ISSN 0973-2020

JESP Vol. 11, No. 1, 2015: 1-10

Journal of Exercise Science & Physiotherapy
Published by
Exercise Fitness & Health Alliance
Article no. 228; UAIC: 97302282020

Prevalence and Determinants of Hypertension among University Employees

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Communication Date:Sep. 9, 2014
Acceptance Date: Dec. 25, 2014
UAIC: ***97302282020***

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Key Words:High Blood Pressure, Risk Factors, Gender Difference, BMI, Work Related Stress

To cite this article: Kulandaivelan, S. and Yamini. *Prevalence and Determinants of Hypertension among University Employees* [online]. *Journal of Exercise Science and Physiotherapy*, Vol. 11, No. 1, June 2015: 1-10.

Availability:
Abstract:http://www.efha.in/wp-content/uploads/2015/01/ABSTRACT-UAIC-97302282020.1.pdf

Full Text: http://www.efha.in/wp-content/uploads/2015/01/FULL-TEXT-UAIC-97302282020.pdf

Abstract

Objective: Aim of the present study was to determine the prevalence of hypertension and identify factors (sex, age, bmi, smoking, alcohol consumption, diet (veg vs non-veg), sweet use, ghee use, family history of hypertension, type of work (teaching vs non-teaching)) that determine hypertension among university employees. *Methodology***:** The present study was a cross sectional survey done on a random sample of 100 out of 671 employees (male 71, females 29) aged 18 or above. Determinants data was collected on a standard performa by a trained physiotherapist who also recorded the bp on each subject through recommended procedure. Set point bp for hypertension was 130/85 mmhg for sbp and dbp respectively. Data was analysed by ibm spss (21.0 version) software. *Results:* Males had higher prevalence than females. Prevalence ofhypertension increased with age and bmi. Smoking, alcohol consumption, family history of hypertension, type of work, qualification significantly influenced the occurrence of hypertension among employees. Multiple regression analysis identified qualification, smoking, bmi factors along with constant predicts 79% variability in SBP hypertension. Sex, smoking, bmi factors along with constant predicts 72% variability in DBP hypertension. *Conclusion:* Prevalence of hypertension among university employees was 37%, 41% for sbp, dbp cut-off respectively.higher prevalence is associated with advancing age, higher bmi and lower education. Analysis also showed smoking, alcohol consumption, family history and type of work are risk factors for hypertension in university employees. Finally smoking, BMI along with either qualification or sex explains more than 70% variability in both sbp and dbp hypertension.

Journal of Exercise Science & Physiotherapy is indexed with Citefactor, Researchbible, Medind, Hinari, Innospace, Informit, Academic Keys, J-Gate, Jour Informatics, GIF, Directory of Science (Impact Value 19.79), Indianscience.in, ICMJE, Infobase Index (IBI factor 3.4). Electronic Journals Library, University Library of Regensburg, International Scientific Indexing (ISI), SIS, International Impact Factor Service, MIAR, DRJI, Advanced Sciences Inerdex (ASI) Germany (Impact factor 0.8), Jifactor (Impact Factor 0.5), Open Academic Journals Index, Sjournals Index, Index Copnicus, http://www.sherpa.ac.uk/romeo/ as Romeo blue journal. Digital archiving finalised with Portico.

ISSN 0973-2020
JESP Vol. 11, No. 1, 2015: 1-10
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Introduction:

Hypertension, defined as elevated blood pressure, is rapidly increasing world wide. It is reported to be a leading cause for mortality, accounting 13% of global death (*Lawes et al., 2008*) and 17% of death in middle income countries, in which India is a part (*WHO, 2009*). It is second only to alcohol use in the middle income countries that causes greater loss of disability adjusted life years (DALYs), accounting 5.4% of total DALYs (*WHO, 2009*). Once considered as disease of developed and industrialized nations, hypertension is rapidly increasing in developing countries now (*Pereira et al., 2009*) and is one of the leading causes of death and disability in developing countries (*Deepa et al., 2003*). Most recent review of hypertension prevalence rates in India (*Gupta, 2004*) reports a significant rise in the prevalence of hypertension. The current prevalence rate of hypertension in India is now equal to that of USA (*WHO, 2011*).

Previous studies indicate that the prevalence of hypertension varies considerably from one region of India to another. This fact emphasis the need of prevalence studies in different parts of India as our country is multi cultural, multi lingual, multi ethnic society. However, there are only very few studies available from Haryana state- that is too using old WHO classification of 160/90 mm of Hg as hypertension reference value (*Gupta et al., 1978*).

India is the third largest country in higher education only after China and America. Since the Indian government considers higher education as one of main source for future economic growth, it allocated considerable percentage of its budget into higher education in11thfive year plan. Its objective is to improve the student gross enrollment index from current 15% to 22% at end of 12thfive year plan which is equal to world's average. To achieve this objective, number of universities has increased to 431 with 5.05 lakh total number of teachers apart from non-teaching academic and administrative supporting staffs (*Gupta, 2010*). The people working in these universities are coming from diverse socioeconomic backgrounds.Their working style also differs both physically and psychologically. This may lead to the development of hypertension among the university population.

Age, sex, smoking, family history of hypertension, obesity (increased BMI or waist circumference), physical inactivity are considered as some of the risk factors for primary hypertension. Thus, primary objective of the present study was to see the prevalence of hypertension among university employees in Haryana according to their qualifications, type of work, age, sex, BMI and other personal traits such as smoking, alcohol use, and type of food intake. The preview of the aim is thus to see whether these factors

ISSN 0973-2020 | JESP Vol. 11, No. 1, 2015: 1-10 | Journal of Exercise Science & Physiotherapy
Published by
Exercise Fitness & Health Alliance
Article no. 228; UAIC: 97302282020

along with fast food intake, weekly salad, fruit, ghee and sweet use ingestion, self-reported hypertension (self HTN) determine the hypertension presence or not in the university employees.

Materials & Methods:

Present study was a cross sectional study that was carried out at a university in Haryana with a total eligible population of 671 (both teaching and non-teaching staffs). Sample size was determined using online sample size calculator, confidence interval 95% with 10% margin of error for 671 subjects yielded 101 as sample size, for practical reason study was carried out on 100 subjects. The subjects were selected using systematic random sampling method from university employees list- every sixth employee from any one of first 71 serial numbers. There was 0% refusal rate as the study was a part of university health programme. There were a total of 100 (71 males and 29 females) subjects with mean ± SD age, height, weight of 34.33 ± 8.80 yrs, 171.24 ± 8.20 cm, 67.12 ± 12.24 kg respectively.

Prior to BP measurement, subjects were asked to sit and following details were recorded from each subject for risk stratification and subsequent analysis: age, sex, height, weight, work profile (teaching, non-teaching), educational qualification, food preference (vegetarian, non-vegetarian), usage of salad, fruit, sweets and ghee (per week), consumption of fast foods, smoking history, alcohol usage, self HTN.

The Physiotherapist measured height with a stadiometer. Patients stood on a firm surface in their bare feet to have their height measured. Body mass was measured at the end of examination with a calibrated bathroom-type digital scale, on a firm surface. Patients were weighed in the standing position, wearing light indoor clothes, but no shoes, jewellery or heavy clothing. Body mass index was calculated by weight (in kg) divided by height (in m^2), and all subjects were divided into low weight (BMI ≤18.5), normal weight (BMI 18.5-22.9), overweight (BMI 23.0-24.9), mild obese (BMI 25.0-26.9), moderate obese (BMI 27.0-29.9) and morbid obese (≥30.0) groups based on recent Indian Health Ministry Guidelines based on *Singh et al., (2008) and Misra etal., (2009)*.

Blood pressure Measurement: Bloodpressure was measured through standard procedure using mercury sphygmomanometer and stethoscope (*Frese et al., 2011*).In simple, subjects were seated quietly in a chair with back support, with both feet flat on the floor and arms at heart level, for at least 5 minutes prior to obtaining a measurement.They were instructed to relax as much as possible and to not talk during the measurement procedure. The blood pressure cuff placed on the patient's bare arm and inflated 30 mmHg above disappearance of brachial pulse. Then cuff was deflated at recommended rate of 2 mm Hg per second. Systolic blood pressure was recorded at the point in which auscultatory pulsations (Korotkoff phase I) appeared and the disappearance of the auscultatory pulsations (Korotkoff phase V) was recorded as diastolic pressure. The whole procedure was repeated again. If the difference between the two readings is more than 5 mm Hg, one more readings was obtained, and the average of the three readings was used for analysis.The cut-off point for hypertension was ≥130 and ≥85 mmHg for SBP hypertension and DBP hypertension respectively.

Hypertension Classification: Hypertension was classified based on ESH (European society of hypertension)/ESC (European society of cardiology) criteria (*Mancia et al., 2007*). This states < 120/<80 mmHg of SBP/DBP as optimal, 120-129/80-84 mmHg as normal, 130-139/85-89 mmHg as high normal, 140-159/90-99 mmHg as grade I hypertension, 160-179/100-109 mmHg as grade II hypertension and ≥180/≥110 mmHg as grade III hypertension. In the present investigation, high normal was included into hypertension risk classification for two reasons. First, ATP (adult treatment panel) for metabolic syndrome include ≥130/≥85 mmHg as hypertension. Secondly, risk for cardiovascular disease double by every 20/10 mmHg rise that starts from 115/75 mmHg. This means even high normal group faces danger of cardiovascular disease (*Lewington et al., 2002; IOM, 2010*). *Statistics:* The Chi-square test (multinominal) was carried out to detect factors that may determine the hypertension. Only factors that were significant in chi-square test were entered into binary logistic regression analysis. All three types (enter, forward and backward) with two modes (with or without constant) was used for regression analysis and the best prediction model was used for presentation. Above said analysis were carried out for both SBP and DBP separately. All statistical analyses were performed using the 'IBM SPSS (21.0 version)' software. A p-value less than 0.05 were used to define statistical significance.

Results:

The overall prevalence of SBP and DBP hypertension based on educational qualifications, age, sex, BMI, smoking, alcohol use, work type and different stages of hypertension was found out and presented in Table 1. In general hypertension prevalence was observed to increase with increase in age and BMI and decrease as the education level increased. Smoking and alcohol use was observed to increase the hypertension prevalence. Male and non-teaching staffs were more commonly affected by hypertension than their counterparts. High normal hypertension was most prevalent and subsequently hypertension rate decreased.

Table 2 shows the significant factors decided by multinominal chi-square test with odds ratio (OR) for dichotomous variables using binary chi-square test. BMI and self HTN are the most significant factors followed by smoking for SBP hypertension. BMI followed by sex are observed to be the most significant factors for DBP hypertension. Binary chi-square test showed smoking and self HTN as highest two OR values for both SBP and DBP hypertension amongst five variables.

Table 1: Prevalence of SBP and DBP hypertension based on qualification, age, BMI, sex, smoking, alcohol use, work type and ESH classification

Factor	Sub factor (n)	Prevalence (%)	
		SBP (37%)	DBP (41%)
Educational Qualifications	Doctrate (n=17)	29.40	29.40
	Post Graduates (n=42)	21.40	33.30
	Post Matric & Graduates (n=33)	57.60	51.50
	Matric & Below (n=8)	50.00	62.50
Age, yrs	<30(n=39)	30.80	33.30
	30-39(n=34)	35.30	44.10
	40-49(n=21)	42.90	47.60
	>49(n=6)	66.70	50.00
BMI (Kg.m^{-2})	Low weight (n=8)	12.50	12.50
	Normal weight (n=45)	37.80	40.00
	Over weight (n=22)	22.70	36.40
	Mild obese (n=10)	30.00	30.00
	Moderate obese (n=13)	69.20	69.20
	Morbid obese (n=2)	100.00	100.00
Sex	Males (n=71)	43.70	50.70
	Females (n=29)	20.70	17.20
Smoking	Yes (n=15)	80.00	73.30
	No (n=85)	29.40	35.30
Alcohol Use	Yes (n=15)	58.30	58.30
	No (n=76)	30.30	35.50
Work Type	Teaching (n=45)	24.40	26.70
	Non Teaching (n=55)	47.30	52.70
ESH Category	High Normal	23.00	16.00
	Grade 1	13.00	08.00
	Grade II	01.00	11.00
	Grade III	00.00	06.00

Table 2: significant factors along with OR (95% CI) for hypertension in University employees (n=100).

Variable (DF)	X^2		OR (95% CI)	
	SBP	DBP	SBP	DBP
Sex (n=4)	08.188*	13.285**	2.97 (1.08-8.19)	4.94 (1.69-14.39)
Work Profile (n=4)	10.198*	09.746*	2.77 (1.17-6.56)	3.07 (1.32-7.15)
Qualification (n=12)	18.565*	17.574^{NS}		
Smoking (n=4)	14.951**	09.361*	9.60 (2.49-36.97)	5.04 (1.48-17.21)
Alcohol use (n=4)	09.468*	07.649^{NS}	3.23 (1.25-8.32)	
Self HTN (n=4)	16.237***	11.379*	7.08 (2.08-24.09)	5.69 (1.68-19.23)
BMI (n=20)	39.983***	56.719***		

*, **, *** are p less than 0.05, 0.01, 0.001 respectively. NS means non-significant value. OR values represents males in sex, non-teaching in work profile, yes in smoking, alcohol use, and self HTN.

Table 3: Determinants of SBP in university employees (n=100)
Model: Backward (conditional) method (4 steps)- x^2= 35.482-0.045-0.282-0.705= 34.450

VARIABLE	β	SE	OR	95% CI OF OR	P
Qualification	-0.757	0.316	0.469	0.252-0.871	0.017
Smoking	2.564	0.818	12.989	2.615-64.523	0.002
Self HTN	1.227	0.735	3.411	0.808-14.400	0.095
BMI	0.644	0.237	1.904	1.198-3.027	0.006
Constant	-4.764	1.483	0.009		0.001

Table 3 shows determinants for SBP after entering all the seven variables in Table 2 into a binary logistic regression analysis. Backward step conditional logistic regression with constant was the best model that could explain the SBP in our population. Qualification, smoking, self HTN and BMI were collectively able to explain 79% of variability in SBP in our population.

Table 4 shows determinants for DBP after entering all the five variables in Table 2 into a binary logistic regression analysis. Enter method logistic regression with constant was the best model that could explain the DBP in our population. Sex, smoking and BMI were collectively able to explain 74% of variability in DBP in our population.

Table 4: Determinants of DBP in university employees (n=100)

Model: Enter method with constant- x^2= 27.217

SNo	Variable	β	SE	OR	95% CI of OR	p
1.	Sex	1.385	0.668	3.993	1.079 - 14.778	0.038
2.	Smoking	1.490	0.806	4.436	0.914 - 21.533	0.065
3.	BMI	0.448	0.217	1.565	1.023 - 2.394	0.039
	Constant	-7.518	1.736	0.001		0.000

OR (95% CI) values represents males in sex, morbid obese in BMI, yes in smoking.

Discussion:

The overall prevalence of hypertension of 48%, observed in the present study is in agreement with recent study reported on larger sample size in India (*Gupta et al 2004*) and *WHO report (2011)*. There was 37% SBP hypertension and 41% DBP hypertension in university employees.Hypertension is a major public health problem in India and the world. Various studies conducted across the country have estimated the prevalence of hypertension ranging from 0.76% in 1994 to 79.8% in 2011. However, the study results were not consistent, due to variations in the cut off values and also differing age groups constituting the study.

Epidemiologicalstudies to assess the prevalence of hypertension are essential as these can be used as baseline value for future research to see the risk factor trends. These studies also help to implement preventive strategies in high risk areas or population. Currently available hypertension preventive strategies include promoting health through reducing weight, increasing physical activity, decreasing salt intake amongst target population. These efforts have the potential to reduce the emergence or minimize the prevalence of pre-hypertension and hypertension in different regions of India.

To our knowledge this is the first of this kind and there is no study that is related to the prevalence of hypertension in university employees either within India or outside. This limits the discussion so we tried to compare our

Journal of Exercise Science & Physiotherapy
ISSN 0973-2020 *JESP Vol. 11, No. 1, 2015: 1-10* *Published by*
Exercise Fitness & Health Alliance
Article no. 228; UAIC: 97302282020

results with latest Indian hypertension epidemiological studies that are similar to our objectives. Recently published article by *Gupta et al. (2013)* on middle class urban subjects reported that hypertension prevalence increase as the age, educational qualification and BMI increase which supports our findings. However, their study results indicate low socio-economic status linkage with less prevalence of hypertension. They also reported fat intake, fruits and salad usage as other risk factors for hypertension.

Hypertension prevalence has been reported to decrease with an icrease in the education level in the present investigation; this observation is in agreement with the similar findings reported by *Kumar et al. (2011) &; Meshram et al. (2012)*. Further the results of the present study demonstrate a gradual increase in the prevalence rate with increase in the age of the subjects. The previous studies have also shown an overall increase in prevalence of hypertension with age (*Hajjar et al. 2006; Agrawal et al. 2008; Kannan and Satyamoorthy, 2009; Todkar et al, 2009; Jonas et al., 2010; Srinivasan et al, 2010; Kumar et al., 2011; Parikh et al., 2011; Bharati et al., 2012; Meshram et al., 2012; Rajasekar et al., 2012*). Thus the prevalence is least in the >29 years age group and highest 50 years and above age groups.The finding of increase in the prevalence of hypertension with increase in the body mass index of the subjects agrees with similar results of association of BMI/obesity with hypertension reported by many researchers(*Deshmukh et al, 2006; Hajjar et al. 2006; Gupta et al, 2007; Mohan et al, 2007; Radhika et al, 2007; Agrawal et al. 2008; Yadav et al, 2008; Tiwari et al, 2009; Todkarei al, 2009; Jonas et al., 2010; Bharati et al., 2012; Meshram et al., 2012; Rajasekar et al., 2012*). *Landsberg et al., (2013)* in their study proposed various patho mechanisms for higher incidence of hypertension in obese population.

The present study results show that prevalence of hypertension is significantly higher in men compared to women. *Hajjar et al. (2006)* reported steeper increase in blood pressure among men with the advancement in age than women before menopause. *Bhat et al. (2010)* observed double the number of hypertension cases among men which is similar to our findings. Similar findingshave been observed by *Tiwari et al., (2009); Bharati et al.(2012); Rajasekar et al. (2012)*.Hypertension was more prevalent in subjects who take smoking and alcohol. The findings of present study were observed to be similar to other authors (*Hajjar et al. 2006; Mohan et al, 2007; Agrawal et al. 2008; Yadav et al, 2008; Kannan and Satyamoorthy, 2009; Todkar et al, 2009; Parikh et al., 2011; Bharati et al., 2012; Meshram et al., 2012; Rajasekar et al., 2012*). In fact recent meta-analysis done by *Briasoulis et al., (2012)* showed increased alcohol consumption has progressively increased the incidence of hypertension.

ISSN 0973-2020 JESP Vol. 11, No. 1, 2015: 1-10
Journal of Exercise Science & Physiotherapy
Published by
Exercise Fitness & Health Alliance
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The prevalence of hypertension was more among non-teaching staff than the teaching staff. The relation was highly significant. The most probable reason assigned to this high prevalence may be related to their day to day engagements, sedentary habits, lower education (*Kumar et al., 2011; Meshram et al., 2012*), lower socioeconomic status (*Kumar et al., 2011; Meshram et al., 2012; Rajasekar et al., 2012*), lower occupational class (*Lynch et al., 1998*), no exercise and stress and strain of office work (*Markovitz et al., 2004*) and present day society including indulgence in alcohol and smoking.

The sample size of the present study was small and localized to one university in a small state of India. Generalization of these results into a larger section need warranted. This is the main limitation of the present study. However, main purpose of this study was to identify the problem in the said population so that future extra mural projects could be implemented in the high risk population (i.e) based on the results we could say male non-teaching staffs with smoking and or alcohol habits need intervention.

Conclusion: The prevalence of hypertension in university employees was similar to that of national average. So this population should be considered as high risk population and preventive measure should be taken to control them. Male sex, non-teaching staffs (lower qualification), obesity (high BMI), smoking are factors that could determine the blood pressure in this population

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Conflict of Interest: None Declared

Journal of Exercise Science & Physiotherapy
JESP Vol. 11, No. 1, 2015: 11-16
Published by
Exercise Fitness & Health Alliance
Article no. 229; UAIC: 97302292020

Relationship among Speed, Power & Fatigue Index of Cricket Players

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Communication Date:

Acceptance Date:

UAIC: ***97302292020***

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Key Words:Speed, Power, Fatigue Index

To cite this article:
Kumar, Ashok andKathayat, Lokendra Bahadur. Relationship among Speed, Power & Fatigue Index of Cricket Players [online]. *Journal of Exercise Science and Physiotherapy*, Vol. 11, No. 1, June 2015: 11-16.

Availability:
Abstract: http://www.efha.in/wp-content/uploads/2015/01/ABSTRACT-UAIC-97302292020.1.pdf

Full Text: http://www.efha.in/wp-content/uploads/2015/01/FULL-TEXT-UAIC-97302292020.pdf

Abstract

Objective: Aim of the present study was to determine the prevalence of hypertension and identify factors (sex, age, bmi, smoking, alcohol consumption, diet (veg vs non-veg), sweet use, ghee use, family history of hypertension, type of work (teaching vs non-teaching)) that determine hypertension among university employees. **Methodology:** The present study was a cross sectional survey done on a random sample of 100 out of 671 employees (male 71, females 29) aged 18 or above. Determinants data was collected on a standard performa by a trained physiotherapist who also recorded the bp on each subject through recommended procedure. Set point bp for hypertension was 130/85 mmhg for sbp and dbp respectively. Data was analysed by ibm spss (21.0 version) software. **Results:** Males had higher prevalence than females. Prevalence ofhypertension increased with age and bmi. Smoking, alcohol consumption, family history of hypertension, type of work, qualification significantly influenced the occurrence of hypertension among employees. Multiple regression analysis identified qualification, smoking, bmi factors along with constant predicts 79% variability in SBP hypertension. Sex, smoking, bmi factors along with constant predicts 72% variability in DBP hypertension. ***Conclusion:*** Prevalence of hypertension among university employees was 37%, 41% for sbp, dbp cut-off respectively.higher prevalence is associated with advancing age, higher bmi and lower education. Analysis also showed smoking, alcohol consumption, family history and type of work are risk factors for hypertension in university employees. Finally smoking, BMI along with either qualification or sex explains more than 70% variability in both sbp and dbp hypertension.

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Introduction

Due to the nature of cricket that is intermittent activities such as batting, bowling, fielding in cricket, anaerobic power and capacity is of great interest to those involved with them, as most rely heavily on players' ability to move quickly and powerfully. *Noakes & Durandt (2000)* estimated that during a one-day game, a hypothetical player scoring 100 runs, made up of 50 singles, 20 twos, 10 threes and 20 fours, would cover a distance of 3.2 km in an activity time of 8 minutes. Average running speed would be 24 $km.h^{-1}$ with at least 110 decelerations required *(Noakes & Durandt, 2000).* From this, it deduces that the physiological demands of batting in a one-day game are substantial. *Noakes & Durandt (2000)* speculate that the main cause of stress for cricket players is the stop-start nature of both sprinting between the wickets and fast bowling (during the 'run up' and delivery of the ball), contributes to early-onset fatigue indicators which, over time, results in a specific type of fatigue which negatively impacts performance and increases the risk of injury *(Christie et al., 2011b).* Sprint running times have been shown to be well correlated to peak and mean power output *(Tharp et al., 1985; Patton & Duggan, 1987).* The purpose of this study was to observe a relationship among speed, power and fatigue index of under 19 year cricket players.

Materials & Methods

Thirty one (N=31) trained male cricketers between the ages of 15 and 19 years of Punjab Cricket Academy volunteered for this study. The design of this study required participants to perform six sprints each of 35 meter. A rest of 10 second was given to the participants between each sprint. The power and fatigue index was calculated using the equations of *Draper and Whyte (1997).*

*Statistical Analysis:*Statistical analysis was performed with SPSS version 16.0 (free trial, SPSS Inc, Chicago). Mean, Standard Deviation and Linear correlation (Pearson's) was run between speed, power and fatigue index. The alpha level for the data analysis was determined at 0.05 levels.

Results & Discussion

Table 1. Descriptive Statistics of male cricketers

Variables	Mean	Std. Deviation
Age, year	**16.81**	**1.13**
Height, cm	**172.23**	**6.85**
Weight, kg	**61.38**	**8.93**
Sprint time-1,seconds	**5.39**	**0.34**
Sprint time-2,seconds	**5.53**	**0.31**
Sprint time-3,seconds	**5.61**	**0.36**
Sprint time-4,seconds	**5.85**	**0.26**
Sprint time-5,seconds	**5.94**	**0.25**
Sprint time-6,seconds	**6.07**	**0.17**
Power-1,watts	**491.00**	**105.90**
Power-2,watts	**454.90**	**94.81**