IOSR Journal of Sports and Physical Education (IOSR-JSPE)
e-ISSN: 2347-6737, p-ISSN: 2347-6745, Volume 5, Issue 4, (Jul. – Aug. 2018), PP 01-04
www.iosrjournals.org

Comparative Study on Different Physical Activity Level and Intensity on Response to Oral Glucose Challenge among Different Physical Activity Adults

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Abstract: *Sedentary behaviour is strongly predictive of type 2 diabetes.Western population have high rates of sedentary behaviour and low levels of participation in physical activity (PA) combined with high rates of diagnosed and undiagnosed type 2 diabetes. The study was aimed for comparison of different physical activity levels and intensity on the basis of oral glucose response. Samples were collected from Yamuna sports complex, Karkardooma and Manav Rachna International Institute of Research and Studies. Purposive sampling was done to collect the sample size of 45 subject. The subjects were categorized into 3 categories based on their physical level activity and intensity- 10 samples in low physical activity level, 10 samples in moderate physical activity level and 10 samples in heavy physical activity levels on the basis of exclusion and inclusion criteria.Quantitative analysis of physical activity was done by GPAQ.Anthropometric measurements were done. Blood glucose measurement was done by doing Oral Glucose Tolerance Test (OGTT) by using glucometer. Blood pressure and heart rate was measured by digital sphygmomanometer. the resullts revealed that, mean and standard deviation of blood glucose by OGTT at 15 minutes, 60 minutes and 120 minutes in sedentary workers was 124.6±8.38, 181.8±9.76 and106.5±5.70 respectively while for moderate workers was 109.6±9.65, 166.2±8.18 and 97.7±7.48 respectively and for heavy workers was 102.2±9.71, 160.9±9.78 and 96.8±6.40 respeectively and the differences were statistically significant ($p<0.01$). The study concluded that intensity of physical activity defines the blood glucose level of individuals. low intensity activity individual had a higher chance of having higher blood glucose levels.*

Date of Submission: 30-06-2018 Date of acceptance: 17-07-2018

I. Introduction

It has been suggested that 30 minutes of physical activity a day may represent the cut-off point at which people begin to accrue benefits to blood glucose control.[1] Physical activiy is seen as an effective preventive measure and a therapeutic intervention post-diagnosis.[2-3] There is a positive effect on glucose tolrance from either reducing weight by diet or by increasing Physical activity.[4] Participation in formals physical activity (gyms, walking, exercise classes etc.) may however, form only part of the solution to effective blood glucose control. Therefore, public health interventions, aimed at preventing type 2 diabetes, may need to focus on avoiding sedentary behaviour in addition to the promotion of planned exercise. The benefits of regular, consistent physical activity are well documented. Physical activity plays an important role in the prevention of chronic diseases and conditions including cardiovascular disease, certain types of cancer, type II diabetes, and obesity.

The term "physical activity" should not be mistaken with "exercise". Exercise is a subcategory of physical activity that is not planned, structured, repetitive, and purposeful in the sense that the improvement or the maintenance of one or more components of physical fitness is the objective. Physical activity includes exercise as well as other activities which involve bodily movement and are done as part of playing, working, active transportation, house chores and recreational activities.

Increasing physical activity is a societal, not just an individual problem. Therefore it demands a population based, multi sectoral, multi disciplinary, and culturally relevant approach.[5]

II. Methodology

The present study was done to compare different physical activity level and intensity on response to oral glucose challenge among different physical activity adults.The study was conducted in Yamuna Sports Complex and Manav Rachna International Institute of Research and Studies. The target group of the study was sportspersons (18-29 years).On the basis of purposive sampling 30 subjects were selected. The subjects were categorized into 3 categories based on their physical level activity and intensity-10 subjects in low physical activity level, 10 samples in moderate physical activity level and 10 subjects in heavy physical activity level. Inclusion criteria was, both males and female players aged between 18- 29 years were included and non diabetics subjects were included and the subjects doing physical activity from past 6 months were included. Exclusion criteria was males and females before 18 and after 29 years of age were excluded, diabetics subjects were excluded and those who had heredity of diabetes and hypertension and any cardiovascular probem were excluded. Quantitative analysis of physical activity was done by GPAQ (Global Physical Activity Questionnaire). Anthropometric measurements were done by using standardized tools, which include weight via digital scale. Blood glucose measurements was done by doing Oral Glucose Tolerance Test(OGTT).Blood pressure and heart rate were measured by digital sphygmomanometer. The data was analysed by SPSS Version 24.

III. Result And Discussion

Table1 mean and standard deviation of age

AGE	M±SD	Minimum	maximum
	22.7±2.25	19	27

Table 1 depicts mean and standard deviation of age which is 22.7±2.25 and the minimum age of the subjects was 19 while the maximum age was 27.

Table 2 distribution of subjects on the basis of gender

GENDER	SEDENTARY	MODERATE	HEAVY
	N (%)	N (%)	N (%)
MALE	5(50%)	6(60%)	10(100%)
FEMALE	5(50%)	4(40%)	0

Table 2 depicts the distribution of subjects on the basis of gender. Out of sedentary workers, 50% were males while 50% were females. In moderate category, 60% were males and 40% were females. In heavy workers, 100% of the subjects were males.

TABLE 3 distributions of subjects on the basis of physical activity

PHYSICAL ACTIVITY	SEDENTARY (N%)	MODERATE (N%)	HEAVY (N%)	CHI-SQUARE
Brisk walking	10(100%)	0	0	0.00
Archery	0	6(60%)	0	
Badminton	0	2(20%)	0	
Tennis	0	2(20%)	0	
Weight lifting,Cardio	0	0	9(90%)	
Power lifting, Cardio	0	0	1(10%)	

Table 3 depicts the distribution of subjects on the basis of physical activity.100% of the sedentary workers were doing casual walking as a physical activity. Out of moderate workers 60% were doing archery, 20% were indulge in badminton and 20% were tennis players. 90% of the subjects were doing cardio and weight lifting in heavy workers while only 10% were doing power lifting and cardio.

TABLE 4 mean and standard deviation of gpaq

GPAQ	SEDENTARY	MODERATE	HEAVY	ANOVA	F VALUE
	M±SD	M±SD	M±SD	0.000	112.6
	588±37.9	1368±115.9	1904±318.9		

Table 4 depicts the mean and standard deviation of GPAQ. The mean and standard deviation of sedentary people was 588±37.9, for moderate workers it was 1368±115.9 and for heavy workers it was 1904±318.9 and the differences were statistically significant ($p<0.01$). This depicts that the physical activity of sedentary workers were less than 600 MET/ week, recommended by WHO.

TABLE 5 mean and standard deviation of anthropometric measurements

ANTHROPOMETRIC MEASUREMENTS	SEDENTARY M±SD	MODERATE M±SD	HEAVY M±SD	ANOVA	F VALUE
HEIGHT	159.5±3.74	161.2±5.40	179.0±7.48	0.000	35.462
WEIGHT	63.9±5.42	55.4±4.62	76.1±6.62	0.000	34.3
BMI	25.08±1.33	21.2±1.03	23.6±0.87	0.000	30.3

Table 5 depicts mean and standard deviation of anthropometric measurements. The mean and standard deviation of height in sedentary workers was 159.5±3.74, for moderate workers was 161.2±5.40 and for heavy workers was 179.0±7.48 and the differences were statistically significant ($p<0.01$).

The mean and standard deviation of weight in sedentary workers was 63.9±5.42, for moderate workers it was 55.4±4.62 and for heavy workers it was 76.1±6.62 and the differences were statistically significant ($p<0.01$).

The mean and standard deviation of BMI in sedentary workers was 25.08±1.33, for moderate workers was 21.2±1.03 and for heavy workers was 23.6±0.87 and the differences were statistically significant ($p<0.01$). This shows that the BMI of sedentary workers is high as compared to moderate and heavy workers. It is of note that only moderate activity group had a statistically lower BMI than the low activity and very active groups. The low activity group, on average, would be classified as "overweight" whereas the other 2 groups are in the healthy range.

TABLE 6 mean and standard deviation of biochemical parameters

BIOCHEMICAL PARAMETERS	SEDENTARY M±SD	MODERATE M±SD	HEAVY M±SD	ANOVA	F VALUE
SYSTOLE BP	132.0±7.88	116.0±5.16	114.0±5.16	0.000	25.26
DIASTOLE BP	82.5±4.40	76.0±5.16	73.5±5.79	0.002	8.12
PULSE RATE	90.0±8.55	83.1±5.89	75.8±5.15	0.000	11.24

Table 6 depicts mean and standard deviation of biochemical parameters. The mean and standard deviation of systole blood pressure in sedentary workers was 132.0±7.88, for moderate workers it was 116.0±5.16 and for heavy workers it was 114.0±5.16 and the differences were statistically significant ($p<0.01$). The systolic blood pressure of sedentary workers is high as compared to other 2 groups. The systolic blood pressure of heavy workers is minimum as compared to other 2 groups.

The mean and standard deviation of diastole blood pressure in sedentary workers was 82.5±4.40, for moderate workers was 76.0±5.16, and for heavy workers was 73.5 and the differences were statistically significant ($p<0.01$). The diastolic blood pressure of sedentary workers is high as compared to other 2 groups while the diastolic blood pressure of heavy workers is minimum.

The mean and standard deviation of pulse rate in sedentary workers was 90.0±8.55, for moderate workers was 83.1±5.89, and for heavy workers was 75.8±5.15 and the differences were statistically significant ($p<0.01$). The pulse rate of sedentary workers is maximum while that of heavy workers is minimum.

TABLE 7 mean and standard deviation of ogtt

OGTT	SEDENTARY M±SD	MODERATE M±SD	HEAVY M±SD	ANOVA	F VALUE
Blood glucose at 15 minutes	124.6±8.38	109.6±9.65	102.2±9.71	0.000	15.156
Blood glucose at 60 minutes	181.8±9.76	166.2±8.18	160.9±9.78	0.000	13.725
Blood glucose at 120 minutes	106.5±5.70	97.7±7.48	96.8±6.40	0.004	6.650

Table 7 depicts the mean and standard deviation of OGTT. The mean and standard deviation of blood glucose at 15 minutes in sedentary workers was 124.6±8.38, while for moderate workers was 109.6±9.65 and for heavy workers was 102.2±9.71 and the differences were statistically significant ($p<0.01$). This shows that the blood glucose at 15 minutes was higher in sedentary workers and was minimum in heavy workers.

The mean and standard deviation of blood glucose at 60 minutes in sedentary workers was 181.8±9.76, while for moderate workers was 166.2±8.18 and for heavy workers was 160.9±9.78 and the differences were statistically significant ($p<0.01$). This shows that blood glucose level at 60 minutes was highest in sedentary workers and remained higher for the duration of test.

The mean and standard deviation of blood glucose at 120 minutes in sedentary workers was 106.5±5.70, while for moderate workers was 97.7±7.48 and for heavy workers was 96.8±6.40 and the differences were statistically significant ($p<0.01$). This shows that blood glucose level even after 120 minutes posttest was higher in sedentary workers as compared to other 2 groups.

IV. Conclusion

The study concluded that intensity of physical activity defines the blood glucose level of individuals. low intensity activity individual had a higher chance of having higher blood glucose levels.

V. Acknowledgment

This is a synthetic result of the contribution from the various sources. I feel privileged to express my sincere gratitude to my supervisor Dr. Mahak Sharma, for her kind inspiration, invaluable guidance and encouragement actuated me to successfully accomplish my work. She always encouraged me in so many ways in completing my work. I express my gratitude to all my subjects for their patience and cooperation. I am incredibly grateful to my husband and parents.

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Harmandeep Kaur "Comparative Study on Different Physical Activity Level and Intensity on Response to Oral Glucose Challenge among Different Physical Activity Adults." IOSR Journal of Sports and Physical Education (IOSR-JSPE) 5.4 (2018): 01-04.