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## Effect of traditional dances on physiological variables among high school students in Ethiopia

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### Abstract

The purpose of this study was to evaluate the effect of Tigray Traditional dances on selected physiological variables among high school students. To achieve the purpose of this study, 100 high school students were selected randomly. The selected subjects were categorized into experimental group (Awris, Hura, Kuda and Shediva) and control group, with twenty subjects in each group (n=20). The experimental groups performed Traditional dances for a period of 16 weeks three days per week whereas participants in the control group were informed to follow their usual activity. All subjects were tested on selected criterion measures of selected physiological variables namely resting heart rate, systolic and diastolic blood pressure prior to and after the 16 weeks of the training period. The data pertaining to the variables in this study were statistically examined by using ANOVA for each variable separately, whenever 'F' ratio of adjusted post-test was found to be significant, the Scheffe's test was used to determine the paired mean differences. The level of significance was fixed at 0.05. Following the training program, significant change was observed on resting heart rate, systolic and diastolic blood pressure as compare the experimental group with the control group. Therefore it can be concluded that Tigray Traditional dance training program can notably improve physiological variables of high school students.

**Keywords:** Traditional dance, resting heart rate, blood pressure, high school students

### Introduction

Today the health problems that were common a century ago do not exist. They are replaced by conditions associated with hypokinetic diseases such as high blood pressure, obesity, coronary heart disease and so on [1]. Therefore to prevent such conditions and have healthy life style fitness is a key factor. To achieve this healthy life style, humans perform variety of activity such as doing morning or evening walk, joining gyms, swimming clubs, martial arts, recreational clubs and so on, and as a result one has to spend lots of money. Out of infinite options, traditional dance is also an approachable system to achieve the target of fitness [2].

For the physiological systems of the body to be fit, they must function well enough to support the scientific activity that the individual is performing moreover different activity make different demands upon the organism with respect to the circulatory, respiratory metabolic and neurologic processes which are specific to the activity [3].

Traditional Dance is corporeal in nature and as such it is a physical art within the domains of anatomy, biomechanics, health, physics and physiology. Dance helps participants develop physical fitness and thus shares many of the health benefits of other sporting events [4]. Dance has a huge potential for both young and old in contributing to healthier lifestyles. It is an art form which can truly engage people both mentally and physically and is particularly appealing to girls and those who are turned off by competitive sports [5].

A number of studies have investigated the health impacts of Traditional dance among school-aged young people with encouraging results. Specifically, research indicates that weekly creative and contemporary dance classes can significantly enhance aerobic fitness and lung capacity. Culturally-specific dances included salsa, cumbia, quebradita, merengue, Macarena, and other Latin dances improved the health condition of the population [6].

Being in general an aerobic exercise, Traditional dance brings well known benefits, such as increase physical fitness, reducing the risk of cardiovascular disease and weight control and

other health benefits commonly associated with physical fitness and also contributes to the physiological and psychological well-being. Scientific evidence supported Traditional dance as an effective way of facilitating students to reach the recommended amount of regular physical activity [7]. According to Flores [8], students who participated in a dance pilot program three times per week for 12 weeks had significantly lower body mass index (BMI) and resting heart. To strengthen the above finding, another study found that dancing lowered the resting heart rate and blood pressure and increased the maximum aerobic capacity in young male ballet dancers [17].

Tigray regional state is rich in Traditional dances. From historical time's Traditional dance has always been a constant source of leisure for Tigray people at different conditions like weddings and many other ceremonial and ritual gatherings. As stated by Hanna, [9] dance provides an opportunity for expression of aesthetic and artistic experiences and has the capacity to stimulate imagination, sensitivity and the appreciation of movement. Participating in traditional dance is equivalent to participating in sports and other physical activity. Several studies have proved that the human body can be strengthened by physical activity and can also be impaired by physical inactivity [10].

## Methodology

### Participants

Out of 207 students 100 male and female students aged 15-17 years, from grade nine and ten Mekelle University community school was taken using a scientific sample determination technique or formula [11] and finally the samples were selected using simple random sampling technique and they were participated voluntarily.

$$n = \frac{1}{\frac{1}{n_0} + \frac{1}{N}}$$

Where: n is sample size,  $n_0$  is before considering the sample, N is total population and Confidence level was 95%, Precision level was  $\pm 7\%$  and Maximum variability was 0.5.

### Study design

Randomized controlled parallel trial was used for this study because it was considered the most appropriate [12]. All the 100 participants were randomly categorized into four experimental and one control group, each group consists of twenty participants ( $n=20$ ). The experimental group was given the four traditional dances of Tigray regional state (Awris, Hura, Kuda and Shadiva) for a period of sixteen weeks excluding the period of utilized for pre-test and post-test. The control group was not participated in any training program during the experimental period.

### Data collection tools

To collect data, first permission was taken from the respective sources that were from administrators, students and experts. All the necessary information about the study was explained to the participants in advance. All the participants were orient

to ready for the pre-test in the physiological variables. Having experts, instruments and facilities for measuring purpose necessary data was collected with standardized procedure in both the pre and post-tests.

**Table 1:** Variables and criterion Measures

S. No	Variables	Tests/tools used	Units
1	Resting heart rate	Pulse rate	Beat per minute
	Blood pressure	Sphygmomanometer	MmHg

### Training protocol

The dance styles used were characterized as a traditional dance of Tigray. It involves a variety of steps, such as delicate neck motion, rhythmical shoulder movement, jumping steps, courting and so on. The physical demands of the dance classes were gradually increased, with the initial four weeks performed at a very light intensity. The program was taken sixteen (16) weeks three times per week. Each dance classes consisted of warm-up, main dance and cool-down sections, with music used to increase enjoyment and aid in highlighted various movement dynamics. The warm-up was lasted for 10 minutes and involved gentle joint mobility, alignment, body awareness and weight transference activities, as well as opportunities for individual choice and expression. The main dance section was lasted 40 minutes and consists of increasingly complex traditional dance movements that offered varied dynamic and expressive phrasing of the upper and lower body. These provided accumulative complexity e.g. awareness of space, directional change, and use of levels which were progressed from the warm-up and include partner dancing and social interaction.

The cool-down lasted 5 minutes and involved gentle movements of the major bodily joints as well as deep and slow inhalation and exhalation respiration cycles.

The participants of the control group were not allowed to participate in any of the training programs. However, all the participants of different training groups and control group were participated in their routine activities of the school.

### Statistical technique

The data collected were analysed statistically using SPSS statistical software version 25 under the guidance of a statistician.

Descriptive statistics, mean and standard deviation were found in order to get the basic idea of the data distribution. The significance of adjusted post-test mean differences between the experimental and control group for each variable ANOVA (Analysis of variance) test was used. Whenever the 'F' ratio was found to be significant, Scheffe's test was used to determine which of the paired means differed significantly. Level of significant was set at 0.05.

### Results

The following tables illustrate the statistical results as an effect of Traditional dances of Tigray regional state on resting heart rate and blood pressure (systolic and diastolic blood pressure) among high school students.

**Table 2:** Analysis of variance for the pre -test and post- test data on resting heart rate, systolic blood pressure and diastolic blood pressure score of Awris, Hura, Kuda, Shediva and control groups

Variable	Tests		Awris Dance	Hura Dance	Kuda Dance	Shediva Dance	Control group	S O V	Sum of squares	df	Mean squares	F ratio
Resting Heart rate	Pre test	Mean	71.35	71.30	70.15	69.15	69.4	B	83.360	4	20.840	0.684
		SD	4.29	6.84	3.89	6.53	5.39	W	2892.800	95	30.451	
	Post test	Mean	68.80	67.35	67.75	66.00	69.25	B	112.836	4	28.209	24.005*
		SD	3.74	4.46	3.83	6.12	5.44	W	109.287	95	1.175	
	Adjusted Posttest	Mean	67.930	66.521	67.856	66.918	69.924	B	138.336	4	34.584	11.331*
			W	286.900	94	3.052						
Systolic Blood Pressure	Pre test	Mean	1.04	1.005	1.035	1.03	1.06	B	384.000	4	96.000	0.695
		SD	11.91	13.26	12.68	9.23	11.25	W	13120.000	95	138.105	
	Post test	Mean	94.00	93.75	93.00	93.50	1.05	B	2104.000	4	526.000	6.287*
		SD	8.36	8.25	10.31	7.96	10.51	W	7948.750	95	83.671	
	Adjusted Posttest	Mean	93.398	95.825	93.067	93.902	1.031	B	1378.341	4	344.585	15.650*
			W	2069.763	94	22.019						
Diastolic Blood Pressure	Pre test	Mean	69.50	69.00	69.2	71.50	68.25	B	117.500	4	29.375	0.472
		SD	7.59	6.80	7.122	7.96	9.63	W	5907.500	95	62.184	
	Post test	Mean	63.00	61.75	60.75	62.25	67.75	B	594.000	4	148.500	4.415*
		SD	4.41	4.94	4.37	5.49	8.65	W	3195.000	95	33.632	
	Adjusted Posttest	Mean	63.000	62.081	60.915	60.928	68.578	B	803.781	4	200.945	30.779*
			W	613.701	94	6.529						

\* F (0.05) (4, 95; 4, 94) = 2.46 \*Significant at 0.05 level of confidence.

**Table 3:** Scheffe’s test for differences of the adjusted post-test paired means of resting heart rate, systolic blood pressure and diastolic blood pressure

Variable	Adjusted Posttest Mean					Mean Differences	Confidence Interval
	Awris Dance	Hura Dance	Kuda Dance	Shediva Dance	Control group		
Resting Heart Rate	67.93	66.521				1.409*	0.56
	67.93		67.856			0.074	
	67.93			66.918		1.012*	
		66.521	67.856			1.335*	
			67.856		69.924	2.068*	
				66.918	69.924	3.006*	
	67.93				69.924	1.994*	
		66.521			69.924	3.403*	
			67.856	66.918		0.938*	
Systolic Blood Pressure	93.398	95.825				2.427*	1.50
	93.398		93.067			0.331	
	93.398			93.902		0.504	
		95.825	93.067			2.758*	
			93.067		1.031	9.992*	
				93.902	1.031	9.157*	
	93.398				1.031	9.661*	
		95.825			1.031	7.234*	
			93.067	93.902		0.835	
Diastolic Blood pressure	63.000	62.081				0.919*	0.80
	63.000		60.915			2.085*	
	63.000			60.928		2.072*	
		62.081	60.915			1.166*	
			60.915		68.578	7.663*	
				60.928	68.578	7.650*	
	63.000				68.578	5.578*	
		62.081			68.578	6.497*	
			60.915	60.928		0.013	
	62.081		60.928		1.153*		

\*Significant at 0.05 level

The result presented in table 2 indicate that, the Traditional dance treatment groups had shown significant improvement in physiological variables namely resting heart rate, systolic and diastolic blood pressure when compared with a control group as well as base line after underwent sixteen weeks Traditional dance training program. And table 3 revealed that, significant

difference were observed between the groups except between Awris and Kuda and Hura and Shediva in resting heart rate, between Awris and Kuda, Awris and Shediva and Kuda and Shediva in systolic blood pressure and between Kuda and Shediva in diastolic blood pressure.

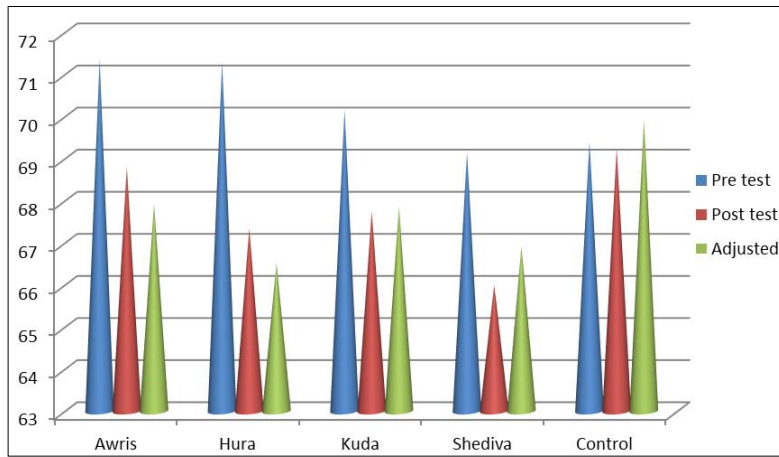


Fig 1: Bar diagram on pre test, post test and adjusted post test means of Resting heart rate

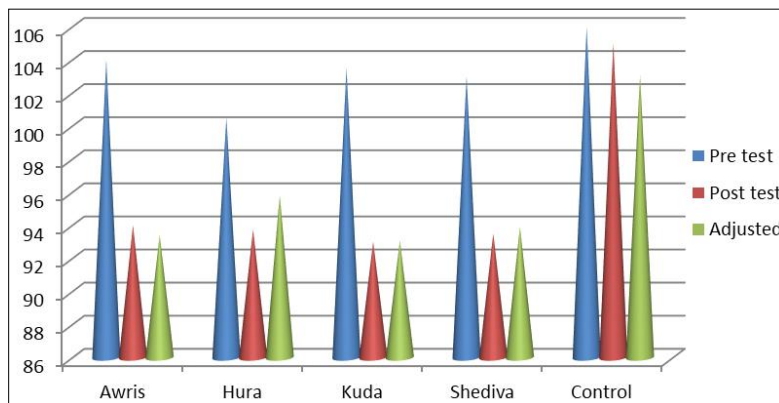


Fig 2: Bar diagram on pre test, post test and adjusted post test means of Systolic blood pressure

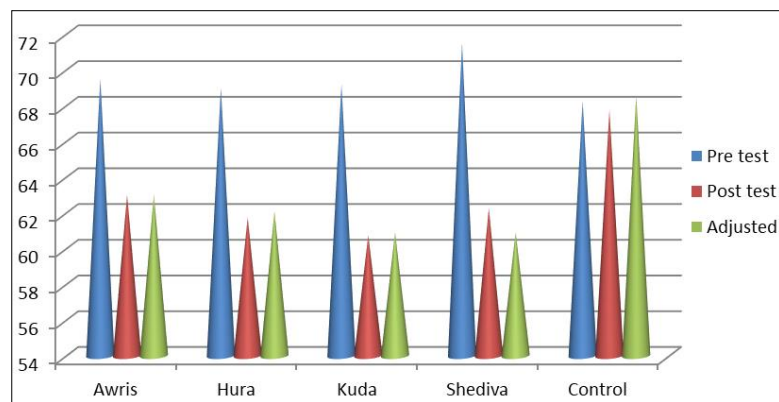


Fig 3: Bar diagram on pre test, post test and adjusted post test means of Diastolic blood pressure

**Discussion**

For the physiological systems of the body to be fit, they must function well enough to support the scientific activity that the individual is performing moreover different activity make different demands upon the organism with respect to the circulatory, respiratory metabolic and neurologic processes which are specific to the activity [3]. To have an effective physiological functioning one should be fit physically. To achieve this humans perform variety of activity such as morning or evening walk, performing gym activities, joining swimming clubs, martial arts and so on, and as a result one has to spend lots of money out of infinite options, traditional dance is an approachable system [2]. The finding of this study proved that the sixteen weeks Traditional dance training program significantly improve the resting heart rate of high school students this is likely due to the inhibition of sympathetic nervous system activation and increased

activation of the parasympathetic nervous system owing to the effects of cardiovascular adaptation caused by traditional dance training program and further resting heart rate is associated with physical fitness, and resting heart rate can be reduced through improved physical fitness [13, 14]. In line with this as an aerobic exercise traditional dance has the immediate and temporary effect of lowering blood pressure through dilating the peripheral blood vessels, and exercise training has the ongoing effect of lowering blood pressure by reducing sympathetic nervous system activity [15]. Physical fitness has proven to result in positive effects on the body's blood pressure because staying active and exercising regularly builds up a stronger heart. The heart is the main organ in charge of systolic blood pressure and diastolic blood pressure. The more physical activity that one engages in, the easier this process becomes, resulting in a fit individual [15]. Through regular physical fitness, the heart does not have to work as

hard to create a rise in blood pressure, which lowers the force on the arteries, and lowers the overall blood pressure [16]. A number of studies have investigated the health impacts of Traditional dance among school-aged young people with encouraging results. Specifically, research indicates that weekly creative and contemporary dance classes can significantly enhance aerobic fitness and lung capacity. Dance can significantly lowered the resting heart rate and blood pressure and increased the maximum aerobic capacity in young male ballet dancers [17] proved that. Another study conducted by Adiputra N [18], revealed that dance program significantly improved blood pressure in a 67 middle-aged pre-hypertensive and hypertensive women. In a physiological study [19] and [20] fund that, Swedish folk dance significantly lowered the heart rate of intervention group than the control group.

### Conclusion

It was concluded from the results of the study that, the Traditional dance treatment groups had shown significant improvement in physiological variables namely resting heart rate, systolic and diastolic blood pressure when compared with a control group as well as base line after underwent sixteen weeks Traditional dance training program.

### Conflict of interest statement

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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