

## Nutrition behaviours among female students and their association with BMI, self-perceived health status, Saudi Arabia.

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### **Abstract:**

**Background:** Nutrition-related diseases are a leading cause of morbidity and mortality in the KSA. Limited information exists regarding nutrition and health behaviours of college-aged females.

**Objectives:** The aim of this study is to assess the current nutrition behaviours in a sample of subjects from the University of Hail.

**Methods:** This study involved 241 students enrolled in UOH, female campus. A confidential survey requesting self-reported information on nutrition behaviours, health status, weight and height was collected using a standardised questionnaire.

**Results:** Mean age and BMI was  $20.68 \pm 1.75$  and  $23.30 \pm 4.50$ . The majority of subjects reported that their perceived health is good (76 %) and physically they feel strong (63 %). Only around 19 % eat fresh fruits, 30 % drink milk, 25 % drink fresh juices 5 or more days in a week while at least 50 % drink soft drinks, 49 % eat chips, 67 % eat chocolates, 44 % eat desserts/sweets, 32 % eat fast foods. Obesity is significantly high in those subjects with high chips consumption habit ( $\chi^2 = 14.401$ ;  $p = 0.025$ ) and less water consuming habit ( $\chi^2 = 14.401$ ;  $p = 0.025$ ).

**Conclusion:** The results of this study indicate that study subjects nutrition behaviours are health risky.

**Keywords:** Nutrition Behaviours, Saudi Arabia, Self-rated Health, Young Adults.

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### I. Introduction

College students between the ages of 18 and 24 years are in a transition phase between adolescence and adulthood which help them gain new experiences and personal freedom as well as develop a sense of identity<sup>1</sup>. However, given their hectic schedules the newly gained freedom from parental influence often results in the tendency to engage in unhealthy dieting, meal skipping, and fast food consumption which can likely increase their future risk for non-communicable diseases and quality of life<sup>2</sup>. These findings emphasise the importance of establishing good eating habits from an early age<sup>3</sup>.

Nutrition knowledge and converting this into practice are critical to improve health and nutrition in a sustainable way. Young adulthood is the time to learn and adopt healthy habits to avoid many health and nutritional problems later in life<sup>4</sup>. They have more easy access to health and nutrition information through colleges, recreational activities, and mass media than they have later in their lives<sup>5</sup>. Particularly, health and nutrition knowledge and healthy habits of female young adults will have critical roles to play in maintaining future family health and nutrition.

There have been a variety of international dietary recommendations for reducing health risks and live a long healthy life. During the past decades, dietary recommendations have tended to shift from nutrients to an overall dietary pattern, with emphasis on varied consumption and with specific attention to certain food groups (eg. limiting consumption of red and processed meats, increase in intake of fruits, vegetables, low fat dairy products and whole-grain foods). For example, 2010 US Dietary Guidelines<sup>6</sup> and food-group recommendations have been extended and advise a shift in food intake to a more plant-based diet that emphasizes fruit, vegetables, legumes, whole grains, nuts, and seeds. In addition, increased intakes of seafood and low-fat dairy products and consumption of only moderate amounts of lean meats, poultry, and eggs were likewise been recommended<sup>6</sup>. Recommendations are ultimately intended to guide the public to a healthful diet. For the public compared with nutrient recommendations, food recommendations are easier to implement since they are more stable over a period of time. However, research needs to focus on how much of these recommendations correspond to actual changes in dietary intakes in the general population and whether changes are different in young adult groups.

In view of the foregoing discussions, this study titled "nutrition behaviour patterns among the college students of University of Hail" was undertaken with the following objectives.

#### 1.1. Objectives

- To assess the current nutrition and dietary practices in a sample of subjects from the University of Hail.
- To study the relationship between food group recommendations and nutrition behaviour patterns.
- To study the association of previous nutrition knowledge on nutrition behaviours.

## II. Methodology

A cross sectional survey was planned and conducted to assess the nutrition behaviour patterns among a random female sample of 241 subjects of University of Hail.

### 2.1. Design, Sample and Data Collection

The study design was a cross-sectional survey and was conducted at the University of Hail (UOH) during the winter 2012 -13 semester. Approximately, a random sample size of 241 sample was enrolled in the study from different colleges in female campus. University of Hail research committee approved the study. No personal identification details were collected protecting privacy and allowing for anonymous and voluntary participation. The inclusion criteria included current registration with University of Hail as students, absence of chronic illness, and knowledge of their height, weight information and acceptance of informed consent form. The exclusion criteria included those with less than 18 years and those who are following any special diets, pregnant and lactating mothers.

### 2.2. Anthropometry

The subjects were asked to record their self-reported height and weight information on the questionnaire. Those who were not aware of the information were excluded from the participation of the study. Body Mass Index (BMI) was calculated as the ratio of weight (kilograms) to the square of height (meters). Weight status was classified into four categories: underweight (BMI  $\leq$  18.5), normal weight (BMI between 18.5 – 24.9), overweight (BMI between 25–29.9), and obese (BMI  $\geq$  30)<sup>7</sup>.

### 2.3. Assessment Tool

The questionnaire requested information on socio-demographic and anthropometric information which included age, gender, college, height and weight followed by questions related to dietary behaviours, preferences and knowledge. The participants were asked regarding their current dietary practices which were tailor made to be more suitable with the dietary and food culture patterns of the Saudi students.

**Validation of the Questionnaire:** For content validity (back to back translation), the questionnaire was initially translated into Arabic and then converted back to English and pre-tested for question accuracy and clarity.

### 2.4. Statistical Analysis

The data set was cleaned and edited for inconsistencies. Missing data were not statistically computed. Statistical analyses were performed using the Statistical Package for Social Sciences (version 16.0, SPSS, Inc) software. Descriptive statistics such as means and standard deviations were calculated for the continuous variables and frequencies for qualitative data. Associations were established using chi-square analysis. All reported *P* values were made on the basis of 2-sided tests and compared to a significance level of 5%; differences were considered statistically significant at  $P < 0.05$  or  $P < 0.01$ .

## III. Results

Table 1 presents the demographic and anthropometric profile of the study subjects (n=241). The total mean age  $\pm$  SD was  $20.68 \pm 1.75$  years (range 18-24) and mean  $\pm$  SD BMI was  $23.30 \pm 4.50$  which was closer towards the upper cut-off of the international normal range (BMI 18.5 to 25). The Table also presents BMI group distribution among the study population. Nearly 23 % and 7 % of study population were overweight and obese respectively while around 12 % were underweight indicating the poor nutrition status among the study population.

Table 2 presents the meal patterns of study subjects. Only 45.6 % suggested that they eat breakfast daily and nearly 42 % eat breakfast less than 4 days in a week. Among those who eat breakfast, majority eat at college canteen daily rather than at home. Only around 35 % suggested they take regularly all three meals (breakfast, lunch and dinner) in a day and 39 % eat three meals less than 4 days in a week which indicates the prevalence of health risk behaviours in these subjects. Around 58 % eat from restaurants at least less than 4 days in a week while college canteen is an important part in providing one part of the meal for at least 40.9 % of the subjects. Around 50.4 % percent eat at least one meal with friends while a majority of 63.9 % eat with family a minimum of one meal daily.

Table 3 suggests dietary behaviours of the study subjects. Only around 28 % eat fresh vegetables 5 or more days in a week. Similarly only around 19 % eat fresh fruits, 30 % drink milk, 25 % drink fresh juices 5 or more days in a week. In contrast, study subjects prefer foods like soft drinks, chips, chocolates, sweets etc. At least 50 % drink soft drinks, 49 % eat chips, 67 % eat chocolates, 44 % eat desserts/sweets and 32 % eat fast foods on regular basis 5 or more days in a week. Fish is eaten at least by 39 % once or twice in a week. Canned foods and processed foods are also highly consumed. The study results indicate at least 29 % eat canned foods,

33.5 % eat processed foods and 33 % eat readymade yogurt products 5 or more days in a week. Only around 19 % of the subjects indicated that they drink daily minimum 8 glasses of water.

Table 4 presents perceptions and practices in study population. Around 12 % of the study population had indicated that they are suffering from constipation from majority days while nearly 23 % suggest that they sleep less than 8 hours for at least 4 or less days in a week. Nearly 76 % perceive their health to be “good” while another 63 % describe their physical strength as “strong”. Around 27 % feel fresh throughout the day, while 16 % feel attentive. A whopping 21 % describe themselves as tired always and another 25 % feel sleepy during the day.

Table 5 present the associations of BMI with chips consumption, minimum 8 glasses of water consumption and body state perceptions and indicates that obesity is significantly high in those subjects with high chips consumption habit ( $\chi^2= 4.296$ ;  $p =0.038$ ;  $OR=1.814$  (95 % CI- 1.030- 3.197) and less water consuming habit ( $\chi^2= 6.688$ ;  $p =0.010$ ;  $OR=1.261$ (95 % CI- 1.033- 1.541).

Table 5 also presents the associations of perception of strong physical strength with fresh fruit consumption and soft drink consumption and suggest that perception of strong physical strength is significantly high in those subjects with high fresh fruit consumption habit ( $\chi^2= 4.616$ ,  $p =0.032$ ;  $OR=2.280$  (95 % CI- 1.060- 4.902) and less soft drink consuming habit ( $\chi^2= 7.400$ ,  $p =0.007$ ;  $OR=1.613$  (95 % CI- 1.132- 2.299).

The associations of perception of good health with minimum 8 hrs. of sleep habit and a minimum of 3 meals a day were also presented in Table 5 and indicates that perception of good health is significantly high in those subjects with good sleep habits ( $\chi^2= 5.136$ ,  $p =0.023$ ;  $OR=2.418$  (95 % CI- 1.108- 5.276) and meal habits ( $\chi^2= 6.245$ ,  $p =0.012$ ;  $OR=2.751$  (95 % CI- 1.216- 6.223).

The results also suggested associations of body state perception with minimum 8 hrs. of sleep habit, breakfast habit and eating fresh vegetables most days (Table 6). The body state perception is significantly better in those subjects with good sleep habits ( $\chi^2= 7.085$ ,  $p =0.013$ ) breakfast habit ( $\chi^2= 10.728$ ,  $p =0.03$ ) and high fresh fruit consumption habit ( $\chi^2= 7.921$ ,  $p =0.02$ ).

#### **IV. Discussion**

The objective of this cross-sectional study was to identify nutrition behaviours with an emphasis on the relationship between perceptions of their health and body state. As expected, female gender were associated with poor dietary behaviours like eating high amounts of chips, chocolates, sweets, soft drinks and fast foods while were significantly at risk for skipping breakfast, meals and less consumption of protective food like milk, fruits and vegetables.

Research supports increasing evidence for the need to emphasize strengthening good health and dietary behaviours among young adults for optimum health and well-being. They represent a transition period from adolescence to adulthood and are vulnerable to poor lifestyle choices and therefore require emphasis regarding their health risk behaviours in view of improving their future health. In general, young adults are frequently identified as being at risk for health risk lifestyle behaviours given their hectic schedules in college and private life. Young adults are potentially at risk for poor dietary choices largely because of their very high nutrient demands coupled with incompatibility of their range of preferred foods and patterns of eating. Their physiological demands drive appetite while meals are dependent mostly on convenience foods and influence of peer groups<sup>8</sup>.

The results of the present study are comparable with other studies reported from Saudi Arabia and neighbouring countries with a similar cultural background. The available limited research from Saudi Arabia focusing on dietary habits in young adults raise alarm for increasing fast food culture and poor life style choices<sup>9-12</sup>. A recent national level nutrition survey in Saudi Arabia has indicated that young adults are undergoing nutrition transition from traditional foods to preference over eating non-nutritional and high calorie snacks like fried foods and carbonated drinks commonly in day to day life<sup>13</sup>. These changes reflect the shifting socio-environmental conditions which can predispose young adults to obesity.

In the present study, for subjects reporting perception of good health, strong physical feeling and fresh and attentive mind states were significantly associated with health promoting habits like regular meal and breakfast habits, fresh fruit and vegetable consumption and good sleep habits implying the need for awareness of the role of dietary behaviours on health among young people. These relations are in support of previous similar findings<sup>14-17</sup>. Sleep quality, although differently assessed in various studies, seems to have an important relationship with feeling of fresh and attentive. These results are in agreement with previous studies<sup>18-20</sup>.

BMI is another important indicator of health status. Research suggests transition period of adolescence to adulthood between the ages of 18 to 29 can cause greatest increases in obesity<sup>21</sup> and particularly young women are at higher risk<sup>9, 10</sup>. The present study projects high prevalence of obesity and also association with dietary behaviours like high chips consumption and drinking less water emphasising the need for giving due recognition to the nutrient. Also associations between BMI and perceptions of mental state indicate the link of obesity with tiredness and fatigue which are in agreement with previous studies<sup>22</sup>. The present study trends

indicate that the perceptions about their health status suggest low confidence level especially among the obese subjects highlighting the importance of urgent need for proper nutrition education intervention in this population.

The present study has a number of limitations. Firstly, the design of the study is cross-sectional which may probably not infer causal associations among measured variables. Repeated studies with larger sample size are required in future to test the reliability of the present results. Secondly, anthropometric measurements, dietary habit information and health, physical and mental status reporting was based on self-report which can increase the likelihood of bias. Thirdly, for water consumption measurement, seasonal influences (data was collected during winter period) could be the reason for high prevalence of subjects with less than minimum amount of drinking water habit. Finally, we did not include other life style factors like physical activity which can influence health status perception like physical activity.

## V. Conclusions

Results from this study highlight the importance of early identification of the health risk behaviors in young adults and the need to promote healthy dietary interventions. A higher percent prevalence of health risk behaviours like breakfast skipping, low intake of fruits, vegetables, milk coupled with high soft drink, chips, chocolate and fast food culture among the study subjects indicates an alarming situation towards their future health status. Health education campaigns, which raise the knowledge on risk factors and unhealthy behaviors among youth's can educate and self-guard young adults.

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**Table 1: Demographic and Anthropometric Profile of the Study Population**

Variables	Minimum	Maximum	Mean	Standard Deviation
Age (years)	18	24	20.68	1.75
Weight (kg)	30	107	58.98	11.77
Height (cm)	143	187	159.10	6.59
BMI (kg/m <sup>2</sup> )	14.47	43.41	23.30	4.50
<b>BMI</b>	<b>Underweight</b>	<b>Normal</b>	<b>Over weight</b>	<b>Obese</b>
<b>Percentage</b>	12.03	58.09	22.82	7.05

**Table 2: Meal Patterns of Study Subjects (%)**

Question	Daily	1-2 days in a week	3-4 days in a week	5-6 days in a week	None
Eat breakfast	45.60	24.70	17.20	8.40	4.20
Eat breakfast at home	20.70	36.10	15.80	5.40	22.00
Eat breakfast at college canteen	39.00	20.80	22.50	9.50	8.20
Eat three major meals	35.40	24.00	14.80	12.20	13.50
Eat in restaurant	11.00	37.90	20.70	15.40	15.00
Eat in college canteen	40.90	17.80	15.20	11.70	14.30
Eat with friends at least one meal	50.40	22.20	13.70	10.30	3.40
Eat with family at least one meal	63.90	15.90	12.30	4.00	4.00

**Table 3: Dietary Behaviours of Study Subjects (%)**

Question	Daily	1-2 days in a week	3-4 days in a week	5-6 days in a week	None
Eat fresh vegetables	14.70	31.20	20.30	13.00	20.80
Eat fresh fruits	8.60	43.10	24.10	10.30	13.80
Drink milk	22.30	27.50	18.50	7.70	24.00
Drink fruit juices	16.10	38.60	22.00	8.90	14.40
Drink soft drinks	35.80	22.80	16.80	14.70	9.90
Eat chips	38.00	29.10	20.70	9.70	2.50
Eat chocolates	51.30	18.90	12.20	15.10	2.50
Eat desserts/ sweets	30.80	30.30	20.50	13.20	5.10
Eat fast foods	16.60	37.90	23.00	15.70	6.80
Eat fish	2.60	38.80	9.10	10.30	39.20
Eat canned foods	20.60	30.70	24.60	8.80	15.40
Eat processed foods	22.30	30.80	22.30	11.20	13.40
Eat yogurt based foods	26.30	34.50	20.70	6.90	11.60
Drink minimum eight glasses of water	18.60	27.00	14.80	7.60	32.10

**Table 4: Perceptions and practices of Study Subjects (%)**

Question	Daily	1-2 days in a week	3-4 days in a week	5-6 days in a week	None
Suffer from constipation	5.20	18.10	9.50	6.90	60.30
Sleep minimum for eight hours daily	43.70	19.70	12.20	9.20	15.10
Describe my usual health as	<b>Good</b>	<b>Very Good</b>	<b>Poor</b>	<b>Very Poor</b>	<b>I can't say</b>
	52.10	34.00	8.40	1.30	4.20
Describe my usual physical strength as	<b>Strong</b>	<b>Very Strong</b>	<b>Weak</b>	<b>Very Weak</b>	<b>I can't say</b>
	54.20	8.40	23.10	3.80	10.50
Describe my usual mental state as	<b>Tired</b>	<b>Fresh</b>	<b>Attentive</b>	<b>Sleepy</b>	<b>I can't say</b>
	20.70	27.00	15.80	24.90	11.60

**Table 5: Health and Nutrition Practices vs. Obesity and Health Perceptions of Study Subjects (%)**

Obesity	Obese	Non Obese	Chi-square	Odd's Ratio (95% CI)
Eat chips ≤ 4 days in a week	37.50	47.88	4.296	1.814
Eat chips 5 or days in a week	62.50	52.12	(p =0.038)	(1.030- 3.197)
Drink Minimum 8 glasses of water ≤ 4 days in a week	37.68	21.43	6.688	1.261
Drink Minimum 8 glasses of water 5 or days in a week	62.32	78.57	(p =0.010)	(1.033- 1.541)
<b>Physical State Perceptions</b>	<b>Feeling Weak</b>	<b>Feeling Strong</b>		

Eat fresh fruits < 4 days in a week	40.86	59.14	4.616	2.280
Eat fresh fruits 5 or days in a week	23.26	76.74	(p =0.032)	(1.060- 4.902)
Habit of soft drinks < 4 days in a week	28.32	71.68	7.400	1.613
Habit of soft drinks 5 or days in a week	45.69	54.31	(p =0.007)	(1.132- 2.299)
<b>Health Status Perceptions</b>	<b>Good Health</b>	<b>Poor Health</b>		
Minimum 8 hrs. sleep < 4 days in a week	81.08	18.92	5.136	2.418
Minimum 8 hrs. sleep 5 or days in a week	91.2	8.8	(p =0.023)	(1.108- 5.276)
Eat 3 main meals < 4 days in a week	20.17	79.83	6.245	2.751
Eat 3 main meals 5 or days in a week	8.4	91.6	(p =0.12)	(1.216- 6.223)

**Table 6: Mental State Perceptions and Healthy Practices of Study Subjects (%)**

	<b>Sleepy</b>	<b>Tired</b>	<b>Attentive</b>	<b>Fresh</b>	<b>Chi-square</b>
<b>Minimum 8 hrs. sleep &lt; 4 days in a week</b>	28.17	23.94	14.08	19.72	7.085
<b>Minimum 8 hrs. sleep 5 or days in a week</b>	23.95	19.76	16.77	30.54	(p =0.013)
<b>Eat breakfast &lt; 4 days in a week</b>	32.11	22.94	14.68	18.35	10.728
<b>Eat breakfast 5 or days in a week</b>	18.90	19.69	17.32	34.65	(p =0.03)
<b>Eat vegetables &lt; 4 days in a week</b>	28.05	22.56	14.63	23.78	7.921
<b>Eat vegetables 5 or days in a week</b>	15.63	20.31	18.75	37.50	(p =0.02)