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Comparative Relationships of Selected Physical Fitness Variables among Different College Students of Mekelle University Ethiopia Africa

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ABSTRACT

The purpose of the present study was to experiment, measure and compare the level of physical fitness among different college students of Mekelle University (MU), Endeyesus main campus. From a total population of 2738, the sample consisted of three hundred forty nine (N=349) first year male students with mean ±SD; Age: 19.92±.909, weight: 57.08±4.233, & height: 1.6887±.05739. The samples were selected using random sampling technique. FITNESSGRAM testing battery was used to measure physical fitness level of the students. To measure endurance of the cardiovascular fitness of the subjects, one mile run test was administered. To assess the abdominal muscle strength & endurance, curl-ups test was applied. Trunk lift Test was used to evaluate the strength and flexibility of trunk extensor, and Back-Saver Sit and Reach test was used to measure lower back and hamstring flexibility of the subjects. To compare the mean differences among different college students one-way analysis of variance (F Ratio) was applied with the help of SPSS (version, 16.00) Software. To test significant mean differences Scheffe's Post Hoc Test was applied. The level of significance was set at 0.05. There were statistically significant mean differences obtained in cardiovascular fitness, abdominal muscle strength and endurance, and strength and flexibility of trunk extensor among different college students except lower back and hamstring flexibility about which no significant mean differences was seen. The finding reveals that students from the CDANR exhibited superior performance in CVF and AMSE. On the other hand, students from CNCS demonstrated better performance on BEMSF than students from the other two colleges (CDANR and EIT-M) but statistically no significant mean difference was showed on LBHMF among CNCS, CDANR, and EIT-M students. From these findings, it is concluded that statistically significant difference had been shown in CVF, AMSE, and BEMSF except LBHMF which did not show statistically significant difference.

Key Words: health-related physical fitness, physical activity, and colleges' students

Introduction

Human body is created to function well when it is in active condition. Physical fitness avoids an individual from being infected or suffers from illness; stay healthy both mentally and physically throughout their lives. In short term, they are able to perform daily chores easily and able to prevent chronic diseases such as heart attack, high blood pressure, cancer, diabetes, and osteoporosis [1].

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Physical fitness is a crucial pillar contributing a lot for the health of an individual so that it affects our ability to function and be physically active and, at poor levels, is associated with such health outcomes as diabetes and cardiovascular diseases [2]. Physical fitness according to the President's Council on Fitness is a broad quality involving medical and dental supervision and care immunization and other protection against disease, proper nutrition, adequate rest, relaxation, good health practices, sanitation and other aspects of healthful living. It further states that exercise is an essential element to achieving and maintaining physical fitness [3].

The benefits of a physical fitness program include improved capability to perform specific physical tasks, improved ability to mobilize the body efficiently, improved tolerance to fatigue, reduced risk during physical attacks, better psychological preparation, and reduced stress and associated health risks [4]. In this sense, data on physical fitness status of students in Mekelle University seem to be scarce. Therefore, the aim of this study wasto measure the physical fitness level of students so that the results obtained can be very helpful to promote good health in the early stages.

Methods

Selection of subjects

In this study, random sampling technique was used to draw samples of first year male students studying in different colleges in Mekelle University, from two colleges and one institute. The size of samples was determined by using a Simplified Formula for Proportions [5] which provides a simplified formula to calculate the sample size. From a total of 2,738 populations, 349 samples were drawn. These samples were distributed for colleges and departments using statistical formula, Proportionate for Sample Size Determination. They were aged 19 to 22 years old with mean ±SD of age: 19.92±.909, weight: 57.08±4.233, & height: 1.6887±.05739 respectively. All of the samples were participated willingly and voluntarily in this study.

Selection of variables and tests

There are three different programs that provide excellent examples of effective tools for measurement within physical education: FITNESSGRAM, Physical Best, and the President's ChallengePhysical Activity and Fitness Awards Program. The FITNESSGRAM is a comprehensive health-related fitness testing battery or assessment program designed specifically for youth that was developed in 1982. The items measure aerobic capacity, body composition, muscular strength and endurance, and flexibility [6]. It tests all students regardless of age, gender, or ability. Students are encouraged to be self-aware of health- related fitness and take responsibility by setting personal fitness goals. When students focus on the process of doing their personal best, a more positive lifelong impact is achieved. It provides a number of options for each performance tasks so all students who have the maximum opportunity to complete the tests. In this present study, the variables were selected based on the review of

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related literature, experts, feasibility of the criteria, availability of tools, and the relevance of the variables to the present study. The Physical Fitness Test (PFT) measures four aspects so that the investigator selected cardiovascular fitness, muscle strength, muscular endurance, and flexibility as criterion variables. Appropriate tests were used cardiovascular fitness – one mile run test, muscle strength – trunk lift, muscular endurance – Curl up and flexibility - Back-Saver Sit and Reach test.

Data collection

For data collection first permission was taken from respective sources. All the necessary information about the study (purpose, procedures etc.) was explained for the participants in advance. Having experts, instruments for measuring purposes, facilities, and sufficient warming up exercises, necessary data was collected with standardized procedure by administering physical fitness tests already selected. Tests were administrated in proper sequence (Back-Saver Sit and Reach, Trunk Lift, Curl Up and One-Mile Run) on the same time of each day in a way that they can accomplish comfortably. To reduce the error and increase the reliability of the test standardized equipments were used.

Statistical technique

The Statistical Package for the Social Sciences (SPSS; version 16.0) was used for the data analysis. To compare means differences among different college students on selected physical fitness variables, one-way analysis of variance ('F' Ratio) was used. To test the significant means differencesScheffe's Post Hoc Test was applied. The level of significance was set at 0.05. Descriptive statistics such as mean, and standard deviation was also obtained to describe the physical characteristics of the study subjects (students).

Results

Table 1: Physical Characteristics of the Students-Descriptive Statistics

Parameters	N	Minimum	Maximum	Mean	Std. Deviation
Age	349	19	22	19.92	.909
Weight	349	46	68	57.08	4.233
height	349	1.55	1.89	1.6887	.05739

N= number of participants

The results concerning the significant difference between means on the selected HRPF variables among different college students were analyzed using one-way analysis of variance (ANOVA) and presented as follows.

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Table 2: The significant means differences in Cardiovascular Fitness (CVF**) of college students**

Variable	Source of variables	Sum of squares	degree of freedom	Mean square	F Ratio
CVF	Between groups	1.717E9	2	8.583E8	18.876* (p = 0.000)
	Within groups	1.573E10	346	4.547E7	
	Total	1.745E10	348		

*****Significant at 0.05

Table 3: Scheffe's Post Hoc Tests for the significant means differences in Cardiovascular Fitness/Endurance

(I) College of the students	(J) College of the students	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
CNCS	CDANR	4365.790*	1093.315	.000	1678.00	7053.57
	EIT-M	-1505.151	866.644	.223	-3635.69	625.39
CDANR	CNCS	-4365.790*	1093.315	.000	-7053.57	-1678.00
	EIT-M	-5870.941*	955.521	.000	-8219.98	-3521.91
EIT-M	CNCS	1505.151	866.644	.223	-625.39	3635.69
	CDANR	5870.941*	955.521	.000	3521.91	8219.98

*. The mean difference is significant at the 0.05 level.

Concerning Cardiovascular fitness (CVF) as presented in table 2, statistically significant means difference was showed among college students in which calculated 'F' Ratio for this variable was 18.876 at 0.05 level of significance and tabulated 'F' value was 3.00 at 0.05 level of significance (i.e. calculated F ratio is greater than tabulated 'F' value). Therefore, students from the College of Dry-land Agriculture and Natural Resources (CDANR) demonstrated better performance than the other two colleges. In contrast, students from Ethiopian Institute of Technology (EIT-M) exhibited the least performance on this variable.

Table 4: The significant means differences in Abdominal Muscle Strength and Endurance (AMSE)

Variable	Source of variables	Sum of squares	degree of freedom	Mean square	'F' Ratio
AMSE	Between groups	4420.234	2	2210.117	17.774* (p = 0.000)
	Within groups	43024.317	346	124.348	
	Total	47444.550	348		

*Significant at 0.05

Table 5: Scheffe's Post Hoc Tests for the significant means differences in AMSE

(I) College of the students	(J) College of the students	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
CNCS	CDANR	-.780	1.808	.911	-5.22	3.66
	EIT-M	6.807*	1.433	.000	3.28	10.33
CDANR	CNCS	.780 *	1.808	.911	-3.66	5.22
	EIT-M	7.587	1.580	.000	3.70	11.47
EIT-M	CNCS	-6.807*	1.433	.000	-10.33	-3.28
	CDANR	-7.587*	1.580	.000	-11.47	-3.70

*. The mean difference is significant at the 0.05 level.

As presented in table 4, it was evident that there was statistically significant mean difference in abdominal muscle strength and endurance (AMSE) among CNCS, CDANR, and EIT-M students in which calculated 'F' ratio for AMSE was 17.774 at 0.05 level of significance and the tabulated 'F' value was 3.00 at 0.05 level of significance (i.e. calculated 'F' ratio is greater than tabulated 'F' value). From this one can understand that students from CDANR and CNCS had shown better performance than students from EIT-M and CDANR demonstrated superior performance.

Table 6: The significant means differences in Back Extensor Muscle Strength and Flexibility (BEMSF)

Variable	Source of variables	Sum of squares	degree of freedom	Mean square	'F' Ratio
BEMSF	Between groups	64.035	2	32.018	5.844* (p = 0.003)
	Within groups	1895.741	346	5.479	
	Total	1959.777	348		

*Significant At 0.05

Table 7: Scheffe's Post Hoc Tests for the significant means differences BEMSF

(I) College of the students	(J) College of the students	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
CNCS	CDANR	1.281*	.380	.004	.35	2.21
	EIT-M	.692	.301	.072	-.05	1.43
CDANR	CNCS	-1.281*	.380	.004	-2.21	-.35
	EIT-M	-.588	.332	.209	-1.40	.23
EIT-M	CNCS	-.692	.301	.072	-1.43	.05
	CDANR	.588	.332	.209	-.23	1.40

*The mean difference is significant at the 0.05 level.

As shown clearly in table 6, Back Extensor Muscle Strength and Flexibility (BEMSF) had shown significant mean difference among CNCS, CDANR, and EIT-M. The calculated 'F' ratio was 5.844 at 0.05 level of significance which is greater than the tabulated 'F' value (3.00) at 0.05 level of significance. Students from CNCS showed better performance than EIT-M and CDANR.

Table 8: the significance of means differences in LowerBack and Hamstring Muscle Flexibility(LBHMF)

Variable	Source of variables	Sum of squares	degree of freedom	Mean square	'F' Ratio
LBHMF	Between groups	10.883	2	5.442	1.187^{NS} (p = 0.306)
	Within groups	1585.885	346	4.583	
	Total	1596.768	348		

^{NS} Not significant at the 0.05 level

As presented in table-8, statistically no significant mean difference was showed in LowerBack and Hamstring Muscle Flexibility (LBHMF) among CNCS, CDANR, and EIT-M students. The calculated 'F' ratio for LBHMF variable was 1.187 at 0.05 level of significance which was less than the tabulated 'F' value (3.00) at 0.05 level of significance.

Discussion: The aim of the present study was to find out and compare means differences of selected health-related physical fitness variables (cardiovascular fitness, flexibility, muscular strength, and muscular endurance) among college students (CNCS, CDANR, and EIT-M) in Mekelle University in relation to their college. Throughout the study, 349 study subjects from two colleges and one institute were participated to determine their physical fitness level. Four tests were administered to measure these physical fitness variables.

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It was hypothesized that students from different colleges may show significant differences in cardiovascular fitness, flexibility, muscular strength, and muscular endurance. Analyzing raw data using analysis of variance (ANOVA), Scheffe's Post Hoc test was applied to test the significant means differences in order to prove the hypothesis already stated. The findings of this study clearly indicated that, statistically there was a significant means difference obtained on cardiovascular fitness, and muscular strength and muscular endurance among CNCS, CDANR, and EIT-M.

The Scheffe's Post Hoc Test revealed that;

- Significant means difference was showed in cardiovascular fitness among CNCS, CDANR, and EIT-M in which students from CDANR performed well than the two other colleges (CNCS and EIT-M). Since 'F' calculated is greater than 'F' tabulated value, this is enough evidence to accept the hypothesis or to reject the null hypothesis.

- At 5% level of significance there is sufficient evidence to support the researcher hypothesis that statistically there was significant means difference observed in abdominal muscle strength and endurance among CNCS, CDANR, and EIT-M students. Students from CDANR performed better than the two other colleges (CNCS and EIT-M). Hence, the hypothesis was accepted or the null hypothesis was rejected.

- Significant means difference was showed in Back Extensor Muscle Strength and Flexibility (BEMSF) among CNCS, CDANR, and EIT-M students in which students from CDANR and CNCS showed better performance than EIT-M so the hypothesis was accepted.

- Since tabulated 'F' ratio is greater than calculated 'F' ratio at 5% level of significance, statistically there was no significant means difference in Low Back and Hamstring Muscle Flexibility (LBHMF) among CNCS, CDANR, and EIT-M students. Hence, this is enough evidence to reject the researcher hypothesis/ accept the null hypothesis.

As analysis of variance (ANOVA) clearly presented, in overall performances, students from CDANR showed superior performance (Significant means difference) than the other two colleges (CNCS and EIT-M). The findings from this study support a results obtained from the research previously done [7] which demonstrated significant means differences in physical fitness level in-between 1st year male college students in which physiotherapy students exhibited better performance on overall tests.

Conclusion

Based on the findings obtained from this study, the following conclusions were drawn.

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- As findings revealed, at 5% level of significance, there is enough evidence to support the claim that there were differences in physical fitness level among students of different Colleges. Statistically significant means differenceswere showed in Cardiovascular Fitness, Abdominal Muscle Strength and Endurance, and Extensor Muscle Strength and Flexibility.

- Students did not demonstrate reasonable difference in the level of physical fitness-Lower Back and Hamstring Muscles Flexibility so statistically no significant difference was observed.

- In overall physical fitness variables students from the College of Dryland Agriculture and Natural Resource demonstrated superior performance. The probable reason for this better performance could be, unfortunately students from the CDANR have an exposure for the practice of physical activities since they have been taking physical education course.

Reference:

1. M. S. O. Fauzee, R. I. R. L. Ahmad, S.A. Rashid, A. Din, H. Hod, Sport Science Students' Fitness level at University Malaysia Sabah, European Journal of Social Sciences, 12 (2010) 538-544.
2. Fitness Measures and Health Outcomes in Youth: Report Brief, Institute of Medicine of National Academy of Sciences, (2012) Washington, DC.
3. M. Jourkesh, I. Sadri, A. Ojagi, A. Sharanavard, Comparison of Physical Fitness Level among the Students of Islamic Azad University, Shabestar Branch, Annals of Biological Research, 2 (2011) 460-467.
4. Q. Sonia (2009) Physical Fitness and Wellness at the Hallandale Beach Police Department, SLP Research Papers, Florida department of law enforcement, Florida Texas School Health Advisory Committee 2008, Fitness gram Guide for Parents and Guardians, Texas, USA.
5. G.D. Israel (1992) Sampling the Evidence of Extension Program Impact, PEOD-5, Department of Agricultural Education and Communication, and extension specialist, Program Evaluation and Organizational Development, Institute of Food and Agricultural Sciences (IFAS), University of Florida.
6. J. R. Morrow, J. S. Tucker, A. W. Jackson, S. B. Martin, C. A. Greenleaf, T. A. Petrie, Meeting Physical Activity Guidelines and Health-Related Fitness in Youth, American Journal of Preventive Medicine, 44 (2013) 439–444.
7. A. Kotwica, P. Majcher, Physical fitness level of 1 year medicine and physiotherapy students of lublin medical university, Polish Journal of Sport and Tourism, 19 (2012) 107-112.