



Six-Minute Walk Test Performance In Adolescents Who Are Normal Weight And Over Weight

Dev K.¹, Arya P.³

1.Assistant Professor, Department of Physiotherapy, GJUS&T, Hisar 2.MPT, Guru Jambheshwar University of Science & Technology, Hisar

Abstract

Aim: The aim for this examination is to gauge 6MWT execution of young adolescents who are normal weight (NW) and overweight (OW) and to make sense of the connections between BMI, 6MWT execution and physical activity level in these adolescents. **Study design:** Cross sectional study design was conducted between two groups where participants in group A are normal weight & group B are overweight. **Methodology:** Simple random sampling method was used. The sample size of the investigation was determined by utilizing the force examination and impact size of result measure from past examinations. There was incorporate 5% drop out rate and members will be allocated into 2 gatherings. 150 participants were assigned into two groups: one is the normal weight and other one is overweight. Fulfilling inclusion criteria for this study, were selected randomly. The subjects were divided into two aforementioned groups. The height & weight of the students without shoes will be measured using a measuring tape & weighing machine respectively. "The 6MWT are going to be performed outdoor along a level, straight walkway as per the American Thoracic Society (ATS) guidelines". According to this study it was found that the resting SBP, DBP, HR are higher in overweight children as compared to normal weight children. As far as the SpO₂ value is concerned, it was found to be lower in the OW children than NW children. There is also difference in physiological variables associated with 6MWT between the group of OW and NW children. Moreover, the study also showed that the 6MWD of NW adolescents (660.88±23.83m) was above OW adolescent (619.80±14.06m). Numerous ways of life propensities like physical inaction or inertia are shaped in youth so further examination attempts are required in this field.

Keywords: Weight, normal weight, obese, over weight, children, six minute walk test.

Introduction

"The term adolescence springs from the Latin word *adolescere* which means to "grow up."¹ Adolescents constitute about one quarter of India's population. "Adolescence is split into early (10- 13years), middle (14-16 years) and late adolescence (17-19 years)."² "During the period of adolescence, there occurs many hormonal fluctuations along with a rapid augmentation in body size which are amid marked changes in body composition and other bodily functions. Body composition incorporates percentage of body fat, lean body mass, bone mineral density and total body water, it additionally can be considered regarding the majority of differed tissues or organs, body cell mass, sans fat extracellular solids, and extracellular water, likewise as its compound arrangement (for example Potassium, nitrogen etc.)"³ Pubertal advancement includes the concoction development of body tissues, including the number and circulation of fat, and increments in bone mass and sans

fat fit tissue mass.

"Both young female and young male experience fast increment in all out muscle to fat ratio (TBF), in spite of the fact that the extent of muscle versus fat builds all the more gradually in young men as an aftereffect of a synchronous quick increment in fat free mass (FFM).⁴ "Steady with certain explores, it's demonstrated that in young females, the amount of TBF increment at a genuinely consistent rate from a mean of generally 5.5 kg at 8 years matured to around 15 kg at 16 years, after which the speed of increment eases back impressively. In young men, there is an ascent in TBF from a mean of generally 5.0 kg at 8 years to about 11.0 kg at 14 years, after which TBF tumbles to roughly 9.0 kg at 16 years and in this manner arrives at a level.

"The examples of pubertal change in male and females for FFM are fairly turned around. In young female, FFM increments until round the age of 15 years, at that point remains generally unaltered. In young male, be that as it may, FFM increments consistently between the ages of 8 and 18 years, with a progressively quick increment somewhere in the range of 12 and 15 years matured "⁵.

"In 1993, the WHO assembled an Expert Consultation Group with the aim of developing uniform categories of the BMI. Four categories were established: underweight, normal, overweight, and obese. A person is taken into account to be underweight if his/her BMI comes within the range of 15-19.9, normal weight if the BMI is 20-24.9, overweight if the BMI is 25-29.9, and obese if it's 30-35 or greater."⁶

"The prevalence and severity of obesity in adolescents is increasing at an alarming rate, because of the changes in dietary habits and sedentary lifestyle, making it one among the foremost serious health problems affecting this age group"⁷ "The worldwide prevalence of obesity in adolescents of 5-17 years has been calculated to be 10% by The International Obesity Task Force (IOTF)"⁸ Childhood obesity could also be a matter of concern worldwide and WHO has designated obesity as a worldwide epidemic. The world health organization (WHO) described obesity as the foremost abandoned public health problems, affecting every region of the globe.

"Overweight and fat teenagers are most likely to stay fat into adulthood, at an expanded hazard to create non-transferable way of life maladies like Diabetes mellitus (type 2) and cardiovascular illnesses at a more youthful age. Obesity and their related illnesses are essentially preventable by public education, lifestyle modification at an early period of life, known as primordial prevention. In youths, stoutness is connected with weakness of cardio respiratory wellness prompting diminished resistance to exercise."⁹

The issue of being overweight and obese in teenage years is an issue of grave concern that extends worldwide."¹⁰ "It is evaluated that 32% of young people are either overweight or obese."¹¹ "Expanded weight file (BMI) in youth, characterized on the grounds that the period from 10 to 19 years, is unequivocally identified with dismalness and mortality in adulthood."^{12 13} "In any case, an increasing number of studies recommend that few of those confusions are as of now present during youthfulness. Juvenile overweight are connected to comorbidities like dyslipidaemia, non-alcoholic steatohepatitis (NASH), DM type 2, obstructive sleep apnoea (OSA), and hypertension."¹⁴ "Hypertension is one of the commonest health hazard distinguished in overweight young people and in this way the main hazard for mortality in adulthood, adding to mortality of roughly 12.8% around the world."¹⁵

"The demand for clinical assessment tools to gauge exercise capacity in adolescents who are overweight is increasing. The 6MWT is standardized, safe, and cheap and requires minimal equipment, training, and time to administer."¹⁶

The 6MWT could likewise be a down to earth basic test that needs a 100-ft foyer yet no gym equipment or propelled preparing for specialists. This test gauges the space that a patient can rapidly stroll on a level, clear ground during a time of 6 minutes (the 6MWD). The self-guided 6MWT evaluates the sub maximal degree of practical limit. As most exercises of day by day living (ADL) are performed at sub maximal degrees of effort, the 6MWD better mirrors the useful exercise level for every day physical activities. It is additionally considered in light of the fact that the premier applicable walk test that reflects physical action of day by day living likewise as cardiopulmonary wellness.¹⁷ Moreover, the legitimacy and reproducibility of the 6MWT in fat grown-ups and young people has been built up and in this way the test are regularly effortlessly performed by grown-ups/teenagers who are stout and don't endure maximal exercise.¹⁸

Clinically moreover to the 6-minute walk distance (6MWD), the test gives important data on vital sign like blood pressure (SBP/DBP), pulse (HR), and saturation of oxygen (SpO₂).

METHODOLOGY

Study design

Cross sectional study design are going to be conducted between two groups where participants in group A are normal weight & group B are overweight.

Consent and Ethical consideration

This proposed study will be carried out after the ethical approval from the Institutional Ethics committee, clinical trial representation of India, Physiotherapy department, at G.J.U.S &T, in the district Hisar. Written informed consent (annexure A) will be collected from each patient.

Sampling source

Subjects will be selected for study from various schools of Hisar and New-Delhi.

Sampling method Simple random sampling

The sample size of the investigation will be determined by utilizing the force examination and impact size of result measure from past examinations. It will incorporate 5% drop out rate and members will be allocated into 2 gatherings.

INCLUSION CRITERIA

- Adolescents of age group ten to nineteen years
- Both male and female subjects will be included in the study
- Subjects in the range of 20 -24.9 BMI which is normal weight
- Subjects in the range of 25- 29.9 BMI which is overweight
- If the participants manifested any of the subsequent characteristics, then they were not include in the study

INSTRUMENTATION

1. A 30m long corridor is chosen for measuring 6MWT
2. Digital Weighing Machine for measuring the weight.
3. Scale with Measuring Bar to measure the height.
4. For measuring blood pressure before & after the test, Aneroid Sphygmomanometer and stethoscope is used.
5. Borg Scale (Borg CR-10) for RPE.
6. Stop watch for recording the time.
7. Pulse Oximeter is use for measuring saturation of oxygen.

INTERVENTION

The subjects were divided into two aforementioned groups. The height & weight of the students without shoes will be measured using a measuring tape & weighing machine respectively. "The 6MWT are going to be performed outdoor along a level, straight walkway as per the American Thoracic Society (ATS) rules" [13]. The strolling separation is to be of 30 m. The length of the passageway are being denoted every 3 m with a brilliantly shaded tape. Cones are to be set at either end of the strolling course to point the start and end focuses. Also, the beginning, which denoted the start and end of each lap, are to be set apart on the base utilizing splendidly shaded tape. Instructions are given to every participant. Members are to be informed that the point of the test isto find out how far they will stroll for six minutes and the longest separation conceivable at their own pace during the apportioned time. Bouncing, skipping, running, and hopping won't be permitted during the test. Just the normalized phrases for consolation (e.g., 'continue onward', 'you progress admirably') and declaration of some time remaining are given. Previously and promptly following the test, the member's HR, BP, SpO₂, and RPE will be recorded. Pulse and SpO₂ are going to be recorded employing a finger pulse oximeter. Blood pressure is going to be recorded with aneroid sphygmomanometer.

Statistical analysis

Information in the current examination was broke down by the SPSS form (20.0) programming. The information was acquired from 150 subjects (75 NW and 75 OW). Mean and standard deviation (SD) of the considerable number of factors for example heart rate, saturation of oxygen, blood pressure (SBP and DBP) and RPE of all OW, NW members were determined. The quartiles were shaped from the values measured from all factors to streamline the estimations. Paired "t" test is use for the investigation of normal weight and overweight information independently, and un-paired "t" test is used to analyse normal weight versus overweight information. The $p < 0.05$ worth was viewed as huge.

Variable	Pre (Mean±SD)	Post (Mean±SD)	t74	Mean difference	95% Confidence Interval
Heart Rate	79.36±2.9 1	85.36±2.7 4	-33.69	-6.00	(-6.35; - 5.65)
SBP	114.65±2. 6	122.79±2. 80	-32.93	-8.13	(-8.63; - 7.64)
DBP	73.33±4.3 1	76.60±4.5 9	-17.81	-3.27	(-3.63; - 2.90)
SpO2	98.41±0.5 0	95.73±0.9 6	20.78	2.68	(2.42; 2.94)
RPE	0.00±0.00	2.45±0.58	-36.86	-2.45	(-2.59; - 2.32)

Table 1. Normal Weight (75) Paired 't' test (related 't' test)

Unpaired 't' test (unrelated 't' test) Variable	Normal(75) (Mean±SD)	Overweight (75) (Mean±SD)	t148	Mean difference	95% Confidence Interval
Pre HR	79.36±2.91	81.45±2.59	-4.65	-2.09	(-2.98; - 1.20)
Pre SBP	114.65±2.6 0	117.97±2.4 0	-8.12	-3.32	(-4.13; - 2.51)
Pre DBP	73.33±4.31	78.19±2.90	-8.09	-4.85	(-6.04; - 3.67)
Pre SpO2	98.41±0.50	97.85±0.78	5.23	0.56	(0.35; 0.77)
Pre RPE	0.00±0.00	0.00±0.00	NA	NA	NA
Post HR	85.36±2.74	88.69±3.55	-6.44	-3.33	(-4.36; - 2.31)
Post SBP	122.79±2.8 0	125.36±2.7 7	-5.66	-2.57	(-3.47; - 1.68)

Post DBP	76.60±4.59	82.20±3.39	-8.51	-5.60	(-6.90; -4.30)
Post SpO2	95.73±0.96	94.19±1.22	8.64	1.55	(1.19; 1.90)
Post RPE	2.45±0.58	5.04±0.42	-31.48	-2.59	(-2.75; -2.42)
Distance Covered	660.88±23.83	619.80±14.06	12.86	41.08	(34.77; 47.39)

Table 2. Normal Vs. Overweight

Discussion

In this study the differences in 6MWT performance of adolescents (OW and NW) were examined. The results show that the two groups of adolescents are different in their resting and post 6MWT values, for SBP and there is a relation between the BMI and the distance covered in this test. Overweight adolescents covered lesser distance as compared to normal weight adolescents.

Some factors which may influence the 6MWT performance like time of day, footwear, attitude towards physical activity and male female ratio were not examined. Length of the corridor in which walking was done could also influence the results, but in this case both NW and OW groups performed the walking test in corridors of identical length so, there would not have been the influence of this factor on the results and performance of both the groups.¹⁵

This test was performed individually and by confirming that the participants started the test at real resting states. "It should be noted that we evaluated adolescents who were NW & OW on the basis of the world health organization who assembled an Expert Consultation Group with a charge of developing uniform categories of the NW and OW adolescents were evaluated on the basis of criteria set by WHO regarding BMI. Based on BMI there are four categories - underweight, normal, overweight, and obese. An individual is considered to be underweight if his/her BMI comes in the range of 15-19.9, normal weight if the BMI is 20-24.9, overweight if the BMI is 25-29.9, and obese if it is 30-35 or greater."¹⁶

Instructions were given carefully but there may have been slight differences and scarcities in understanding the instructions. There is very less information regarding the validity of 6MWT and other measures of exercise capacity in this age group, so more research is needed in this field.

Expanded degrees of resting and post 6MWT qualities were watched for systolic SBP in OW when contrasted with NW adolescents. These results are as per the outcomes from the examination directed in Loni by Rajak et al, (2012) on solid kids matured 5-6 years who likewise announced gentle increments in cardiovascular boundaries following six-minute walk test (6MWT). The main reason for this can be attributed to the fact that during walking the demand for oxygen by muscles increased and this increased demand is fulfilled by increasing the cardiac output and also by increasing blood circulation to the muscles which are contracting. This increases physical exertion and hence workload on vital organs resulting in an increase in basal parameters⁹. One of the more fascinating findings from this investigation is that OW youngsters had lower benefit of resting SpO2 and post 6MWT SpO2 when contrasted with their NW partners. Another helpful discovery is that inside the current investigation mean 6MWT for young people who were NW were 619.80±14.06 m while 6MWT for youths who were OW were 619.80±14.06 m with the mean distinction of 41.08 m. This is regularly a result of the expanded weight in individuals who are OW requests more vitality which will confine the space secured. The discoveries from the sole examination led by the US compare with our outcomes. Less physical action and laid back mentality towards physical wellness is an overall issue. The issue with the youngsters and youths is the sedentary way of life that they spend inferable from numerous reasons. Physical latency may add to increased risk of cardiac illnesses in youths in their later years. Be that as it may, it isn't plainly realized whether examples of stationary conduct freely sway heart chance elements in small kids. The discoveries from the current examination recommend a powerless connection between physical action scores and post-6MWT SBP. An ongoing report by Maggio et al shows that physical action level and oxygen consuming wellness were lower in kids who were fat contrasted and controls who were NW. The exploration in future must test the connection

between physical movement levels and cardiovascular maladies hazard in little youngsters. Numerous ways of life propensities like physical inaction or inertia are shaped in youth so further examination attempts are required in this field. Albeit both these qualities were well inside typical cut-off points yet they need consideration and further examination as these distinctions from the get-go in youth may cause potential wellbeing concerns sometime down the life. OW people face more noteworthy burden on their inspiratory muscles and this additional heap must be defeated during every motivation whether it is very still or during exercise. The expanded interest of oxygen in OW kids can prompt lower levels of oxygen because of potential exercise hypoxia. The highlight to be noted here is that the distinctions in post 6MWT qualities in SBP in the OW and NW gatherings might be because of the difference seen in both the gatherings during resting state and not really because of the reactions during the 6 MWT. Other cardiopulmonary measures and examinations were not done, they may have given further understanding. Further exploration to look at these contrasts between youngsters who are NW and OW utilizing extra cardiopulmonary measures are required.

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