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Comparison of QRS complex in graded treadmill test among different Sports Men.

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Abstract

The study was conducted on a total of 30 male volunteers in the age range of 16 to 22 years. The subjects were grouped in to Aerobic, Anaerobic and Sedentary groups based on their training specialty. The aerobic group consisted of 8 trained cyclists while the anaerobic group consisted of 3 sprinters, 4 footballers and 5 wrestlers. Both the aerobic and anaerobic groups were trained for a year and above. The sedentary groups comprised of 10 students from different departments of Punjabi University, Patiala and were not taking part in any regular exercise program. The main aim of the study was to compare the ECG responses to graded treadmill exercise among the aerobic, anaerobic and sedentary groups as well as to report the effect of intensity of exercise on the ECG. All the subjects of the study were administered a graded treadmill test using Modified Bruce Protocol that consisted of nine stages each of which lasted for 3 minutes. All the subjects completed all the nine stages. Exercise test was performed on Electrical Treadmill. Heart rate and ECG responses were monitored by using a standard 12-lead system with a computerized Electrocardiograph machine. The Grade of the treadmill was kept constant for the first three stages (0%) and then starting from stage 4 grade was increased to 12% where after it was progressively increased by 2% until stage 9 to 22%. The speed of the treadmill belt was 2.70 Kilometer per hour in the first three stages thereafter gradually increased to 4.00, 5.40, 6.70, 8.00, 8.80 and 9.60 kilometer per hour at stage 4, 5, 6, 7, 8 and 9 respectively. The workload or intensity was 4.80, 7.10, 10.00 and 14.00 MET at stages 3, 4, 5 and 6 respectively; and 20 MET through stage 7 to 9

Introduction

The heart as a pumping organ undergoes a rhythmical contraction and relaxation due to the action potential generated by special excitatory and conduction system of the heart. The force and rate of myocardium contraction determines the amount of blood pumped by the heart and distribution to the various tissues of the body. This demand is tremendously enhanced during exercise. The electrical events of the heart produce mechanical events like systole which in turn pumps the blood out of the heart and raise the blood pressure to move blood to the lungs and peripheral regions. This action potential when travels through different conduction pathways of the heart create different waves .The duration and amplitude of these waves are crucial in indicating the atria and ventricular contraction and recovery time. Therefore, based on the above background the present study is planned to compare the duration and amplitudes of the different ECG waves among the normal sedentary, aerobic and anaerobic group of players as well as explore the effect of the intensity of effort on the wave amplitude and durations characteristics.

The study was conducted on a total of 30 male volunteers with age range of 16 to 22 years. All the subjects were healthy. The total subjects were grouped in to Aerobic, Anaerobic and Sedentary groups. The aerobic group consisted of 8 trained cyclists who represented

Punjabi University, Patiala in state and national level competitions. The anaerobic group consisted of 3 sprinters, 4 footballers and 5 wrestlers. They were also trained athletes participating in the state and national level representing Panjabi university, Patiala. Both the aerobic and anaerobic groups were trained for a year and above. The sedentary groups were 10 in number and they all were students from different departments of Punjabi University, Patiala and were not taking part in any regular exercise program.

Material Exercise test was performed on Electrical Treadmill (Car-division) and heart rate and ECG responses were monitored by standard 12 lead system using Computerized Electrocardiograph machine.

Methods One day before the exercise test, subjects were informed not to take food for at least two hours prior to the test. During the test day subjects were screened using life style assessment inventory questionnaire. They were also motivated to complete all the nine stages unless they encounter any complications related to their health.

Results & Discussion

the results pertaining to the study entitled Comparison Of QRS complex in graded treadmill test among normal Sedentary, aerobic and Anaerobic Sports Men ‘conducted on 30 males belonging to aerobic, anaerobic and sedentary groups have been presented in the form of tables and illustrated with the help of suitable figures where ever necessary. For the sake of convenience and systematic presentation of results, the results of the study have been presented and discussed with respect to the different stages of exercise as per Modified Bruce Protocol in the following order.

QRS-Complex

- Duration and amplitude

The level of participation of players was up to state and national level.

- **QRS complex**

The QRS-complex represents ventricular depolarization. Ventricular rate can be calculated by determining the time interval between QRS-complexes. The duration of the QRS-complex is normally 0.06 to 0.1 seconds. This relatively short duration indicates that ventricular depolarization normally occurs very rapidly. If the QRS-complex is prolonged (> 0.1 sec), conduction is impaired within the ventricles. This can occur with bundle branch blocks or whenever a ventricular foci (abnormal pacemaker site) becomes the pacemaker driving the ventricle. Such ectopic foci nearly always results in impulses being conducted over slower pathways within the heart, thereby increasing the time for depolarization and the duration of the QRS-complex.

Table 2 enlists the mean values of QRS- complex duration during different stages of Modified Bruce Protocol among sedentary, aerobic and anaerobic groups of players. Statistical comparison of the mean values reveals existence of non-specific differences among the three groups at different stages of the treadmill exercise (Tables,1&2). Although the differences in the

mean values have no statistical significance but consistently lower mean QRS duration is observed in the case of aerobic group as compared to the sedentary and anaerobic groups. QRS-complex represents ventricular depolarization which involves the interventricular septum and simultaneous left and right ventricular stimulation. The lesser duration of ventricular depolarization in case of aerobic group is indicative of faster spread of electrical activity in the ventricles and more time available for the recovery of the heart. Sympathetic stimulation increases conduction velocity, whereas ischemia tends to decrease conduction velocity by slowing the rapid upstroke (phase 0) of the ventricular action potential. It has been postulated that differences in QRS duration from rest to exercise might serve as a marker of ischemia. A subtle prolongation of QRS duration during exercise was demonstrated by *Ahnve et al (1986).* Modest exercise QRS shortening in normal subjects was found by *Michaelides et al (1993).* The magnitude of change in these studies was small, in the range of 3 ms of shortening in normal subjects and 6 to 8 ms of lengthening in coronary disease patients. *Berntsen et al (1995)* were able to associate more marked exercise-induced QRS prolongation, in the range of 15 ms, with increased risk for subsequent ischemia-related ventricular tachycardia. Computer-based optical scanning for more precise measurement of QRS duration during exercise testing was introduced by *Cantor et al (1997)* and was found to outperform standard ST-segment criteria for identification of disease in women *(Cantor et al, 1998; Yosefy et al, 2004)* and for the detection of post–percutaneous transluminal coronary angioplasty restenosis *(Efrati et al, 2003).* These methods are amenable to computer-based implementation in digital ECGs. It seems that the aerobic group of activities produces positive effects on the conduction channels of the ventricles facilitating electrical spread of impulses and giving more time to the heart to recover specially at higher heart rates.

Table 2 depicts the mean QRS amplitude values along with its statistical derivatives among the three groups i.e., aerobic, anaerobic and sedentary at different stages of graded treadmill exercise. It is observed that amplitude of the overall QRS-complex demonstrate wide variations in the mean value of QRS-wave. The mean amplitude has been observed to be 1.66 mV, 1.85 mV and 2.17 mV in the sedentary, anaerobic and aerobic groups respectively at stage 1 of the Modified Bruce Protocol. In the aerobic and anaerobic groups a general feeble tendency of increase in the mean amplitude is observed with increase in the intensity of the effort Application of analysis of variance reveals existence of significant differences in the mean QRS-wave amplitudes among the three groups at stages 2 through 8 of the treadmill exercise (Tables 3to8). The differences are of statistical significance at all stages of Modified Bruce Treadmill Protocol except at stage 1.

Further exploration with Schafee's post-hoc test demonstrates that aerobic group of players on average have significantly greater QRS amplitude than their anaerobic and sedentary counterparts (Tables 3&8). The observation of the present study indicates greater ventricular myocardial mass involved in the pumping of blood during exercise in case of aerobic group of players. This is an adaptive process by virtue of which heart of athletes undergoing aerobic training are able to pump more blood per beat i.e., stroke volume and therefore are able to meet the oxygen demand of exercise at relatively lower heart rates compared to the sedentary and anaerobic groups of athletes. The sedentary and anaerobic groups of players accomplish the task of meeting of the oxygen demand of exercise with higher heart rates and

lower stroke volumes. This is indicated by the results of the present study between the three groups in case of minute heart rates and RR interval at a comparable stage of exercise. Anaerobic and sedentary groups show higher heart rates and lower QRS amplitude compared to the aerobic group at any given stage of exercise. QRS amplitude has been reported to be influenced by age, sex, physical fitness, and body build of the individual. The findings of the present exploration are also in agreement with the above. The factors such as age and sex were controlled in the study and it was the difference in physical fitness that might have lead to the difference in QRS amplitude among the three groups. This observation has a great potential from the training point of view. Coaches can make use of this observation in gauging the progression of athletes during the aerobic training regimes. This will eliminate tedious evasive and time consuming procedures involved in monitoring and evaluating the measurement of cardiac output and heart dimensions. QRS amplitude measurements are simple and non-evasive and also provide the same information quickly and are less expensive.

Conclusion The results indicate that the electrical activity of the atria in terms of duration and amplitude remains unaffected by the intensity of exercise and specialized training i.e., aerobic or anaerobic training do not produce any change in this character of the p-wave. Consistently lower mean QRS duration is observed in the case of aerobic group as compared to the sedentary and anaerobic groups but with no statistical significance. QRS-complex represents ventricular depolarization, which involves the interventricular septum and simultaneous left and right ventricular stimulation. The lesser duration of ventricular depolarization in case of aerobic group is indicative of faster spread of electrical activity in the ventricles and more time available for the recovery of the heart. Aerobic group of players on an average have significantly greater QRS-amplitude than their anaerobic and sedentary counterparts. The observation of the present study indicates greater ventricular myocardial mass involved in the pumping of blood during exercise in case of aerobic group of players. This is an adaptive process by virtue of which heart of athletes undergoing aerobic training are able to pump more blood per beat i.e., stroke volume and therefore are able to meet the oxygen demand of exercise at relatively lower heart rates compared to the sedentary and anaerobic groups of athletes. The sedentary and anaerobic groups of players accomplish the task of meeting of the oxygen demand of exercise with higher heart rates and lower stroke volumes. This observation has a great potential from the training point of view. Coaches can make use of this observation in gauging the progression of athletes during the aerobic training regimes. This will eliminate tedious, evasive and time consuming procedures involved in monitoring and evaluating the measurement of cardiac output and heart dimensions. QRS-amplitude measurements are simple and non evasive and also provide the same information quickly and are less expensive. Like QRS-complex amplitude, T-wave duration values show different mean durations of T-wave at all stages of treadmill exercise. This difference has statistical significance at all stages of exercise except stage 1. In general aerobic and anaerobic group of players demonstrate greater mean amplitude of T-wave at all stages of exercise as compared to the sedentary group, with aerobic group of players demonstrating even greater mean amplitude of T-wave at all stages of exercise as compared to the anaerobic group except at stages 7 & 8 of treadmill exercise. Regarding PR and ST-segment durations no differences have been observed between the three groups. PR-interval also exhibits the same picture. Mean QT-interval demonstrate grater mean values in the aerobic group as compared to anaerobic and sedentary groups at all stages of graded treadmill exercise protocol which is

indicative of the fact that the heart of the aerobic group players has more time available for electrical activation and recovery of the ventricular myocardium at any intensity of workload as compared to the other two groups. Analysis of variance reveals that the mean differences assume statistical significance at stages 3, 5, & 8 of Modified Bruce Treadmill Protocol only. Even the corrected QT-interval values display grater mean values in the aerobic group as compared to the anaerobic and sedentary groups at all stages of graded treadmill exercise protocol. Significantly greater RR-interval values are observed in the aerobic group than the other two groups. This observation signifies that at corresponding stage of exercise, the aerobic group increase their heart rate significantly less than the other two groups. This further signifies greater level of cardiovascular fitness enjoyed by the aerobic group of players than the other group peers. Aerobic training has been known to produce positive adaptive changes in the heart of player like increase in stroke volume, cardiac hypertrophy, etc. In nutshell, electrocardiographic changes reflected physiologic cardiac hypertrophy in the aerobic athletes compared to the sedentary and anaerobic groups. The QRS duration increases in response to endurance exercise training and, therefore, may be of use in predicting performance in endurance activities.

Table 1: QRS-interval/duration values (Secs) during different stages of Bruce Protocol

Stage of Modified Bruce Protocol		Sedentary	Aerobic	Anaerobic
Stage 1	Mean	0.088	0.080	0.085
	SD	0.017	0.021	0.012
	SEM	0.005	0.008	0.004
Stage 2	Mean	0.090	0.080	0.087
	SD	0.025	0.021	0.013
	SEM	0.008	0.008	0.004
Stage 3	Mean	0.090	0.080	0.087
	SD	0.017	0.021	0.013
	SEM	0.005	0.008	0.004
Stage 4	Mean	0.088	0.080	0.087
	SD	0.017	0.021	0.013
	SEM	0.005	0.008	0.004
Stage 5	Mean	0.092	0.080	0.085
	SD	0.019	0.021	0.012
	SEM	0.006	0.008	0.004
Stage 6	Mean	0.092	0.080	0.085
	SD	0.019	0.021	0.012
	SEM	0.006	0.008	0.004
Stage 7	Mean	0.088	0.080	0.085
	SD	0.017	0.021	0.012
	SEM	0.005	0.008	0.004
Stage 8	Mean	0.086	0.080	0.085
	SD	0.019	0.021	0.012
	SEM	0.006	0.008	0.004

Table 2: QRS-wave amplitude values (mV) during different stages of Bruce Protocol

Stage of Modified Bruce Protocol		Sedentary	Aerobic	Anaerobic
Stage 1	Mean	1.660	2.169	1.850
	SD	0.534	0.528	0.363
	SEM	0.169	0.187	0.105
Stage 2	Mean	1.550	2.094	1.908
	SD	0.487	0.525	0.351
	SEM	0.154	0.186	0.101
Stage 3	Mean	1.555	2.225	1.875
	SD	0.398	0.455	0.409
	SEM	0.126	0.161	0.118
Stage 4	Mean	1.405	2.213	1.867
	SD	0.386	0.567	0.365
	SEM	0.122	0.200	0.105
Stage 5	Mean	1.455	2.138	1.883
	SD	0.361	0.407	0.419
	SEM	0.114	0.144	0.121
Stage 6	Mean	1.505	2.175	1.863
	SD	0.407	0.328	0.351
	SEM	0.129	0.116	0.101
Stage 7	Mean	1.556	2.200	1.954
	SD	0.452	0.367	0.392
	SEM	0.143	0.130	0.113
Stage 8	Mean	1.515	2.350	1.967
	SD	0.362	0.460	0.412
	SEM	0.115	0.163	0.119

Table 3: Comparison of Mean differences in QRS amplitude among the three groups at stage 2 of Modified Bruce Protocol

	(I) GROUP	(J) GROUP	Mean Difference (I-J)	Std. Error	Sig.
QRS Amplitude	Sedentary	Aerobic	-0.544	0.213	0.053*
		Anaerobic	-0.358	0.192	0.194
	Aerobic	Sedentary	0.544	0.213	0.053*
		Anaerobic	0.185	0.204	0.667
	Anaerobic	Sedentary	0.358	0.192	0.194
		Aerobic	-0.185	0.204	0.667

*The mean difference is significant at the .05 level.

Table 4: Comparison of Mean differences in QRS amplitude among the three groups at stage 3 of

Modified Bruce Protocol					
	(I) GROUP	(J) GROUP	Mean Difference (I-J)	Std. Error	Sig.
QRS Amplitude	Sedentary	Aerobic	-0.670	0.198	0.009*
		Anaerobic	-0.320	0.179	0.221
	Aerobic	*Sedentary*	*0.670*	*0.198*	*0.009**
		Anaerobic	*0.350*	*0.191*	*0.205*
	Anaerobic	*Sedentary*	*0.320*	*0.179*	*0.221*
		Aerobic	*-0.350*	*0.191*	*0.205*

Table 5: Comparison of Mean differences in QRS amplitude among the three groups at stage 5 of Modified Bruce Protocol

	(I) GROUP	(J) GROUP	Mean Difference (I-J)	Std. Error	Sig.
QRS Amplitude	Sedentary	Aerobic	-0.683	0.189	0.005*
		Anaerobic	-0.428	0.170	0.058
	Aerobic	Sedentary	0.683	0.189	0.005*
		Anaerobic	0.254	0.181	0.388
	Anaerobic	Sedentary	0.428	0.170	0.058
		Aerobic	-0.254	0.181	0.388

Table 6: Comparison of Mean differences in QRS amplitude among the three groups at stage 6 of Modified Bruce Protocol

	(I) GROUP	(J) GROUP	Mean Difference (I-J)	Std. Error	Sig.
QRS Amplitude	Sedentary	Aerobic	-0.670	0.173	0.003*
		Anaerobic	-0.358	0.156	0.092
	Aerobic	Sedentary	0.670	0.173	0.003*
		Anaerobic	0.313	0.167	0.192
	Anaerobic	Sedentary	0.358	0.156	0.092
		Aerobic	-0.313	0.167	0.192

Table 7: Comparison of Mean differences in QRS amplitude among the three groups at stage 7 of Modified Bruce Protocol

	(I) GROUP	(J) GROUP	Mean Difference (I-J)	Std. Error	Sig.
QRS Amplitude	Sedentary	Aerobic	-0.644	0.193	0.009*
		Anaerobic	-0.398	0.174	0.092
	Aerobic	Sedentary	0.644	0.193	0.009*
		Anaerobic	0.246	0.186	0.428
	Anaerobic	Sedentary	0.398	0.174	0.092
		Aerobic	-0.246	0.186	0.428

*The mean difference is significant at the .05 level.

Table 8: Comparison of Mean differences in QRS amplitude among the three groups at stage 8 of Modified Bruce Protocol

(I) GROUP	(J) GROUP	Mean Difference (I-J)	Std. Error	Sig.
Sedentary	Aerobic	-0.835	0.194	0.001*
	Anaerobic	-0.452	0.175	0.051
Aerobic	Sedentary	0.835	0.194	0.001*
	Anaerobic	0.383	0.187	0.142
Anaerobic	Sedentary	0.452	0.175	0.051
	Aerobic	-0.383	0.187	0.142

*The mean difference is significant at the .05 level.

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A Study of Reaction Time and Speed in Football Players

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Abstract

The aim of this study was to determine the relationship between reaction time (auditory & visual) and speed (20 meter sprint time) in male football players. A total of 45 male football players with an average age, height and weight of 21.38 ± 3.15 years, 170.34 ± 5.79 cm and 64.17 ± 6.45 kg, respectively, volunteered to participate in this study. Each subject's reaction time and speed were measured, and the data analyzed using Pearson's correlation and paired *t* tests. There were no meaningful correlations between reaction time and speed in the subjects. However, their auditory reaction times were significantly better than their visual reaction times, and there was a negative correlation between body weight and speed ($p < 0.01$).

Keywords: Reaction time, Football, Speed

Introduction- Reaction time is the intermission between the onset of a stimulus and the commencement of a movement response (Magill 1998). The reaction time for a visual stimulus is about 250 ms and for an auditory stimulus is about 170ms (Magill 1998).Reaction time can be further broken down into three parts. The first part is perception time - the time for the application and perception of the stimulus and giving the essential reaction to it. The second part is decision time, which signifies the time for giving a suitable response to the stimulus. The third part is motor time, which is the time for compliance to the order received (Tripo 1965). Singer et al. (1993) defined reaction time as being composed of four stages, namely: the start of eye movements, eye movement time, decision time and muscle contraction time. Reaction time is affected by various factors such as age, gender, number of simultaneous stimuli, nutrition, physical activity, training and physical fitness and fatigue (Morehouse & Miller 1976 and Spirdiso 1975). The athletes have better reaction times than non-athletes (Moka et al. 1992). Reaction time is a crucial factor affecting success in many sporting competitions. The reaction times of athletes in different sports and even in the same sports but playing in different positions show variations (Moka et al. 1992). The reaction times of high performance sprinters were found to be shorter than those of low performance sprinters. Exercise induces arousal that supports alertness to external environmental stimuli in highly trained athletes (Mouelhi et al. 2006). Explosive power, together with reaction time, decides the results of competitions in the first 2–3 meters (Akgün 1996). Since football requires 1–3-second explosive sprints, the importance of this characteristic becomes much more obvious in the performance of players. Research has shown that speed can be enhanced by strengthening the muscles (Akgün 1996). One of the most significant biomotor abilities required in sports is speed, or capacity to travel or move very quickly. From a mechanical point of view, speed is expressed through a ratio between space and time. The term *speed* incorporates three elements: (i) reaction time; (ii) frequency of movement per time unit & (iii) speed of travel over a given distance (Bompa 1994). Research Studies have revealed that reaction time is independent of speed (Paradis et al. 2004 and Yakut 2004). Although it is also known that physical training has positive effects on both reaction time (Davranche et al. 2006) and speed (Little & Williams 2005), the relationship

between reaction time and speed has not been extensively investigated in the literature. The aim of this study was, therefore, to observe the relationship between reaction time (auditory & visual) and speed (20 meter sprint time) in male football players.

Methods

Subjects- The subjects in this study were 45 male football players from different professional football clubs/or teams of Punjab.

Data were collected in the Exercise Neuro Physiology laboratory of Department of Sports Science, Punjabi University Patiala [Punjab] India. The body heights and weights of the subjects were measured with anthropometric rod and spring based weigh machine. The 20-meter speed test was carried out in the field and visual and auditory reaction times were measured using the audio & visual reaction time instrument.

Statistical analysis- Data were statistically evaluated with the paired *t* test and Pearson's test using SPSS version 10.0 (SPSS Inc., Chicago, IL, USA) for Windows. Significance was set at the $p < 0.05$ level.

Results- Subjects' mean age, height and body weight were 21.38±3.15 years, 170.34±5.79 cm and 64.17±6.45 kg, respectively (Table 1).

Table 1 Mean ± SD of Physical profiles & 20 meter sprint speed of the football players

Age (years)	**21.38 ± 3.15**
Body height (cm)	**170.34 ± 5.79**
Body weight (kg)	**64.17 ± 6.45**
Time playing (years)	**7.65 ± 2.53**
Visual Reaction Time of the Right Hand [VRTRH] (ms)	**225.37**
Visual Reaction Time of the Left Hand [VRTLH] (ms)	**224.63**
Auditory Reaction Time of the Right Hand [ARTRH] (ms)	**189.13**
Auditory Reaction Time of the Left Hand [ARTLH] (ms)	**192.70**
20-m Sprint Speed (s)	**5.08 ± 0.55**

There were significant differences between the auditory and visual reaction times of both the right and left hands ($p < 0.01$). The visual reaction time of the right hand (VRTRH), visual reaction time of the left hand (VRTLH), auditory reaction time of the right hand (ARTRH), and auditory reaction time of the left hand (ARTLH) were 225.37ms, 224.63 ms, 189.13ms, and 192.70ms, respectively. There were no significant relationships between the reaction time and speed of the subjects (Table 2). However, there was a negative relationship between the body weights and sprint values of the football players ($p < 0.01$). In other words, the greater the body weight, the shorter the 20-meter sprint time. Moreover, there was a statistically significant positive relationship between the auditory and visual reaction times ($p < 0.01$) of the players.

Table 2 Correlation (Pearson's) among the parameters in the male football players

	Body weight	**Age**	**VRTRH**	**VRTLH**	**ARTRH**	**ARTLH**
Body weight	-					
Age	0.405**	-				
VRTRH	−0.063	0.057	-			
VRTLH	0.119	0.202*	0.604**	-		
ARTRH	0.085	0.200*	0.463**	0.547**	-	
ARTLH	−0.036	0.232*	0.479**	0.546**	0.650**	-
Speed (20-m)	−0.311**	−0.513**	0.034	−0.007	0.020	−0.147

**$p < 0.01$; *$p < 0.05$. VRTRH = visual reaction time of the right hand; VRTLH = visual reaction time of the left hand;

ARTRH = auditory reaction time of the right hand; ARTLH = auditory reaction time of the left hand.

Discussion- Reaction time and speed variables have been used in the evaluation of the motor skills of athletes for a considerable time. Although reaction time is a measure of performance, researchers usually use it to evaluate motor skills (Magill 1998). The right and left hand auditory (ARTRH, ARTLH) and visual (VRTRH, VRTLH) reaction times of the male football players who participated in this study examining the relationship between reaction times and speed were 189.13ms, 192.70ms, 225.37ms, and 224.63ms, respectively. Imamog˘lu et al. (2000) found the auditory and visual reaction times of professional soccer players to be160.0 ± 19.0 ms and 175.0 ± 14.0 ms, respectively, and of amateur soccer players to be 163.0±20.0 and 177.0± 18.0 ms, respectively. Hasçelik et al. (1989) found the visual and auditory reaction times of volleyball

players before a training program to be 214.55ms and 200.0 ms, respectively, and after a training program to be 191.3 ms and 175.05 ms, respectively. Ziyagil et al. (1994), in their study of wrestlers, determined the right and left hand auditory reaction times to be (1/100 s) 17.46 ± 1.46 and 16.87 ± 1.12, respectively, and the right and left hand visual reaction times to be (1/100 s) 17.38 ± 1.85 and 17.84 ± 1.27, respectively. Erog˘lu & Senel (2002) found the following mean reaction times in their study of wrestlers: ARTRH of 182.09 ms, ARTLH of 179.54ms, VRTRH of 206.09ms, and VRTLH of 212.91ms. The reaction times obtained in the current study are in good compliance with the values reported in all of these previous studies. Imamog˘lu et al. (2000) reported the 20-meter sprint values of professional and amateur soccer players as 2.95±0.17 s and 3.07±0.27 s, respectively. The 20-meter sprint values of soccer players at different levels from other studies are as follows: Eniseler et al. (1996) reported values of 2.86 ± 0.10 s for premier league soccer players, 2.89 ± 0.07 s for second league soccer players, 2.94 ± 0.07 s for division 3 players, and 2.96 ± 0.08 s for amateur soccer players. Ziyagil et al. (1997) reported values of 2.99 ± 0.1 s for professional soccer players, and 3.24 ± 0.11 s for reserve team players. Alpay (1999) reported values of 2.84 ± 0.9 s for professional soccer players, and 2.97 ± 0.1 s for amateur soccer players. Çebi (1999) reported values of 3.01 ± 0.1 s for professional soccer players, and 3.24 ± 0.1 s for amateur soccer players. The mean 20-meter sprint result of 5.08 ± 0.55 s obtained in this study is in good concordance with the above previously reported values.

Table 2 shows that there was a negative correlation between body weight and sprint speed of the football players ($p < 0.01$). In other words, the greater the body weight, the shorter the 20-meter sprint time. There was a statistically significant positive correlation between the auditory and visual reaction times ($p < 0.01$). The decrease in the visual reaction times of the subjects is accompanied by a decrease in their auditory reaction times. The auditory reaction times of the subjects were significantly shorter than their visual reaction times ($p < 0.01$). This is also supported by data in the literature (Teichner 1954). In the present study, no significant correlation was observed between reaction time and sprint speed. Paradis et al. (2004), in their study of 209 male and female athletes who competed in the Greek, Balkan and European indoor championships in 2002, determined that there was no significant correlation between reaction times and the 60m, 60m hurdles and 200 m race results. Reaction time cannot be an indication of action time performance since these two variables represent different components of performance. In other words, reaction time and action time are not dependent on each other (Yakut 2004). The most important characteristic of reaction and action times is that they are independent measures. This signifies that the correlation between reaction time and action time is typically low. Thus, one cannot use reaction time to determine or predict action time. Magill (1998) stated that reaction time and action time were independent of each other; he studied 402 subjects between 8 and 30 years of age and found almost zero correlation between reaction time and action time. Action time can be improved by appropriate training. It is known that regular training also has a positive effect on reaction time. Although these two factors are independent of each other, they can both be improved by common strategies such as suitable physical training (Lemmink & Visscher 2005; Montes-Mico et al. 2000). Linford et al. (2006) reported that a 6-week training program significantly reduced reaction time of the peroneus longus muscle in healthy subjects. The fact that the subjects in this study had similar performance levels may have resulted in the lack of a significant correlation between reaction times (audio & visual) and sprint times.

Conclusion- No significant correlation was found between the audio and visual reaction times and the speed of the football players who participated in this study. However, there was a negative relationship between the body weights and sprint times of the football players. In

addition, there were significant differences between the audio and visual reaction times of the subjects.

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A study on the performance of muscular endurance in the pre and post test of the male students

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ABSTRACT

The purpose of the study was to find out the variable of muscular endurance of the orientation students of KFUPM, Saudi Arabia and determine the difference of muscular endurance from pre to post test. For this a group of 300 male students enrolled for orientation course at KFUPM, Dhahran, Saudi Arabia for the 2nd semester of 2009 academic year were selected as subjects. Further this group consisted of four categories namely under weight, normal weight, over weight and obese. Sit-ups Exercise training for the students was given twice a week for a period of 12 weeks. The following were the objectives of the study a) To find out the muscular endurance of the students by the sit- ups test .b) To know whether there is any significant improvement in the muscular endurance of students in the different categories. To find out the above objectives of the study the following statistical tools were used i.e., mean, standard deviation, 't' –test and ANOVA. As a result of the above analysis it was found that there is a significant improvement in the performance of the students in all the four categories. Further more it is found that, the students with average BMI have performed excellent when compared with the under weight, over weight and obese students. The under weight students performed better than overweight and obese students. Lastly obese students stand in the bottom with regard to the performance when compared with all the categories.

Keywords: Obese, Body Mass Index, Sit- ups, Muscular endurance, performance.

INTRODUCTION: The term fitness has been gaining more important now with the people realizing its effect on the daily life. To improve physical fitness the systems of the body like the muscular strength and cardio respiratory must be stressed. To increase the muscular endurance the muscles must be worked over longer duration than normal such as performing a higher number of exercise repetitions. Muscular endurance is one of the components of fitness which plays a key role in effecting the performance of athletes. To achieve success one has to perform the action repeatedly delaying fatigue. If you stop performing endurance exercise you will loose muscular endurance relatively rapidly. Hence athletes plan their schedule to enhance muscular endurance through various exercises regime. There are a number of tests which have been existing to measure the muscular endurance.

PURPOSE: The main purpose of the study was to evaluate the muscular endurance of the under weight, normal weight, overweight and obese students of KFUPM and determine the difference of performance from pre to post test.

METHOD: The subjects for this study were 300 male students enrolled in the orientation course at KFUPM, Saudi Arabia for the 2nd semester of the 2009 academic year. The above subjects consisted of four categories each category had 75 subjects. The test which was 'sit-ups' was explained and demonstrated to the students before the pre test administration. The test was carried out during the class hours for all the subjects. The subjects performed the test as per the procedure for a period of 30 seconds. Training for the subjects was given twice a week for 12 weeks. A post test was conducted at the end of 12 weeks for all the groups.

RESULTS AND DISCUSSION: Every exercise prescription includes a specific type of exercise to be performed from a wide variety of activities. With people consuming nutrition high in calories with little activity there is a tendency to put on weight. This leads to the dangers of obesity which are quite fatal. To reduce the above tendency and to keep fit the endurance exercise come to play a handy role.

The data collected during the study is analyzed and the means, standard deviation, and 't'-test of the subjects are presented in the tables from 1 to 4. The mean, standard deviation for the male students in the under weight category are presented in the table-1 .The mean scores (16.34 & 23.05) in the study was higher in post testing sit-ups which is one of the muscular endurance test for the students. It is observed from the table that the standard deviation from pre to post (3.05 & 2.98) which also showed improvement in the under weight groups. The gain of muscular endurance in the students with training has been beneficial for the students as there was consistence improvement in the endurance thus leading to improved performance. There was significant improvement in the performance of the under weight students between pre and post test ($p<0.0001$).

Table-1

The students under the category of normal weight were considered as more fit and had better prospect of improving in their performance. This is because their body composition is perfect for attempting to take on training for increased physical fitness.

Paired t-test and CI: UW Pre, UW Post

Paired t for Under Weight Pre & Post

	N	Mean	SD	SE Mean
UW Pre	75	16.34	3.05	0.35
UW Post	75	23.01	2.98	0.34
Difference	75	-6.66	3.19	0.36

95% CI for mean difference: (-7.40, -5.93)

T-Test of mean difference = 0 (vs not = 0): T-Value = -18.08 P-Value = 0.00

Table -2, reveals the means of normal weight students which reads from (23.36 to 33.13) in the pre to post which can be considered to show a climb. The standard deviation also had made an impact with the range being from (3.07 to 5.17). The results have shown that the performance highly significant with p value at (0.0001) thus corroborating the belief of this group being the most improved.

Table-2

Paired t-test and CI: Normal pre & post

Paired t for Normal pre & post

	N	Mean	SD	SE Mean
Normal pre	75	23.36	3.07	0.35
Normal post	75	33.13	5.17	0.59
Difference	75	-9.77	5.39	0.62

95% CI for mean difference: (-11.01, -8.53)

T-Test of mean difference = 0 (vs not = 0): T-Value = -15.68 P-Value = 0.00

In table-3 the over weight student's analysis of mean and standard deviation reads 8.92 to 12.68 and 1.53 to 1.45 respectively. These students tend to have body weight which is above the normal there by making them to be a little less prone for better performance. The results suggest in that direction and the improvement was not significant with $p<0.0001$ but still there was some improvement in their performance in the post test.

Table-3

Paired t-test and CI: Over weight Pre & Post

Paired t for Over Pre - Over Post

	N	Mean	SD	SE Mean
Over weight pre	75	8.92	1.53	0.17
Over weight Post	75	12.68	1.45	0.16
Difference	75	-3.76	1.35	0.15

95% CI for mean difference: (-4.07, -3.44)

T-Test of mean difference = 0 (vs not = 0): T-Value = -24.05 P-Value = 0.00

From the table-4 it may be seen that the mean and standard deviation of obese students from pre to post test are (7.8 to 10.33) and (1.78 to, 1.43) respectively. This group also improved in their performance. It is believed that the intensity and volume of training for such groups should be highly aerobic in nature to have better fitness, hence the fitness levels of these group shows improvement at $p<0.001$.

Table-4

Paired t-test and CI: Obese Pre & Post

Paired t for Obese Pre – Obese Post

	N	Mean	SD	SE Mean
Obese Pre	75	7.80	1.74	0.20
Obese Post	75	10.33	1.43	0.16
Difference	75	-2.53	1.39	0.16

95% CI for mean difference: (-2.85, -2.21)

t-test of mean difference = 0 (vs not = 0): T-Value = -15.69 P-Value = 0.000

The table-5, presents the results of one way ANOVA of under weight, normal weight, over weight, and obese. The result reveals that there is significant improvement in the performance of all the groups.A one way ANNOVA was used to determine the inter group difference and the results are presented in table-5 where shows that the group standing under normal weight had a highly significant improvement and stands ahead of all the groups. This was followed by the under weight students who stand second. The difference between the overweight and obese students was very slight showing the overweight students a little above the obese category. The group which stands last is the obese students who also showed improvement in their performance but was marginal.

Table-5

One-way ANOVA:

Under Weight Pre, Norm weight pre, over weight Pre, and Obese Pre

Analysis of Variance

Source	DF	SS	MS	F	P
Factor	3	11798.80	3932.93	651.17	0.000
Error	296	1787.79	6.04		
Total	299	13586.59			

Individual 95% CIs For Mean

Based on Pooled StDev

Level	N	Mean	StDev	------+---------+---------+---------+
UW Pre	75	16.34	3.05	(*)
Norm pre	75	23.36	3.07	(*)
Over Pre	75	8.92	1.53	(*)
Obs Pre	75	7.80	1.74	(-*)

------+---------+---------+---------+

Pooled StDev = 2.45 10.0 15.0 20.0 25.0

One-way ANOVA:

Under Weight Post, Norm weight post, Over weight Post, and Obese Post

Analysis of Variance

Source	DF	SS	MS	F	P
Factor	3	24631.13	8210.38	823.64	0.000
Error	296	2950.64	9.97		
Total	299	27581.77			

Individual 95% CIs for Mean

Based on Pooled StDev

Level	N	Mean	StDev	-------+---------+---------+---------
UW Post	75	23.01	2.98	(*)
Norm post	75	33.13	5.17	(*)
Over Post	75	12.68	1.45	(*)
Obs Post	75	10.33	1.43	(*)

-------+---------+---------+---------

Pooled StDev = 3.157 14.0 21.0 28.0

CONCLUSIONS:

1) It is concluded from the study, that there was a significant improvement in the performance of all the groups, which is quite encouraging.

2) The under weight students have shown the improvement which is better than the over weight and obese students. It is interesting to note that, they are far away when compared with normal weight group.

3) The normal weight category was the best performers and they improved significantly in the performance. This group dominates on all the three groups

4) The over weight students also made a significant improvement in the performance and they are better than obese students.

5) The obese students did improve their performance but were behind when compared to all other groups.

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The Effect of Cardiovascular Reactivity During Teaching an Emerging Occupational Stress on School Teachers

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ABSTRACT

Background: Stress is the ultimate gift the school teachers get during the teaching and handling of children. There are a large number of cases where they have undergone Coronary artery bypass graft (CABG) in recent years in the country. The objective of the study was to assess the cardiovascular reactivity (CR) as a determinant of stress in teachers.
Subjects : School teachers (n=33; males 13,Females 20) with no major risk factors such as smoking, diabetes, Hypertension, hyperlipidemia (age 23 -40 years , teaching experience > 5 years, teaching hours 6-8 hours/day) volunteered for the study.
Methods: Resting heart rates in the early morning (RHR) and resting blood pressure (RBP); teaching heart rates (THR) and blood pressure (TBP) during their teaching hours were measured with the help of polar heart rate monitoring system and standard manometer. Their heart rates (THR2) and blood pressure (TBP2), rate of physical exertion at the end of class is also recorded with the help of RPE (perceived rate of exertion) scales.
Results: The investigation indicated significantly higher THR2's ($p<0.05$) and TBP2 ($p<0.05$) than the
THR1, TBP1. But their physical exertion was very light 7 of Borg's scale of RPE. The increment in heart rates and blood pressure were higher when compared to increments in physical exertion. Study indicated that CVR during continuous verbal communication as abrupt increase in BP & HR occurred.
Conclusions: It is concluded that the CVR during teaching may be due to sympathetic drive and stress during shouting to control the students (crowded classes). Prolonged exposure to such stress without correct coping strategies may emerge as a potential risk factor for hypertension and coronary diseases. Biochemical determinants of oxidative stress need to be evaluated in teachers.
Key words: Teachers, stress, cardiovascular reactivity, heart rate, RPE scales.

INTRODUCTION

School teachers face high amounts of stress during teaching and handling of young students. Classrooms which are present in developing countries remain overcrowded, and schools in rural areas consists more aged children for their classes due to late education. Teachers face intensive verbal communication, prolonged standing, high volume of workload and studies have shown incidence of cancer, vehicular accidents and heart disease in primary and secondary school teachers. Cardiovascular reactivity, the abrupt increase in blood pressure and heart rate that occurs during stress is emerging as a potential risk factor for hypertension and coronary artery diseases It is recorded that a large number of teachers have been found to have undergone Coronary artery bypass graft (CABG) in the recent years as observed in ongoing retrospective study of 6000 CABG patients (unpublished data) in Apollo Hospitals, Hyderabad,

A.P. India. Intention of the current study was to measure the heart rate, blood pressure to assess the cardiovascular reactivity in teachers during teaching hours in schools.

METHODS

A total of thirty three school teachers (20 females & 13 males) with no major risk factors such as smoking, diabetes, hypertension and hyperlipidemia volunteered for the investigation. They were aged between 22 to 32 years and with a teaching experience of > 3 years with teaching hours of 6 -8 per day. Personal interviews were conducted with individuals to understand their problems in depth. These teachers belong to primary school and teaching students from nursery to fifth class. The resting heart rates (RHR) of teachers were noted by self measurement by the subjects; as radial pulse (beats /min) for three consecutive days and average was taken as RHR. Their morning blood pressure (RBP) was measured with standard manometer. Their heart rates (THR1), blood pressure (TBP1) were measured at the beginning of the First class of the day. Their heart rate (THR2) and blood pressure (TBP2) were measured immediately at the end of the last class of the day. Heart rates recorded with the help of' Polar Sport Tester PE 4000 'heart rate monitoring system (Polar Electro, Made in Finland) the rate of physical exertion both at the beginning and at the end of class was recorded with the help of Borg Scale of perceived rate of exertion (RPE) . The help of the medical professional was taken for measuring the blood pressure.

RESULTS

The study indicated that most of the schools have more female teachers than males; Physical characteristics of the primary school teachers are listed in Table 1.

Table: 1

***Physical Characteristics of subj*ects (n=33, Males13, Females 20)**

Age in years	23-32
Height in cm	153-174
Weight in Kg	58- 82
Resting Heart Rate(RHR beats/min)	59-72
Resting Blood Pressure(RBP:mm of Hg) Systolic Pressure(lying) Diastolic Pressure(lying)	 90-120 68-78

The resting heart rate (RHR) and resting blood pressure (RBP) measured was within normal ranges for all the subjects. The THR, TBP measured at the beginning of the first class were marginally higher than the resting levels.

TABLE 2: Comparison of 'CR' before and after the classes

Variables measured	Before First class (Mean +/- SD)	End of the last class (Mean +/- SD)	Level of Significance P
Heart rate (beats/min)	90+/ --12	133 +/- 10 ***	< 0.005
Systolic blood pressure (mm of Hg)	112 + / -16	140 + / - 8 **	< 0.005
Diastolic blood pressure (mm of Hg	76 +/ - 8	80 +/ - 9 *	< 0.05
RPE Scales (Borg)	' 6 '	Very, very light ' 7 '	NS

The THR2, TBP2 were significantly ($p<0.005$) higher than the THR1 and TBP1 (Table 2) in all the teachers irrespective of their age. When all the subjects were told to use Borg scales RPE for their physical exertion , significant number of Teachers chose very very light 7 and less; there were no significant differences between the chosen scale of RPE at the beginning and at the end of their classes of the day.

DISCUSSION

It was evident in the present study that verbal communication and relationship in the form of teaching and shouting in primary school resulted in increase in PR and BP. There were significant increments (Table 2) in heart rates and blood pressures noted at the end of the classes in all the teachers. When the teachers were asked to rate exertion, during teaching both before and after, the perception of tiredness and physical exertion, they perceived minimal physical exertion at the end of teaching. RPE has been most commonly used to asses subjectively the degree of difficulty of carrying out physical tasks. In the present investigation, teachers were taught how to use the RPE and were found to have no differences during exhaustive teaching classes. Blood pressure changes during speech were studied by many authors and in certain situations, changes greater than 20 percent in systolic and diastolic blood pressure and heart rate can occur within 30 seconds after the initiation of human speech and similar findings were noted now. In one of the study, individuals with higher resting base line pressures tended to show greater increases during talking than did those with lower pressures; 20-40 % occurred within 30 seconds after the initiation of human speech. Increase in blood pressure and heart rate (the laboratory, medical clinic, class room and home) were noted; and

significant positive correlation was also observed between the level of resting pressures and the magnitude increase in pressure while talking. This indicates that primary school teachers undergo moderate to severe stress during their occupation resulting in cardio vascular reactivity without much physical exertion. Although there are many factors such as fitness levels, workload on individuals' personality can influence CR, which needs to be, evaluated in future studies. Similar effects may be studied in professions involving counseling and prolonged talking.

CONCLUSIONS

It is concluded from the present study that the primary teachers undergo cardio vascular reactivity during their teaching hours especially at the end of the day. Prolonged exposure to such CR may pose risk for cardiovascular diseases. Teachers need to practice good stress coping skills and relaxation techniques to reduce the risk of stress related illnesses. More controlled studies on large population for longer duration are needed to standardize stress free teaching skills.

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A comparative study of achievement motivation among individual game sports persons and team game sports persons

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ABSTRACT

Achievement Motivation defined as the need to perform well or the striving the success as the need to perform well or the striving for success and evidenced by persistence and effort to achieve high performance in sports. Motivation is based on your emotions and achievement related goals. Achievement Motivation is the desire to excel at task. The purpose of the study is to find out the level of achievement motivation among Individual Game Sports Person and Team Game Sports Persons. The sample for the study consists of 100 Individual Game Player and 100 Team Game Players those who have participated in the Inter College Tournaments of Osmania University, Hyderabad. The Standardized Dr.B.N.Mukharji Achivement Motivation scale were used for the study.It was found the Individual Game Player are having more Achievement Motivation than Team Game Player because the Individual Game Players required compulsory Motiviation to achieve excel in sports then the Team Game Player is a group effort. This type is study is useful to the Physical Educators and Coaches to enhance the performance through achievement motivation.

Key Words: Achievement Motivation, striving, Performance etc.

INTRODUCTION:

Sport Psychology is the scientific study of people and their behaviors in sport. The role of a sport psychologist is to recognize how participation in sport exercise and physical activity enhances a persons development.

Beginning, in the 1970, Sport psychology became a part of the curriculum on university campuses. Today, sport and exercise psychologists have begun to research and provide information in the ways that psychological well being and vigorous physical activity are related. Modern day sports are very demanding . It requires for the sportsmen and athletes a like to perform to the very best of their abilities and beyond. Individual sport activities such as wrestling and gymnastics, have shown to elicit higher anxiety levels than competitive team sport activities such as soft ball and basket ball.

Achievement Motivation defined as the need to perform well or the striving for success and evidenced by persistence and effort in the face of difficulties. Achievement Motivation is regarded as central human motivation. Achievement Motivation form to be the basic for good life. People who are oriented towards achievement in general, enjoy life and feel in control, being motivated keeps people dynamic and gives them self respect. They set moderally difficult but easily achievable targets, which help them, achieve their objectives. They do not set up extremely difficult or extreme easy targets by motivated people prefer to work on a problem rather than leaving the outcome to chance. It is also seen that achievement motivated sports persons seem to be more concerned with their personal achievement rather the rewards of success.

STATEMENT OF PROBLEM: To find out the Achievement Motivation among sports persons of Individual Sports and Team Games.

SAMPLE: For the present study 100 Male Individual Sports Persons in Athletics, Badminton, Boxing, Judo, Wrestling, Weight Lifting, Lawn Tennis and 100 Male Sports Person in Foot Ball, Volley Ball, Basket Ball, Hand Ball, Cricket are taken for the study. This sports persons are participants in the O.U.Inter College Tournaments during the year 2010-11.

TOOL: TheStandardized Dr.B.N.Mukharji Scale were used for the study.

RESULTS AND DISCUSSION:

The Questionnaire were administered in small groups during the Osmania University Inter College Sports and Games for the year 2010-11.

Table No.1

Sports Persons	Mean	S.D.	N	DF	't'
Male Team Game Sports Persons	32.13	5.92	100	198	8.14**
Male Individual Sports Persons	39.27	7.90	100		

The results in Table No.1 Shows that Individual Sports Persons are more Achievement than Team Game Sports Persons. Individual Performance sports like Athletics, Badminton,boxing, Judo, Weight Lifting etc must have more achievement motivation to excel in sports. The Decision must be made by Individual sports persons is final for his performance. Whereas in Team Game there will be group effort among all players and their achievement motivation differs from each sports persons to sports persons.

CONCLUSIONS AND RECOMENDATIONS:

1. It is concluded that Individual Sports persons are having more Achievement Motivation because they set goals and aims to give level best performance to win the Competition, where as the Team Game sports persons depend upon their group to give the high level of performance.
2. It is recommended that achievement motivation is compulsory for all sports persons to achieve high excellence in sports.
3. The Coaches must prepare all the sports persons with high level of motivation to excel in sports.

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A comparative study of personality differences among athletes and non athletes

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ABSTRACT

Sports Psychology is the study of persons behavior in sport. It deals with increasing performance by managing emotions and minimizing the psychological effects of injury and poor performance. Some of the most important skills taught are goal setting, relaxation, visualization, self talk, awareness and control, concentration, confidence, using rituals, attribution training and periodization. Personality can be defined as a dynamic and organized set of characteristics possessed by a person that uniquely influences his or her cognitions, motivations, and behaviors in various situations.The Study is to find out the personality of Athletes and Non Athletes.The sampl e for the study are 60 Athletes and 60 Non Athletes of Osmania University, Hyderabad.60 Athletes are the students taken in the Inter College Athletics Meet and 60 Non Athletes are Foot Ball Players,Basket Ball, Hand Ball Players. It was found that Athletes are having good personality triats compare to non athletes.It is recommended to coaches to give psychological training to sports persons to enhance the performance.

Key Words: Sports Psychology, personality, attribution training.

INTRODUCTION:

Sports Psychology is upcoming and up growing branch of the Psychology now a days sports psychology is a soul of Physical Education. Sports Psychology is the scientific study of people and their behaviors in sport. Modern day sports are very demanding. It requires for the sportsmen and athletes alike to perform to the very best of their abilities and beyond. The team includes supporters, trainers and sports doctors among others, who are all doing their bit in ensuring that that athlete performs in competitions at the height of the mental, physical and emotional abilities that he or she is capable of. In all of this, one area of psychology has an important part to play and that is sports Psychology.

Sports Psychology is concerned with preparing the athlete or teams to be able to hand the high emotional stress levels that come with participating in sports competitions. Psychologists and Sports Trainers can work in tandem to enhance the performance levels of the athlete. The Coach can give appropriate information about the particular athlete to the psychologist, who will then be able to derive the psychological and behavioral patterns of the athlete before an event. With the help of this mental picture as well as the characteristic mental attitude of the athlete, the Coach will be able to set up the most effective training schedule that will bring out the best in all of the athletes capabilities. Thus sports trainers can use psychology and help their charges better and get the best performance out of them. In modern competitive sports, psychological preparation of a team is as important as teaching them the different skills of a game with scientific methods.

Personality is defined as 'distinctive patterns of behavior that characterize each individual's adaptation to the situations of his or her life. Personality can be defined as a dynamic and organized set of characteristics possessed by a person that uniquely influences his or her cognitions, motivations and behaviors in various situations.

Statement of the Problem: To find out the Personality differences between Athletes and Non Athletes

Sample: The Study were conducted on 60 Male Athletes and 60 Non Male Athletes those who have taken part in the O.U.Inter College Sports and Games during the year 2010-11.

Tools: EYSENCK'S Personality Inventory were used in the study.

ADMINISTRATION OF THE TEST: Questionnaires were distributed to 60 Male Athletes and 60 Male Non Athletes of Foot Ball,Basket Ball and Hand Ball Players those who have taken part in the O.U.Inter College Sports and Games during the year 2010-11. Neuroticism, Extraversion, Psychoticism are the Personality traits are given more importance in this study.

RESULTS AND DISCUSSION:

The present study deals with the comparison of Personality traits among Athletes and Non Athletes in respect to neuroticism,extraversion and Psychoticism. In this study total of 120 Players were selected out of which 60 athletes and 60 non athletes.The data was treated statistically by employing 't' Test to determine the significant difference of personality characteristics between athletes and non athletes.

Table No.1

Sports Persons	Number	Mean	Standard Deviation	T-Value
Athletes	60	14.89	2.55	3.75 *
Non Athletes	60	13.16	2.01	

The Table No.1 shows that the athletes are good Personality Triats compare to non athletes because the athletes are self reliant,dedicated,highly motivated to achieve the high level of performance. Athletes performances are depend upon their own talent and skill but non athletes are from foot ball,basket ball and hand ball and they have to depend upon their team effort to win the competitions.Hence non athletes will differ from each other.

CONCLUSIONS AND RECCOMMENDATIONS:

1. It is concluded that Athletes are having good personality traits compare to non athletes.
2. It is recommended that Coaches and Trainers must give psychological training to sports persons to enhance the sports performance.

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Changes on selected body composition after a year of systematic hockey academy training program

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ABSTRACT

The rationale of this investigation was to estimate the changes on selected body composition as a result of systematic hockey academy training program for a year. To achieve this purpose, a total of twenty-two boys from RDT Hockey Academy, Anantapur, Andhra Pradesh, were considered. The age of the selected subjects were ranged between 11 and 14 years. The body mass, lean body mass and percent body fat were adjudged prior to and immediately after the systematic hockey academy training program. Paired 't' test was employed to establish the degree of significant difference between data collected during the academic year '08 and '09 respectively on body mass, lean body mass and percent body fat. The findings of the study reveals that one year of systematic hockey academy training program had a significant amplification on body mass and lean body mass, while percent body fat is diminished. These findings suggest that the systematic hockey academy training program for one year has a statistically significant influence on selected body composition.

Key Words: *Body Composition, Training*

Introduction

Field hockey is one of the oldest sports games which underwent very dynamic changes during history and especial in the last years (rules, equipment, quality of field). One of the most important changes was the swap from natural to artificial grass. This transformation demanded changes in training process which must taking into consideration competitive loads of players as a specific model of target preparation. Contemporary field hockey requires competitors to be very fit. The effective time of a match is two times approximately 35 minutes with consecutive attacks and defenses performed with high and very high intensity. The optimal physical preparation of elite field hockey players has become an indispensable part of the professional game, especially due to the increased physical demands of match-play, it can be observed during international competitions e.g. Olympic games or Asian games. To assess the level of player preparation a battery of different tests (laboratory or field) are used, which show actual possibilities of single player or whole team to realize training and competitive loads, e.g. on the basis of hypothetical model of changes on the main abilities in macrocycle (Konarski, 2010). Researches on energy expenditure and heart rate during training and competitive efforts can be done (Konarski, 2010), however there exist many others tools utilized in professional sport (e.g. observation sheets, notation systems, etc). On the other hand, an equally important part of design for training programs is knowledge about competitive loads which are the basis and the main aim of the training process during its preparatory period for main competition. Without

such information as distance, velocity, energy expenditure, heart rate level, etc., and systematically monitoring of them trainers work the only using “coaches nose” or estimate “on eye” training program and/or training loads.

The purpose of this investigation was to estimate the changes on selected body composition as a result of systematic hockey academy training program for a year.

Methodology

Subjects and Variables

To achieve this purpose, a total of twenty-two boys from RDT Hockey Academy, Anantapur, Andhra Pradesh, were considered. The age of the selected subjects were ranged between 11 to 14 years. The training regimen lasted for one year. These subjects were from below poverty line families in rural and suburbs surroundings. In the RDT Hockey Academy, Anantapur, the students were provided with free boarding and lodging, so that they can meet out the energy requirements for their optimal growth and hockey playing ability.

The criterion variables chosen for this study were body mass, lean body mass, and percent body fat and they were assessed using standard procedures, prior to and immediately after the training regimen for one-year.

Tests

Sl. No	Variables	Tests
1	Body mass	Electronic weighing machine
2	Percent body fat	The skin fold thickness was taken from four different sites of the body (biceps, triceps, sub-scapular and suprailiac) using the skin fold calliper on the right side of the body. Body fat (%) = (495 / Body density) – 450
3	Lean body mass	Derived by subtracting fat mass from total body mass

Training Protocol

The subjects confined to this study underwent training regimen consisting two sessions a day, seven days a week for forty-eight weeks. Pre-season training starts with conditioning and strength training, moving on to skill training as the season approaches. Match practice and fitness are improved moving into the season. There are usually 3-4 hockey skills training sessions per week with a game on the weekend. Training sessions are generally 1-2 hours in length with the intensity of sessions reducing towards the end of the week in preparation for competition. Cross training sessions such as resistance training, flexibility, speed and endurance may form parts of these sessions or extra training throughout the week. The usual competitive season involves one game per week on the weekend.

Statistical technique

Paired 't' test was employed to establish degree of significant difference between data collected during the academic year '08 and '09. The level of confidence was fixed at 0.05 for significance.

Results

The descriptive analysis and *t* values of data collected on body mass, lean body mass, and percent body fat prior to and immediately after forty-eight weeks of systematic hockey training is presented in table 1.

Table 1

Computation of mean, standard deviation and *t* value on body mass, lean body mass, and percent body fat

Variables	Data gathered in one year	$\bar{x}$	σ	t
Body mass	Initial data	39.218	5.76	3.916*
	Final data	45.176	4.213	
Lean body mass	Initial data	35.721	5.71	2.473*
	Final data	39.557	4.51	
Percent body fat	Initial data	8.918	1.261	1.617
	Final data	8.383	0.904	

* Significant at .05 level of confidence

Table value required for significance at 0.05 level of confidence for the df of 21 is 2.080

The table 1 states that the criterion variable body mass reveals a significant difference as the obtained *t* value of 3.916 is greater than the required table value of 2.080 at α = 0.05 for the df of 21. Similarly lean body mass also reveals a significant difference as the obtained *t* value of 2.473 is greater than the required table value of 2.080 at α = 0.05 for the df of 21. However, percent body fat reveals an insignificant difference as the obtained *t* value of 1.617 is lesser than the required table value of 2.080 at α = 0.05 for the df of 21.

Discussion

Though, it is common that body mass and VO_2max increases with aging in youngsters. Regular exercise and physical activity is the main cause to improve body composition and cardiovascular fitness. The changes in body fat percent, body mass index and body muscle mass as a result of exercise, improves maximum oxygen uptake (Hill *et al*., 2007). The development of muscular and cardio respiratory fitness with regard to normal level of body composition are the main factors that researchers have been focusing. In the present study, the changes in body composition within a training year were noticed. Body composition of these hockey players changed in many ways within training seasons. The most pronounced changes observed were considerable increase in body mass and lean body mass, while a statistically insignificant decrease in percent body fat.

It is important to use caution when comparing percent body fat values between athletes because there are many different levels of competition and training (Heyward & Wagner, 2004). The percent body fat results for athletes fall within or around the average body fat reported for male and female hockey players (Warner, *et al*., 2004; Heyward & Wagner, 2004; Drinkwater, Pyne, & McKenna, 2008; Godina, *et al*., 2007). It is also important to recognize healthy ranges of percent body fat for young athletes.

Similar observations have been noted by many researchers in their recent studies. Studies on professional athletes showed that percent body fat decreased during preparatory and competition season (Vercruyssen & Shelton, 1988; Fruth, *et al*., 2008). This study reinforces the need for administrators, coaches and athletes to be concerned with percent body fat and skinfold measures rather than weight alone when determining if a person is 'fat'

Conclusion

The yearly training has resulted in alteration of body mass, lean body mass and percent body fat. The training found to be effective in altering body composition of younghockey players.

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Periodical assessment of one year systematic hockey academy training program on selected biomotor abilities

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Introduction

Field hockey is played on gravel, natural grass, sand-based or water-based artificial turfs, with a small and hard ball. The game is popular among both males and females in many continents of the world, particularly in Europe, Asia, Australia, and South Africa. A field hockey game consists of two halves of 35 minutes each an intermission of 5-10 minutes. Match analyses at the elite level show that field hockey is a high intensity non-continuous game in which the physiological demands are considerable, placing it in the category of 'heavy exercise' (Ghosh et al., 1991; Reilly and Borrie, 1992). The unique requirements of field hockey including dribbling the ball and moving quickly in a semi-crouched posture superimpose the work-load demanded by the game (Reilly and Seaton, 1990). Thus, the execution of tactical skills in field hockey is always related to the physiological and technical limitations of the individual player, his or her teammates and his or her opponents. To obtain expert status in field hockey, players must excel in four domains, i.e. physiological, technical, tactical, and psychological.

In hockey, training for successful competition has become virtually a year-round endeavour. To assist in better preparation, a competitor's year may be divided into phases such as off-season and in-season, indicating reduced or increased competition commitments, respectively. A number of studies have described the effects of seasons or periods of competition, training, detraining and reduced training on aspects of physical fitness. Depending on performance level, the type of sport and the fitness parameter in question, the swings in fitness variables reported may be as high as 18% from one season to another. In elite competitors, anaerobic parameters, heart frequencies, subcutaneous fat, flexibility and hemoglobin levels remain relatively unchanged throughout the year. Aerobic metabolism and muscular strength may demonstrate noticeable (mostly unfavourable) changes, and plasma hormonal levels normally follow changes in training intensities. Aspects related to long term fatigue and genetics, and to appropriate training are just a few explanations for these observations. It is still not known whether greater fitness gains attainable with longer off-season training programmes can be successfully maintained over the duration of the competition season. However, the consensus would seem to be that specialised training (based on technique and competition tactics only) is inadequate for fitness maintenance and/or improvements. This is perhaps supported by the general trends found in the literature regarding muscular strength: while supervised off-season conditioning programmes may result in significant improvements for both recreational and competitive athletes, no such changes are normally observed after competition seasons. These findings may reflect, amongst other factors, a lack of optimal training intensity to bring about strength increases during in-season periods. In novices and in athletes at low competitive levels, training seasons may lead to considerable functional improvements of the cardiorespiratory system, coupled with occasional increases in muscular strength and decreases in body fat. Relatively low fitness levels at the beginning of training have been put forward as an explanation for these improvements. Seasons of training and competition result in no significant changes in flexibility

measurements. Similar changes to those found in novices and in athletes at low competitive levels may also be seen in children and adolescents engaged in sport, although their fitness improvements are consistent with normal patterns of growth and development. No differences have been identified between male and female athletes participating at different competition levels.

Methods

Sample

The subjects employed in the present study were twenty four male Hockey players from the RDT Hockey Academy, Anantapur, Andhra Pradesh (Mean ± SD: Age 16.5 ± 1.5 years, Height 168.7 ± 7.9 cm, Body Mass 65.9 ± 6.1 kg) preparing for the 2008 - 09 district and state Championship. All the players had been part of the team for a minimum of 2 years. In this study players provided written, informed consent to participate.

All subjects were familiar with all the testing that took place, which included both field and laboratory assessments. The inclusion criteria for the current study dictated that all subjects must have completed the selected tests on all testing sessions. From the above sample, all subjects met these criteria, and thus, only these subjects were used for subsequent analysis.

Testing procedure

Testing took place at four points during the periodized training year; at the beginnings of general preparation (T1), specific preparation (T2), competition (T3) phases of training and peak (T4). The selected variables speed, power, abdominal strength endurance, arm strength endurance and cardio respiratory endurance was assessed on all testing sessions a schematic figure of the periodized year can be found in figure-1.

June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
General Preparation			*Specific Preparation*			*Competition*			*Peak*
T_1			T_2			T_3			T_4

Figure 1. A schematic representation of the periodized training year of the RDT Hockey Academy, Anantapur, Andhra Pradesh male hockey team. The different training phases, as well as the testing points (T1-T4) are presented.

The study commenced after the end of the previous transition season and at the beginning of the general preparation phase of training. The training year was divided into four mesocycles

(general preparation, June to August; specific preparation, September to November; competition, December & February) and Peak (March). Training for general preparation followed a low intensity, high volume' build up (60-70% maximum heart rate and 8-12 hours training over a weekend). The training progressed to 'high intensity, low volume' (~85% maximum heart rate and ~6 hours over a weekend) at competition. The training focus also changed from developing the relevant components of fitness to maintenance and game preparation. The training weekends were designed to increase the player's training loads in the general preparation phase while increasing the intensity and sport-specific training during the latter specific preparation and competition stages. A similar approach was followed for the games and tournaments, where more difficult tournaments were entered later in the year. Two reduced-training periods were used, one at the end of the general preparatory phase and the other at the end of the specific preparation phase. Finally, it is important to note that the periodized training year presented above relates to the physical training completed for the state squad only. The players all trained in RDT Hockey Academy, Anantapur, Andhra Pradesh it is possible to quantify exact training loads. The tests conducted on all testing session were in the order of aerobic, anaerobic and strength. This order was followed to minimize the effects of previous tests on subsequent test performance, as suggested by the American College of Sports Medicine (1995). The same order was followed for all testing sessions. The equipment was calibrated according to manufacturers' standardized procedures.

All subjects were familiarized with the procedures prior to testing. Sport-specific testing had been used frequently as part of the training programme, while for the laboratory-based tests the subjects undertook specific familiarization trials prior to the testing sessions. The subjects had been instructed to refrain from strenuous exercise for forty-eight hours prior to testing and to avoid food and caffeine intake for two hours preceding the assessments. All subjects completed testing at the same time of day to avoid any circadian rhythm effects (Atkinson & Reilly, 1996).

Tests

Sl. No	Variables	Tests
1	Cardio respiratory endurance	One-and-half mile run
2	Speed	30 metres dash
3	Power	Standing broad jump
4	Abdominal strength endurance	Sit-ups for 1-minute
5	Arm strength endurance	Push-ups for 1-minute

Training and competition

Statistical analyses

Descriptive statistics were calculated for all variables. A repeated measures analysis of variance (ANOVA) was utilized to determine significant differences for each variable between the testing sessions. Scheffé S *post-hoc* test was used to locate differences between testing sessions. Significance level was set at P ≤ 0.05. All statistical analyses were conducted using SPSS 11.5 version.

Results

Descriptive (mean ± SD) of the results can be found in Table 1. Repeated measures of analysis of variance (ANOVA) indicated significant differences between testing sessions for speed (F = 20.75, p < 0.05), abdominal strength endurance (F = 5.026, p < 0.05) and cardio respiratory endurance (F = 24.53, p < 0.05) significant changes were observed throughout the season.

Table 1. Descriptive and F value of selected variables results for all four testing sessions (T1, T2, T3 and T4).

Testing session	***T_1***	***T_2***	***T_3***	***T_4***	*F*
Endurance	9.37±0.92	9.39±0.64	8.73±0.51	8.75±0.55	24.53*
Speed (sec)	4.87±0.30	4.88±0.26	4.71±0.25	4.60±0.25	20.75*
Power (cm)	2.01±0.14	2.04±0.14	2.02±0.14	2.03±0.15	0.719
Abdominal strength	20.29±4.51	21.37±4.70	21.91±3.57	23.58±3.57	5.026*
Arm strength	21.08±5.96	21.75±4.82	21.20±5.50	22.16±3.81	0.515

*Significant at 0.05 level of confidence

The table value required for significance at 0.05 level of confidence with df 3 and 69 is 2.742.

There was a significant change from T_1 to T_4, occurred in speed, abdominal strength endurance and cardio respiratory endurance. No statistically significant changes were observed throughout the season in power and arm strength endurance. The changes in selected variables are presented in table 1. The Scheffé S *post-hoc* test was applied for cardiorespiratory endurance, speed and abdominal strength endurance.

Table 2. The Scheffé S *post-hoc* test between testing sessions in a periodized year

Compared Sessions	Cardiorespiratory Endurance			Speed			Abdominal Strength Endurance		
	MD	CI	%	MD	CI	%	MD	CI	%
T_1 vs. T_2	0.0292	0.3031	0.31	0.0129	0.117	0.26	1.0833	2.483	5.33
T_1 vs. T_3	0.6396*		6.82	0.1571*		3.22	1.625		8.00
T_1 vs. T_4	0.6108*		6.51	0.2604*		5.34	3.2916*		16.22
T_2 vs. T_3	0.6688*		7.11	0.17*		3.48	0.5417		2.53
T_2 vs. T_4	0.64*		6.80	0.2733*		5.59	2.2083		10.33
T_3 vs. T_4	0.0288		0.32	0.1033		2.19	1.6666		7.60

*Significant at 0.05 level of confidence

From Table 2, *Post-hoc* analysis revealed that the significant differences for cardiorespiratory endurance existed between T_1-T_3, T_1-T_4, T_2-T_3 and T_2-T_4. Cardiorespiratory endurance improved towards the end of the year by 6.82% between T_1-T_3, 6.51% between T_1-T_4, 7.11% between T_2-T_3, and by 6.80% between T_2-T_4.

Speed also showed similar differences as cardiorespiratory endurance. The changes in the speed noticed between T_1-T_3, T_1-T_4, T_2-T_3 and T_2-T_4 were 3.22%, 5.34%, 3.48% and 5.59% respectively.

Abdominal strength endurance results indicated a increase towards the end of the season by 16.22% between T_1-T_4.

Discussion

This is the first study to monitor selected variables over an entire periodized season in young male hockey players. Periodization aims to maximize performance by organizing the training duration into distinct periods (Kraemer, Duncan & Volek, 1998) and reducing the potential for injury (Stone & Steingard, 1993). The training duration is usually divided into larger training phases (macro cycles) further divided into smaller ones (messo cycles) and further it was divided into smaller ones (micro cycles) (Kraemer, Duncan & Volek, 1998; Stone & Steingard, 1993). Each cycle has its own aims, emphasizing different objectives, with the athlete ideally peaking at the major goal of the training program (Kraemer, Duncan & Volek, 1998).

The preparatory training period is usually devoted to the training of motor skills, while the competitive period focuses primarily on the improvement of hockey technique and tactics (Hakkinen, 1993).

Cardiorespiratory Endurance

There was a significant difference in cardiorespiratory endurance was found across the season. Competitive and peak phases of training showed grater improvement in cardiorespiratory endurance when compared to preparatory periods. It has been reported that oxygen uptake is a sensitive enough indicator of fitness when changes in aerobic performance are small (Svensson & Drust, 2005) and as the current study employed young academy hockey players, further improvements in this parameter would be expected.

Therefore, it is argued that it is its specificity that explains the differences in the results across the season. In addition, the competition phase included a substantially higher number of games, which could have improved the players' match fitness (Mujika, McFadden, Hubbard, *et al*., 2006).

Speed

It indicates that increases in concentric power production of the lower extremities may more likely produce major running sprint performance gains than those with lower increases of muscle power production. This relationship suggests a possible transfer from the gain in leg muscle power into enhanced sprint performance and emphasizes the importance of increasing leg muscular strength and power to improve short-distance sprint performance (Delecluse, Van Coppenolle, Wilems, *et al*., 1995; Gorostiaga, Izquierdo, Ruesta, *et al*., 2004).

The present study revealed significant changes on speed of hockey players. Considering the fact that hockey training aimed at the improvement of players' force also enhances their power and speed (Clutch, Wilton, McGown, *et al*., 1983; Young, Wilson & Byrne, 1999), the results obtained are satisfactory. The present observation agrees with other studies performed with female volleyball players by Hakkine (1993) revealed an increase in all measured parameters only until the completion of the competitive period, after which a decrease was noted.

Abdominal Strength endurance

Abdominal strength endurance does not alter significantly as that of cardiorespiratory endurance and speed. It showed significant difference of 16.22% between T_1-T_4. The present observation agrees with other studies performed with elite basketball players (Hakkine, 1988) and female volleyball players (Hakkine, 1993).

Conclusions and Practical Application

The current study is the first to examine the cardiorespiratory endurance, speed, power, abdominal strength endurance and arm strength endurance of young male hockey players over the course of a periodized training year using both laboratory and field-based tests. The results demonstrated that significant increase in cardiorespiratory endurance, speed and abdominal strength endurance occurred as the training year progressed. However, no changes occurred during the season in power and arm strength endurance.

Future studies should attempt to examine training loads simultaneously with monitoring, utilizing a larger sample size. It is suggested that sport-specific tests may be better indicators of performance related measures. A modern battery of hockey specific tests should be developed to enable accurate evaluation of the players' abilities, in addition to overall performance evaluation.

MODEL OF TRAINING PROGRAM (WEEKLY)

Day	Morning Session (6.00am to 8.00 a.m.)	Evening Session (4.30pm to 6.30 pm)
Monday	Speed Training	Skill practice / positional play
Tuesday	Strength Training	Technical Training / individual tactics
Wednesday	Endurance Training	Match practice, Team tactics, System's of the game
Thursday	Flexibility / Coordination	Technical training / Set play's
Friday	Strength training	Attack &Defensive strategies / Control Game
Saturday	Endurance Training	Match practice/ Recreation
Sunday	**REST DAY**	

ADAPTED TRAINING METHODS TO IMPROVE SPECIFIC PERFORMANCE

S.No.	Fitness Component	Training Methods
1	**Speed**	Interval Training : Continuous method, Interval Method and Reputation Method
2	**Strength**	Weight Training, Polymeric Training and Resistance training – Continuous method, Interval Method and Reputation Method, Own body weight exercised, Exercises with additional Resistance, Up hill running, sand running, Medicine ball etc.
3	**Endurance**	Fartlek Training, Cross country, Road race - Continues method, Interval Method Reputation Method, Aerobics exercises etc.
4	**Flexibility**	Stretching Exercises – Active, Passive, Partner Exercises, Yogic, Medicine ball exercises etc.
5	**Coordination**	Calisthenics, Aerobics, Shuttle Run, Dodge Run, Zig Zag Running, Specific exercise with variations etc.
6	**Technical& Tactical Trg, Positional Play & Functional Trg., System Of the game, Set plays etc.**	Practice all the above training methods with the ball and stick. Rich variation of Drills, exercises, minor, lead-up games are to be planned to improve technical, tactical abilities. Concentrate more on individual performance, Group performance, team tactics and team combination.

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A Study of Successful Sportsman and Unsuccessful Sportsman Respect to Tough minded and Tender minded

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Introduction

Personality psychology is a branch of psychology that studies personality and individual differences. One emphasis in this area is to construct a coherent picture of a person and his or her major psychological processes (Bradberry, 2007). Another emphasis views personality as the study of individual differences, in other words, how people differ from each other. A third area of emphasis examines human nature and how all people are similar to one other. These three viewpoints merge together in the study Of personality.

Personality can be defined as a dynamic and organized set of characteristics possessed by a person that uniquely influences his or her cognitions, motivations, and behaviors in various situations (Ryckman, 2004). The word "personality" originates from the Latin persona, which means mask. Significantly, in the theatre of the ancient Latin-speaking world, the mask was not used as a plot device to disguise the identity of a character, but rather was a convention employed to represent or typify that character.The pioneering American psychologist, Gordon Allport (1937) described two major ways to study personality, the nomothetic and the idiographic. Nomothetic psychology seeks general laws that can be applied to many different people, such as the principle of self-actualization, or the trait of extraversion. Idiographic psychology is an attempt to understand the unique aspects of a particular individual. The study of personality has a rich and varied history in psychology, with an abundance of theoretical traditions. Some psychologists have taken a highly scientific approach, whereas others have focused their attention on theory development. There is also a substantial emphasis on the applied field of personality testing with people Contents.

Philosophical assumptions

Ben Hogan is a great example of tough mindedness on and off the course, Gentle Ben Crenshaw appears to be tender minded, but make no mistake both of the Masters Champions are tough minded. Being tough or tender is not always visible. Tough guys with a loud growl are sometimes cowardly and tender warm guys are real warriors who will cut your heart out. OPA requires tough mindedness while playing golf. Do not be discouraged if you tend to be tender minded, you spouse, family and friends love you and so do your golf partners when they take your money. You truly tough minded folks win most all the bets, have great courage and probably have a spouse that would like to see your tender caring side more often. We need a balance! On the course, tough-mindedness gives us the edge in playing all day with good tempo and focus, without distractions and the highs and lows that can distract our OPA Montserrat Gomài Freixanet(1991) Personality profile of subjects engaged in high physical risk sports The present study investigated the relationship between some personality traits and participation in high physical risk sports. Twenty-seven alpinists, 72 mountaineering-related sportsmen, 221 sportsmen and 54 subjects not engaged in any risky activity, were administered the Sensation Seeking Scale, the EPQ, the Impulsiveness Scale of the IVE, the Socialization Scale of the CPI, and the Susceptibility to Punishment and Reward Scales. The results seem to indicate that there exists a personality profile of subjects engaged in high physical risk normative activities who share the following characteristics: extraversion, emotional stability, conformity to social norms, and seeking thrill and experience by socialized means.

Boris Egloff, A. Jan Gruhn(1996) Personality and endurance sports This study examined personality as related to endurance sports. Compared to a group of non-exercisers (n = 73) with similar scores on demographic variables, 86 triathletes and long-distance runners were more extraverted and reported less physical complaints. Groups did not differ concerning Neuroticism and Lie scores. Outstanding athletes (11 hr or more training per week) were more extraverted than average sportsmen (less than 4 hr). Neuroticism was associated with “management of negative affect” and “recreation” as reasons for beginning with endurance sports. Extraversion correlated with improvements due to sporting activity in “goal achievement/success”, whereas Intensity of training was associated with positive changes in “physical health”. These results are discussed in terms of psychological processes related to the benefits of endurance sports and with respect to factors that might influence successful performance.

Dennis M. O'Sullivan, Marvin Zuckerman, Michael Kraft(1998) Personality characteristics of male and female participants in team sports Males members of two college teams, baseball and football, and female members of two teams, field hockey and lacrosse (combined) and

equestrians, were compared on the five scales of the Zuckerman-Kuhlman Personality Questionnaire (ZKPQ). All teams were significantly higher on the Activity and lower on the Neuroticism-Anxiety scales than the general college population of the University of Delaware. Lacrosse and field hockey athletes were higher on activity than equestrians and baseball players were higher than football players on this scale. Contrary to predictions, football players scored lower than the general university male population on Impulsive Sensation Seeking and the lacrosse and field hockey players did not differ from the general college females on Impulsive Sensation Seeking. The baseball players also scored lower on this scale. The hypothesis that body contact sports attract high sensation seeking and aggressive participants was not supported. Sensation seeking is more characteristic of participants in high risk sports offering unusual sensation and personal challenges.

Bruce D. Kirkcaldy(1982) Personality profiles at various levels of athletic participation Various grades of athletes (265 male and 134 female) were administered the German version of the EPQ. The entire group was characterized by being more extraverted and less neurotic (compared to population norms); sex differences were exhibited, female profiles being higher on emotionality and lower on Psychoticism (tough-mindedness) with no significant difference being observed in mean Extraversion scores. When grouped in terms of 'level of competitive involvement', top-class male athletes were shown to be significantly more tough-minded and less stable than middle- or lower-class participants, an almost opposite trend being found in females, where top athletes were liable to be more extraverted, less neurotic and less aggressive and tough-minded than the other classes.

Aim and Objectives of the study:

To Examine of tough minded and tender minded of successful Sportsman and unsuccessful Sportsman.

Hypothesis:

Following major hypothesis were framed.

Successful Sportsman have significantly better tough minded than unsuccessful Sportsman (Tender minded).

Sample:

Selected the successful national Sportsman from the various events those who win the matches. unsuccessful national Sportsman from the various game who loss the matches. For the present study 80 players were selected. The age range of subjects where 18 to 25 years.

Tools:

16PF test:

S.D.Kapoor test was used for measuring Personality. All the 187 items of the scale are presented in simple and brisk style. Each of the 187 item has five answers. (Multiple Choices) Overall the average short interval reliability for forms (A+B) is .80. This type of evidence is described as criterion-related test validity.

Procedures of data collection:

Each of the three instruments could be administered individuals as well as a small group. While collecting the data for the study the later approaches was adopted. The subjects were called in a small group of 10 to 15 subjects and there seating arrangements was made in a classroom. Prior to administration of test or scale, through informal talk appropriate rapport form Following the instructions and procedure suggested by the author of the scale and tests. the test were administered and field copies of each test was collected. Following the same procedure, the whole data were collected.

Variables: **Independent Variable:** **Age** a) 18-21 b) 22-25

Dependent Variable: Tough minded

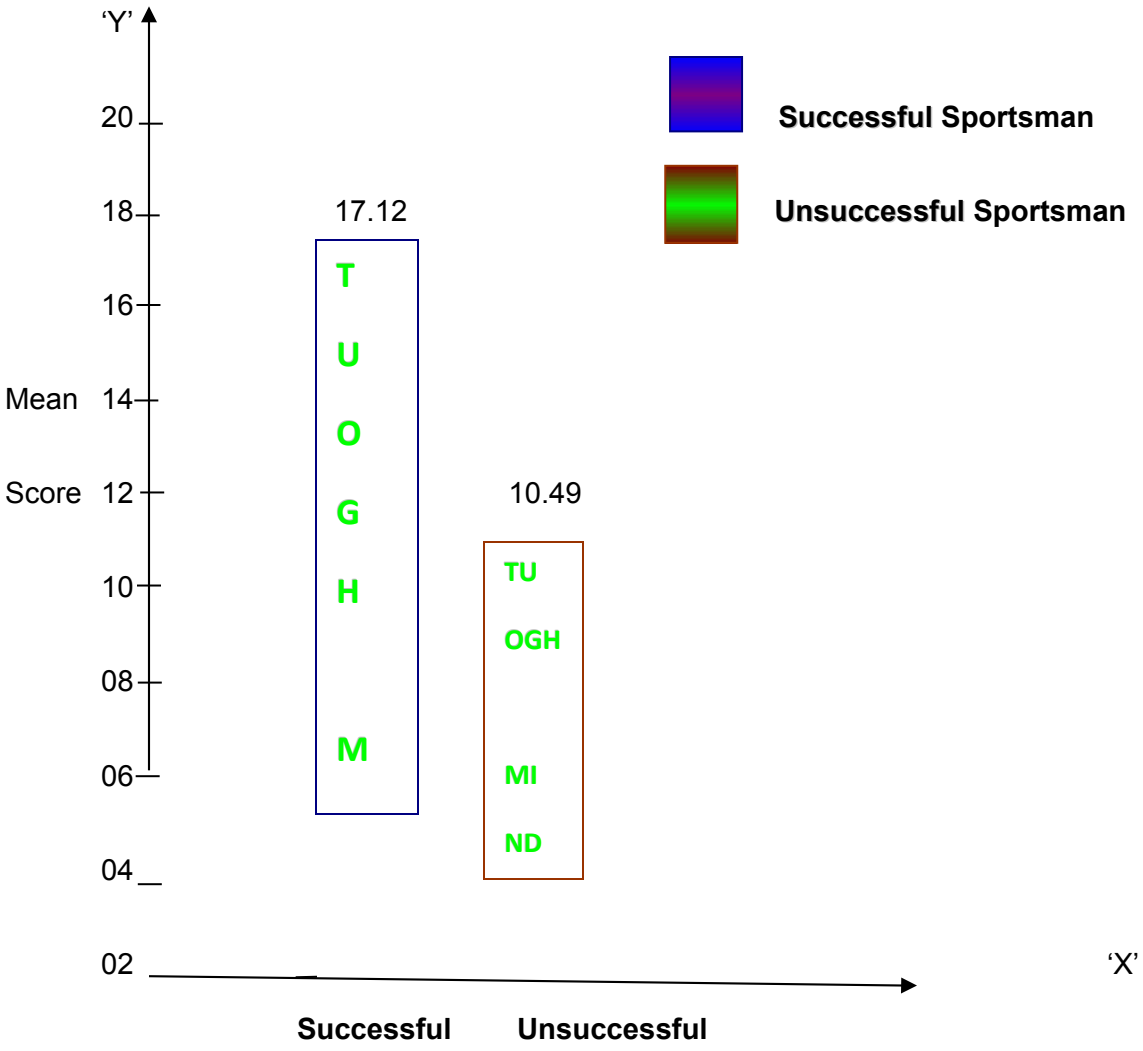
Statistical treatment of data:

Data were subjects to descriptive statistics i.e. mean and standard deviation. And "t" Test has been used.

Successful National Sportsman and Unsuccessful National players Shows the mean S.D and't' value of factors 'Tough Minded'

Sportsman	MEAN	SD	N	DF	t
Successful National Sportsman	17.12	3.39	40	78	8.09**
Unsuccessful National Sportsman	10.49	3.81	40		

Significant at 0.01 levels**



The results related to the hypothesis have been recorded. Mean of tough minded score of the Successful Sportsman is 56.09 and that of the unsuccessful Sportsman 46.92 The difference between the two mean is highly significant't'= 8.09, df =78.

Thus the hypothesis is confirmed Successful Sportsman have significantly better tough minded than unsuccessful Sportsman (Tender minded).

Results:

Following major hypothesis were framed.

Successful Sportsman have significantly better tough minded than unsuccessful Sportsman (Tender minded).

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A Comparative Study of Physical Fitness of Central, Navodaya and Adarsh Residential Schools' Students of Gujarat State

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Introduction: In the current time, it has become necessary to think about the ways to increase the capacities of human beings and to sustain those potentialities. The thinking in that direction is a call of a day. Not even that, the research in that direction will definitely help the future generations. It is good that Physical Education has been accepted as a general subject since last many years. In the today's High technological Age, Physical Education is accepted as a "complete experience". "Physical Capacity" is the biggest potentiality of human being. It can not be bought. It can only be achieved through day to day physical activity.

For physical capacity, mainly five factors are responsible. They are known as prosaic or gesture factors. They include: strength, speed, bearing, speed harmony and flexibility. If a person achieves prosaic capacity according to his capacity then only can he achieve physical capacity. There prevails many misconception regarding physical fitness and capacity among people. Many people believe that the heroes of the films are physically fit. People believe that one who can run good or a person who has good height and body is one who is physically fit. These are all misconceptions. Then what can be really known as physical fitness? It is very important to know this. If we understand in the larger sense physical fitness is a capacity to perform greater tasks. So it can be said that a person's physical fitness depends on his regular work. That's why we can not decide one parameter for physical fitness. From the scholars and researchers like Ahara, Meshamishel, A.J.Rayon and H.Harrison Clark, it can be said that, "a person can do his regular duties and at the same time can fulfill the accidental tasks and by increasing the prosaic capacities develops his physical capacity is called to possess physical fitness. Through physical fitness a person can perform his regular duties in proper way and calmly and at the same time can experience pleasure. He can also remain full of energy through physical fitness in the time of crisis.

The researchers of Physical fitness and medical science have tried to discuss the physical fitness in various forms inn the researches done in the field in contemporary time. According to these studies, the physical fitness depends on the following factors:

1. Psychological fitness: (A) Psychological fitness is necessary so a human can fight against the environmental challenges. (B) In good psychological health a person can keep himself intact in the times of mental crisis.
    - Health and physical activities can be performed in routine time.
    - The body mechanism is so that a person's all physical activities can be done in good manner.
2. The body shape is so that the height of the body, size and muscles remain in proper speed harmony.

Central Schools are run and managed by the Human Resource Department of India. They are all affiliated to Central School Board, New Delhi. In Gujarat there are 44 such schools. The time of these schools is from 7.30 mornings to 1.40 afternoons. Inn every class there are four periods of physical education in a week. One day they have mass drill. In these schools mostly the children of the employees of the central government of the urban area.

Javahar Navodaya Vidyalayas are residential schools. JNV have been started in the year 1986 with the aim that the intelligent students of the rural areas get chance to study in good schools. In Gujarat there are such 18 schools. In these schools the sports is compulsory from five to six in the evening. In such schools the most of the students are from rural areas. These schools are also affiliated to Central Board.

Adarsh Residential Schools have been started to give good education to the children of backward areas and those of laborers to stop them from going for labor in the very early age. In such schools there is provision for free of cost education and lodging and boarding. These schools are affiliated with Gujarat Secondary Education Board. In Gujarat there are 43 such schools are for ST students, 17 for SC students and 33 for undeveloped class. They have three periods inn week in every class for physical education. The mass drill is kept once in a week.

The current study is done with the intention to help the results regarding the physical fitness by knowing the physical fitness of the students of the just mentions three schools.

Materials and Methods:

- The selection of the subjects: fot his study the boys of the age group of 13 to 16 years of the Central, Navodaya and Adarsh Residential Schools of Gujarat have been selected as subjects. From every of the above mentioned schools, 400 students have been selected as subjects. Every subject was informed regarding the need of the Scholarly study and their agreement was taken in advance.
- Procedure: to measure he physical fitness of the selected subjects, the permission of the concerned principals was taken. And then the Ahyar Youth Physical Fitness Test was taken in reciprocal suitable time and dates. All schools were visited for two days each and following aspects were measured.

    - FIRST DAY:

  Pull-ups: to measure the bearing capacity of the hands and shoulders, the test of

  Pull-ups as done. The number of pull-ups was measured.

- Sit-Ups: to measure the capacity of the Waist muscles and the bearing of it, the test of sit-ups was carried out. The sit-ups done for 60 seconds were noted.
- Shuttle Run: To measure the speed and flexibility, the shuttle run of 4 by 30 meter run was tested. The record was noted in seconds.
    - SECOND DAY:

  Standing Broad Jump: to measure the explosive capacity of the legs' extensions

  muscles the test of Standing Broad Jump was taken. The best performance from

  the given three chances was recorded.

- 50 Yard run: to measure the speed of the leg muscle and also to measure the explosive power of the same the test of 50 yard run was done. The note was done in seconds.
- 600 Yard Run: To measure the cardio vascular Endurance,, the test of 600 yard run was carried out. The records were taken in seconds.

The physical Fitness Index was received by using the data received thus and used in the acceptable table and by converting into marks. The measurement was done perfectly by taking the exact measure of the grounds and infrastructure.

Statistical Analysis: the ANOVA (Analysis of Variance) was applied to measure the index of the received physical fitness. After receiving the significant variance, LSD (Least Significant Variance test) was applied to know the difference. The Significant level were kept 0.05.

Results & Discussions : While doing ANOVA on the received data, the following F- Ratio was received:

Table-1

Analysis of variance of Physical Fitness

Source of variance	Sum of square	Degree of freedom	Mean of square	F-ratio
Between group	2774.88	2	1387.44	24.72
Within group	67181.93	1197	56.12	

Significant at 0.05 levels Tab 0.05 (2, 1197) = 3.03

As shown in Table 1 F=24.72 are received which is bigger than standard value 3.03 at the level of 0.05 which can be called significant at the level of 0.05. so it can be said that at he physical fitness of all the three school students vary from one another. To know the exact variance and difference LSD (Least Significant Test) was done. The results of that test are as following.

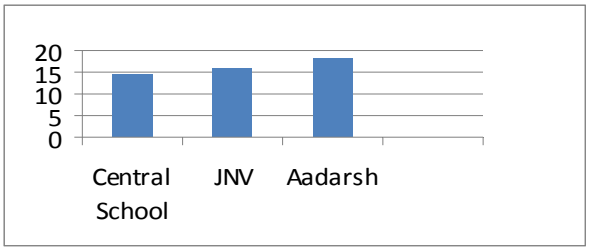
Table 2

Central school	JNV	Adarsh School	Mean Difference	0.05 level CD%
14.68	15.69		1.01	
	15.69	18.29	2.60	1.03
14.68		18.29	3.61	

It can be seen from the Table 2 that the Mean of Central School is 14.68 and the mean of JNV is 15.69 and the mean of Adarsh School is 18.29. The critical difference received is 1.03 at 0.5% level. The mean difference of JNV and Adarsh and that of Central and Adarsh (respectively 2.60 and 3.61) is smaller so it can be said that physical fitness of the Adarsh Residential school students is better than that of Central School and JNV. The Physical Fitness of Central School students and that of JNV is almost similar. These things can be seen more properly through the graph follow:

Graph

The mean difference of Physical Fitness



Conclusions: When we do the stastical analysis of the received data of the study, the result received reveal that the Physical Fitness of the Students of the Adarsh Residential School is quite different from that of the central Schools and JNV. In short although the students belong to the same age group the result varies. The reason behind this difference is that the students of the Adarsh Residential Schools are from backward class. And the objective of such schools is to develop the students of these areas by giving the facilities of education. We can say that the physical fitness of the students who are born and brought up in the hilly and rural areas is naturally better. Moreover the students of the Adarsh Residential Schools were from tribal belt. So it can be concluded that the physical fitness of the tribal students is better than other students.

Recommendations:

From the result of this study it can be said that if the talent hunt is done among the tribal students from the very beginning, good sports people from this category can be found out who can make their name in the national and international level. The physical fitness of the students can improve if the activities like mountaineering, physical activities in the adverse conditions etc are included in the school activities.

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The Impact of Lateral Thinking Training (LTT) on the Level of Aspiration and Achievement Motivation of Physical Education Students

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Abstract:

LTT enhances student's need for achievements and brings changes in the level of aspirations of high school students (Ms. Jayashree Reddy, 2005), and motivates students to evaluate themselves favorably. Number of researches were conducted studies to know the factors influencing on achievement motivation and aspirations, such as task design, authority structure, rewards, grouping arrangements, evaluation practices, coaching in physiological skills (Baker-Richard, 2002), critical thinking coaching-enhancing self-sufficiency (Wright-and etal., 2001) etc.

Introduction:

"Perhaps most importantly in today's information age thinking skills are viewed as crucial for educated person's to cope with a rapidly changing world. The specific knowledge will not be as important to tomorrows workers and citizens as the ability to learn and make sense of new information"-

D Gough, 1991.

QUEST network, a Programme dedicated to building quality-learning community that supports high-level students performance. Here the students were found to be SMART (Successful, Motivated, Autonomous, Responsible and Thoughtful). Here programmes summarizes of 'Six Thinking Hats' were used. Thinking skills instruction improves both academic performance and enables students to become better problem solvers in other situation, both in and outside of school.

Level of Aspiration and Achievements Motivation are the factors, which act as qualities measures, which are expected to be associated with student's performance. Students with high Aspiration & Achievements Motivation have shown high performance at curricular & Extra-curricular activities (Survey by Ms. Jayashree Reddy, 2004).

Thinking, self-concept, self-confidence, Aspirations and Motivation are interdependent on each other, training in any one of these is expected to enhance another. Number of studies are being conducted in this connection.

The programme entitled "Creative Teaching and Technology" (Barak and Dopplet, 1998) encomposed two hours of study every week during an entire school year. They learned thinking tools form CoRT, the Programme developed by Edward de sono (1986,96). Thinking tools such as PMI, CAF, APC, and Six Thinking Hats can be used as 'Motivators' to develop interest in

people to think. High need for achievements is positively related to high level of aspiration (Ali and Akther, 1973, Jawa, 1972 and Kureshi, 1978) (Bhatia, 1980).

The very word "Lateral' suggested the movement 'sideways' to generate alternative patterns instead of moving straight ahead with the development of one particular pattern.

In this present study researcher used LTT, which is an, Intensive Training Programme, where in students learn to think 'Laterally'. Lateral Thinking programme enhances number of other thinking skills.

Objectives of the study:

1) To study the impact of LTT the Level Of Aspiration of physical education Students.

2) To study the impact of LTT on Achievement Motivation of physical education students.

Statistical Hypotheses:

1) There is no significant difference between Level of Aspiration in before and after training.

2) There is no significant difference between Achievements Motivation in before and after training.

Sample:

Researcher selected M.P.Ed 3rd Semester students from Dept. of Physical Education, Gulbarga University, Gulbarga. Whole of training programme was planned for15 Hrs, one and half hours daily, from 8.00 to 9.30 Am, Interest, Enjoyment and Sportiveness have been shown by almost all experimental group Students, during and after training. Out of 25 students 15 students were selected for the study. All the students were requested to attend the curricular and extra-curricular activities regularly. Researcher then processed instructions, and factors related to training such as place, period, timing, conditions, activities etc. to the students on the first day.

All the students were tested and results have been recorded for level of aspiration and achievement motivation using the scales developed and standardized by Bhargava and V.P.Bhargava.

On the 45th day, all the students from both of the groups were again tested and recorded results for the same tests using same scales.

The pre-training and post-training score are shown in table I.

TABLE-I

S. No.	L.O.A		
	B	A	A
1	6.8	9.2	19
2	2.5	4.3	19
3	3.5	5.3	21
4	2.8	5.6	22
5	2.6	7.0	29
6	0	1.0	29
7	2.8	5.9	25
8	-0.5	5.6	17
9	2.1	9.2	19
10	4.5	6.6	29
11	2.5	5.3	16
12	0.5	6.9	24
13	2.4	7.6	32
14	3.5	7.2	20
15	2.6	3.9	21

Stastical Analysis and Interpretation:

The scores were treated to study the significant difference of variables before and after experimentation by calculating S.D Mean and 't' – test. The results are shown in table-II

TABLE-II

N=15		Mean	S.D	Table 't' Value		Obtained 't' Value
				0.05	0.01	
L.O.A	B	2.5	1.6	2.05	2.76	2.2
	A	6.0	28.6			
A.M	B	18.2	4.2			0.61
	A	22.8	4.8			

Interpretation:

As shown in the table-II the obtained 't' at 0.05 level of significance level aspiration is 2.2.Thisis compared with table 't' value which is2.05,which is less than obtained t value, hence the Hypothesis 1 is rejected. That means there is a significant difference between the means of level of aspiration of students before and after LTT.

Similarly, obtained t value for Achievement Motivation is 0.61, which is less than Table t value, hence the second hypothesis is accepted. That means there is no significant difference in Achievement Motivation before and after training.

Conclusion:

LTT is shown to enhance the level of aspiration of physical education student, but the impact of LTT is shown to be not much on Achievement Motivation of students, the reason may be 'internalization' of lateral Thinking skills is expected after a period more than 45 days.

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Effect of training on resting and normal heart rate

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Abstract

The heart is one of the most important organs in the entire human body. It is really nothing more than a pump, composed of muscle which pumps blood throughout the body, beating approximately 72 times per minute of our lives. The heart pumps the blood, which carries all the vital materials which help our bodies function and removes the waste products that we do not need. For example, the brain requires oxygen and glucose, which, if not received continuously, will cause it to loose consciousness. Muscles need oxygen, glucose and amino acids, as well as the proper ratio of sodium, calcium and potassium salts in order to contract normally. The glands need sufficient supplies of raw materials from which to manufacture the specific secretions. If the heart ever ceases to pump blood the body begins to shut down and after a very short period of time will die.

The heart is essentially a muscle (a little larger than the fist). Like any other muscle in the human body, it contracts and expands. Unlike skeletal muscles, however, the heart works on the "All -or-Nothing Law". That is, each times the heart contracts it does so with all its force. In skeletal muscles, the principle of "gradation" is present. The pumping of the heart is called the Cardiac Cycle, which occurs about 72 times per minute. This means that each cycle lasts about eight-tenths of a second. During this cycle the entire heart actually rests for about four-tenths of a second.

Key Words: Heart, Resting Rates, Normal Rates, Training, Regulations and Functions.

Introduction

The Heart works as a pump moving blood around in our bodies to nourish every cell. Used blood, that is blood that has already been to the cells and has given up its nutrients to them, is drawn from the body by the right half of the heart, and then sent to the lungs to be reoxygenated. Blood that has been reoxygenated by the lungs is drawn into the left side of the heart and then pumped into the blood stream. It is the atria that draw the blood from the lungs and body, and the ventricles that pump it to the lungs and body. The output of each ventricle per beat is about 70 ml, or about 2 tablespoons. In a trained athlete this amount is about double. With the average heart rate of 72 beats per minute the heart will pump about 5 liters per

ventricle, or about 10 liters total per minute. This is called the cardiac output. In a trained athlete the total cardiac output is about 20 liters. If we multiply the normal, non-athlete output by the average age of 70 years, we see that the cardiac output of the average human heart over a life time would be about 1 million liters, or about 250,000 gallons.

Objectives of the Study

1. To study the effect of training on heart rate of normal group
2. To study the effect of training on heart rate of resting group
3. To compare the effectiveness of training on heart rate between normal and resting group.

Materials and Methods

Variables Considered in the study

The main variable for the study is heart rate

Hypothesis

Hypothesis 1: There is no significant difference between before training and after training with respect to heart rate scores in normal group.

Hypothesis 2: There is no significant difference between before training and after training with respect to heart rate scores in resting group.

Collection of data

The investigator has selected 83 males from Hiremallur Ishwaran P.U. Science College, Dharwad for this study in between the age group of 16 to 18years. Resting heart rate was taken for 1minute of this subject for 7 days early in the morning before they would get-up from the bed and average was taken. Normal heart rate was taken for 1minute of this subject for 7 days around 5pm. Average resting, and normal heart rate was taken before and after training.

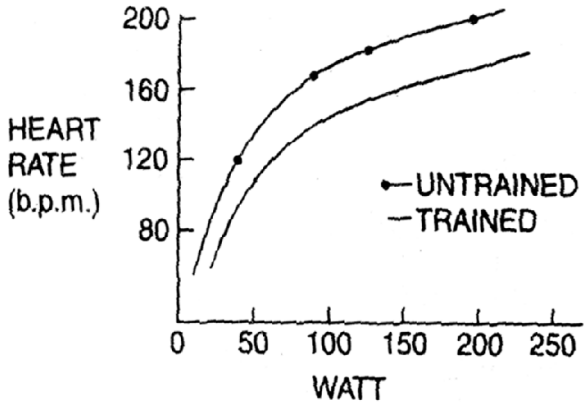
Limitations:

This study is limited only to the H.I.P.U. Science College students.

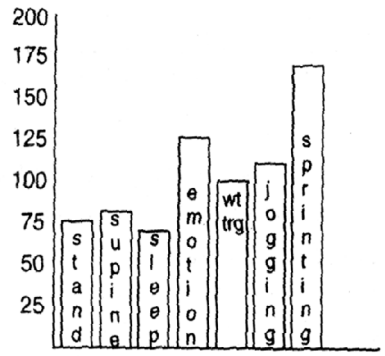
Delimitations:

1. This study was delimited on 83 students of H.I.P.U. Science College
2. Further the study was delimited on 16-18 years age group students.

Heart rate response to exercise



Heart rate response during exercise in trained and untrained subject.



Maximum heart rate in various sports and events

Fig.1.1 indicates some selected factors, affecting heart rate:

Cardiovascular response to exercise

As exercise intensity increases, heart rate increases. The heart pumps blood more often, thus speeding up circulation Stroke volume also increased with exercise, so the amount of blood ejected with each contraction increases. SV is determined by 4 factors: (i) the volume of venous blood return to the heart (ii) ventricular distensibility, or the capacity to enlarge ventricle (iii) ventricular contractility (iv) aortic and pulmonary artery pressure.

Most researchers agree that stroke volume increases with increasing rate of work, but only up to exercise intensity between 40% and 60% of maxi ma! capacity. Several studies have found a plateau in SV at approximately 50% ofV0 with little or no change occurring with further increases (Crawford et al, 1985, Higginbotham et al, 1986). However, several other studies have shown that SV continues to increase beyond this rate (Ekblom & Hermansen, 1968, Harmensen et al, 1970; Scruggs et al, 1991).

Importance of heart rate monitoring

Heart rate monitoring of actual game condition and training work out supply an objective picture of the exercise. For this reason alone it makes sense to register heart rate regularly. By analyzing heart rate records it appears that many mistakes are made during workout, It is often difficult to estimate the right intensity of the exercise in specific training addressed to develop endurance. Heart rate records provide an excellent means to teach the athlete the correct subjective feeling for a given intensity which enables him to have optimal benefits of his training by which performance level may rise.

Method of assessment of heart rate

During ventricular contraction blood is ejected into the arteries with a pressure and this pressure wave is transmitted throughout the arterial system which can be felt easily in superficial artery. The number of pressure waves per minute felt at the arteries is called pulse rate. Normally it is about 70 to 80 per minute. In trained person it is found to be as low as 40 to 50 beats per minute Measurement of heart rate can be done by e following way: (a) Stethoscope, (b) by pulse, (c) through electrocardiogram and (d), radio- telemetric devise.

Age	**Normal heart rate (beats per minute)**
newborn	130
3 months	150
6 months	135
1 year	125
2 years	115
3 years	100
4 years	100
6 years	100
8 years	90
9 years	95
12 years	85
Adult	60-100

Miguel Indurain, a cyclist and five times Tour de France winner, had a resting heart rate of 28 beats per minute, one of the lowest ever recorded in a healthy human

Physical Education is one of the important areas of general education, which develops physical, mental, moral, cultural and social aspect of human beings Games are integral part of the society and having important valuable effects on many parts of social life. Similarly the whole social pattern of a society may be reflected in its play.

Play and physical exercise unlike such activities as no product. It is undertaken essentially for its own sake. If we want to know why people involve themselves in physical exercises and activities, sports and games. The first answer in that each differs in their own way as some play for fun or to few it is enjoyment, more or less for many, it is a kind of activity like other daily necessities.

Physical education today is totally based on scientific facts and principles as such, its programme is developed as a result of systematized knowledge on scientific analysis.

The physical education programme is established with to the biological, psychological and mechanical aspects of the growth and development. The programme of physical education is not only confined to the activities and exercises but, also knowing and understanding for other indigenous and

This is a person's heart rate at rest. The best time to find out your resting heart rate is in the morning, after a good night's sleep, and before you get out of bed.

The heart beats about 60 to 80 times a minute when we're at rest. Resting heart rate usually rises with age, and it's generally lower in physically fit people. Resting heart rate is used to determine one's training target heart rate. Athletes sometimes measure their resting heart rate as one way to find out if they're overtrained. The heart rate adapts to changes in the body's need for oxygen, such as during exercise or sleep

MEN RESTING HEART RATE						
AGE	18 -25	26 -35	36 -45	46 - 55	56 -65	65+
ATHLETE	49-55	49-54	50-56	50-57	51-56	50-55
EXCEL'T	56-61	55-61	57-62	58-63	57-61	56-61
GOOD	62-65	62-65	63-66	64-67	62-67	62-65
ABOVE AV	66-69	66-70	67-70	68-71	68-71	66-69
AVERAGE	70-73	71-74	71-75	72-76	72-75	70-73
BELOW AV	74-81	75-81	76-82	77-83	76-81	74-79
POOR	82+	82+	83+	84+	82+	80+

What affects your resting heart rate?

The resting heart rate is affected by:

- age
- sex (men are lower usually)
- physical fitness
- some drugs/medication
- genetics
- anxiety

The first wireless heart rate monitor (HRM) was introduced in 1983

Factors effecting Heart Rate

Many factors can alter your heart rate:

- Stress
- Illness
- Over training
- Medication
- Time of day
- Food and drink (Caffeine)
- Altitude
- Temperature
- Hydration levels
- Weather conditions
- Heart rate drift

Heart rate variability

Result and Discussion

After the data had been collected, it was processed and tabulated using Microsoft Excel - 2007 Software. The data collected on heart rates from pre university college students aged between 16-18 years. The main purpose of the study was "A study Effect of Training on Resting and Normal heart rate". Then the data were analyzed with reference to the objectives and hypotheses by using independent T- test was used to find out the significant difference between normal and resting groups with respect to heart rate and paired T-test was used to find out the effect of training on heart rate for normal and resting groups by using SPSS 11.0 statistical software and the results obtained there by have been interpreted.

The level of significance set at 5% level of significance ($p<0.05$) was considered to reject or accept the null hypothesis. On the basis of objectives the following hypotheses were formed

Hypothesis 1: There is no significant difference between before training and after training with respect to normal heart rate scores

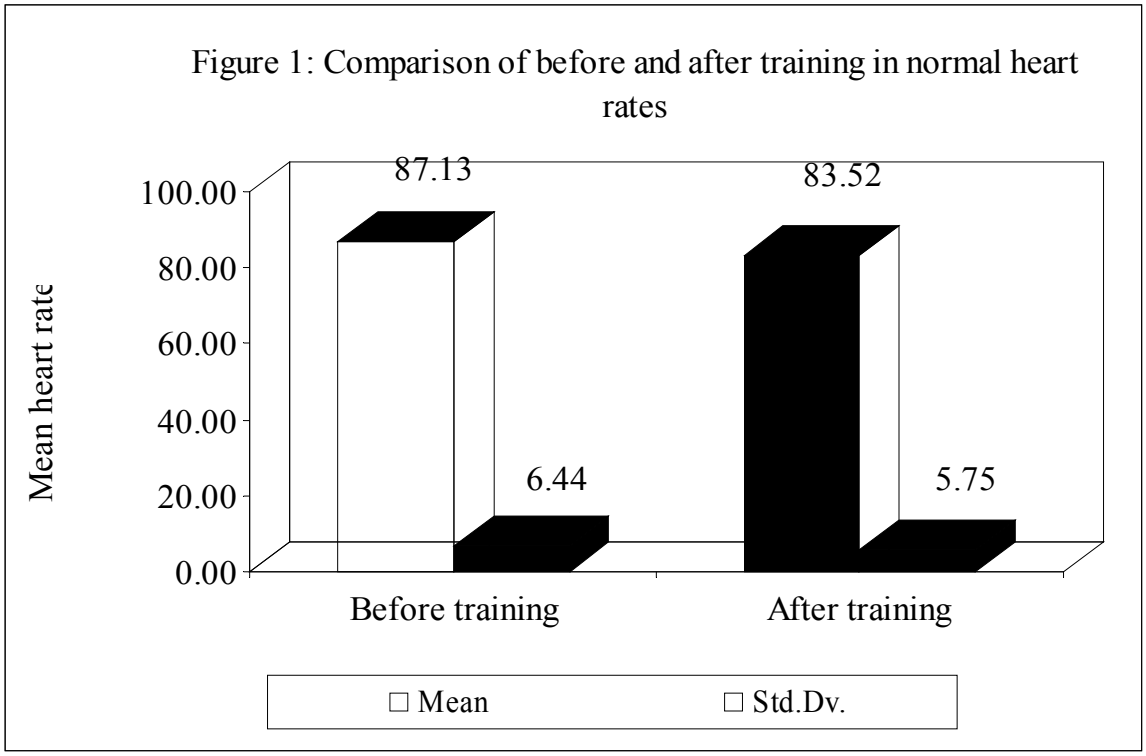
To achieve this hypothesis, the paired T-test was applied and the results are presented in the following table:

Table 1: Results of paired T-test between before training and after training with respect to normal heart rate scores

Training	Mean	Std.Dv.	Mean Diff.	SD Diff.	Paired T-value	p-value	Signi.
Before	87.1325	6.4407					
After	83.5181	5.7538	3.6145	4.9506	6.6516	<0.05	S

From the results of the above table, we had seen that, there is a significant difference between before and after training with respect to normal heart rate ($T=6.6516$, $p<0.05$) at 5% level of significance. Hence, the null hypothesis is rejected and alternative hypothesis is accepted. It means that the after training normal heart rate scores are significantly smaller as compared to

before training normal heart rate scores. In another words, the training has more effect on reduction of normal heart rate. The mean and SD values of heart rate of before and after training is also presented in the following Figure 1.



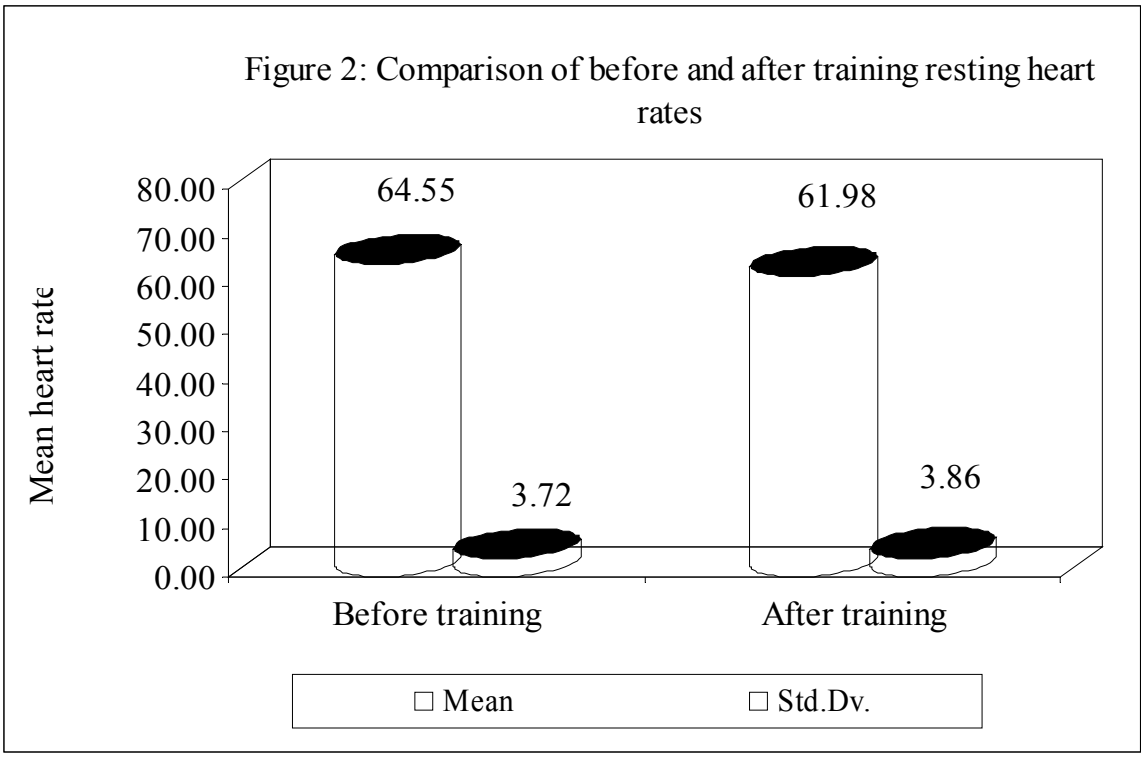
Hypothesis 2: There is no significant difference between before training and after training with respect to resting heart rate scores.

To achieve this hypothesis, the paired T-test was applied and the results are presented in the following table:

Table 2: Results of paired T-test between before training and after training with respect to resting heart rate scores

Training	Mean	Std.Dv.	Mean Diff.	SD Diff.	Paired T-value	p-value	Signi.
Before	64.5542	3.7229					
After	61.9759	3.8634	2.5783	3.2912	7.1370	<0.05	S

From the results of the above table, we had seen that, there is a significant difference between before and after training with respect to resting heart rate ($T=7.1370$, $p<0.05$) at 5% level of significance. Hence, the null hypothesis is rejected and alternative hypothesis is accepted. It means that the after training resting heart rates are significantly smaller as compared to before training resting heart rates. In another words, the training has more effect on reduction of resting heart rate. The mean and SD values of heart rate of before and after training is also presented in the following Figure 2.



Conclusion

The data collected for the present investigation have been analyzed and findings presented in the preceding chapters. This chapter presents a brief summary of the investigation, the findings, discussions of the findings, conclusions that have been drawn from the findings, limitations of the study, and implications of Pre University college students and suggestions for further research in the field.

The heart rate is a useful parameter for monitoring the reaction of the athlete's body to training and the HRM provides a convenient method for measuring and recording heart rate during exercise. Heart rate, on its own, does not allow for an accurate assessment of the training effectiveness over time and cannot tell the coach or athlete which aspects of the training program are having a positive or negative influence on training adaptation.

Data received from the students of Pre University College were scored according to given procedure. The before and after training heart rates from two groups were taken for the analysis. These scores were used for different types of statistical techniques.

- Students paired T-test
- Students unpaired T-test

Major Findings

The findings of the study are listed below point wise.

- There was a significant difference between before and after training heart rate scores in normal group
- There was a significant difference between before and after training heart rate scores in resting group
- There was a significant difference between normal and resting groups with respect to before training heart rate scores
- There was a significant difference between normal and resting groups with respect to after training heart rate scores
- There was no significant difference between normal and resting groups with respect to gain of before and after training heart rate scores.

Suggestions and Recommendations

- ❖ There is an urgent need to train Pre university college students regarding the importance or effectiveness of training on heart rate
- ❖ There is an urgent need to train degree college students regarding the importance or effectiveness of training on heart rate
- ❖ There is an urgent need to train primary and secondary school students regarding the importance or effectiveness of training on heart rate
- ❖ Periodical workshops and seminars should be arranged constantly for students.
- ❖ The students must be supplied with various knowledge aids towards importance of heart rate such as guides, handbook and other audio-visual aids.

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