



DOES ACCLIMATIZATION HAVE ANY IMPACT ON PRIMARY HEALTH STATUS AMONG STUDENTS OF VIT UNIVERSITY, VELLORE?

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ABSTRACT

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Objective: The present study was undertaken to determine the overall prevalence of nutritional status among young adult of VIT University, Vellore with impact of psycho-somatic changes, primary health and climate change among fresh admission.

Material & Methods: Study measured data on height and weight of adults aged 17-23 years of the newly admitted students (n=157; Girls=87 & Boys=70). One commonly used indicator i.e., body mass index (BMI; kg/m²) was used to evaluate the nutritional status of subjects. Based on BMI, chronic energy deficiency (CED) and obesity were determined accordingly.

Results: The mean BMI varies from 21.828 to 23.223 among girls between 17-23 years of age while 23.493 to 24.265 among boys of 17-19 years of age. The mean magnitudes of BMI are between 23.497 and 22.563 respectively among students of 17 to 23 years old. The nutritional status of 57.32% of fresher is normal with the estimated BMI while 11.46 % are suffering from under-nutrition and 31.21% are with obesity. Overall prevalence of CED was (11.3 %). Among 87 girls, 58 (67.5%) and 27.1% of 70 boys are psychologically stressed. The study has also intervened the shifting of time management and utilization before and after to VIT system. Students either gained or lost their bodyweight during the first semester of academic courses; a total of 51 students (17 girls and 34 boys) lost their weight by 1-10 kg while a total of 36 students gained weight.

Conclusion: Acclimatization has brought changes among studied students those who came from distant states.

Keywords: Body mass index, chronic energy deficiency, climate change, primary health

“Undergraduate students get acclimatized in a new environment in a new college/university. Environments have subtle impact on growth of students. This study is a beginning to understand these impacts”

INTRODUCTION

Students life in University campus is designed to create a forum where our youth can face challenges presented by university living conditions, peer pressure, handling freedom, thus equipping them for a positive future. VIT University offers a well-defined campus with international standards. It receives approximately 4000 thousands students from 28 states, 7 union territories of the country and from 40 different countries, every year. Majority of these fresh students are in-housed (~90%) and are admitted in different disciplines, from bachelor to doctoral degrees. VIT is situated in the southern state of India, Tamilnadu and in the third populous city, Vellore which is situated at the boarder of other two southern states, Andhra Pradesh and Karnataka. Vellore district lies between 12° 15' to 13° 15' North latitudes and 78° 20' to 79° 50' East longitudes in Tamil Nadu State. The average maximum temperature experienced in the plains is 39.5 degree Celsius and the average minimum temperature experienced is 15.6 degree Celsius. The region experiences an average annual rainfall of 795 mm, out of which North East Monsoon contributes to 535 mm and the South West Monsoon contributed to 442 mm.

Freshly admitted students from different parts of the country with varied climatic conditions are acclimatized in due time during their stay at VIT. During the first few months of their stay, it brings many changes and impacts including nutritional disorder, psycho-somatic changes like, sleep disorder, loss of appetite, loss of weight; loneliness, inattentiveness towards classroom activities, prone to diseases and disorders like allergy, diarrhoea, insect bites; emotional changes; cultural changes etc. and frequent visit to health centre for primary health care and many more parameters.

Climate change has shown a greater impact on all sorts of life forms including humans. Though students are from different provinces of home

country, yet diversity is the key point in Indian system. Most of the fresh students come out the home for the first time for studies. This situation makes sheer contrast to the residential students' life. Understanding the gravity of the situational impact, we initiated this small piece of work to evaluate the spatial and climatic change and their impact on primary health parameters among fresher VITians, those who got admitted during June, 2011.

MATERIALS AND METHODS

The present study was cross-sectional and conducted in VIT University, Vellore, Tamil Nadu, which is situated about 130 km from Chennai, the provincial capital of Tamil Nadu. A total of 157 students with 87 female adults and 70 male adults aged between 17 to 23 years participated. They were admitted during June, 2011 and the study was carried out during August-November 2011. Data were collected with the consent of students those who participated. The data schedule includes the registration number, home town, the climatic parameters like temperature, humidity, rainfall; age, sex, body weight, height, food habit, time investment for study, game, sleep and other activities; psychological measures through different feelings like feeling cold, hot, uncomfortable, lone, melancholy, trauma; clinical presentations like headache, stomachache, diarrhea, vomiting, fever, cold, cough, sneezing; other conditions like malaria, jaundice, asthma, allergy etc with hospital visits and use of antibiotics, analgesics and antacid- before and after the admission to VIT system.

The self-attested height and weight were considered and these measurements were computed following standard techniques¹ (Cogill, 2003) for estimation of BMI (body mass index) following standard equation: $BMI = \text{Weight (kg)} / \text{height (m}^2\text{)}$. Nutritional status was evaluated

using internationally accepted BMI guidelines of World Health Organization (WHO, 1995)², as shown in Table 1. We followed the WHO (1995)² of the public health problem of low and high BMI, based on adult populations worldwide. Besides the mean and SD (standard deviation) were calculated accordingly. Data were analyzed by the one-way analysis of variance (ANOVA) of duplicate trials. P-value ($P < 0.05$) was considered statistically significant. The climatic parameters were enumerated from www.google.com and Wikipedia respectively.

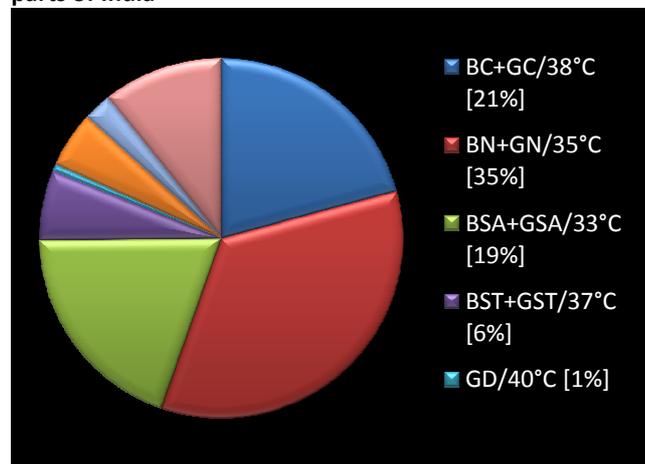
RESULTS

The study showed the nutritional status among freshly admitted students during June, 2011 (Table 1 and Table 2). The mean BMI varies from 21.828 to 23.223 among girls between 17-23 years of age while 23.493 to 24.265 among boys of 17-19 years of age. The mean magnitudes of BMI are 23.497, 23.493, 23.916, 22.378, 22.440 and 22.563 respectively among students of 17 to 23 years old (Table 1).

Table 2 shows the nutritional status of fresher which reveals that 57.32% are normal with the estimated BMI whereas 11.46 % are suffering from under-nutrition and 31.21% are with obesity.

Table 3 shows that students joined in the VIT system during 2011 and acquired a set of psycho-somatic exhibit on the way of acclimatization. Among 87 girls, 58 (66.7%) and 27.1% of 70 boys showed either individually or in combination, they had been experiencing cold/hot/uncomfortable/trauma/melancholy/loneliness etc. during their stay. Majority of students declared the feeling of hot, uncomfortable and loneliness. The data presents that such feeling is more prominent among girls than boys (66.7% versus 27.1%). It has also been observed that girl students from Andhra Pradesh do not bear any temporal and spatial stresses.

Figure1. Distribution of VIT fresher (2011) from different parts of India



The studied population joined to VIT system during June, 2011 are from different parts of the country. Majority of students are from north (35%), followed by south (28%) and central part of India (21%) respectively (Figure 1). The average temperatures of those places range from 25-40°C.

DISCUSSIONS

India is home to an extraordinary variety of climatic regions, ranging from tropical in the south to temperate and alpine in the Himalayan north, where elevated regions receive sustained winter snowfall. The nation's climate is strongly influenced by the Himalayas and the Thar Desert (http://www.indianetzone.com/40/types_indian_climate.htm)³. It has 4-6 seasons and is accommodated in the Indian calendars. Students in VIT are the true representatives of Indian subcontinent. They participate in the academic exercises with acclimatization and adaptation. The biased factor is the economy; students are mostly hailed from medium to higher class of economy. Hence the primary health in terms of nutritional standards of students is good⁴(Nerlander, 2009). The above average socio-economy and western

Table1. Mean and standard deviation of nutritional variables of the studied students (n=157)

Age (year)	Sex (M/F)	N*	Weight (Kg)		Height (cm)		BMI*** (Kg/m ²)	
			Mean	SD**	Mean	SD	Mean	SD
17	M	12	73.93	16.18326	173.3186	16.18326	24.52481	4.525775
	F	9	56.14	11.14	157.1278	6.221192	22.766	4.260641
	Total	21	64.40784	16.1335	164.8902	10.44689	23.49784	4.451435
18	M	42	72.77372	15.99126	173.2117	7.083982	24.26561	4.545708
	F	13	55.9369	11.9326	156.7838	7.083982	22.73558	4.558739
	Total	55	64.64312	16.11546	164.9524	10.40877	23.49353	4.468877
19	M	16	71.88312	15.69443	173.2208	6.76606	24.00474	4.659115
	F	2	56.55814	13.88096	155.6977	7.472282	23.22983	4.841696
	Total	18	67.31336	16.24219	167.3041	10.43009	23.91685	4.403868
20	M	0	0	0	0	0	0	0
	F	9	55.36893	9.323164	159.3204	6.848806	21.82808	3.650242
	Total	9	55.36893	9.323164	159.3204	6.848806	21.82808	3.650242
21	M	0	0	0	0	0	0	0
	F	27	56.02761	10.65657	158.2209	13.02013	22.37836	4.069679
	Total	27	56.02761	10.65657	158.2209	13.02013	22.37836	4.069679
22	M	0	0	0	0	0	0	0
	F	16	55.86335	10.54781	157.7578	6.076364	22.44039	4.042875
	Total	16	56.02761	10.65657	158.2209	13.02013	22.37836	4.069679
23	M	0	0	0	0	0	0	0
	F	11	55.93706	11.12491	157.4056	6.121122	22.56297	4.246119
	Total	11	55.93706	11.12491	157.4056	6.121122	22.56297	4.246119

*N, Number of students participated; **SD, standard deviation; ***BMI, body mass index

Table 2. Prevalence (%) of Nutritional status in terms of CED (chronic energy deficiency) and obesity among studied students

Nutritional status		Age (year)														Total (%)
Type	BMI (Kg/m ²)	17		18		19		20		21		22		23		
		M	F	M	F	M	F	M	F	M	F	M	F	M	F	
CED II	16.00-16.99	0	1	3	0	0	0	0	0	0	1	0	0	0	0	5
CEDI	17.00 - 18.49	0	5	3	1	1	0	0	0	0	2	0	1	0	0	14
Total CED	Upto 18.49	0	6	6	1	1	0	0	0	0	3	0	1	0	0	18 (11.46%)
Normal	18.50 – 24.99	6	6	18	10	6	1	0	6	0	19	0	1	2	6	90 (57.32%)
Overweight	25.00-29.99	4	1	13	2	4	1	0	3	0	3	0	2	0	2	35
Obese	>30.00	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Class I	30.00 – 34.99	2	0	2	0	2	0	0	0	0	1	0	1	0	0	8
Class II	35.00-39.99	1	0	1	0	0	0	0	0	0	0	0	0	0	1	3
Total Obese		10	1	16	2	6	1	0	3	0	4	0	3	0	3	49 (31.21%)
59/157	36.57%	11		18		7		3		4		3		3		

Table3. Temporal and spatial of distribution of students from different parts of India and Psycho-somatic variables of the studied students

Place	N*	Psychological parameters: feeling										Total
		cold	hot	Uncomfortable	Trauma	Melancholy	Lone	Pain	Whising	Asthama		
GN	17	2	3	1	1	0	2	0	0	0	9	
GC	13	1	3	2	1	1	2	0	0	0	10	
GE	8	1	2	1	0	1	2	1	1	0	9	
GSA	13	0	0	0	0	0	0	0	0	0	0	
GST	15	0	2	1	2	2	4	0	0	1	12	
GKA	4	1	2	3	1	0	3	0	0	0	10	
GSK	17	1	6	7	1	1	2	0	0	0	18	
Total	87	6	18	15	6	5	15	1	1	1	58	
	%	5.16	15.5	12.9	5.16	4.30	12.9	0.86	0.86	0.86	66.7%	
BN	38	5	1	3	0	0	2	0	0	0	11	
BC	3	0	0	0	0	0	0	0	0	0	3	
BSA	18	0	2	0	0	0	0	0	0	0	2	
BST	10	3	0	0	0	0	1	0	0	0	3	
BSK	1	0	0	0	0	0	0	0	0	0	0	
Total	70	8	3	3	0	0	3	0	0	0	19	
	%	5.6	2.1	2.1	0	0	2.1	0	0	0	27.14%	

*N, Number of students participated; G=Girls; B=Boys; GN=Girls from North; GC= G from Central India; GE=Girls from East; GSA= Andhra Pradesh; GST=Tamilnadu; GKA= Karnataka & GSK= Kerala; BN= Boys from North; BC= Boys from Central India; BSA= Boys from AP; BST= Boys from TN; BSK= Kerala

campus environment offer an optimum and better healthy environment. Treated drinking water, hygienic food and pollution free green campus with health care facility obviously lessen or remove the ill impacts of several changes including climate among residents. However, the study showed the nutritional status among freshly admitted students where the mean BMI varies from 21.828 to 23.223 among girls between 17-23 years of age while 23.493 to 24.265 among boys of 17-19 years of age.

Students joined in the VIT system during 2011 and acquired a set of psycho-somatic display on the way of acclimatization. It has been observed that the stresses are more with students from distant places than from near-by states. Girl students were found more vulnerable. However, girl students from Andhra Pradesh did not bear any temporal and spatial stresses. This might be because of uniformity in cultural and culinary activity and vicinity of the home state (World Bank, 2006; WHO, 2006; Puri *et al.*, 2008; Nerlander, 2009)^{4,5,6,7}. CED is an indicator of malnutrition in women which can result in reduced productivity, slow recovery from illnesses, increased susceptibility to infections, and a heightened risk of adverse pregnancy outcomes. A woman's nutritional status has important implications for her health as well as the health of her children. A woman with poor nutritional status, as indicated by a low body mass index (BMI), short stature, anemia, or other micronutrient deficiencies, has a greater risk of obstructed labour, having a baby with a low birth weight, having adverse pregnancy outcomes, producing lower quality breast milk, death due to postpartum haemorrhage, and illness for herself and her baby^{8,9} (Chatterjee, 1990; Boerma and Sommerfelt, 1993). Women's height can be used to identify women at risk of having a difficult delivery, since small stature is often related to small pelvic size. The risk of having a baby with a low birth weight is also higher for mothers who are short^{9,10} (Chatterjee, 1990; NFHS-III, 2007). The study has also intervened the shifting of time

management and utilization before and after to VIT system. The data shows drastic changes occurred in the time investment for study, game and sleep. The study hour has been declined from 10 to 0, game hour from 3 to 0 and sleep has either increased or decreased among the studied students population. Interesting observation remains with the other activities which include drawing, dancing, composing, debating, acting, joking, singing, swimming, cycling, nature watching, the majority of the students had one or the other activity before but shifted to almost no activity at the first semester life in VIT. Though the sample size is too meager to draw any conclusion however from the obtained facts and figures, it demonstrates that the newcomers are under certain kind of psychological stresses.

Majority of the students (>98%) have and had good appetite. Among different food habits, there was 100 non-vegetarian (NV) and 57 vegetarian (V). Students admitted freshly to VIT system either gained or lost their bodyweight during the first semester of academic courses; a total of 51 students (17 girls and 34 boys) lost their weight by 1-10 kg while a total of 36 students gained weight.

During last month (10th October to 9th November, 2011), a total of 82 visits were made by 75 fresh students for different ailments at the VIT Health Centre with 1-3 consecutive visits for fever, headache, stomachache, cold, cough, sneezing, diarrhea, vomiting, allergy, skin rashes, acne, BP and diabetes; which demonstrate the possibility of sustainable interaction for acclimatization at VIT (data not elucidated). There remains every chance to be exposed to unknown pathogens of new geographic place and to fall sick¹¹ (Roland, 2004).

Due to the wide variation in cultures, religions, and levels of development among India's 28 states and 7 union territories, it is not surprising that women's health also varies greatly from state to state.

Numerous studies indicate that malnutrition is another serious health concern that Indian women face ^{6, 8} (Chatterjee, 1990; World Bank, 1996). It threatens their survival as well as that of their children.

The CED is an indicator of nutritional status of subjects reflecting the economic background. According to the national report, the Central zone of India (42.55 %) has the highest prevalence of CED followed by Eastern zone (42.15 %), North-Eastern zone (36.51 %), Western zone (36.4 %), Northern zone (29.05 %), and Southern zone (28.85 %). Recent study from West Bengal revealed 28.3 % of college women population had CED. The present study shows the rate of prevalence of CED is 11.46% which is much less than any states of India and country India (35.6%). Punjab state has 18.9% of prevalence of CED. The present CED distribution is between Nigeria (13.5%) and Kenya (9.6%). The lowest minimum CED prevalence has been observed in Ghana (9.1%), Zimbabwe (7.9 %), Brazil (7.3 %), Uzbekistan (7.2 %), Kazakhstan (6.2 %), South Africa (5.0 %), Kyrgyz Republic (4.7 %), Morocco (3.6 %), Colombia (2.1 %), Turkey (1.8 %), Jordan (1.7 %) and Guatemala (1.6 %). Egypt (1.3 %) from North Africa had the lowest prevalence of CED.

Climate change is a major problem caused by the increase of human activities leading to several direct and indirect impacts on health. It is predicted that climatic changes will have wide-ranging harmful effects including increase in heat-related mortality, dehydration, spread of infectious diseases, malnutrition, and damage to public health infrastructure ^{4, 11} (Roland, 2004; Nerlander, 2009). Thus we should be concerned and should take appropriate measures to stop this climate change. Indirectly, changes in weather pattern, can lead to ecological disturbances, changes in food production levels, increase in the distribution of malaria, and other vector-borne diseases. Fluctuation in the climate especially in the temperature, precipitation, and humidity can influence biological organisms and the processes linked to the spread of infectious

diseases (Roland, 2004). Students attended to study in VIT system are found to be vulnerable to new climatic zone at VIT, Vellore.

CONCLUSION

Students in VIT are the true representatives of Indian subcontinent. They participate in the academic exercises with acclimatization and adaptation. The above average socio-economy and green campus environment offer an optimum and better healthy environment. Treated drinking water, hygienic food and pollution free environment with health care facility obviously lessen or remove the ill impacts of several changes including climate among residents.

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