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"PHYSIOLOGICAL RESPONSES BEFORE AND AFTER ATTENDING THE HIMALAYAN TREKKING CAMP"

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ABSTRACT:

Background: A physiological response is the body's response to intense fear or the environment around the individual. A physiological response to intense and irrational fear caused by a phobia will manifest itself in physical ways.

Aims: the main purpose of this study is to study the physiological responses before and after attending Himalayan trekking camp.

Setting and Design: Ten students were taken as the subjects for the study. The age of the subjects ranged from 20-25 years. The design used for the study was pre-post design. Random sampling technique was used for the subject's selection.

Methods: the current study was performed on the physiological responses of trekkers; pre and post data for the study were assessed on the tests conducted. No training was given to the trekkers because the trekking camp was itself as training programme at the high altitude.

Statistical Analysis Used: Dependent *t*-test was used for comparing the means of pre and post data collected from the trekkers.

Results: Though there was no significant level of change occurs in the physiological factors after the camp but little improvement observed.

Conclusions: The results conclude that the trekking camp for a longer duration may have highly significant level of change in the physiological factors.

Key Words: Resting Pulse rate, Blood Pressure, Cardiovascular endurance and Himalayan Trekking Camp.

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INTRODUCTION

A physiological response is the body's response to intense fear or the environment around the individual. A physiological response to intense and irrational fear caused by a phobia will manifest itself in physical ways.

When challenged with any physical task, the human body responds through a series of integrated changes in function that involve most, if not all, of its physiologic systems. Movement requires activation and control of the musculoskeletal system; the cardiovascular and respiratory systems provide the ability to sustain this movement over extended periods. When the body engages in exercise training several times a week or more frequently, each of these physiologic systems undergoes specific adaptations that increase the body's efficiency and capacity. Removal of the training stimulus, however, will result in loss of the efficiency and capacity that was gained through these training-induced adaptations; this loss is a process called detraining. This chapter provides an overview of how the body responds to an episode of exercise and adapts to exercise training and detraining.

The effects of high altitude on humans are considerable. The percentage oxygen saturation of hemoglobin determines the content of oxygenic blood. After the human body reaches around 2,100 m (7,000 feet) above sea level, the saturation of oxy-hemoglobin begins to plummet. However, the human body has both short-term and long-term adaptations to altitude that allow it to partially compensate for the lack of oxygen. Athletes use these adaptations to help their performance. There is a limit to the level of adaptation; mountaineers refer to the altitudes above 8,000 meters (26,000 ft) as the "death zone", where it is generally believed that no human body can acclimatize.

Evidence that human physiology responds to a wide variety of mental events has been available since the late 19th century, in an extensive and wide *Corresponding author ranging review of the field, reports that Skin Conductance (SC) (a measure of the activity of the echini sweat glands), cardiovascular activity, respiration, electrical activity in the brain, muscles and the peripheral nervous system, papillary size and other physiological phenomena, have all been observed to vary along with factors such as task difficulty, levels of attention, activities involving

decision-making and problem solving, experiences of frustration, surprise and insult, and the affective meanings of stimuli and mental imagery. These responses are involuntary and surprisingly sensitive. They reflect changes in levels of arousal and may also provide clues about emotional valence (positive or negative emotion). From time to time it has been proposed that physiological responses might contribute to the design and evaluation of software interfaces by helping to identify factors and events that cause changes in levels of arousal, and are therefore likely to be of significance to users. As HCI events are essentially no different from other stimuli, they should evoke similar physiological responses.

Acute physiological responses are a vital part of our ability to respond to the changes and demands being placed on our bodies various systems. Just the act of getting up in the morning and walking to the bathroom requires acute physiological responses such as an increased heart rate, increased respiration rate, release of hormones, increased neuromuscular activation. The type of and degree to which physiological responses occur is down to the demands being placed on the body. For example only very small changes are required in the cardiovascular and respiratory systems in order to walk to the bathroom in the morning, whereas significant changes are required if you go for a 30 minute run. Without acute physiological responses we simply would not even be able to get up in the morning, let alone exercise. An acute physiological response refers to an immediate response of one or more of the bodies systems to exercise, such as the heart rate increasing as a gym member sits on the bike and starts their warm up.

Few studies have investigated the acute physiological response yielded by certain HIIE protocols compared to CE in cardiac patients. No significantly different response for cardiac biomarkers, hemodynamic markers and arteriovenous O_2-difference, C-reactive protein, and RPE were observed between HIIE and CE, despite markedly higher peak intensities in HIIE. In these studies, HIIE and CE were is caloric or matched for mean load. However, no HIIE protocols with peak workload durations longer than 1 min were applied in these investigations. Used longer peak workload durations of 90 s for intermittent exercise but did not compare HIIE vs. CE.

Hypothesis: There may be a significance level of difference between the physiological responses before and after attending the Himalaya trekking camp.

METHODS

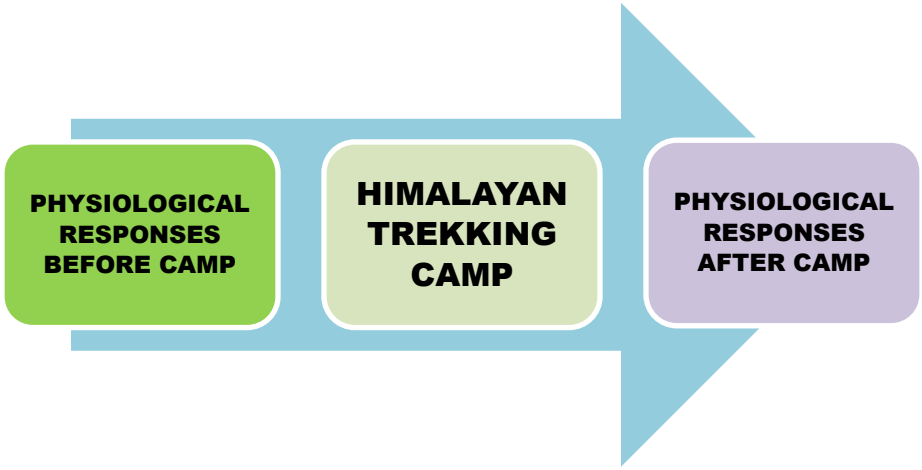
Subjects and Sampling:

Ten (10) students were selected for the study from the Bharati Vidyapeeth Deemed University, College of Physical Education for the Himalayan trekking camp. The age group of the subjects ranged from 20-25 years.

Random sampling technique was used for the collection of the subjects.

Research Design:

Single group of trekkers were used for conducting the present study.



Tools Used:

As it is an Experimental study research has used standardized tools. The following tool was used for this study are:

- **Physiological Variables: 1. Resting Pulse rate- Pulse Oxi-meter Finger Device, 2. Blood Pressure- Sphygmomanometer 3. Cardiovascular Endurance- Harvard Step test.**

Procedure:

Pre-training test was conducted on the groups before starting the Himalayan trekking camp. And the test was conducted through the instruments on the groups. The trekking camp was of 15 days. The subjects were considered as one groups (N=10). After 15 days of Himalayan trekking camp post test was conducted. And the test was conducted through instruments on the particular group.

RESULTS

The data collected on 10 subjects before and after attending the Himalayan trekking camp, was analyzed by comparing the means of Pre and Post data of the group and was again statistically analyzed by applying the Independent-'t' test to check the difference among selected variables and also to check the level of significance. Therefore separate tables and graphs have been drawn for each item as follows:

Section-1

This section of the chapter deal with the description statistical analysis and **Independent-'t'** test applied on data collected from selected subjects on resting pulse rate before and after Himalaya trekking camp attended

Table No. 1

Resting Pulse Rate Before and After Himalaya

Trekking camp Group, age 20-25 years

Descriptive Statistics

Group	N	Mean	SD	S.E	DF	MD	Cal. T.
Before Camp	10	74.2	5.99	1.89	9	1.6	3.46
After Camp	10	72.6	6.75	2.14			

Mean, S.D, S.E, M.D, T' Ratio of resting pulse rate of Himalaya trekking camp attended students of B.V.D.U, college of physical education.

Tabulated-'t' value required to be significant at 0.05 level of confidence with 9 degree of freedom was 2.262.

Level of Significance = 0.05

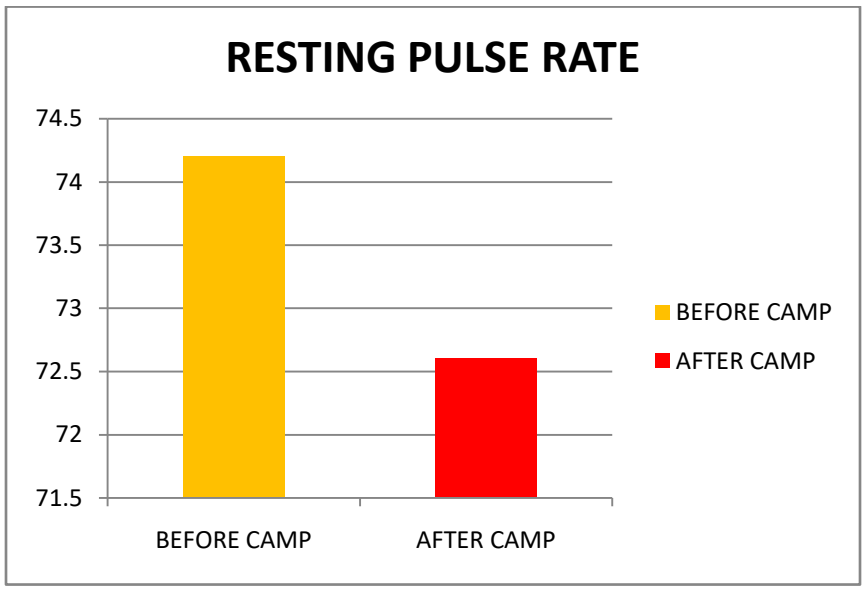
Tabulated-'t' 0.05(9) = 2.262

Table No.1 revels that there is significant difference between means of before and after Himalaya trekking camp in case of resting pulse rate. Because means of resting pulse rate before Himalaya trekking camp of the group is 74.2 is slightly higher than means of resting pulse rate

after Himalaya trekking camp of the group is 72.6 and the mean difference is 1.6. To check significant difference between means of resting pulse rate before and after Himalaya trekking camp group the data was again analyzed by applying independent-'t' test. Therefore after applying independent-'t' test it was found that there was significant difference between the resting pulse rate before and after Himalaya trekking camp because value of calculated-'t' is 3.46 which is higher than value of tabulated-'t' is 2.262 at 0.05 level of confidence.

Graphical Representation of Resting Pulse Rate before and after
Trekking camp of the Group,
Group age 20-25 years

Resting Pulse Rate- (Before and After camp)



Graph- 1

Section-2

This section of the chapter deal with the description statistical analysis and **Independent-'t'** test applied on data collected from selected subjects on systolic pressure before and after Himalaya trekking camp attended.

Table No. 2

Systolic Pressure Before and After Himalaya

Trekking camp Group, age 20-25 years

Descriptive Statistics

Group	N	Mean	SD	S.E	DF	MD	Cal. T.
Before Camp	10	121.1	9.87	3.12	9	8.2	0.50
After Camp	10	112.9	33.79	10.69			

Mean, S.D, S.E, M.D, T' Ratio of systolic pressure of Himalaya trekking camp attended students of B.V.D.U, college of physical education.

Tabulated-'t' value required to be significant at 0.05 level of confidence with 9 degree of freedom was 2.262.

Level of Significance = 0.05

Tabulated-'t' 0.05(9) = 2.262

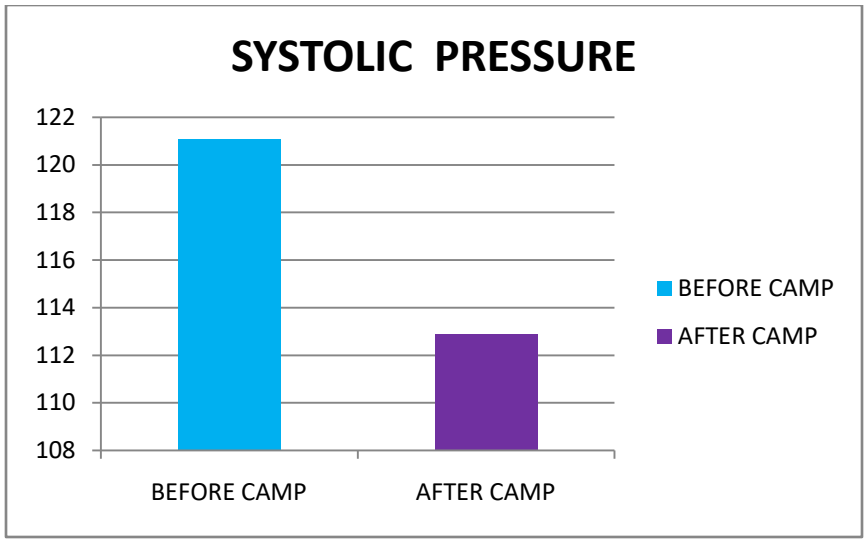
Table No.2 revels that there is no significant difference between means of before and after Himalaya trekking camp in case of systolic pressure. Because means of systolic pressure before Himalaya trekking camp of the group is 121.1 is slightly higher than means of systolic pressure after Himalaya trekking camp of the group is 112.9 and the mean difference is 8.2. To check significant difference between means of systolic pressure before and after Himalaya trekking camp group the data was again analyzed by applying independent-'t' test. Therefore after applying independent-'t' test it was found that there was no significant difference between the systolic pressure before and after Himalaya trekking camp because value of calculated-'t' is 0.50 which is lower than value of tabulated-'t' is 2.262 at 0.05 level of confidence.

Graphical Representation of Systolic Pressure before and after

Trekking camp of the Group,

Group age 20-25 years

Systolic Pressure- (Before and After camp)



Graph- 2

Section-3

This section of the chapter deal with the description statistical analysis and **Independent-'t'** test applied on data collected from selected subjects on diastolic pressure before and after Himalaya trekking camp attended.

Table No. 3

Diastolic Pressure Before and After Himalaya

Trekking camp Group, age 20-25 years

Descriptive Statistics

Group	N	Mean	SD	S.E	DF	MD	Cal. T.
Before Camp	10	75.8	5.77	1.83	9	4.1	0.24
After Camp	10	71.7	9.02	2.85			

Mean, S.D, S.E, M.D, T' Ratio of systolic pressure of Himalaya trekking camp attended students of B.V.D.U, college of physical education.

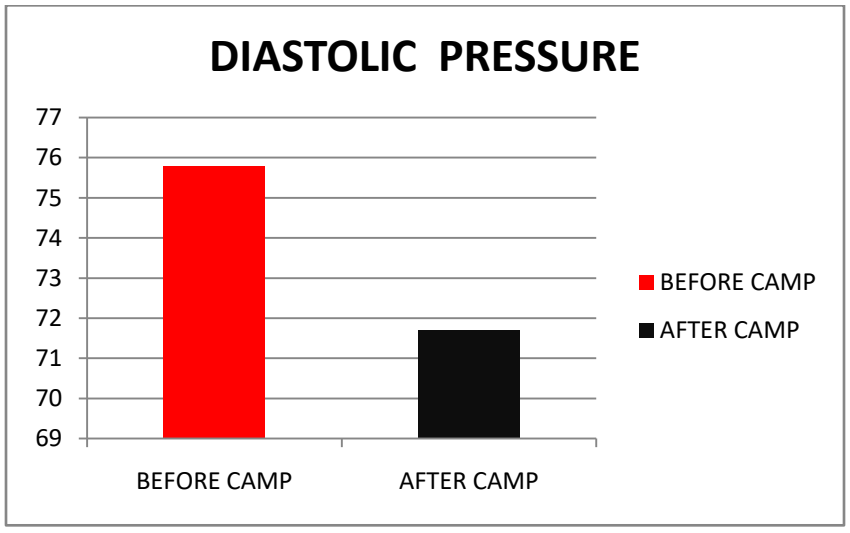
Tabulated-'t' value required to be significant at 0.05 level of confidence with 9 degree of freedom was 2.262.

Level of Significance = 0.05

Tabulated-'t' 0.05(9) = 2.262

Table No.3 revels that there is no significant difference between means of before and after Himalaya trekking camp in case of diastolic pressure. Because means of diastolic pressure before Himalaya trekking camp of the group is 75.8 is slightly higher than means of diastolic pressure after Himalaya trekking camp of the group is 71.7 and the mean difference is 4.1. To check significant difference between means of diastolic pressure before and after Himalaya trekking camp group the data was again analyzed by applying independent-'t' test. Therefore after applying independent-'t' test it was found that there was no significant difference between the systolic pressure before and after Himalaya trekking camp because value of calculated-'t' is 0.24 which is lower than value of tabulated-'t' is 2.262 at 0.05 level of confidence.

Graphical Representation of Diastolic Pressure before and after
Trekking camp of the Group,
Group age 20-25 years
Diastolic Pressure- (Before and After camp)



Graph- 3

DISCUSSION AND CONCLUSION

The results of the study indicate that though there was no statistically significant difference among the physiological variables after 15 days of Himalayan trekking camp, at 0.05 level of confidence, yet the little improvement occurs but not at a significant level to draw a assertive conclusion because the improvement was little and this happens due to the short duration of Himalayan trekking camp. The results conclude that if the trekking camp was of longer duration then major changes in physiological variables can be observed and high acclimatization adaptation may happens, then there may be a significant change in the physiological variables.

Pamela Gellatly (2011) this study was conducted to observe the purpose of this retrospective study was to understand and test the theory that multiple physical and psychological ill health effects occur when trekking at high altitude to Everest Base Camp (EBC), Nepal. The tour operator, The Adventure Company, agreed to send out 100 questionnaires to clients who had undertaken either the 11 day trek via Tengboche or the 16 day via Goyko Lakes, to EBC. The questionnaires also considered: age, gender, general levels of fitness and previous experience of trekking at altitude. The respondents (n=49) were 53% male (n = 26) and 45% female (n=22) and one unknown. Of the 49 participants, 36 lost weight ($p < 0.001$) sd ± 2.95 of which 17 were males ($p < 0.001$) sd ± 2.6 and 19 were females ($p < 0.001$) using the Lake Louise Score for Acute Mountain Sickness (AMS); 35% (n=17) had mild AMS, 43% (n=21) had severe AMS. The incidence of other conditions was: bacterial infections = (n= 31) or 57% ($p < 0.001$); general heart rate (n=26) or 55% ($p< 0.001$). The incidence of AMS was higher on reaching 4000m and was consistent with the literature. Other factors identified and consistent with the literature included: significant weight loss; bacterial infections; increase in heart rate in general and at night. Low mood was present during the trek and for some people continued on returning home and has not been well documented in other studies reviewed. Further research on the multiple ill health effects of trekking and how they may be prevented or better managed is needed to reduce risk and aid overall enjoyment.

Gopinath Bhaumik *et al.* (2008) Maximum aerobic capacity decreases at high altitude. This study was conducted to compare the changes in maximum aerobic capacity in men and women mountaineering trainees on induction to high altitude at 4350 m by trekking. Eight men and 8

women mountaineering trainees in a mountaineering course were selected for the study. The initial study was conducted at 2100 m (586 mm Hg) and then during 6 to 7 days of sojourn at 4350 m (435 mm Hg). Maximum oxygen consumption VO (2max), maximum heart rate (HR (max)), pulse arterial oxygen saturation (SaO (2)), and maximum ventilation (VE(max)) were measured. VO (2max), HR (max), duration of work (minutes), and SaO (2) saturation decreased significantly ($P < .05$) with increasing altitude in both sexes. Conversely, VE (max) and ventilator equivalent (VE/VO (2)) increased significantly ($P < .05$). Men showed a relatively higher value of maximum exercise variables (total exercise time, exercise intensity, and VO (2max)) than women trainees at both altitude locations. The decrement of VO (2max) was 13% in women and 17% in men ($P < .05$). The results indicate that the decrement of maximum aerobic capacity at 4350 m was less in women than in men under similar modes of ascent.

Mergul Colak and Ulviye Bilgin (2015) the aim of this study was to determine acute physiological responses of nature walkers such as, systolic blood pressure (SBP), diastolic blood pressure (DBP), heart rate (HR) and blood lactate (BLA) levels at different altitudes. 25 nature walkers voluntarily participated in the study. SBP, DBP, HR and BLA values of the subjects were measured in Erzincan (1,185 m), at the campsites of Kesis Mountain (2,800 m) and at the summit of Esence (3,549 m). The Bonferroni method, multivariate and test of Within-Subject Effect parametric tests were used in terms of a variance-covariance matrix. No statistically significant difference was found in SBP and DBP values ($p>0.05$).The summit BLA and HR values were found significantly higher ($p<0.01$) than lactate and HR values at the camp site and in Erzincan, the campsite values were found importantly higher than those in Erzincan ($p<0.05$, $p<0.01$ respectively). In conclusion, it was found that acute exposure to different altitude causes an increase in HR and BLA, but did not make a significant impact on SBP and DBP.

According to Goncalves *et al.* (2011) study was conducted to assess the levels of flexibility, functional autonomy and QOL in elderly yoga practitioners. The subjects were divided into a yoga group (YG; $n = 52$; age = 66.79 ± 3.30 years; BMI = 24.77 ± 3.18) and control group (CG; $n = 31$; age = 69.33 ± 4.84 years; BMI = 24.32 ± 3.71) and submitted to flexibility tests through goniometry, the LADEG autonomy protocol and QOL, using the WHOQOL-Old questionnaire. The remaining variables showed no significant intergroup modifications. Thus,

the study suggests that the regular practice of yoga may lead to improved range of motion in the performance of activities of daily living in elderly women.

Wyatt F B (2014) was conducted to evaluate the Hypoxia has been defined as conditions with lower than normal oxygen availability. Altitude exposure and acclimatization have been areas of research for a considerable time. The immediate (acute) effects of lowered ambient pressure of oxygen (PO2) pertaining to the human response and the adaptations to prolonged exposure (chronic) are complex. Several systems (i.e., cardiovascular, pulmonary, and endocrine) react to the hypoxia associated with altitude exposure. Adding to the complexity, these systems rarely react in isolation but rather interact to allow the work of the individual to be accomplished in this type of environment. While generalities exist relating to acute and chronic adaptations (acclimatization) to altitude exposure, current evidence indicates individual responses may facilitate or hinder the acclimatization process. Responders and non-responders have been identified in the literature during attempts to understand the human response to a lowered partial pressure of oxygen. This review summarizes the affects of acute and chronic exposure to altitude as it relates to exercise and work output. Several sub-categories will be addressed. Included in these categories are the following: (a) acute and chronic exposure; (b) performance and length of events; (c) substrate utilization; and (d) various adaptations associated with various increasing altitudes. While much research has been conducted regarding living high/training low (LHTL) scenarios, this review will only discuss findings associated with acute and chronic exposure to altitude. Thus, the purpose of this brief review is to summarize two basic tenets of altitude and exercise: (a) acute exposure response; and (b) chronic adaptations.

Thus, the current research concludes that the longer duration may have significant change in the level of physiological variables.

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