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COMPARISON AND CORRELATION OF VITAL CAPACITY BETWEEN MALE AND FEMALE CRICKET PLAYERS

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ABSTRACT

The aim of the present study to identify and assimilate Vital Capacity between Male and Female Cricket Players. A total of one hundred and twenty (120) subjects of different ages have been selected for the present study, sixty (60) of them being male cricket players and sixty (60) being female cricket players. In the present study, a Wright pick flow meter and a digital metronome will be used for the collection of the data. The researcher discusses the procedure, demonstrates the test, allows for practice, allows the subject to stop the test at any time, takes normal breathing, and condenses the test of all subjects to collect accurate data using a pick flow meter. The collected data was analyzed using descriptive and independent t-test was applied to check the level of significance. The significance level was set at p<0.05. Appropriate inferential statistics SPSS was used for the analysis of the gathered data collected on VC. The Pearson correlation is 0.05 between vital capacity and training age but between BMI and vital capacity of cricket players correlation is -0.12.; mean BMI of male cricket players is 21.93 (SD = 2.37) and female cricket players are 20.91 (SD = 2.58); mean vital capacity of male cricket players is 5.67 (SD = 0.52) and female cricket players are 4.42 (SD = 0.41). The finding of present study is mean difference of vital capacity between male and female cricket players is 1.25 and male cricket players is superior vital capacity than the female cricket players. The amount of lung capacity and specific vital capacity of male cricket players is higher than that of female cricket players, as gender processes normal adult vital capacity too. This finding also effects on performance so focus on more cardiovascular endurance training. The negative Pearson correlation is stable between BMI and vital capacity.

Keywords: *Cricket players, vital capacity, wright pick flow meter, comparison.*

1. INTRODUCTION

In the 1550s, Surrey schoolboys were certainly familiar with the sport of cricket, and in the following century, the rural people of those and other southern counties played it frequently (Underdown, 2006). Cricket, the famous gentleman's game, has just recently overtaken other sports as Bangladesh's favorite pastime. Although the British East India Company introduced cricket to Bengal in the eighteenth century, Bangladesh did not join the International Cricket Council (ICC) until 1977 as an associate member and did not join as a regular member until 1997 before it became a test-playing nation in June 2000 (Zaman et al., 2016).

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At various stages of the respiratory cycle, the amount of air in the lungs is divided into four volumes and four capabilities. The four lung capacities are total lung capacity (TLC), vital capacity (VC), inspiratory capacity (IC), and functional residual capacity (FRC). The four lung volumes are inspiratory reserve volume (IRV), expiratory reserve volume (ERV), tidal volume (TV), and residual volume (RV) (David, & Sharma, 2019). The amount of air that can be maximally exhaled after being fully inspired is referred to as the vital capacity (VC). Tidal volume, inspiratory reserve volume, and expiratory reserve volume are all added up to form VC (VC = V + IRV + ERV) (Lofrese, Tupper, Denault, & Lappin, 2023). Vital capacity may be measured as inspiratory vital capacity (IVC), slow vital capacity (SVC), or forced vital capacity (FVC). The FVC is similar to the VC, but it is measured as the patient exhales with maximum speed and effort (Ponce, Sankari, & Sharma., 2023; & Huprikar et al., 2019). It is the amount of air that the lungs can hold in their entirety, after accomplishing maximum inspiration, or the total of all volume compartments. The normal value is about 6,000 mL (4-6 L). TLC is calculated by summing the four primary lung volumes (TV, IRV, ERV, and RV) (Delgado, & Bajaj, 2022). The vital capacity of a typical adult is between 3 and 5 liters. Factors that affect a person's vital capacity include age, sex, height, weight, and ethnicity. For instance, with age, the vital capacity decreases as the residual volume and functional residual capacity rise. A person's vital capacity has been observed to improve with an increasing height; however, a rising body mass index (BMI) has been linked to a loss in vital capacity (Lofrese et al., 2023).

The lung volumes are about 10 percent smaller in women than in men of the same age and size (Kaur, & Singh, 2016). The lung is a critical component of good health. Normal metabolic processes, tissue healing, and athletic performance all depend on effective breathing. There are at least two aspects to effective breathing the proper use of the breath-controlling muscles, including the muscles of the abdomen, the diaphragm, and the intercostals muscles of the thorax; and the functioning of the lungs themselves (Birkel, & Edgren, 2000). The risk of bad vital capacity is increased weight because overweight effect on lung function (Peng et al., 2016). After the age of about 30, the residual volume and functional residual capacity increase, and the vital capacity usually decreases (Astrand et al., 1986). A researcher clearly identified the mean vital capacity as 5843.333 mL for both high- and low performance cricket players (Kaur, & Singh, 2016). In Bangladesh, cricket has surpassed other major sports like football, volleyball, and Kabaddi in popularity as a whole. Vital capacity is an essential part of not only daily life but also exercise or playing time. That whenever a cricket player's lung or vital capacity improves, they perform highly. The aim of the present study identifies and assimilate Vital Capacity between Male and Female Cricket Players. The research sought to evaluate male and female cricket players' vital capacities.

2. METHODS AND MATERIALS

2.1 Participants

A total of one hundred and twenty (120) subjects of different ages have been selected for the present study, sixty (60) of them being male cricket players and sixty (60) being female cricket players. Some personal information, such as age, BMI, sex, training age, citizen district, highest level played and COVID survivors or non-survivors of all subjects, is being collected.

2.2 Research Tools

In the present study, Wright pick flow meter and a digital metronome was used for the collection of the data and the measurement of vital capacity.

2.3 Data Collection

Before collecting data, the researcher describes the purpose of the present study. Finally, discuss the procedure, demonstrate the test, give the subject the opportunity to practice, give the subject the liberty to quit the test any time, take normal breathing, and concisely describe the test to all subjects before collecting accurate data by pick flow meter. To measure the peak flow meter score, subjects are free to give the test from either a sitting or standing position, but they must follow the same procedure each time. There are only three chances in every subject, but only the highest score is entered on the score sheet.

2.4 Data Analysis

Using Kolmogorov-Smirnov and Shapiro-Wilks tests to scan the data and the data had a normal distribution. Those non-parametric analyses have been adopted. The collected data was analyzed using descriptive and for the comparison appropriate inferential statistics SPSS was used for the analysis of the gathered data collected on VC. The significance level was set at $p<0.05$.

3. RESULTS

Table 1: Descriptive statistic -mean and standard deviation

	Gender	Mean	Std. Deviation
Training Age(year)	Male	6.29	4.45
	Female	3.62	2.56
BMI (score)	Male	21.93	2.37
	Female	20.91	2.58
Vital Capacity(liters)	Male	5.67	0.52
	Female	4.42	0.41

It is clearly shows from the table number 1 average Training Age of male cricket players 6.29 (SD= 4.45) years and female cricket players 3.62 (SD= 2.56) years; Mean BMI of male cricket players 21.93 (SD= 2.37) and Female cricket players 20.91 (SD= 2.58); mean Vital Capacity of male cricket players 5.67 (SD= 0.52) and female cricket players 4.42 (SD= 0.41).

Table 2: Test of Normality of BMI and Vital Capacity

		Kolmogorov-Smirov			Shapirpo-Wilk		
	Gender	Statistic	df	Sig.	Statistic	df	Sig.
BMI (score)	Male	.08	60	.18	.97	60	.82
	Female	.12	60	.01	.96	60	.31
Vital	Male	.11	60	.05	.95	60	.05
Capacity(liter)	Female	.11	60	.06	.94	60	.10

In table number 2 a Kolmogorov-Smirnov and Shapiro-Wilks test ($p>.05$) (Shapiro & Wilk, 1965; Razali & Wah, 2011), and a visual inspection of their histograms, normal Q-Q plots and box plots showed that the exam scores were approximately normally distributed for both BMI and Vital capacity.

Table 3: Test of Homogeneity of Variance of BMI and Vital Capacity

		Levene static	df 1	df 2	Sig.
BMI (score)	Based on Mean	1.24	1	118	0.26
Vital Capacity (liter)	Based on Mean	1.03	1	118	0.31

Asymptotic significances are displayed. The significances level is .05.

Table 3 Test of Homogeneity of Variance based on mean value BMI Levene statistic 1.24 df1 is 1, df2 is 118 and sig. value .026; Vital Capacity Levene statistic 1.03df1 is 1, df2 is 118 and sig. value is 0.31. All the data are normally distributed and parametric statically treatment is done for BMI and Vital Capacity.

Table 4: Independent Samples Test BMI and Vital Capacity

		Levene`s Test for Equality of Variances		*t*-test for Equality for Means		
		F	Sig.	*t*	df	Sig(2-tailed)
BMI (score)	Equal variances assumed	1.24	0.25	2.21	118	0.02
Vital Capacity (liter)	Equal variances assumed	1.02	0.29	12.33	118	0.00

The significances level is .05.

It is clearly shows from the table number 4 Levene`s Test for Equality of Variances and t-test quality for means BMI value F= 1.24, Sig. 0.25, *t* value 2.21, df 118, Sig (2-tailed) 0.02. Vital Capacity value is F= 1.02, Sig. 0.29, *t* value 12.33, df 118, Sig. (2-tailed) 0.00.

Table 5: Persona Correlation Sig. (2-tailed) in between variables

			Male	Female
Vital Capacity (liter)	Pearson Correlation	Training Age	0.05	0.54
	Sig. (2-tailed)		0.96	0.00
Vital Capacity (liter)	Pearson Correlation	BMI	- 0.12	0.13
	Sig. (2-tailed)		0.33	0.32

It is clearly shown from the table number 5, the correlation between vital capacity and training age for male cricket players 0.05 and significant level is 0.96; for female cricket players 0.54 and significant level is 0.00. The correlation between vital capacity and BMI for male cricket players -0.12 and significant level is 0.33; for female cricket players 0.13 and significant level is 0.32.

4. DISCUSSION

Fitness is the ability of the individual to live a healthy, satisfying, useful, and more productive and understood as the ability to do some work (Arafat, Rickta, & Mukta, 2020; Arafat, Rickta, Mukta, & Islam 2022; Rickta, Arafat, & Mukta, 2021; Ahsan, & Mohammad, 2018). Regular physical activity is an important part of a healthy lifestyle. It is associated with decreased risk of heart disease and obesity (Alobai, Bari, Ansari, Parrey, & Mohammad, 2022). Lung volumes rarely change over the next ten years despite the fact that the lungs mature at around 20 to 25 years of age and develop continuously from infancy through maturation (Sharma, & Goodwin, 2006). Lung volumes and amount of physical activity have a good relationship (Nystad et al., 2006). In this situation, the vital capacity of the lungs has been one of the most important roles of respiratory function, and it becomes obvious that lung disorders as well as some cardiac ailments are related to the vital capacity (Foster, 1924). An adult male's typical vital capacity is 4.8L, whereas a female's is 3.1L. Another research clearly shown that normal adult vital capacity ranges from 3 to 6 liters and is influenced by a variety of physiological parameters, including age, sex, weight, height, chest size, and general physical fitness (Bhatti et al., 2014; Hewlett, & Jackson, 1922). Physically inactive people of the same sex, age,

height, and weight are regarded to have lower vital capabilities to physically active people who participate in sports or at work (Rong et al.2008).

Present research indicates cricket male players are taller than female players in Bangladesh. In Bangladesh, male cricket players have greater average body weights than female players. Male cricket players in Bangladesh have higher mean BMI levels than female players. Males had larger lungs, more respiratory bronchioles, and broader airways widths than females of the same age and stature, according to standard morphmetric methods, which try to measure size, shape, and the relationship between size and shape (Hussain, Bari, Khan, Mohammad, & Ahmad, 2011; Martin, Castile, Fredberg, Wohl, & Mead, 1987; Thurlbeck, 1982).

The volume of adult female lungs is typically 10-12% smaller than that of males who have the same height and age (Bellemare et. al., 2003). Present investigation of lung capacity specially the amount of vital capacity of male cricket players are more than female players. A researcher shows average vital capacity both batsman and bowler of cricket players 3.21L (Thomas, 2017). Another research result clearly showed average vital capacity both high low performance cricket players 5843.33L (Kaur, & Singh, 2016). It was found that high altitude cricket players had better aerobic capacity, heart rate, and vital capacity than low altitude cricket players based on the Astrand Ryhming sub maximal aerobic test (Khan et al., 2019). Gender differences in static lung volumes and capabilities are explained by these structural characteristics in the male and female lungs. Males are more likely to have greater static lung volumes and capacities due to their propensity for larger anthropometric measurements (Carey et al., 2007). Men perform better than women of the same age in terms of forced vital capacity normal mean values and the ratio of forced expiratory to forced vital capacity (Morris et al., 1973). The Pearson Correlation is 0.05 between vital capacity and training age but between BMI and Vital capacity of cricket players correlation is -0.12. This study helps to identify the week point of lung function both male and female cricket players. Present study suggests to female cricket players to focus aerobic training specially develop vital capacity training in future. Circuit training and interval training for athletes significantly boosted Vital capacity and VO_2 max (Gokulkrishnan, 2018). The increase in the total lung capacity and vital lung capacity will occur through an increase in the ability of the respiratory muscles and the activation of the alveoli in a trained person (Hadiansyah et al., 2022).

5. CONCLUSION

The male cricket players taller and more heavy weight than the female cricket players. BMI ranges of male cricket players are better than the female cricket players. The amount of lung capacity specific vital capacity of male cricket players is higher than the female cricket players as gender process normal adult vital capacity too. The negative Pearson correlation stable between BMI and vital capacity.

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