ISSN 2454-6089(E)
ISSN 0973-2020

A Comparative Study of Selected Anthropometric Variables and Health Related Fitness Parameters of High and Low Altitude Male Residents of Himachal Pradesh
Journal of Exercise Science & Physiotherapy
JESP Vol. 12, No. 1, 2016: 38-41 *Published by Exercise Fitness & Health Alliance*
Article no. 250; DOI: 10.18376//2016/v12i1/86810

A Comparative Study of Selected Anthropometric Variables and Health Related Fitness Parameters of High and Low Altitude Male Residents of Himachal Pradesh

Lehri, Anuradha & Johri, Pooja

ARTICLE AUTHORSHIP & AFFILIATION DETAILS

COMMUNICATION DATE: SEP. 9, 2015

ACCEPTANCE DATE: SEP. 21, 2015

DOI: 10.18376//2016/v12i1/86810

Lehri, Anuradh Assistant Professor, Department Of Sports Science, Punjabi University, Patiala, Punjab, India
Johri, Pooja Department Of Sports Science, Punjabi University, Patiala, Punjab, India
Email: johri_pooja@yahoo.com

KEY WORDS: Health, Related Fitness, Anthropometric Variables, High & Low Altitude

To Cite This Article:
Lehri, Anuradha & Johri, Pooja. A Comparative Study Of Selected Anthropometric Variables And Health Related Fitness Parameters Of High And Low Altitude Male Residents Of Himachal Pradesh [Online]. *Journal Of Exercise Science And Physiotherapy*, Vol. 12, NO. 1, JUNE 2016: 38-41.

Abstract

Keeping in view the lack of information about health related fitness of the residents of himachal pradesh, the present study was carried out on 400 males of himachal pradesh, out of which 200 were taken from high altitude(>2200 m) and 200 were taken from low altitude (<300 m). The subjects were divided into four groups of 5 years interval. Four components of health related physical fitness namely cardiovascular endurance, muscular endurance/strength, flexibility were assessed using standard techniques. The results clearly indicate excellent level of vo2 max in male residents residing at high altitude, even the results of muscular strength/endurance were found to be pretty good in the residents of high altitude. In terms of curl ups for muscular strength surprisingly the residents of 30-45 age group inhabiting low altitude were found to have more strength than the residents of same age group inhabiting high altitude. The findings of the variables are discussed at length in the paper.

Introduction

It has been proven beyond doubt that genetic factors guide the course to maturity and the environmental factors accelerate or retard this course. This explains to larger extent, the differences in body structure among different population groups. About 140 million persons reside at high altitude over 2200 m mainly in North, central and South America: Asia and eastern Africa *(Ward et al., 2000: Sherpa et al, 2011).* The important factors to affect the human morphology and physiology are extremes of environmental temperature, nutrition and altitude. It is a common observation that striking differences exists between high and low altitude human populations with respect to various biological traits *(Baker, 1969).* Several morpho-physiological and demographic studies have been carried out in different high altitude populations worldwide to study the pattern of growth and body composition, sexual maturation, structural, compositional and physiological variations *(Kapoor, 2000).* But as such no studies have been carried out on Himachal Pradesh. Physical fitness of an individual depends on body composition, age, sex, training, nutritional status and environmental factors *(Weltman et al 1994; Monyeki, and Kemper, 1997; Hasalkar et al 2005, Dutt, 2005,*

Armstrong et al, 2007; Monyeki, and Kemper, 2007; Kaur & Kaur, 2011).

The interest in studies on physical fitness in India especially Himachal Pradesh is of comparatively recent origin. It is quite evident that so many findings have been published on the physical growth and development patterns in the last fifty years *(Kansal et al, 1982; Verma 1986; Kumar and Bhalla, 1988; Kumar et al, 1994; Kaur et al, 1996; Kumar, 2001 and Ajita, 2001; Dutt, 2005,).* From the above it is gathered that very less or negligible studies on health related fitness have been conducted so far on Himachal Pradesh. Therefore a present attempt has been made in this direction to compare the health related fitness of Rajput males living at high altitude and Low altitude of Himachal Pradesh.

Materials and Methods

The present study was conducted on male Rajputs of high altitude (>2400 meter above sea level) residing at Bulah, Pataru, Sangalwada, Rail Chowk, Tunga Dhar areas of Distt. Mandi. For low altitude (≤ 392 meter sea level), male Rajputs residing in Baddi area of Distt. Solan, Himachal Pradesh were included. A total of 200 subjects each from high and low altitude area male Rajputs ranging in the age group from 20-40 years were selected. All the subjects were divided into following four groups on the basis of age of 5 year interval. Each group comprised of 50 subjects. Keeping in view, the feasibility criteria and the relevancy of the variables of the present study, various anthropometric variables, components of health related physical fitness, were studied using standard techniques.

Table 1: Tests and Equipments used for assessing various components of Health related Physical Fitness

COMPONENT	TESTS EXECUTED
Cardiovascular Endurance	1.5 mile run test
Upper Body (Push Ups)	Score
Curl Ups	Score
Muscular Flexibility	Modified Sit and Reach test

The experimental protocol was explained to all subjects. Each subject was explained and demonstrated about the procedure to be performed. The mean, SD and Pearson coefficient of correlation was calculated by SPSS software.

Results and Discussion:

*Cardiovascular Endurance (1.5 mile run test)***:** It is determined by one's ability to perform dynamic exercise at moderate to high intensities, utilizing large muscle groups, for prolonged periods. The ability to perform such exercise depends on the functional ability of the respiratory, cardiovascular and skeletal muscle system. Maximal oxygen uptake (VO_2 max) or aerobic capacity is the standardized measure of cardio-respiratory fitness. VO_2 max is the maximum amount of oxygen a person can consume per kg body weight per minute ($l\ min^{-1}\ kg^{-1}$). Hence, VO_2 max is closely related to the functional capacity of the heart. A wide range of exercise tests are used to estimate VO_2 max. 1.5 mile run test is a widely used field test to measure VO_2 max. 1.5 mile run test provides a reasonable prediction of the aerobic capacity of an individual. The subject was informed about the purpose of the test and need of effective pace during testing. The stop watch coincided with the subject's start of the run test. The subject was asked

ISSN 2454-6089(E)
ISSN 0973-2020

JESP Vol. 12, No. 1, 2016: 38-41

A Comparative Study of Selected Anthropometric Variables and Health Related Fitness Parameters of High and Low Altitude Male Residents of Himachal Pradesh
Journal of Exercise Science & Physiotherapy
Published by Exercise Fitness & Health Alliance
Article no. 250; DOI: 10.18376//2016/v12i1/86810

to run 1.5 miles distance in shortest possible time.

Table 2: Statistical comparison of Cardiovascular Endurance (1.5 mile run time) of high and low altitude age group peers.

Age, goup yrs	1.5 mile		
	High altitude	Low altitude	P value
20-25	12.57 ± 1.63	11.18±1.78	0.010
26-30	12.80 ±1.24	11.73±1.58	0.020
31-35	11.67 ± 0.90	12.03±1.31	0.124
36-40	14.24 ± 0.73	11.73±0.78	0.010
Total	12.82 ± 1.49	11.67±1.44	0.020

Comparison of mean values of cardiovascular endurance among different age groups among high and low altitude groups reveal statistically significant differences in all the age groups except the 31-35 yr age group where p value is non-significant (0.124). Mean value in the age group 20-25 of high altitude is 12.57±1.63 as compared to 11.18±1.78 in the low altitude group, p value is pretty significant (0.010). In nutshell males residing at high altitude possess significantly greater cardiovascular endurance as indicated by 1.5 mile run time in different age groups.

Muscular Strength and endurance (Push Ups and Curl Ups):- Muscular fitness integrates muscular strength, muscular endurance and flexibility and is an integral component of total health related fitness. The subjects were asked to perform Push-ups and Curl-ups to measure muscle endurance. The push-up test was administered with the subject starting in the standard "down" position (hands pointing forward and under the shoulders, back straight, head up, using the toes as the pivotal point. The maximal number of push-ups performed consecutively without rest was counted as the score. For Curl Ups the subject assumed a supine position on a mat with the knees at 90 degrees. The arms were at the side, palms facing down with the middle fingers touching a line drawn at the edge of middle finger. A second line was drawn 10 cm apart. The subject was asked to touch the second line while performing curl-up test. Shoes remained on during the test. The low back was flattened by the subject before curling-up. A metronome was set to 50 beat min^{-1} and the individual performed slow, controlled, curl-ups to lift the shoulder blades off the mat (trunk had to make a 30 degrees angle with the mat) in time with metronome at a rate of 25 per minute. The test was done for 1 minute.

Table 3: Statistical comparison of Push Ups scores of high and low altitude age group peers.

Age group (years)	Push ups		
	High Altitude	Low Altitude	P value
20-25	18.78± 4.82	18.10± 3.11	0.024
26-30	19.72 ±5.82	21.94± 6.74	0.081
31-35	19.76± 2.76	17.94± 4.03	0.010
36-40	12.52± 2.71	18.14± 3.20	0.010
Total	17.70± 5.18	19.03± 4.79	0.008

Table 4: Statistical Comparison of Curl- Ups of high and low altitude age group peers.

Age group (years)	Curl ups		
	High Altitude	Low Altitude	P value
20-25	11.92±5.67	9.78 ± 1.92	0.013
26-30	14.78±4.88	16.64±5.40	0.074
31-35	15.86±3.23	15.42±3.46	0.512
36-40	11.40±2.60	15.62±2.98	0.010
Total	13.49±4.64	14.37±4.52	0.057

Again if we compare the two parameters of muscular strength/ endurance, the results clearly signify that the males residing at high altitude show better muscular strength and endurance except in the age group 31-35 where p value is non significant in terms of curl-ups. *Flexibility (Modified Sit and Reach Test):* Flexibility is the ability to move a joint through its complete range of motion. It is important in athletic performance and in the ability to

carry out the activities of daily living. A precise measurement of joint range of motion can also be assessed at all anatomical joints. The sit and reach test has been commonly used to assess low back and hip joint flexibility.

Table 3: Statistical Comparison of Sit & Reach Test of High and Low Altitude

Age group (years)	Sit & Reach		
	High Altitude	Low Altitude	P value
20-25	12.40 ± 3.04	11.38± 2.05	0.053
26-30	12.96 ± 2.93	15.34± 4.03	0.031
31-35	15.42± 2.32	14.34± 2.57	0.030
36-40	11.40 ± 2.08	15.10± 2.01	0.010
Total	13.05 ± 3.00	14.04± 3.19	0.021

It is clearly evident from the results that in all the age groups p-value are significant. In the age group 26-20 males of low altitude were found to have more flexibility (15.34 ± 4.03) in comparison to males of the same age group of high altitude (12.96 ± 2.93). Same observation is there in the age group 36-40 where low altitude males have more flexibility (15.10 ± 2.01) than high altitude males (11.40 ± 2.08). *Conclusion:* As per the results and the study conducted on the male population of Himachal Pradesh, the study clearly indicates that altitude to some extent do play a role in assessing the health related fitness parameters

References:

Ajita, 2001. Cardiorespiratory adjustments in relation to exercise and anaerobic threshold in young athletes, Doctoral thesis (Unpublished), Punjabi University, Patiala

Armstrong, N; Barrett, J.R.; and Welsman, L.A. 2007. Cardiorespiratory training during childhood and adolescence. *Journal of Exercise Science and Physiotherapy*, **3(1):** 17-25.

Baker PT. 1969. Human Adaptation to High Altitude--- *Science*, **163:** 1149-1156

Dutt, Sunil, 2005. Health related physical fitness of boys aged 8 to 18 years. *Journal of Exercise Science and Physiotherapy*, **1:** 12-22.

Hasalkar S, Shivalli R and Biradar N. 2005. Measures and physical fitness level of the college going student. *Anthropologist*, **7:** 185-7.

Kansal, D.K., Verma, S.K. & Sidhu. L.S. 1982. Physical Growth and Performance of School Boy. Human Biology –Recent Advances, Chapter: Physical Growth and Performance of School Boy, Publisher: Today and Tomorrows Printers and Publishers, Editors: J. S Bansal, Singhal P, Sidhu L. S., Bhatanagar D. P., Verma S. K, Kansal D. K., Bhanot J. L. and Sohal M. S., pp.239-248.

Kapoor S. 2000. Body Structure and respiratory efficiency among high Altitude Himalayan populations. *J. Hum. Ecol.*, **11:** 101.

Kaur, G.; Sidhu, L.S. & Verma, S.K. 1996. Age changes in height, weight and motor performance of girls from 12-17 years of age. *Ind. J. Sports Sci. Phy. Ed.*, 8 (2): 23-31.

Kaur, I.P. & Kaur, A. 2011 Comparison of nutritional profile and prevalence of anemia among rural girls and boys. *Journal of Exercise Science and Physiotherapy*, 7(1): 11-18.

Kumar V and Bhalla, A.K. 1988. Percentile growth charts for Punjabi Infants. *Ind. J. Ped.*, **55:** 773-782.

Kumar, H., Singh, R.; Sachdeva, A. & Verma, S.K. 1994. Age changes in some morphological and strength measures related to jumping in Punjabi boys. *Journal of Sports Science & Medicine*, **6(1):** 9-20

Monyeki, H.C.G. and Kemper, M.A. 2007. Is there a positive relationship between physical fitness and physical activity in children? - A brief review. *Journal of Exercise Science and Physiotherapy*, **3(1):** 12-16.

Verma, S.K. 1986. Relationship of maximum oxygen uptake with lean body mass in Indian athletes. Modern Perspectives In Physical Education & Sports Sciences 137-141.

Weltman, A.; Weltman, J.Y.; Hartman, M.L.; Rogol, A.D.; and Evans, W.S. 1994. Relationship between age, percentage body fat, fitness, and 24-hour growth hormone release in healthy young adults: effects of gender. *J. Clin. Endocrinol. Metab.*, **78:** 543-8.

West, J.B. 2006. Human response to extreme altitudes. *Integ. Comp. Biol.*, **46:** 25-34.

Conflict of Interest: None declared