

A COMPARATIVE STUDY ON ANTHROPOMETRIC MEASUREMENT OF SRI LANKA DEFENCE SERVICE (SL ARMY, SL NAVY AND SL AIR FORCE) MALE SOCCER TEAMS

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Abstract - Anthropometry is a branch of anthropology and is concerned with the measurement of the human body. The intent to do this research was because there was no comparison on the anthropometric measurements of Sri Lankan defence service male soccer teams. The purpose of this study was to identify the dependency of anthropometric for performance. In this research Anthropometric measurements of the Sri Lanka Air Force, Army, and Navy male soccer players were taken into consideration. A survey was used as the main data collection method and the total sample population (all soccer team members of defence services) was 29, 27 and 27 from the Air force, Army and Navy respectively. Interviews and measurement were conducted to those samples to gather this data. In addition, the latest Sri Lanka dialogue premier league result was used to identify and compare their performance. According to the results of the research, the Air Force is greater than the Army and the Army is greater than the Navy when considering Sitting height, Waist to hip ratio, Calf girth, Thigh girth, Leg length and Arm Span. Also, when considering the BMI and percentage of fat, the Air force is less than the Army and the Army is less than the Navy. For the Statically Analysis, the SPSS software was used as the tool in this research. According to the study, anthropometry characteristic of players affects their performance.

Keywords: Soccer, Anthropometry, performance, Tri-forces

I. INTRODUCTION

Anthropometry is the branch of the human sciences that deals with body measurements. At it is most basic, anthropometrics is used to help scientists and

anthropologists understand physical variations among humans. Anthropometrics is useful for a kind of baseline for human measurement. Anthropometry is the measurement of people and the analyses of those measurements for various purposes. It can be used for talent identification, and also nutritional and physical assessment.

Specifically, Sri Lanka Dialog football premier league is the top of the football tournament in Sri Lanka. This tournament is conducted by Sri Lanka football federation annually with an 18th soccer club in Sri Lanka. These 18th soccer clubs are selected by Sri Lanka football federation through the standard selection procedure. Within these 18th clubs, Sri Lanka air force (Air force), Sri Lanka army (Army S.C) and Sri Lanka Navy (Navy S.C) are important teams. Because these teams represented Sri Lanka three forces and also Sri Lanka national football squad. But according to the 2017- 18 Sri Lanka football premier league table, air force, army S.C and navy S.C soccer teams is not in one level within those 18thsports clubs. Within three forces in that table, air force is in first place with 28 pts, army S.C is second place with 22 pts. And navy S.C is third place with 20 pts.

This research main aim was to assess the anthropometric in Sri Lanka defense service male soccer teams. According to the ISAK (International Society for the Advancement of Kinanthropology) standard anthropometric measurements data were collected by the researcher

Elite soccer players have a higher percentage of muscle in comparison to non - exercise population being as high as 62%. But their fat percentage is lower than non -exercise population. But their fat percentage higher than long-

distance runners or endurance runner. The researcher hopes to get full and correct anthropometric data. This method involves a structured interview and measuring.

And also muscle size effect to do maximum training in soccer or any other sport. Because the muscles have the ability to store necessary energy during the game. As well as training. Elite soccer players should focus on maximal strength training, with emphasis on the maximal mobilization of concentric movements, which may improve their sprinting and jump performance.

II. METHODOLOGY AND EXPERIMENTAL DESIGN

A. Problem Specification

These study support coaches for the trained athlete do hard practices in their sports lives in the sporting life as a team without a care about athletes' anthropometry characteristics. Because of nutrition level of athletes depend on anthropometry characteristics. This situation badly affects them when they face competitions and results of those are low performing levels. This guide to anthropometric and biomechanical assessment introduces athletes to the details of standardized protocols and outcomes of the study.

B. Study Area

Anthropometric measurements of defense service male soccer teams (SL Air Force, SL Army, and SL Navy) and analyzing their anthropometric characteristics according to their measured data.

C. Data gathering technique

The research topic and objectives were built depending on the study of the researcher and of the literature review. The researcher used measuring tests of anthropometry for athletes. The procedure involved two measures at each site to calculate a mean value and an acceptable technical error margin. SPSS.16.0 was used for data analysis in this study.

D. Anthropometric Equations

- BMI (Kg-m⁻²) = $\frac{\text{Wight (Kg)}}{\text{Height}^2 \text{ (m)}}$

- Waist to Hip Ratio (cm) = $\frac{\text{Waist Girth (cm)}}{\text{Hip Girth (cm)}}$

- Body Fat percentage % = $0.29288(X2) - 0.00050(X2)^2 + 0.15845(X8) - 5.76377$

X2 = sum of triceps, abdomen, suprailliac and thigh skin folds.

X8 = age in the year (Wellens, Roche et al. 1996)

E. Material

- A weight scale (CONSTANT Digital LCD Glass Top Bathroom Weighing Scale)

- Slim Guide skinfold caliper

- (Fabric Body Sewing Tailor Soft Flat Measure Measuring Tape)

- Seca 201 Ergonomic circumference measuring tape.

The sample consisted of 83 (n= 83) National players = 23 and Non – national players = 60, players from Sri Lanka defense service men's Soccer teams. The data were gathered through measuring their anthropometric. The data were analyzed and presented with the use of SPSS software and Microsoft Excel. Defense service three forces' all the players (83 players) were taken to this research.

National players of each team separately (A) Height

	Mean	Std. Deviation	N
Air Force	170.07	3.17090	9
Army	169.79	3.75119	7
Navy	169.07	3.33452	7

In this study the mean height of national athletes, SL Air Force, SL Army and SL Navy were 170.07 ± 3.17 cm, 169.79 ± 3.75 cm and 169.07 ± 3.33 cm respectively.

BMI (Body Mass Index)

	Mean	Std. Deviation	N
Air Force	22.8311	1.77094	9
Army	22.8843	1.64908	7
Navy	23.1857	1.64796	7

In this study, the mean BMI of national athletes, SL Air Force, SL Army and SL Navy were 22.8311 ± 1.77 kg-m⁻², 22.8843 ± 1.65 kg-m⁻² and 23.1857 ± 1.65 kg-m⁻² respectively.

Sitting Height

In this study the mean Sitting Height of national athletes, SL Air Force, SL Army and SL Navy were 86.0444 ± 3.36 cm, 84.9286 ± 3.12 cm and 84.0286 ± 2.98145 cm respectively.

	Mean	Std. Deviation	N
Air Force	86.0444	3.36122	9
Army	84.9286	3.11700	7
Navy	84.0286	2.98145	7

Fat Percentage

	Mean	Std. Deviation	N
Air Force	9.5367	1.70141	9
Army	9.7443	1.61737	7
Navy	10.1029	1.91100	7

In this study, the mean Fat percentage of national athletes, SL Air Force, SL Army and SL Navy were 9.54 ± 1.70 mm, 9.74 ± 1.62 mm and 10.10 ± 1.91 mm respectively.

Non-National players of each team separately (B)

Height

	Mean	Std. Deviation	N
Air Force	169.53	5.24836	20
Army	169.03	6.07857	20
Navy	168.53	5.70809	20

In this study the mean height of Non - national athletes, SL Air Force, SL Army and SL Navy were 169.53 ± 5.25 cm, 169.03 ± 6.08 cm and 168.53 ± 5.71 cm respectively.

BMI(Body Mass Index)

	Mean	Std. Deviation	N
Air Force	22.8910	1.64283	20
Army	22.9762	1.43601	20
Navy	23.2812	1.54117	20

In this study, the mean BMI of Non - national athletes, SL Air Force, SL Army and SL Navy were 22.89 ± 1.64 kgm², 22.98 ± 1.44 kgm⁻², and 23.28 ± 1.54 kgm⁻² respectively.

Sitting Height

	Mean	Std. Deviation	N
Air Force	84.2350	3.85127	20
Army	83.9375	3.85968	20
Navy	83.8438	3.83301	20

In this study the mean Sitting Height of Non - national athletes, SL Air Force, SL Army and SL Navy were 84.24 ± 3.85 cm, 83.94 ± 3.86 cm and 83.84 ± 3.83 cm respectively.

Fat Percentage

	Mean	Std. Deviation	N
Air Force	10.0320	2.25435	20
Army	10.2156	2.68123	20
Navy	10.2188	2.40977	20

In this study the mean Fat Percentage of Non - national athletes, SL Air Force, SL Army and SL Navy were 10.03 ± 2.25 mm, 10.22 ± 2.68 mm and 10.22 ± 2.41 mm respectively.

And also like Height, BMI, Sitting height and fat percentage, according to the Thigh girth, Calf girth, Leg length and Arm span, Sri Lanka Air Force is a greater army, Sri Lanka Army is greater than Sri Lanka Navy. But in the Waist to hip ratio, all the teams in low health risk level.

Different between National players and Non-National players of all defense service (C)

Thigh Girth

	Mean	Std. Deviation	N
National Players	51.3174	3.13074	23
Non-National Players	50.1462	3.59026	60

In this study the mean Thigh Girth of National and Non - national players were 51.3174 ± 3.13 cm and 50.1462 ± 3.59 cm respectively.

Calf Girth

	Mean	Std. Deviation	N
National Players	35.4391	2.39122	23
Non-National Players	34.9865	2.15407	60

In this study the mean Calf Girth of National and Non – national players were 35.4391 ± 2.39 cm and 34.99 ± 2.15 respectively.

Leg Length

	Mean	Std. Deviation	N
National Players	95.6261	3.88051	23
Non-National Players	95.3000	3.07590	60

In this study the mean Leg length of National and Non – national players were 95.6261 ± 3.88 cm and 95.3000 ± 3.08 cm respectively.

Waist to Hip ratio

	Mean	Std. Deviation	N
National Players	0.8335	0.03113	23
Non-National Players	0.8269	0.03943	60

In this study the mean Waist to Hip Ratio of National and Non – national players were 0.8335 ± 0.03 cm and 0.8269 ± 0.04 respectively.

And also like Thigh girth, Calf girth, Leg length and Waist to Hip ratio, according to the Height, BMI, Sitting height, Arm span and Fat percentage, Sri Lanka Air Force are a greater army, Sri Lanka Army is greater than Sri Lanka Navy. But in the Waist to hip ratio, all the teams in low health risk level.

Different between all Air SL Force, SL Army, and SL Navy(D)

Height

	Mean	Std. Deviation	N
Air Force	169.70	5.81571	29
Army	169.26	5.39964	27
Navy	168.70	5.03113	27

In this study, the mean Height of SL Air Force, SL Army, and SL Navy was 169.70 ± 5.82 cm, 169.26 ± 5.40 cm and 168.70 ± 5.03 cm respectively.

Leg length

	Mean	Std. Deviation	N
Air Force	95.8448	3.20185	29
Army	95.3696	3.46822	27
Navy	94.8696	3.38169	27

In this study, the mean Leg length of SL Air Force, SL Army, and SL Navy were 95.84 ± 3.20 cm, 95.37 ± 3.47 cm and 94.87 ± 3.38 cm respectively.

Arm Span

	Mean	Std. Deviation	N
Air Force	177.23	5.42420	29
Army	175.48	5.37423	27
Navy	174.80	5.93529	27

In this study, the mean Arm Span (FW) of SL Air Force, SL Army, and SL Navy were 177.23 ± 5.42 cm, 175.48 ± 5.37 cm and 174.80 ± 5.94 cm respectively.

Fat percentage

	Mean	Std. Deviation	N
Air Force	9.8783	1.50023	29
Army	10.0722	1.58879	27
Navy	10.1835	1.25873	27

In this study, the mean Fat Percentage of SL Air Force, SL Army, and SL Navy were 9.8783 ± 1.50 mm, 10.0722 ± 1.59 mm and 10.1835 ± 1.26 mm respectively.

And also Height, leg length, Arm span and Fat percentage, according to the Sitting height, BMI, Waist to hip ratio, Calf girth, Thigh girth, leg length, Sri Lanka Air Force are a greater army, Sri Lanka Army is greater than Sri Lanka Navy. But in the Waist to hip ratio, all the teams in low health risk level.

IV. DISCUSSION AND CONCLUSION

According to above result of defense service soccer teams, Air force is greater than the army and the army is greater than navy when considering about Height, sitting height, Waist to hip ratio, Calf girth, Thigh girth, Leg length and Arm Span. And also when considering the BMI and percentage of fat, Air force is less than the army and the army is less than navy.

This study focused the study to assess the anthropometric characteristics in athletes of Sri Lanka defense service male soccer teams. There are three soccer teams including Sri Lanka Air Force, Sri Lanka Army and Sri Lanka Navy.

According to the results in chapter III, it emphasizes SL navy soccer team have lowest of anthropometrical characteristics. And SL Army soccer team is middle place within those teams and SL Air Force is greatest with anthropometrical characteristics. Soccer is a game where standard physical characteristics with height, weight, leg length, sitting height, waist to hip ratio, the girth of leg muscles and fat percentage require for good performance. When considering as national and non – national players, there is the difference between them according to their height, SL Air Force, SL Army, and SL Navy differ 0.54 cm, 0.76 cm, and 0.54 cm respectively. According to that, can be considered national players have more height than non-national players. And also, SL Air Force soccer players were greater than SL Army and SL Navy respectively.

When considering as national and Non – national players, there is the difference between them according to their BMI, SL Air Force, SL Army and SL Navy is in normal BMI level. That is good for performance. But within those three teams SL Air Force, SL Army, and SL Navy BMI level are low between normal BMI levels respectively. Actually, when considering BMI level, SL Air Force take success level than SL Army and SL Navy, SL Army takes success level than SL navy.

When considering as national and non – national players, there is the difference between them according to their Sitting height, SL Air Force, SL Army, and SL Navy differ 0.19 cm, 0.99 cm, and 0.18 cm respectively. According to that, can be considered national players have more Sitting height than non- national players. And also, SL Air Force soccer players were greater than SL Army and SL Navy respectively.

According to World Health Organization (WHO), waist to hip ratio is an indicator of obesity. When considering as national and non – national players, there is the difference between them according to their Waist to Hip Ratio in SL Air Force, SL Army, and SL Navy. But all the teams are in less of health risk level. That is good for performance. And also, SL Air Force, SL Army, and SL Navy soccer players were in less of health risk level when considering their mean Waist to Hip Ratio. The WHR is an important predictor of several cardiovascular and other chronic diseases; documentation of a strong effect of physical activity on the WHR selectively in men may provide a partial explanation of how the effect of physical activity is mediated and why physical activity is more effective in reducing disease risk.

A soccer match makes heavy demands on both aerobic and anaerobic metabolism. Elite players run 8-12 km during a game, with aerobic metabolism predominating. Nevertheless, anaerobic metabolism is also crucial in sprints, jumps, and tackles. When considering as national and non – national players, there is the difference between them according to their girth of calf and girth of the thigh in SL Air Force, SL Army, and SL Navy. And also, SL Air Force soccer team have girth circumference greater than SL Army and SL Navy soccer teams respectively, when considering their mean calf and thigh girth. Specifically, the girth of these leg muscles is important factors in the soccer. Because every time in the match, legs are active. And more energy needs to these muscles than other. If this muscle is more size, maximum energy can be stored in muscles. If this muscle is not more size, easily comes to fatigue level. And also when considering about arm span, it is important anthropometric characteristics. Because arm span can be decided upper body fitness components. When considering as national and non – national players, there is different between them according to their length of arm span in SL Air Force, SL Army, and SL Navy. And also, SL Air Force soccer players were greater than SL Army and SL Navy respectively.

Most athletes attempt to reduce adiposity levels alongside improving their fitness. Normal physiological functioning requires certain levels of body fat, though excess adipose tissue acts as an undesirable load in activities such as soccer in which the body weight must be lifted repeatedly against gravity. When considering as national and non – national players. There is the difference between them according to their percentage of fat, SL Air Force, SL Army and SL Navy is in a good percentage of the fat level. But within these three teams differ 0.50, 0.47 and 0.54 respectively. According to that, can be considered national players have less percentage of fat than non- national players. And also, SL Air Force soccer players were greater than SL Army and SL Navy respectively.

Anthropometry is a branch of anthropology and is concerned with the measurement of the human body. It is well known that the characteristics of physique apparently associated with success in sports and another form of physical performance. Evaluation of these anthropometric characteristics has an immense effect on sports in the preparation and maintenance of training program along with energy consumption and nutrition.

Generally, there was not much of a different body height, BMI, sitting height, girth of thigh and calf, arm span and percentage of body fat of national athletes from different teams. And also non-national athletes in a different team. The national players had a significantly high height when compared to non - national athlete. And also sitting height of national athlete higher than non - national athlete. And also circumference of thigh and calf (girth of thigh and calf) higher than comparing to non – national athlete. And also arm span is another characteristic differs from national and non -m national players. Because there is differ range of arm span in national players higher than non - national players. And specifically, the fat percentage of national players in defense service soccer teams, have less percentage than non – national players of teams.

Above data showed that the mean of anthropometric characteristics Sri Lanka Air Force soccer players achieved good characteristics regarding the anthropometry than Sri Lanka Army and Sri Lanka navy respectively. SL Air Force characteristics of anthropometry measurements were greater than Sri Lanka Army's Lanka Army characteristics of anthropometry measurements were greater than Sri Lanka Navy. This investigation indicates the need for further research on the effect of anthropometric characteristics since it is associated with players' performance. In addition, there may be some relationship

between anthropometric and team performance when studying Sri Lanka Dialog Premier League in 2017. Because of the team which has greater anthropometric characteristics suitable for a soccer game, is top place in a table within Sri Lanka defense service soccer. That team is Sri Lanka Air Force soccer team. And also the team which has greater anthropometric characteristics less than Sri Lanka Air Force suitable for a soccer game is second place in a table within these soccer teams. That team was Sri Lanka Army soccer team. And also the team which has less anthropometric characteristics was the last place that means a third place in a table within defense service soccer. That team was Sri Lanka Navy soccer team.

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