



Research Article

FOOD CONSUMPTION PATTERN AND LIFESTYLE MODIFICATION TRAITS IN RELATION TO THE LEVEL OF STRESS AMONG INDIVIDUALS OF UTTARAKHAND, INDIA

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Abstract

The increase in the stress generated psychophysiological disorders promotes a probe into the influence of lifestyle modification factors and food consumption on stress. Hence, the present study aims to study, firstly, the impact of lifestyle modification factors on stress in reference to sex and secondly, the frequency of the consumption of major food groups by individuals experiencing various levels of stress in reference to sex. An exploratory study comprising a sample of 117 individuals (62 females and 55 males) of age range 22-55 years was conducted in Uttarakhand, India. PSSI was administered for assessing the levels of stress. Questionnaires were developed for identifying lifestyle modification factors and food consumption pattern. Mean scores and percentages were employed to describe the data. t-test and χ^2 were deployed for the assessment of significant difference. Non vegetarian females, male smokers and alcoholics of both the sexes revealed higher stress than their counterparts. Females consuming junk and market food had lower stress than those females who were not consuming the same. Contrary to the females, males consuming junk and market food had higher stress levels than the males who were not consuming junk and market food. Significant differences were found in the stress levels of males who consumed roots and tubers, milk based products and saturated fats. Further studies with larger sample size are required.

Keywords: Food consumption pattern; lifestyle modification factors; stress; Uttarakhand.

Introduction

Globally, stress has been recognized as one of the vital reason, which increases the vulnerability towards various disorders. In India also, stress has been a leading cause of various psycho-physiological disorders. High prevalence of problems, like, hypertension (Gupta *et al.*, 2012) and mental and behavioral disorders (Reddy and Chandrashekhar, 1998) are disturbing. An association of stress with these problems has been revealed by the researchers (Sparrenberger *et al.*, 2009; Kuruvilla and Jacobs, 2007). In a study subjects reported that their poor lifestyle behavior was due to the stress (McKenzie and Harris, 2013).

Lifestyle modification behaviors, like, smoking, alcohol and junk food consumption, etc may be considered merely a part of daily living. Their high prevalence signifies that they can be the indicators or initiators of some psycho-physiological complexities. For instance, In India, a study conducted in Meerut region revealed the prevalence of tobacco users among adult males to be 72.8% (52.4%

current users and 20.4% ever users) (Garg *et al.*, 2013). In Bangalore city, among four communities (rural, urban, slum and town), a total of 6,997 households were enumerated out of which 46% were alcohol user households and it was found that more than 83% of the users were light drinkers (consuming less than five drinks a day) and 17% were heavy drinkers (Girish *et al.*, 2010). Eating outside home and junk food consumption at or outside home are identified as significant risk factors causing overweight and obesity among adolescents (Goyal *et al.*, 2011). This reinforces the attention provided to the dietary intake. A study conducted in Kurukshetra district, Haryana state, India revealed that meal skipping, more intake of junk food, carbonated drinks were some unhealthy eating habits among overweight adolescent girls and also, the girls were consuming excess of energy, protein and fats but inadequate micronutrients like iron and beta carotene (Goel *et al.*, 2013). This has encouraged various research investigations into the etiology of such high prevalence rates and their consequences, which are the reflection of some underlying problems. Job strain was found to increase the drinking

intensity for heavy drinkers, while it increases smoking intensity for light smokers (Azagba and Sharaf, 2011).

Though the problems mentioned above are grave enough to require research investigations but still, there isn't adequate information available regarding association of stress with dietary intake and lifestyle modification behaviors, specifically, in Uttarakhand. Every state in India, has its own geographical and climatic conditions, which, influences the food consumption pattern of the individuals of that region. Hence, the present study was conducted in Uttarakhand with the following objectives:

1. To study the impact of lifestyle modification factor on stress in reference to sex.
2. To assess the frequency of the consumption of major food groups by individuals experiencing various levels of stress in reference to sex.

Methodology

The present exploratory study is conducted with the following methodology:

Sampling Design

A sample of 117 individuals was randomly taken from age range 22 to 55 years from Dehradun, Haldwani, Kashipur, Pithoragarh and Pauri Garhwal areas of Uttarakhand state of India. Individuals suffering from any form of physical disability were not considered during sampling. This reduced the likelihood of obtaining variations in the causes of stress enabling an adequate interpretation of the data. Incomplete questionnaires were excluded from sample.

Tools administered:

- Personal Stress Source Inventory (PSSI-sss): It is developed by Singh *et al.* (2005). It consists of 35 items and each item had three possible answer options, namely, seldom, sometimes and frequently. The scores describing level of stress are, namely, mild (0-30), moderate (31-79) and high (80 and above). The test-retest reliability of the tool is 0.79 and 0.68 is the concurrent validity.
- Lifestyle modification factors and food consumption pattern: 5 variables viz. food habit, smoking habit, alcohol consumption, junk food and market food intake were identified as indicator of lifestyle modification factors which may affect the level of stress. Subjects were asked to complete a 13 item food frequency questionnaire that measured consumption of major food items like cereals, whole pulses, GLV(green leafy vegetables), roots and tubers, other vegetables, fruit and fruit juices, milk, milk based product, meat and fish, egg, nuts, tea /coffee and saturated fat. The response category included 7 options-

daily, ≥ 2 times/week, weekly, ≥ 2 times per month, monthly, rarely and never.

Statistical design:

Mean scores and percentages were employed to describe the data. t-test and χ^2 ($p \leq .05$) were used for the assessment of significant difference between the variables.

Results

In the current study, health modifying behavior like eating habit, alcohol consumption, smoking status, junk food intake and readymade market food consumption was studied in 62 females and 55 males in relation to their stress levels. The impact of life modifying factors on stress level is documented in Table 1 and Table 2 for females and males, respectively.

Table 1: Impact of lifestyle modification factors on stress in female subjects.

S.N.	Life style modification factors	N	Stress level	p value
1	Non-Vegetarian	40	43.80±14.00	p=0.8412
	Vegetarian	15	43.0±10.30	
2	Smoking	12	46.58±14.13	p=0.3707
	No Smoking	43	42.74±12.72	
3	Alcohol intake	21	47.05±10.01	p=0.1213
	No Alcohol intake	34	41.44±14.27	
4	Junk food consumption	49	44.02±12.94	p=0.4799
	No Junk food consumption	06	40.0±14.21	
5	Market food consumption	45	44.38±13.38	p=0.34033
	No Market food consumption	10	40.0±11.03	

Eating Habit and Stress

Out of 62 females, 41 were non vegetarian and 21 were vegetarian. It was found that the stress level was higher for non-vegetarian females while in case of males both the non-vegetarian and vegetarian males had equal stress status.

Smoking and Stress

Since only one female reported smoking, out of 62, hence the impact of smoking on stress was not statistically analyzed. Out of 55 males, 12 reported smoking habit. The stress level of smokers (46.58) was found to be higher than nonsmokers (42.74), though the difference was not significant.

Table 2: Impact of lifestyle modification factors on stress in male subjects.

S.N.	Life style modification factors	N	Stress level	p value
1	Non-Vegetarian	41	41.95±16.92	p=0.3914
	Vegetarian	21	38.05±16.70	
2	Smoking	01	64.0	-
	No Smoking	61	40.24	
3	Alcohol intake	10	43.2±20.45	p=0.6017
	No Alcohol intake	52	40.13±16.21	
4	Junk food consumption	58	39.59±16.83	p=0.0624
	No Junk food consumption	04	55.75±6.24	
5	Market food consumption	48	39.69±16.96	p=0.4188
	No Market food consumption	14	43.86±16.52	

Alcohol and Stress

16 % females and 38 % males were found to consume alcohol on regular basis. Both the male and female alcoholic were observed to have higher stress level compared to their nonalcoholic counterparts. The female alcoholic had a stress score of 43.2 compared to 40.13 for nonalcoholic and male alcoholics had a stress level of 47.05 compared to 41.44 for nonalcoholic males.

Junk Food Consumption and Stress

A very high percentage of females (93.5%) and males (89.1%) were seen to consume junk food like chips, *samosa*, noodles, burger, mo-mo, pizza etc. These food stuffs are mostly fried and made of refined grains having inferior nutritive value. It was interesting to notice a contradictory trend regarding junk food consumption and stress. Females who consumed junk food had lower stress level (39.59) than those who did not (55.75) whereas males who consumed junk food had higher stress (44.02) than who did not (40.0).

Market Food Intake and Stress

48 (77.4%) females and 45 (82%) males consumed readymade market food as lunch or dinner. Females whose market food consumption was high exhibited lower stress level (39.69) compared to their counterparts (43.86) who did not consumed market food. On the other hand, males consuming market food revealed higher stress (44.38) against their non-consuming counterparts (40.0).

Food Frequency and Stress

In order to assess the effect of different food group on stress, the stress level of males and females was determined separately and further, how frequently these food items were consumed by different stressed group (moderate and low stress groups) was found and is documented in Table 3 and Table 4 for males and females, respectively.

The PSSI score revealed that 42 (67.7%) females were moderately stressed (score range 31-79) and 20 (32.3%) were low stressed having a stress score between 0-30. The stress level of 55 males were studied and it was seen that 47 (85.5%) had moderate level of stress and 8 (14.5%) experienced low stress.

The diet of both moderately and low stressed males and females was basically cereal based. They ate cereal twice a day and therefore cereal formed the staple diet for both the groups. Coarse cereals like millets which are considered to be quite nutritious and grown abundantly in Uttarakhand region was not consumed on regular basis by any of the group.

Whole pulses, good source of fiber and protective nutrients were consumed equally by moderately and low stressed groups, though 2.3% females in moderate stressed group reported that they had never consumed whole pulses. A good proportion of moderately stressed males consumed whole pulses on regular basis compared to their low stressed counterparts.

The consumption of GLV was found to be equal in moderate and low stressed male as well as female subjects. An equal consumption of roots and tubers by moderately and low stressed female on regular basis was found. Though a significant difference was seen between moderately and low stressed males consuming roots and tubers. A higher percent (72.3%) of moderately stressed males consumed roots and tubers on regular basis compared to low stressed males (5%). No significant difference due to consumption of other vegetables on stress status was seen in females and male subjects.

A non significant difference in the level of stress between moderately and low stressed male and female subjects due to consumption of fruits and milk was observed. The difference in the level of stress due to consumption of milk based products like curd, *paneer*, yoghurt, cheese, buttermilk etc. was analyzed and a significant difference was revealed for male subjects but not for females.

No significant difference was seen in level of stress due to meat consumption. A higher percentage of males as well as females reported low consumption of meat and meat products on regular basis. A large percentage consumed meat and meat products once a month, or occasionally or never. Similar results were noticed for subjects consuming eggs.

Consumption of nuts also did not show any significantly pronounced difference in the level of stress experienced by male and female subjects. Almost equal percentage (85%) of moderate and low stressed female consumed tea and coffee on daily basis and had no significant difference on level of stress but a significant difference in the level of stress due to consumption of tea/coffee was revealed for males.

76.1% in moderate and 75% low stressed category females consumed saturated fat daily or more than twice a week, respectively. 11.9% moderate stressed females and 5% low stressed female reported that they never consumed saturated fat. Rest consumed it either on monthly basis or occasionally whereas in case of males 87% consumed saturated fat daily or more than twice a week compared to 50% of low stressed male. A significant difference in level of stress due to consumption of saturated fat was seen for males.

Table 3: Frequency of consumption of major food groups by moderate stressed (MS) low stressed (LS) males.

Food group	Level of stress	Daily	≥2 times/ week	weekly	≥2 times/ month	Monthly	rarely	never	χ^2
Coarse cereals	MS		8(17.02)	4(8.5)	6(12.7)		21(44.6)	8(17.02)	3.98
	LS			1(12.5)			4(50)	3(37.5)	
Whole pulses	MS	10(21.2)	22(46.8)	10(21.2)	2(4.2)	1(2.1)	2(4.2)		8.28
	LS		2(25)	3(37.5)	2(25)		1(12.5)		
Green Leafy veg.	MS	17(36.1)	19(40.4)	5(10.6)	2(4.2)			4(8.5)	3.29
	LS	2(25)	4(50)					2(25)	
Roots and tuber	MS	34(72.3)	10(21.2)	3(6.3)					14.1*
	LS	1(12.5)	7(87.5)						
Other vegetable	MS	18(38.2)	19(40.4)	4(8.5)	3(6.3)	1(2.1)	2(4.2)		0.998
	LS	3(37.5)	3(37.5)	1(12.5)	1(12.5)				
Fruit and fruit juices	MS	11(23.4)	14(29.7)	4(8.5)	5(10.6)	4(8.5)	4(8.5)	5(10.6)	8.52
	LS		4(50)	2(25)		2(25)			
Milk	MS	24(51)	7(14.8)	2(4.2)	1(2.1)		7(14.8)	6(12.7)	2.39
	LS	4(50)	2(25)				2(25)		
Milk products	MS	14(29.7)	19(40.4)	7(14.8)	4(8.5)	2(4.2)	1(2.1)		15.5*
	LS		3(37.5)	1(12.5)	4(25)				
Meat and fish	MS	2(4.2)	7(14.8)	7(14.8)	5(10.6)	6(12.7)	6(12.7)	14(29.7)	9.28
	LS		1(12.5)		3(37.5)	3(37.5)		1(12.5)	
Egg	MS	3(6.3)	14(29.7)	8(17)	5(10.6)	1(2.1)	6(12.7)	10(21.2)	9.47
	LS	3(37.5)	1(12.5)	1(12.5)	2(25)			1(12.5)	
Nuts	MS	12(25.5)	8(17)	7(14.8)	4(8.5)	3(6.3)	13(27.6)		5.05
	LS		2(25)		1(12.5)	1(12.5)	4(25)		
Tea/ coffee	MS	44(93.6)	2(4.2)		1(2.1)				6.41
	LS	7(87.5)						1(12.5)	
Saturated fat	MS	29(61.7)	12(25.5)	1(2.1)	1(2.1)	1(2.1)	2(4.2)	1(2.1)	13.3*
	LS	4(50)				2(25)	2(25)		

*Significant difference

Table 4: Frequency of consumption of major food groups by moderate stressed (MS) low stressed (LS) females

Food group	Level of stress	Daily	≥2 times/ week	weekly	≥2 times/ month	monthly	rarely	never	χ^2
Coarse cereals	MS	3(7.1)	3(7.1)	3(7.1)	3(7.1)	4(9.5)	16(38.1)	10(23.8)	8.86
	LS	1(5)			5(25)		7(35)	7(35)	
Whole pulses	MS	14(33.3)	12(28.5)	9(21.4)	3(7.1)	1(2.3)	2(4.6)	1(2.3)	6.84
	LS	3(15)	4(20)	9(45)	1(5)	2(10)	1(5)		
Green Leafy veg.	MS	17(40.4)	15(35.7)	3(7.1)	6(14.2)			1(2.3)	7.3
	LS	6(30)	6(30)	5(25)	1(5)		1(5)	1(5)	
Roots and tuber	MS	27(64.2)	9(21.4)	4(9.5)	1(2.3)			1(2.3)	3.56
	LS	14(70)	3(15)	1(5)	1(5)		1(5)		
Other vegetable	MS	24(57.1)	8(19)	6(14.2)	1(2.3)		1(2.3)	2(4.6)	5.26
	LS	8(40)	7(35)	2(10)	1(5)	1(5)		1(5)	
Fruit and fruit juices	MS	15(35.7)	13(30.9)	4(9.5)	4(9.5)		4(9.5)	2(4.6)	4.69
	LS	6(30)	7(35)	5(25)	1(5)			1(5)	
Milk	MS	24(57.1)	8(19)	1(2.3)			4(9.5)	5(11.9)	1.74
	LS	14(70)	2(10)	1(5)			1(5)	2(10)	
Milk products	MS	22(52.3)	14(33.3)	2(4.7)	1(2.3)	1(2.3)	1(2.3)	1(2.3)	5.36
	LS	7(35)	6(30)	3(15)	2(10)		1(5)	1(5)	
Meat and fish	MS	2(4.7)	5(11.9)	8(19)	7(16.6)	2(4.6)	4(9.5)	14(33.3)	2.89
	LS		4(20)	5(25)	2(10)		2(10)	7(35)	
Egg	MS	5(11.9)	10(23.8)	12(28.5)	2(4.7)		5(11.9)	8(19.04)	8.4
	LS		7(35)	2(10)	3(15)		5(25)	3(15)	
Nuts	MS	12(28.5)	6(14.2)	7(16.6)	5(11.9)	1(2.3)	7(16.6)	4(9.5)	5.65
	LS	6(30)	3(15)		5(25)		3(15)	3(15)	
Tea/ coffee	MS	36(85.7)	4(9.5)				2(4.7)		3.06
	LS	17(85)	2(10)					1(5)	
Saturated fat	MS	23(54.7)	9(21.4)		1(2.3)		4(9.5)	5(11.9)	3.62
	LS	11(55)	4(20)			1(5)	3(15)	1(5)	

Discussion

Evidence exemplify that certain lifestyle modifying factors have an impact on level of stress or vice-versa. Also, during stress, alteration in food choice or preferences, food consumption frequency, eating behavior and food intake occurs; although the contrary studies are also present. Stress is correlated with lifestyle factors like unhealthy eating, cigarettes and drinking, especially in men (Lindquist et al., 1997). During stress cortisol is secreted which may alter the food choice resulting in increased consumption of fat and carbohydrate rich food and snacking (George *et al.*, 2010). Higher stress is associated with poor intake of healthy food like fruits, vegetables and fiber (Laugero *et al.*, 2011; Hinote *et al.*, 2009).

Unfortunately, studies related to food consumption frequency and health behavioral factors in relation to stress are negligible in Uttarakhand. In the current study vegetarian food habit was observed to be related with low

stress score than non-vegetarian. This result is consistent with an earlier study (Jain and Jinger, 2011) which showed that food habits determine stress level as non-vegetarians had higher stress than vegetarian group.

In the present study it was seen that smokers had higher stress than nonsmokers. The results are in line with results of Roohafza et al.(2013) where they found a higher level of stress in smokers than nonsmokers. A dual relationship between stress and smoking has been suggested in earlier studies as stress may trigger smoking and also cigarette smoking is believed to be a means of coping with stress as it brings tranquility and relieves tension.

Alcoholics had higher stress than non-alcoholics. Similar results were observed in an earlier study (Laitinen *et al.*, 2002) wherein stressed girls and boys drank alcohol frequently. In their review article Esper and Furtado (2013) analyzed 20 studies and found more frequent use of alcohol as the coping strategy for stress in both males and females, although the type of stressors were different in each case.

During stressed state an increase tendency to snack is seen (Oliver and Wardle, 1999). More consumption of snack-type food by stress driven boys than non-stressed boys was also reported (Jaaskelainen *et al.*, 2014). Women identified as stress driven eater reported more frequent consumption of take away fast foods than non stress driven (Mikolajczyk *et al.*, 2009).

Considering the frequency of various food group intake on daily and ≥ 2 times per week as regular basis, it was seen that higher percent of moderately stressed females consumed less fruits and fruit juices, milk, meat/fish, as compared to low stressed females. Although the consumption of saturated fat, tea/coffee, nuts, eggs, other vegetables, roots /tubers were almost equal for both the stressed groups. However we found converse results to earlier studies as far as consumption of coarse cereals, whole pulses, GLV, milk based products were concerned, as a higher percentage of moderately stressed females consumed these food groups on regular basis compared to their low stressed counterparts.

In case of male subjects, a higher percent of low stressed males consumed more of roots and tubers, milk, egg on regular basis whereas, a higher percentage of moderately stressed males reported more intake of coarse cereal, whole pulses, milk products, meat/fish, nuts, tea/coffee and saturated fat than the low stressed males. Some of our results are in agreement with the earlier studies as far as female subjects were concerned wherein it was observed that as the stress level increased the consumption of fruits, fruit juices and meat decreased.^{20, 22} A significant differences for consumption of roots/tuber, milk based products and saturated fat was found for the male subjects. This indicated that more stressed males consumed more saturated fat, milk based products and less of roots/tubers. These results are partially in line with the results observed by Roohafza *et al.*¹⁷ where they reported a significant association between stress and saturated fat intake, and a converse result for dairy products.

Conclusion

Non vegetarian females, male smokers and alcoholics of both the sexes revealed higher stress than their counterparts. Interestingly, females consuming junk and market food had lower stress than those females who were not consuming the same. Contrary to the females, males consuming junk and market food had higher stress levels than the males who were not consuming junk and market food. Significant differences were found in the stress levels of males who consumed roots and tubers, milk based products and saturated fats. The study contributes by taking a step into the process of unveiling and enhancing the available information on the impact of lifestyle modification factors on stress and also, the dietary intake of the individuals in Uttarakhand on various levels of stress. The results of the

study cannot be generalised as the sample size is not large enough to represent the population of Uttarakhand. This may be the reason for not obtaining data of highly stressed individuals. Thus, any insight on the food consumption pattern and lifestyle modification traits of the individuals experiencing high stress was not created.

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