 4 sleep or the REM period is responsible for the memory consolidation of the declarative memory which contains factual knowledge and the non-declarative memory which is responsible for learning new motor tasks like say riding a bike, swimming. To study this relation, a study was conducted in which college students either took the lessons in the morning and gave its test in the evening or took the lessons in the evening and gave the test the following morning. The morning test takers performed better than the evening test takers since there was an intervention of sleep.

Existing sources have already confirmed that more the REM period more the learning. This is because a study did do on rats in which the rats' REM period was deprived by almost 85% in one group of rats and by 43% in the yoked control (YC) rats. It was observed that cell proliferation was reduced by 63% in the first group of rats as compared to the YC rats. The study also found a direct relation between REM sleep and brain plasticity, and the cell proliferating across all animals. One study showed that REM sleep deprivation causes abnormalities in coping the defense response of rats in hostile situations. It is also observed that REM sleep deprivation was related to the tendency of being overweight in adolescents. Not only overweight adolescents had decreased REM sleep, but also slept approximately 22 minutes less than normal-weight children, had decreased sleep efficiency, and delayed first REM period.

In order to confirm if the converse relation also holds, a study was conducted which divided individuals into four groups based on the tasks they were performing: Visual learning group(VL), Audial Learning (AL), Mild Visual Learning(MVL), and Mild Audial Learning group(MAL). The VL group was given a structured passage and were asked to go through it, and the AL group was given the audio version of the passage. Whereas, the MVL and MAL groups were given jumbled visual and audio versions, respectively. All the four groups gave a test before sleeping, and the following morning post sleeping. The results showed that there was a significant increase in the REM period of VL and AL groups as compared to MAL and MVL group. This proves the fact that there exists a bidirectional relation in learning and REM period. Also, there was no decrement in the performance of groups the following morning, which also shows that REM sleep is related to memory consolidation to some extent.

Conclusions

- ❖ Afternoon exercise is better than evening exercise for better sleep.
- ❖ Stress or depression-like symptoms leads to suppressed BDNF production.
- ❖ Higher depression levels lead to overexpression of BDNF.
- ❖ Mixed exercises that are low and high-intensity exercises are recommended for obtaining maximum learning benefits.
- ❖ Regular exercise is found to promote sleep than acute exercise better.
- ❖ How we perceive our exercise intensity also determines our sleep much specifically stage three sleep, so perceiving to have performed strenuous exercise can improve our stage three sleep, which is responsible for growth hormone secretion.
- ❖ Poor sleep leads to reduced exercise; however, good sleep does not mean good exercise.
- ❖ Perform mind-body exercises such as yoga and tai chi for better sleep improvement than aerobic exercise if one feels that he usually remains overstressed.
- ❖ In case the person is overweight, aerobic exercises performed for a more extended period can be a better alternative. This is because high fat composition corresponds to higher stress levels leading to poor sleep and hence poor learning.
- ❖ Strenuous exercise helps in better BDNF production, which helps in increased brain plasticity essential for learning.
- ❖ Overexpression of BDNF through acts as an anti-depressant, it hinders in both Long Term and Short Term memory formation. However, this overexpressed BDNF does not hinder without behavioral performance.

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Comparative Study on Selected Anthropometrical Measurement of National and State Level Women Soccer Players

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ABSTRACT

The purpose of the study was to compare selected anthropometrical measurement of National and State level women soccer players, Thirty two (32) National level and State level women soccer players of which Sixteen (16) of each level (age ranging - 14-19 years) were selected from different clubs and academy of Manipur, India. Players were selected from especially different playing position of soccer that is forward and defending players. Subjects Height, Bodyweight, Thigh Girth, Calf Girth and Leg length were measured as anthropometrical measurement by using Stadiometer, Weighing machine and Freeman Steel tape. To find out the significant differences of data collected were analyzed by applying't' test and tested at 0.05 level of confidence. Results of the study showed that significant differences on Bodyweight, Thigh Girth, Calf Girth and Leg length.

Keywords: Anthropometric measurement, Height, Bodyweight, Thigh Girth, Calf Girth and Leg length.

Introduction

Anthropometry is the branch of Anthropology which is concerned with taking of measurements of human body. This definition has been confined to the kinds of measurements commonly used in associating physical performance with body build (Warren, 1974). Anthropometrical measurement focused on three areas growth measures, body type and body composition. The use of such measures helps to prediction of growth patterns and predictions of success in motor activities as well as assessment of obesity (Correlation, 1974). The major role for physical performance is partly dependent up on the physique and body composition of an

individual (Bubruben, 1975). Measurements of body size include such descriptive information as height weight and surface area while measurements of body proportion describe the comparative of on height and weight and among length of various body segments. It has been found that top athlete in some sports tends to have those proportions that biomechanically and the particular performance required (Early, 1982). Athletes for superior performance in any is selected on the basis of his physical structure and body size, which has proved to appropriate for high performance in the given sports (Tanner, 1964) therefore this study has been undertaken with a view to find out the selected anthropometrical measurement of National and State level women Soccer players.

Method and Metarials

In order to compare selected anthropometrical measurement of National and State level women soccer players, Thirty two (32) National level and State level women soccer players of which Sixteen (16) of each level (age ranging-14-19 years) were selected from different clubs and academy of Manipur, India. Players were selected from especially different playing position of soccer that is forward and defending players. Subjects Height, Bodyweight, Thigh Girth, Calf Girth and Leg length, (D.K. Kansal, 2007) were measured as an anthropometrical measurement by using Stadiometer, Weighing machine and Freeman Steel tape.

Statistical Procedure

The gathered data were duly analyzed through statistical procedure using descriptive statistics and't' test was applied to find out significant differences between selected Anthropometrical measurement and of National and State level Athletes, the level of significance was set at 0.05 level of confidence.

Result of the Study

Table 1

Analysis on Anthropometrical Variable of Height of National and State Women Soccer Players

Level	Mean	SD	Mean Difference	"t" Value
National	158.06	3.92	5.62	0.000175*
State	152.43	3.63		

****Significance at 0.05 level***

Tabulated t 0.05 (30)=1.697

Table 1 reveals that significant difference exist in the anthropometrical variable of height between National and State level women soccer player as because calculated t- value (0.000175) is lower than tabulated t-value (1.697) tested at 0.05 level of significance.

Table 2

Analysis on Anthropometrical Variable of Body Weight of National and State Women Soccer Players

Level	Mean	SD	Mean Difference	"t" Value
National	53.87	5.35	3.0625	0.044107*
State	50.81	4.56		

Significance at 0.05 level

Tabulated t 0.05 (30)=1.697

Table 2 shows that significant difference exist in the anthropometrical variable of body weight between National and State level women soccer player as because calculated t- value (0.044107) is higher than tabulated t- value (1.697) tested at 0.05 level of significance.

Table 3

Analysis on Anthropometrical Variable of Thigh Girth of National and State Women Soccer Players

Level	Mean	SD	Mean Difference	"t" Value
National	40	3.62	0.9375	0.239436*
State	40.93	4.18		

Significance at 0.05 level

Tabulated t 0.05 (30)=1.697

Table 3 reveals that significant difference exist on the anthropometrical variable of thigh girth between National and State level women soccer player as because calculated t-value (0.239436) is higher than tabulated t-value (1.697) tested at 0.05 significance.

Table 4

Analysis on Anthropometrical Variable of Calf Girth of National and State Women Soccer Players

Level	Mean	SD	Mean Difference	"t" Value
National	31.62	0.80	0.5	0.041932*
State	31.12	1.23		

Significance at 0.05 level

Tabulated t 0.05 (30)=1.697

Table 4 shows that significant difference exist on calf girth between National and State level women soccer player as because calculated t -value (0.041932) is higher than tabulated t- value (1.697) tested at 0.05 level of significance.

Table 5

Analysis on Anthropometrical Variable of Leg Length of National and State Women Soccer Players

Level	Mean	SD	Mean Difference	"t" Value
National	89.81	1.03	1.1875	0.052323*
State	88.62	2.23		

Significance at 0.05 level

Tabulated t 0.05 (30)=1.697

Table 5 shows that significant difference exist on leg length on between National and State level women soccer player as because calculated t- value (0.052323) is higher than tabulated t- value (1.697) tested at 0.05 of significance.

The mean scores of all the anthropometrical variables are depicted in figure 1.

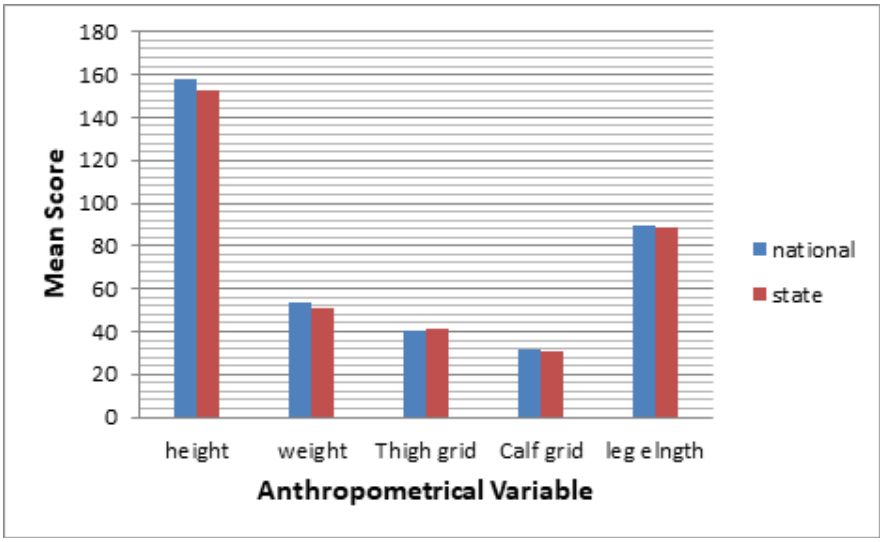

Figure 1: Mean Scores of the Anthropometrical Variables

Discussion and Conclusion

The results of the present study, conducted on 32 National and State level women soccer players with age ranging from 14 to 19 years from Manipur are as follows:

Results of the study showed that Anthropometrical characteristics such as height, body weight, thigh girth, calf girth and leg length were found to be significant difference.

In the present study average height of the National soccer players recorded was158.06 cm which was better than State players 152.43cm. It was believed that due to biological, environmental and genetic makeup of the players might be the

cause obtaining more height (Nudry, et. al., 1996). Rather it can be said that in the adolescence stage (14 to 19yrs) height increases steadily and obtained near top height than other growth stage (Singh, et. al., 2007). Leg lengths of the National players were found better than state soccer players. Leg length also increases due to increasing over all height of the players and development of lower limb is quicker than upper limb (Gunnell, 2001). Calf girths of the National players were found better than state players. Literature revealed that due to strenuous practice and exercise aspect of the players calf muscle hypertrophy might occur thus increasing the overall circumference of the calf girth.

Conclusion

In this study anthropometrical characteristics such as height, body weight, thigh girth, calf girth and leg length were found to be significant between National and State level women soccer players with their age ranging between from 14 to 19 years from Manipur.

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The Influence of Ideokinetic Imagery on Adolescent Posture: A Controlled Investigation

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Abstract:
This study examines how ideokinetic imagery affects adolescent posture in a controlled experiment with 30 male students from Delhi government schools. Participants were separated into two groups: an experimental group (n=15) that received a six-week ideokinetic training program, and a control group (n=15) that continued their normal activities. The New York Posture Test was used to measure postural changes. The experimental group had a substantial improvement in posture ratings ($t(14) = 11.225$, $p < 0.001$), whereas the control group showed no significant change ($t(14) = 0.367$, $p = 0.719$). The findings suggest ideokinesis as a successful, non-invasive approach for improving posture.

Keywords:
Ideokinetic imagery, teenage posture, bodily alignment, mental imagery, posture repair.

1. INTRODUCTION

A complex notion, body intelligence reflects great variety within the human population in terms of an individual's ability to precisely and efficiently manage and coordinate bodily motions. This type of intelligence, also referred to as kinesthetic intelligence, shows as a spectrum whereby some people show natural inclination for physical activities while others acquire high-level motor abilities by committed effort and instruction (Gardner, 1983; Hannaford, 1995).

Beyond conscious control, the subtleties of body intelligence help the human body to react spontaneously and instinctively to many environmental cues. From daily motions to sophisticated sports achievements, this unconscious part of physical intelligence is very vital (Feldenkrais, 1972; Shusterman, 2008).

People naturally acquire new neuromuscular habits as they move through several phases of life. Although these adaptations are usually required for adjusting to shifting physical demands, occasionally they cause poor posture and movement patterns. Chronic stress, everyday routines, and the ergonomic constraints presented by modern surroundings like extended sitting and screen use (Kendall et al., 2005; Janda, 1983) all help to contribute to these changes.

Understanding the frequency of posture-related problems, kinesiologists and movement experts have developed many approaches meant to retrain the body. These techniques aim to get better alignment, more effective movement, and general greater physical performance. Among these methods, ideokinesis is one that most distinguishes itself in using mental images to improve posture and movement patterns (Sweigard, 1974; Bernard et al., 2006).

Developed by Mabel Elsworth Todd in the early 20th century and polished by Lulu Sweigard, ideokinesis uses imagination and vision to produce fresh neuromuscular patterns. Recent developments in neuroscience and motor learning theory (Todd, 1937; Doidge, 2007) support the idea that genuine physical changes in the body might result from mental practice of movement.

With an eye toward teenagers especially, the current study seeks to investigate the pragmatic uses of ideokinesis in enhancing body posture. This group is particularly interesting as early intervention in postural patterns has possible long-term advantages. Adolescence is a crucial stage of physical and neurological development in which the formation of ideal movement patterns may have broad effects on future health and well-being (Malina et al., 2004; Viel et al., 2009).

This study aims to add to the increasing corpus of information on non-invasive, holistic methods to posture correction and movement optimization by exploring the effectiveness of ideokinesis in this setting. The results might have major ramifications for disciplines including physical education, sports training, and preventative medicine, therefore providing fresh approaches for encouraging lifetime physical well-being.

2. Methodology

2.1 Scholars

Recalled from government schools in Shahdara District, Delhi, thirty male teenagers between the ages of 14 and 17 Two groups—randomly—were formed out of the subjects:

1. Scientific Group (n=15): Acquired training in ideokinetic images

2. Control Group: Maintaining their usual schedules, n=15

2.2 Evaluation Method

Postural alterations were assessed with the State of New York Posture Test. On a 5-point rating system, this exam evaluates 13 separate parts of the body to give a complete picture of a person's postural alignment (The University of the State of New York, 1958).

2.3 Methods

While the control group carried on with their regular activities, the experimental group undergoing six-week ideokinetic imagery training program. Before and during the intervention, both groups had posture evaluations.

2.4 Analytical Statistics

Pre-test and post-test findings within every group were compared by data analysis using paired t-tests. To examine group changes, an independent t-test was also run.

3. Outcomes

Following six-week ideokinetic imagery training, the study showed a statistically favorable change in the posture of the Scientific group. By comparison, for the same period the control group showed no appreciable change in posture.

3.1 Results of Experimental Groups

Table 1 shows the outcome of the Scientific group:

Score Taken	Average(M)	Standard Deviation	df	t-ratio	P-Value
Pre test	39.65	4.85	14	11.225	0.00
Post test	45.56	4.91			

The experimental group demonstrated a significant increase in posture scores ($t(14) = 11.225$, $p < 0.001$), confirming the effectiveness of ideokinetic imagery training.

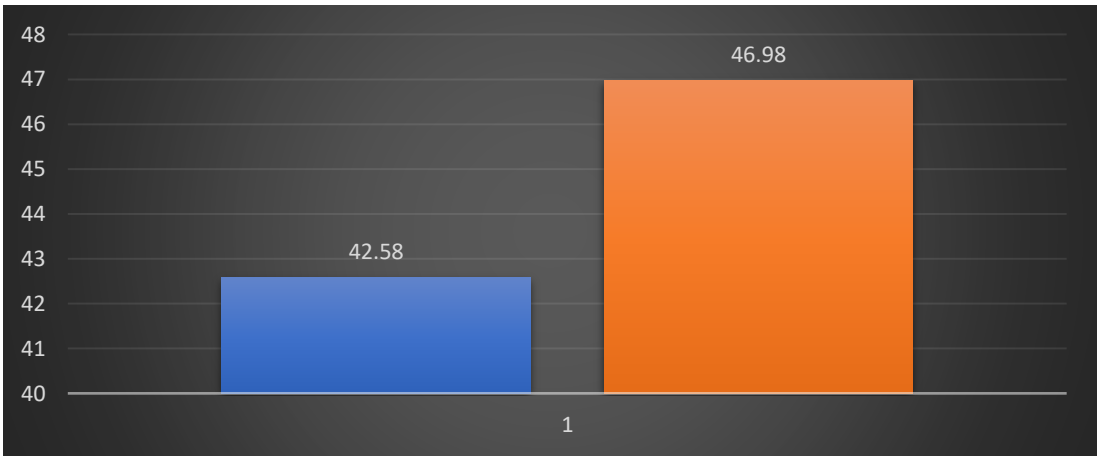

Fig. 1: Visual representation showing significant improvement in posture scores after ideokinetic imagery training in the experimental group.

3.2 Control Group Outcomes

Table 2 presents the results for the control group:

Score Taken	Average(M)	Standard Deviation	df	t-ratio	P-Value
Pre test	42.58	4.13	14	0.367	0.719
Post test	46.98	4.06			

The control group showed no statistically significant difference in posture scores ($t(14) = 0.367$, $p = 0.719$), indicating that regular activities alone did not lead to noticeable improvements in posture.

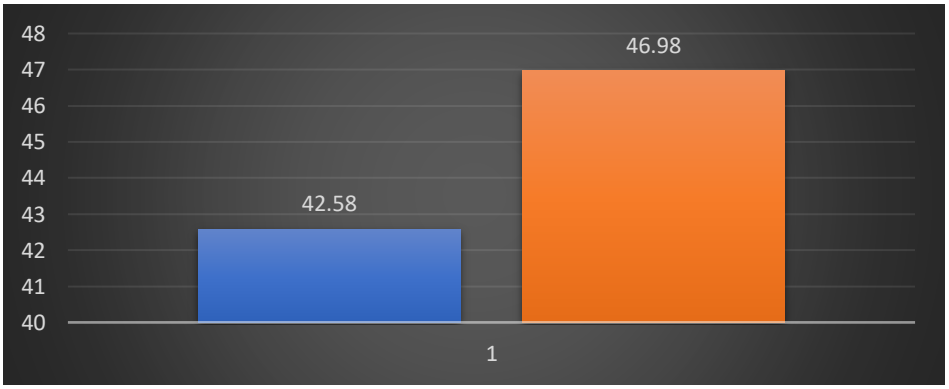

Figure 2: Visual representation showing no significant change in posture scores for the control group.

4. **Discussion**

Ideokinetic imagery training improves posture, especially in teenagers, according to the study. Mentally visualizing motions using ideokinesis tends to subconsciously enhance bodily alignment. Over six weeks, visualization exercises likely changed neuromuscular patterns, improving posture without conscious effort (Sweigard, 1974; Matt, 2014).

In motor learning and control, cognitive processes are crucial to movement acquisition and refinement (Schmidt & Lee, 2019). This improvement supports this. By including the mind in postural shift, the ideokinetic technique may draw on adolescent brain plasticity (Giedd et al., 1999). These plasticities may explain participants' receptivity to the intervention and beneficial outcomes.

The considerable improvement in the experimental group compared to the control group shows that specialized therapies like ideokinetic training may be more successful at resolving postural difficulties than everyday activities alone. Adolescent health and physical education programs are affected by this fact. It suggests that systematic, mind-body methods to posture and physical well-being should be added to existing courses (Gelb, 1994; Franklin, 2012).

In addition, the study's findings support imagery-based therapies for motor skill learning and performance improvement (Cumming & Williams, 2013). The novel use of these techniques to modify posture combines cognitive science with physical therapy.

Results are promising, but the study's limited sample size and short duration may restrict generalizability. Experimentatory studies have these limitations, but they guide future research. Higher sample sizes might improve statistical power and show more complex intervention effects (Cohen, 1988).

Extended intervention beyond six weeks may reveal cumulative effects and the long-term maintenance of postural changes. According to research on habit development, new behaviors take longer to establish (Lally et al., 2010).

To understand how ideokinetic imagery affects posture across varied groups, future study must include women. Growth patterns and hormonal factors associated with gender in adolescence may impact the intervention's efficacy (Malina et al., 2004).

The synergistic benefits of ideokinetic training with other posture-improvement methods like strength training or ergonomic treatments should also be studied (McGill, 2015). This multi-modal method may improve adolescent posture better and offers a more comprehensive approach.

In conclusion, 3D motion capture or electromyography might give more objective evidence on ideokinetic training's biomechanical effects (Winter, 2009). The findings would be more precise and we would understand how mental imagery affects physical posture.

A promising foundation, the current study offers up several opportunities for future research to further explore the potential of ideokinetic imagery to promote healthy posture and movement patterns across varied groups and circumstances.

5. **Conclusions**

This study proves that ideokinetic imagery training improves boys' body posture. During the six-week training session, posture profiles changed, showing that ideokinesis might boost posture in educational contexts.

The study has implications for physical education and health promotion. Ideokinetic imagery training may help educators and health workers manage postural disorders and reduce the risk of future musculoskeletal diseases.

Future study should examine ideokinetic training's long-term benefits, suitability for different age groups and genders, and compatibility with other posture correction methods. IDEOKINESIS may improve posture and body awareness in young people as we study the complicated links between mental images, neuromuscular control, and physical alignment.

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