ORIGINAL ARTICLE

SUBJECTIVE ASSESSMENT OF APPETITE AT HIGH ALTITUDE AND FACTORS ASSOCIATED WITH DECREASED APPETITE

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ABSTRACT

OBJECTIVE
To perform subjective assessment of appetite among temporarily employed individuals at high altitude (HA) with the use of standardized scale and look for the the factors associated with decreased appetite.

STUDY DESIGN
Descriptive cross sectional study

PLACE AND DURATION OF STUDY
Study was conducted in District Skardu in three months duration from 1stoctober 2015 to 31st December 2015.

SUBJECTS AND METHODS
The sample population comprised of subjects living at a height of 4500 meter or more above the sea level at Karakorum ranges in periphery of district Skardu for more than one month and less than three months and having normal appetite at sea level. Appetite was assessed by using Simplified Nutritional Appetite Questionnaire (SNAQ). Age, smoking, BMI, use of any drug, altitude, duration of stay and availability of palatable food were related with decreased appetite to evaluate the association of these factors with decreased appetite in the study population.

RESULTS
A total of 106 men with normal appetite at sea level when screened through SNAQ were included in the study. Out of them, 32.1% had normal appetite, while 67.9% had decreased appetite at high altitude. With logistic regression increasing age, smoking and altitude above 4500 meters were found significantly associated with the decreased appetite at HA.

CONCLUSION
This study showed a high prevalence of decreased appetite among individuals at high altitude. Special attention should be paid to individuals with increasing age, smokers and those living at very high peaks to prevent the weight loss and maintain optimum physical health.

KEY WORDS
Appetite, SNAQ, High altitude.

INTRODUCTION

Adequate food intake is necessary for maintenance of homeostasis especially when body is exposed to tough conditions. Changing environment affects all the biological functions of the body including appetite.[1] Ascent to High altitude (HA) expose the individual to decreased atmospheric pressure and less oxygen tension which alters the normal physiology of body to considerable extent. The saturation of oxy hemoglobin begins to fall at 7000 feet above the sea level. Various mechanisms and adaptations in the body allow it to compensate for this lack of oxygen. Stay at HA and prolong exposure to low tension oxygen can give rise to multiple health issues including diabetes, heart problems, hypertension, sexual dysfunction, anxiety, sleep apneas, reduced sleep efficiency, decreased appetite and weight loss.[1,2,3] Raised levels and sensitivity of leptin and CCK due to activation of hypoxia inducible factor is considered as main cause of decreased appetite at HA. Decreased appetite is one of the main factors contributing to weight loss of the individuals at HA.[4,5]

An animal study done on rats at HA concluded that there is decrease in daily food and water intake and body weight after exposure to environment at HA.[6] A review on data from military soldiers at high altitude revealed that same is true in case of human beings i-e ascent and stay at HA involves high energy expenditure but contrary to demand, energy intake is often less due to decreased appetite, changes in hormonal profile and lack of energy rich food.[7]

A study conducted at Mount Everest concluded that rapid ascent is associated with poor appetite and decreased caloric intake and improvement in this phenomenon occurs after several days of acclimatization.[8] A recent study done in US showed very interesting results that people living at HA have lesser chance of getting obese as compared with those at sea level and decreased appetite was stated as one of the reasons for such findings5. High body mass index (BMI)[9], increase in altitude[10], lack of palatable food[11] and rapid ascent[8] were correlated with decreased appetite and weight loss at HA in the studies done in past.

In addition to hypoxia and endocrine causes, appetite can also be affected by psychological issues encountered at HA. Various studies have concluded increased prevalence of anxiety and depression at high altitude contributing to the adverse symptoms of that harsh and unusual environment[12,13]. Decreased appetite if experienced for a long period can be a major contributing factor in weight loss at HA[4]. Good appetite and choice of right kind of food is necessary for sound health and carrying out of normal daily activities at challenging environment of HA.[3]

A large number of individuals are employed temporarily at HA. Armed forces of various countries are engaged in alpine warfare which is unique in its kind.

Tourism and Mountaineering also engage a lot of people to stay and work there. No study has so far been undertaken in our country on people engaged temporarily at HA, to identify the appetite disturbances and the associated risk factors. This study aims to investigate this interesting and unique phenomenon.

SUBJECTS AND METHODS

Participants

106 subjects were included in the final analyses after the application of inclusion/exclusion criteria. All subjects were male and above the age of 25. Each had been living at high altitude (4500 meter above sea level or more) for more than one month and less than three months and had completed SNAQ at sea level before the ascent. All individuals who did not give consent or those with age less than 25 or those with SNAQ score 14 or less at sea level were excluded from the study. Subjects living there for less than one month or more than three months or permanent residents of that area or those who were unable to complete /understand the required questionnaire were also excluded. Subjects with any physical or psychiatric illness were also excluded from the study.

Instruments

We used Simplified Nutritional Appetite Questionnaire (SNAQ). The SNAQ is an effective instrument for subjective assessment of appetite and prediction of weight loss. This is validated tool that allows pre-emptive identification and management of nutritional problems.[14] A global sum of "14"or less indicates poor appetite and the risk of at least 5% weight loss within six months.

Procedure

After ethical approval from concerned ethical review committee, this cross sectional study was planned from 1stoctober 2015 to 31st December 2015 at Karakorum ranges in periphery of Skardu city. The subjects were provided with a detailed description of the study and written consent from all the participants was taken. The confounding variables were taken care of by detailed history taking and subjects with these variables were excluded from the study. The risk factors which were to be related with decreased appetite and socio demographic data of the full sample of subjects participating in the research was entered in a structured Performa; keeping in mind the wish of some subjects for anonymity only initials of their names were kept as record. SNAQ was administered to the subjects and were asked to answer the questions according to their condition in last one month.

Descriptive statistics were used to describe the risk factors and the distribution of SNAQ score. Samples were identified under the categories of normal appetite and decreased appetite. Variables in the study included age, smoking, BMI, use of any drug altitude, duration of stay and availability of palatable food. Between-group variances in categorical correlates were determined using chi-square. Binary logistic regression analysis was done to evaluate the factors related to decreased appetite. All statistical analysis was performed using Statistics Package for Social Sciences version 20.0. Differences between groups were considered significant if p-values were less than 0.05.

RESULTS

A total of 106 men with normal appetite at sea level when screened through SNAQ were included in the final analysis. Out of them, 32.1% persisted with normal appetite, while 67.9% had decreased appetite at HA. As shown in Table 1 increasing age, smoking, altitude above 4500 meter and availability of palatable food had significant association with decreased appetite when chi-square was applied. Table 2 shows that only increasing age, smoking and altitude above 4500 meter were significantly associated with decreased appetite after the regression analysis.

Table 1
Factors associated with decreased appetite

Socio demographic factors	Subjects with normal appetite (15 20) -		Subjects with decreased appetite (1 14) -		χ^2	p-value
	N	%	N	%		
Total	34	32.1	72	67.9		
Age						
25-35	30	88.2%	40	55.5%		
>35	04	11.8%	32	44.5%	10.997	0.001
Duration of stay						
1-2 months	10	29.4%	32	44.5%		
>2 month	24	70.6%	40	55.5%	2.182	0.102
Altitude at which stayed						
4500-6000 meter	29	85.3%	29	40.3%	18.888	0.000
>6000 meter	05	14.7 %	43	59.7%		
Tobacco smoking						
Non Smoker	30	88.2%	25	34.7%	26.491	0.000
Smoker	04	11.8%	47	65.3%		
Any drug using						
NO	34	100%	34	100%		
Yes	00	0%	00	0%	-	-
Palatable food						
Not Available	02	6.2%	20	27.8%	6.732	0.007
Available	32	93.8%	52	72.2%		
BMI						
<25	24	70.6%	50	69.4%	0.014	0.547
25 or more	10	29.4%	22	30.6%		

Table 2
The correlated factors relating to decreased appetite: the binary logistic regression

	B	p-value	Odds ratio	Confidence interval	
				lower	upper
Age (ref. is 25-35)	2.268	0.005	9.658	2.007	46.486
Duration of stay(ref. is1-2 months)	-0.958	0.172	0.383	0.097	1.518
Altitude at which stayed (ref. is 4500-6000m)	3.276	0.000	24.466	4.517	155.059
Any drug using(ref. is no drug using)	-	-	-	-	-
Palatable food(ref. is availability of palatable food)	1.332	0.185	3.790	0.529	27.165
Smoking(ref. is non smoker)	3.511	0.000	33.465	6.428	174.226
BMI(ref. is <25)	-1.015	0.213	0.362	0.073	1.793

DISCUSSION

Using SNAQ we found that 67.9% of our subjects showed reduced appetite which supports the idea already mentioned in literature. Important reasons for decreased appetite may be chronic hypoxia leading to activation of hypoxia inducible factor which causes a raise in leptin concentration and sensitivity4 or psychological issues encountered commonly at unusual and stressful environments like high altitude.[12]

Presence of high psychiatric morbidity among people going to high altitude and staying there is supported by local as well as foreign data[12,13]. Loss of appetite or decrease in it is a symptom of depression and other psychiatric illnesses as per international guidelines[15] and also concluded in various studies done in past[16, 17]. Though scope of our study is not to look for any psychiatric morbidity at HA as it is an established fact by now but appetite is such an important biological function with physiological, biochemical and psychological dimensions that it needs discussion from this point of view as well. It is easier for the health professionals to look for and address medical causes of reduced appetite at HA but difficult for them to screen for mental health issues and even patient himself is usually unable to comprehend the psychosomatic issues which may give rise to multiple problems including reduced appetite.

Various studies in past concluded that elder age and smoking are consistent correlates with reduced appetite[5,18,19]. The results in our study were similar. Overall decrease in appetite due to aging and nicotine in smokers potentiating the effect of leptin may be the reasons behind these findings. Smoking may result in decreased eating, serving as a habitual alternative to food. The strong association of decreased appetite with increase in altitude above 4500 meters is also in line with studies done elsewhere[5,9,10]All hazards of HA increase as individuals go up and up. Administrative facilities and logistic support also shrink with more ascent so these findings are not surprising.

An interesting finding in our study was that not a single individual was using any non prescribed medication. It is a common practice in our setup that people of all age and socio economic groups are involved in use of non prescribed medicines.[20,21,22] It was expected that our sample population would be doing same and taking multivitamins or analgesics etc to cope with the harsh environment but findings were opposite. This might be due to proper awareness about the changes in body at HA before going there.

No association of high SNAQ score was established with duration of stay, BMI and lack of palatable food. These results were different from studies done in past in foreign countries[9,11,23]. Reason might be proper acclimatization in our setup and assurance of provision of good quality food. Controlled BMI of individuals and timely sending them on vacations to minimize the duration of stay may also be contributing to these results. Multiple large multi-center studies would be required to establish the association of these aspects.

There are many limitations in our study. The use of self administered questionnaires and small sample size pose methodological issues. The results are not generalizable as our study population was not selected from a randomized sample of all the people employed at various peaks of this region including Himalayas and Hindukush. Similarly, the findings are not generalizable to individuals working at HA in other parts of the world. Another limitation is the chance that the subject may under or over report symptoms on self-administered questionnaires like SNAQ. We suggest further studies on a broader based and a more representative sample size using locally developed and standardized psychometric tools on the subject.

CONCLUSION

This study showed a high prevalence of decreased appetite among individuals at high altitude. Special attention should be paid to individuals with increasing age, smokers and those living at very high peaks. This will help in preventing the weight loss and maintain optimum physical health to cope with the harsh environment of HA.

DISCLOSURE STATEMENT

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