

# Sociocultural Characteristic, Lifestyle, and Metabolic Risk Factors Among a Sample of Kuwaiti Male University Students

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Maha Al-Sejari, PhD<sup>1</sup>

## Abstract

In the past six decades, the Kuwaiti population has been exposed to rapid transformation in the quality of diet intake, daily activities, and career types. This major socioeconomic shift was accompanied by the introduction of both communicable and noncommunicable chronic diseases afflicting people of all ages. This article aims to detect a relationship between sociocultural characteristics—such as physical activity, dietary habits, and smoking—and the prevalence of metabolic syndrome (MetS). A descriptive, cross-sectional survey was conducted among 262 male university students in Kuwait; participants were selected by using a convenient nonrandom opportunistic sample. Associated social and health factors were obtained using a closed-ended questionnaire. BMI and blood tests that include clusters of MetS risk components were drawn from participants in primary health care clinics. More than half of the participants were overweight and obese; 74.4% of the participants reported they did not visit a nutritionist; 69.8% said that they are currently not on a diet; 53.4% of the students were nonsmokers; 42.7% reported moderate to very low daily physical activity. The prevalence of MetS components increased among students with older age, employed, and married ( $p < .001$ ), higher BMI, higher income, smoking, fewer number of family members living, and belonging to the Shia religious sect ( $p < .05$ ). The high frequency of MetS among younger students needs to be considered by Kuwaiti community members and the government to highlight the risk factors of MetS on individuals' well-being, quality of life, and life expectation.

## Keywords

metabolic risk factor, lifestyle, sociocultural, medical anthropology, Kuwait

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## Introduction

In the past six decades following the discovery of oil, Arabian Gulf countries have undergone rapid economic and sociocultural transformation (Guy, Nunn, Thomas, & Bell, 2009). The sudden increase in natural resources, along with lifestyle changes as a result of adopting a Western lifestyle, transformed the disease types seen in the Gulf region from transmitted diseases to chronic diseases (Al-Kandari, 2003). Consequently, there has been an increase in the prevalence of chronic diseases such as obesity, hypertension, type 2 diabetes, cardiovascular disease, and cancer among populations living in the Arabian Gulf countries (Al-Kandari, 2003; Al-Rashdan & Al Neseef, 2010; Barakat-Haddad, 2013; Motlagh, O'Donnell, & Yusuf, 2009; Musaiger et al., 2013). Unhealthy food intake,

sedentary lifestyle, smoking, high carbohydrate intake, office occupation, reliance on domestic help, reliance on car transportation, and avoidance of outdoor activities have been detected as a daily lifestyle pattern leading to poor health among populations living in the Arabian Gulf (Al-Adsani, Moussa, Al-Jasem, Abdella, & Al-Hamad, 2009; Al-Isa, 2004; Al-Kandari, 2006).

Several research studies were conducted among Arabian Gulf country populations to determine the correlation of an

<sup>1</sup>Kuwait University, Kuwait City, Kuwait

### Corresponding Author:

Maha Al-Sejari, Department of Sociology and Social Work, College of Social Science, Kuwait University, 71962 Kuwait City, Kuwait.  
Email: huna1973@hotmail.com



unhealthy diet with the prevalence of obesity and its comorbidities. The studies' findings illustrate that most of the communities with a high incidence of obesity reported consuming foods with high components of fat and calories (Al-Haifi et al., 2013; Guy et al., 2009; Musaiger, 2004). For example, the following studies illustrate the negative impact of the discovery of oil and socioeconomic transformation in UAE population's dietary habits and level of physical activity, which led to a downturn in the population's health status (Marzooqi, Al Badi, & El-Jack, 2010; Punnose, Agarwal, Khadir, Devadas, & Mugamer, 2002). A serious consequence of adopting a sedentary lifestyle was the increased prevalence of chronic diseases such as diabetes, cardiovascular disease, asthma, obesity, and anemia in UAE population. According to the Department of Health & Medical Services and Government of Dubai (2005), the major cause of death in the United Arab Emirates is cardiovascular disease; the city of Dubai accounted for 35.3% deaths of cardiovascular disease in 2010 in the United Arab Emirates, and Abu Dhabi accounted for 27% of those deaths (Health Authority Abu Dhabi, 2010). The percentage of deaths of cardiovascular disease in the United Arab Emirates is comparable to the World Health Organization (WHO) report that states that in 2010, 30% of deaths in Kuwait were due to cardiovascular disease.

Cross-cultural studies examining the association between the prevalence of chronic diseases, such as overweight/obesity, diabetes, and metabolic syndrome (MetS), and individuals' adoption of a sedentary lifestyle report an inverse relationship between reduction in physical activity and increase in the incidence of chronic disease (Bauman, Allman-Farinelli, Huxley, & James, 2008; Healy et al., 2008; Hu, Li, Colditz, Willett, & Manson, 2003; Monda, Adair, Zhai, & Popkin, 2008; Owen, Bauman, & Brown, 2009; Salmon, Bauman, Crawford, Timperio, & Owen, 2000; Wang, Du, Zhai, & Popkin, 2007). Bauman et al. (2008) reported a relationship between an increase in body weight in China and the population's motorized modes of transportation, their occupation type, lower levels of daily household activity, and decline in physical activity. According to the China Health and Nutrition Survey, between 1991 and 2000, 22% of Chinese men and 24% of Chinese women reported an increase in their body weight due to a reduction in their energy expenditure associated with a reduction in their amount of physical activity (Monda et al., 2008). Wang et al. (2007) revealed that the rate of overweight or obesity has increased among the Chinese urban population from 12.2% in 1989 to 25.6% in 2000.

Other cross-cultural studies illustrate an association between individuals' sedentary habits, that is, reduction in their physical activity, and their rate of MetS components (Bertrais et al., 2005; Dunstan et al., 2005; Dunstan et al.,

2007; Ford, Kohl, Mokdad, & Ajani, 2005; Healy, Dunstan, Shaw, Zimmet, & Owen, 2006; Li, Lin, Lee, & Tseng, 2007). Whereas Bertrais et al. (2005) reveal an inverse relationship between individuals' sedentary habits and MetS components, Al-Zenki et al. (2012) identified that individuals who engaged in higher physical activity reported a lower rate of MetS components, and individuals who reported having adopted a modern lifestyle, spending long periods of time in front of a computer screen, developed MetS components at a higher rate.

Hu et al. (2003) illustrate a positive association between sedentary habits and increase in the risk of type 2 diabetes and obesity. Individuals' employment environment requiring less physical activity correlated with a high rate of diabetes and obesity (Al-Tarah, 1998). Individuals who do more home chores and spend more time standing at a job reported a lower rate of diabetes and obesity. Chen, Pang, and Li (2009) illustrate an association between individuals' fat intake and lower exercise activity and developing MetS. They report that individuals who consume a high-fat diet have nearly twice the risk (44.4%) of developing MetS than individuals who reported a lower fat intake (28.9%). Chen et al.'s (2009) study reveals that individuals who spend more than 4 hours daily watching television, reading, or using a computer have a higher risk of experiencing MetS than do individuals who spend less than 2 hours per day engaging in these habits.

In Kuwait, the discovery of oil in the 1940s brought significant changes in living patterns (Al-Kandari, 2003). The Kuwaiti government provides free medical care, free education, high salary, and comfortable, affordable housing to its citizens. These comforts contributed to significant enhancements in citizens' standard of living and lifestyle (Al-Kandari, 2010). However, some of their consequences have been detrimental to the population's health because of the adoption of a sedentary lifestyle and consumption of an unhealthy diet. According to the International Comparison data from the WHO Global InfoBase, Kuwait is classified as a country with a high prevalence of adult obesity compared with other countries around the world (WHO, 2011). According to the WHO (2006), the percentage of insufficient physical activity among Kuwaiti adults above the age of 18 years is 49.2% for men and 63.9% for women. In 2002, 72% of all deaths in Kuwait were due to chronic disease (WHO, 2014a). The International Diabetes Federation (2013) reported the following chronic diseases in the Kuwaiti population: 48.2% obesity, 25.3% hypertension, 23.3% diabetes, 17.8% smoking-related ailments, 11% cancer, and 2% chronic respiratory disease. In addition to the high prevalence of chronic diseases due to modernization, Kuwait is placed in a mild to moderate (5% to 22%) category for the prevalence of anemia (WHO, 2014b).

Many studies have been conducted among the Kuwaiti population to explain the high percentage of the diagnosis of individuals with chronic disease. Their findings demonstrate that the cultural and economic changes in dietary habits and lifestyles that Kuwaiti individuals made were the main causes of these poor health outcomes (Al-Arouj, Bennakhi, Alnesef, Sharifi, & Elkum, 2013; Al-Kandari, 2003; Al-Mousa, Prakash, Jackson, & Al Raqua, 2003; Jackson, Al-Hamad, Prakash, & Al-Somaie, 2010). Al-Rashdan and Al Nesef (2010) illustrate the high prevalence of overweight, obesity, and MetS among Kuwaiti adults. The researchers report that 80.4% of Kuwaiti adults were diagnosed as overweight, 47.5% were diagnosed as obese, and 36.2% were diagnosed with MetS. Also, their study revealed that the rates of overweight and obesity were higher among Kuwaiti women (81.9% and 53%, respectively) than among Kuwaiti men (78% and 39.2%, respectively). Ali (2016) conducted a study among Kuwaiti university students to investigate the association between participants' lifestyle choices and their level of knowledge about diabetes, oral health, and body mass index (BMI). The study revealed a direct association between the participants' lifestyle and obesity.

## Theoretical Framework

Biocultural theory is the theoretical framework that has been used to explain how an individual's culture shapes his or her daily physical activity and how he or she values and favors certain types of food, which consequently affects one's health and well-being. The biocultural approach can be understood as a feedback system of the interaction between biology and culture. Cultural values and norms allow certain behaviors and, in turn, those behaviors affect biological traits and well-being (Oyama, 2000). The theoretical model used in the current study aims to explain how Kuwaitis' cultural norms and values regarding their food/diet and the changes in their lifestyle affect their health conditions and well-being.

## Objective of the Study and Research Questions

The objective of this study is to examine the association between Kuwaiti male university students' sociocultural characteristics, physical activities, dietary, and smoking habits, and their blood profile for MetS components (fasting plasma glucose [FPG], triglycerides [TGs], and high-density lipoprotein [HDL] cholesterol) from the perspective of medical anthropology. This article will try to answer the following research questions:

**Research Question 1:** Are there significant differences between sociocultural characteristics, dietary habits, and MetS components among Kuwaiti male university students?

**Research Question 2:** Are there significant differences between sociocultural characteristics, physical activity, and MetS components among Kuwaiti male university students?

**Research Question 3:** Are there significant differences between sociocultural characteristics, smoking habits, and MetS components among Kuwaiti male university students?

## Method

### Study Design and Population

A descriptive, cross-sectional survey was conducted among 262 Kuwaiti male university students from June 2015 to May 2016. The average age of the students was 25.22 years ( $SD = 6.23$ ), and 99 (37%) of Kuwaiti student participants were in the age category of 22 to 28 years. Participants were selected by using a convenient nonrandom opportunistic sample from six governorates of Kuwait: Al Ahmadi, Al Farwaniyah, Al Jahra, Capital, Hawalli, and Mubarak Al-Kabeer. Participation in this study was voluntary; the participants were asked to answer a self-administrated questionnaire and to agree to a blood test at a primary health care clinic. The data collection procedures follow the Kuwait University research method roles and regulations. The questionnaire was translated into Arabic and went through a process of forward and backward translation by five faculty experts at Kuwait University in the fields of nutrition, public health, and medical anthropology to ensure the content validity of the instrument. The accuracy and meaning of the translated instrument were checked prior to data collection; the questionnaire was pretested for content, design, question clarity, and recognition in 20 individuals.

As reported in Table 1, 109 (41.6%) of Kuwaiti male student BMI was normal, half ( $n = 132$ ; 50.4%) of the participants reported middle income, and more than half ( $n = 166$ ; 63.4%) of them were single. The majority ( $n = 234$ ; 89.3%) of the participants' religious affiliation was Sunni, and 182 (69.5%) of the participants' ethnicity background was Bedouin (tribal). One fourth of the participants lived in Hawalli district ( $n = 67$ ; 25.6%). The majority ( $n = 195$ ; 74.4%) of the participants reported that they did not visit a nutritionist in the past year; and 183 (69.8%) of the participants said that they were currently not on a diet. An almost similar percentage of the Kuwaiti student participants claimed that they usually eat a meal at night ( $n = 97$ ; 37%) or between the main meals ( $n = 101$ ; 38.5%). More than half ( $n = 147$ ; 56.1%) of the

**Table 1.** Kuwaiti Male University Students Characteristics as a Percentage of the Sample (N = 262).

Characteristics	n (%)
Age (years)	
<21	90 (34.4)
22-27	99 (37.8)
>28	73 (27.9)
Body mass index	
Underweight	11 (4.2)
Normal	109 (41.6)
Overweight	85 (32.4)
Obesity	57 (21.8)
Occupational status	
Student	166 (63.46)
Student and employment	96 (36.6)
Marital status	
Not married	166 (63.4)
Married	92 (35.1)
Divorced	1 (0.4)
Widow	3 (1.1)
Sect	
Sunni	234 (89.3)
Shia	28 (10.7)
Roots	
Bedouin	182 (69.5)
Urban	80 (30.5)
Kuwait governorates	
Al Asimah	38 (14.5)
Al Ahmadi	21 (8.0)
Al Farwaniyah	53 (20.2)
Al Jahra	55 (21.0)
Hawalli	67 (25.6)
Mubarak Al-Kabeer	28 (10.7)
Income	
Low income	27 (10.3)
Middle income	132 (50.4)
High income	101 (38.5)
Have you visited a nutritionist in the past year?	
Yes	66 (25.2)
No	195 (74.4)
Are you on a diet?	
Yes	79 (30.2)
No	183 (69.8)
Do you eat between meals?	
No	64 (24.4)
Usually at night	97 (37.0)
Yes	101 (38.5)
How do you rate your daily physical activity?	
Very high	86 (32.8)
High	35 (13.4)
Middle	112 (42.7)
Light	19 (7.3)
Never	10 (3.8)

(continued)

**Table 1. (continued)**

Characteristics	n (%)
Number of family members living with you	
1-5	76 (29.0)
6-10	147 (56.1)
>11	39 (14.9)
Do you get support from others to follow a healthy diet?	
Very important	38 (14.5)
Important	40 (15.3)
Moderate	99 (37.8)
Not important	38 (14.5)
Not important at all	47 (17.9)
Do you smoke cigarettes?	
Yes	111 (42.4)
No	140 (53.4)

participants said the number of family members living with them was between 6 and 10 individuals, and more than one third ( $n = 99$ ; 37.8%) of Kuwaiti students said that the other individuals had moderate influence and support of helping them follow a healthy diet. Also, the study's sociocultural data reveal that 112 (42.7%) of the participants reported performing moderate physical activity daily, and more than half ( $n = 140$ ; 53.4%) of the students were nonsmokers.

### Study Instruments and Data Collection

The questionnaire consisted of four sections containing closed-ended questions to measure the identified variables (sociocultural information, dietary habits, physical activities, and smoking habits). The dietary habits and levels of physical activity sections of the questionnaire for this study was modified from a previous questionnaire by Al-Isa, Campbell, Desapriya, and Wijesinghe (2011). The questionnaire was divided into four parts: The first section included 10 items to provide sociocultural information and personal health information about the characteristics of the participants, such as their age, BMI, roots, religious sect, marital status, educational level, employment, residence, monthly income, and number of individuals living in their home. The second section of the questionnaire included questions about the participants' attitude toward healthy dietary habits, such as: Have you ever seen a dietician before (yes = 1, no = 0)? Are you currently on any particular diet (yes = 1, no = 0)? Do you eat foods between the main meals (no = 0, usually eat food at night = 1, and usually eat food between main meals = 3)? How important is the support that you get from other individuals to follow a diet (ranging from 1 = not important to 5 = very important)? The third section consisted of participants' daily physical activities were

self-reported as “sedentary,” “lightly active,” “moderately active,” or “very active.” And the last sections consisted of participants’ smoking habits included four items that described their smoking experience at present, such as: How many cigarettes do you smoke per day? Do you smoke filtered cigarettes? How old were you when you started smoking?

### Blood Test and Biochemical Values

Each participant was asked to complete the first section of the questionnaire, and was informed and consented to fast for 12 hours prior to the blood test. The participants were requested to have blood drawn by qualified phlebotomists at a health care center that is located nearby their residential area in the six governorates and related to health ministry in Kuwait. Also, participants were requested to return to complete the second and third sections of the questionnaire after getting their blood test results. Blood tests including a cluster of metabolic risk components—fasting blood glucose, HDL cholesterol, low-density lipoprotein (LDL) cholesterol, and TGs—were collected in the health care center laboratory and a blood profile report handed to the students. Those who tested positive for three or more of the following components were classified as having metabolic abnormalities syndrome: elevated FPG, elevated TGs, and low HDL cholesterol (Alberti et al., 2009). Based on the Kuwaiti Ministry of Health Laboratory report, normal values of participants’ blood rate for FPG were  $<6.1$  mmol/L; for total cholesterol were  $<5.2$  mmol/L, for TG cholesterol were  $<1.7$  mmol/L, for HDL cholesterol were  $<1.5$  mmol/L, and for LDL cholesterol were  $<3.4$  mmol/L. Participants’ BMI were measured by health clinics staff in their primary health care clinics. Their BMI was calculated by dividing their weight in kilograms by their height in meters squared. The participants were classified as underweight (BMI  $<18.5$  kg/m<sup>2</sup>), normal (BMI  $18.5$  kg/m<sup>2</sup>- $24.9$  kg/m<sup>2</sup>), overweight (BMI  $25$  kg/m<sup>2</sup>- $29.9$  kg/m<sup>2</sup>), and obese (BMI  $\geq 29.9$  kg/m<sup>2</sup>), based on the WHO’s (2014a) definition of obesity.

### Statistical Analysis

Following data collection and categorization of the variables, the SPSS version 20 (SPSS Inc., Chicago, IL, USA) was used to perform the data analyses after cleaning the data. Descriptive statistics were performed on all of the variables and were reported as mean values and standard deviations. Analysis of variance and *t* test were performed to test differences in mean intake of metabolic components profile by sociocultural factors at 95% confidence interval. All reported *p* values were made on the basis of two-tailed tests. Differences were considered statistically significant at  $p < .05$ .

## Results

### Sociocultural Characteristic and Metabolic Syndrome Components Rate

The data in Table 2 reveal that based on the participants’ age, there were significant differences in the mean levels of total blood cholesterol, TG, HDL, and LDL cholesterol values. Older students had higher total blood cholesterol values ( $M = 4.74$ ,  $SD = 0.84$  mmol/L) than students between the ages of 22 and 27 years ( $M = 4.41$ ,  $SD = 0.88$  mmol/L), and those who were 21 years and younger ( $M = 4.18$ ,  $SD = 0.86$  mmol/L;  $p < .05$ ). Moreover, the older students reported higher TG levels ( $M = 1.23$ ,  $SD = 0.74$  mmol/L) than students between the ages of 22 and 27 years ( $M = 0.91$ ,  $SD = 0.47$  mmol/L), and who were 21 years and younger ( $M = 0.81$ ,  $SD = 0.36$  mmol/L;  $p < .001$ ). There was an inverse significant relationship between the participants’ age and their HDL cholesterol levels ( $p < .05$ ). Students who were 21 years and younger ( $M = 1.27$ ,  $SD = 0.26$  mmol/L) reported higher levels of HDL cholesterol than those between the ages of 22 and 27 years ( $M = 1.23$ ,  $SD = 0.24$  mmol/L), and who were 28 years and older ( $M = 1.09$ ,  $SD = 0.30$  mmol/L). Moreover, the study results present a positive significant relationship between the students’ age and their LDL cholesterol values ( $p < .05$ ). Students who were 28 years and older had higher levels of LDL ( $M = 3.49$ ,  $SD = 0.91$  mmol/L) than younger students.

The results reveal a positive significant relationship between students’ BMI and the mean level of TGs; obese students had higher levels of TGs ( $M = 1.22$ ,  $SD = 0.88$  mmol/L) than overweight students ( $M = 1.01$ ,  $SD = 0.46$  mmol/L), normal weight students ( $M = 0.83$ ,  $SD = 0.36$  mmol/L), and underweight students ( $M = 0.73$ ,  $SD = 0.35$  mmol/L;  $p < .05$ ). The current study revealed a significant variance between students’ level of income and their blood test levels ( $p < .05$ ). Students who have high income reported a higher mean of FPG ( $M = 5.43$ ,  $SD = 0.86$  mmol/L) than middle-income and lower income students,  $M = 5.16$ ,  $SD = 0.48$  mmol/L and  $M = 5.37$ ,  $SD = 0.70$  mmol/L, respectively.

The number of family members living with the students was significantly associated with their mean level of total blood cholesterol values ( $p < .05$ ). Students who live with fewer number of family members (1-5 individuals) reported a higher mean of total cholesterol than students who live with a larger number of family members ( $>11$  individuals),  $M = 4.73$ ,  $SD = 0.88$  mmol/L and  $M = 4.32$ ,  $SD = 0.96$  mmol/L, respectively. The data in Table 3 reveal that students’ occupational status shows a significant relationship with their TG levels ( $p < .05$ ). The mean levels of TG ( $M = 1.13$ ,  $SD = 0.70$  mmol/L) for

**Table 2.** Mean Differences Between Sociocultural Characteristics and Metabolic Components.

	Glucose			Cholesterol			Tri			HDL			LDL		
	M	SD	F	M	SD	F	M	SD	F	M	SD	F	M	SD	F
Age (years)															
<21	5.35	0.80	0.800	4.18	0.86	6.130*	0.81	0.36	9.928**	1.27	0.26	3.514*	2.95	0.94	3.111*
22-27	5.21	0.58		4.41	0.88		0.91	0.47		1.23	0.24		3.31	1.17	
>28	5.31	0.65		4.74	0.84		1.23	0.74		1.09	0.30		3.49	0.91	
BMI (kg/m <sup>2</sup> )															
<18.49	5.30	0.49	1.381	4.37	1.06	0.514	0.73	0.35	4.946*	1.32	0.22	2.321	3.58	1.23	0.647
18.50-24.99	5.27	0.61		4.32	0.93		0.83	0.36		1.28	0.27		3.30	1.07	
25.00-29.99	5.20	0.57		4.46	0.80		1.01	0.46		1.12	0.24		3.05	0.92	
>30	5.47	0.98		4.52	0.90		1.22	0.88		1.18	0.30		3.22	1.13	
Income															
Low income	5.37	0.70	4.255*	4.46	0.65	0.079	1.25	1.10	2.290	1.07	0.26	1.848	3.09	0.61	0.293
Mid income	5.16	0.48		4.38	0.93		0.93	0.45		1.20	0.30		3.16	1.01	
High income	5.43	0.86		4.42	0.87		0.94	0.50		1.25	0.23		3.29	1.16	
KW governorates															
Al Asimah	5.57	1.18	1.412	4.68	1.01	1.015	1.18	1.06	1.143	1.20	0.25	0.407	3.22	0.85	1.154
Al Ahmadi	5.28	0.40		4.58	1.01		0.97	0.93		1.15	0.15		3.21	0.61	
Al Farwaniyah	5.28	0.58		4.26	0.89		0.95	0.80		1.27	0.29		3.46	1.03	
Al Jahra	5.20	0.64		4.44	0.94		0.90	0.90		1.23	0.25		3.68	1.03	
Hawalli	5.23	0.51		4.36	1.61		0.89	0.80		1.17	0.30		3.12	0.99	
Mubarak Al-Kabeer	5.21	0.44		4.28	0.97		0.92	0.90		1.26	0.32		3.38	1.49	
Number of family members living with you															
1-5	5.28	0.82	0.081	4.73	0.88	5.270*	0.96	0.48	0.010	1.20	0.29	1.235	3.38	0.87	0.631
6-10	5.28	0.65		4.27	0.83		0.97	0.62		1.23	0.27		3.15	1.12	
>11	5.33	0.48		4.32	0.96		0.95	0.37		1.09	0.21		3.16	1.02	
Eating between meals															
Yes	5.30	0.77	0.330	4.30	0.83	0.897	0.90	0.41	1.189	1.22	0.26	0.839	3.26	1.00	0.234
No	5.33	0.51		4.49	0.94		0.94	0.45		1.14	0.30		3.10	0.99	
Usually eat at night	5.24	0.69		4.47	0.90		1.04	0.72		1.23	0.27		3.24	1.12	
How important others support you to follow health diet															
Very important	5.12	0.43	0.844	4.37	0.88	0.989	0.93	0.48	0.542	1.08	0.26	1.281	3.18	0.87	0.688
Important	5.31	0.50		4.23	0.74		0.88	0.42		1.21	0.30		3.05	0.93	
Moderate	5.33	0.88		4.37	0.77		1.03	0.69		1.25	0.28		3.29	1.11	
Not important	5.20	0.56		4.41	1.09		0.96	0.48		1.16	0.22		2.99	1.04	
Not important at all	5.38	0.59		4.66	1.03		0.90	0.38		1.26	0.25		3.47	1.13	
Daily physical activity															
Very high	5.17	0.47	1.176	4.29	0.85	1.678	0.86	0.39	1.950	1.19	0.26	0.842	3.12	0.99	0.916
High	5.41	0.63		4.54	1.00		1.03	0.54		1.32	0.35		3.26	0.90	
Middle	5.35	0.79		4.44	0.89		0.98	0.49		1.19	0.25		3.27	1.15	
Light	5.31	1.01		4.87	0.82		1.33	1.32		1.13	0.29		3.69	0.91	
Never	5.13	0.51		3.97	0.59		0.84	0.22		1.22	0.05		2.66	0.72	

Note. BMI = body mass index; Tri = triglycerides; HDL = high-lipoprotein cholesterol; LDL = low-lipoprotein cholesterol.

\* $p < .05$ . \*\* $p < .001$ .

students who are employed are higher than nonemployed students ( $M = 0.87$ ,  $SD = 0.42$  mmol/L).

Moreover, the current study identifies a significant variance between students' MetS components and their marital status. Married Kuwaiti students have higher mean levels of total blood cholesterol ( $M = 4.61$ ,  $SD = 0.87$  mmol/L) than nonmarried Kuwaiti students ( $M = 4.27$ ,  $SD = 0.85$  mmol/L;  $p < .05$ ). And married students have higher TG mean values ( $M = 1.13$ ,  $SD = 0.69$  mmol/L) than nonmarried students ( $M = 0.87$ ,  $SD = 0.44$  mmol/L;  $p < .05$ ). Married students have lower mean levels of HDL cholesterol ( $M = 1.05$ ,  $SD = 0.26$  mmol/L) than nonmarried students ( $M = 1.28$ ,  $SD = 0.25$  mmol/L;  $p < .05$ ). Students' religious affiliation also demonstrated

significant variation in total blood cholesterol levels ( $p < .05$ ). Students who are Shia Muslims reported higher mean values of total blood cholesterol ( $M = 4.82$ ,  $SD = 0.88$  mmol/L) than Sunni students who reported lower mean values of cholesterol ( $M = 4.36$ ,  $SD = 0.87$  mmol/L). In addition, the mean levels of TG ( $M = 1.08$ ,  $SD = 0.70$  mmol/L) for students who are smoking are higher than nonsmoking students ( $M = 0.87$ ,  $SD = 0.40$  mmol/L;  $p < .05$ ).

## Discussion

The present study identified a significant association between the male Kuwaiti students' sociocultural variables

**Table 3.** Mean Differences, Standard Deviation, and *t* Values for Sociocultural Characteristics and Metabolic Components.

Variables	Glucose			Cholesterol			Tri			HDL			LDL		
	<i>M</i>	<i>SD</i>	<i>t</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>M</i>	<i>SD</i>	<i>t</i>
<b>Marital status</b>															
Nonmarried	5.29	0.72	0.21	4.27	0.85	2.57	0.87	0.44	3.13	1.28	0.25	4.16	3.12	1.10	1.57
Married	5.27	0.62		4.61	0.87		1.13	0.60		1.05	0.26		3.41	0.91	
<b>Occupation</b>															
Student	5.28	0.73	0.06	4.28	0.89	2.87	0.87	0.42	3.26	1.25	0.26	1.90	3.11	0.97	1.66
Students	5.29	0.59		4.66	0.83		1.13	0.70		1.14	0.29		3.43	1.15	
<b>Religion sect</b>															
Sunni	5.29	0.69	0.23	4.36	0.87	2.29	0.96	0.55	0.19	1.20	0.27	0.47	3.19	1.05	1.00
Shia	5.26	0.58		4.82	0.88		0.98	0.53		1.25	0.23		3.51	0.94	
<b>Roots</b>															
Urban	5.32	0.60	0.50	4.56	1.03	0.08	0.95	0.44	0.12	1.23	0.26	0.59	3.28	0.85	0.54
Bedouin	5.27	0.72		4.34	0.80		0.96	0.60		1.20	0.23		3.18	1.13	
<b>Visit nutrition</b>															
Yes	5.42	0.96	1.62	4.36	0.98	0.43	1.05	0.80	1.33	1.17	0.31	0.98	3.11	0.97	0.831
No	5.24	0.56		4.43	0.86		0.93	0.43		1.23	0.25		3.27	1.07	
<b>Are you on a diet</b>															
Yes	5.21	0.42	1.106	4.40	0.86	0.113	0.91	0.43	0.726	1.20	0.30	0.173	3.19	1.28	0.157
No	5.32	0.77		4.41	0.90		0.98	0.59		1.21	0.26		3.22	0.93	
<b>Smoking</b>															
Yes	5.34	0.82	1.319	4.56	0.83	2.103	1.08	0.70	2.531	1.14	0.25	-2.397	3.36	1.10	1.581
No	5.22	0.53		4.28	0.92		0.87	0.40		1.27	0.27		3.07	0.99	

Note. Tri = triglycerides; HDL = high-lipoprotein cholesterol; LDL = low-lipoprotein cholesterol.

(age, occupational status, marital status, BMI, income, and religious sect) and the prevalence components of MetS. It identified irregular meal patterns, eating at night, not following a healthy diet, not having sufficient support from others to encourage them to follow healthier dietary habits, and reduction in daily physical activity as contributing factors to the incidence of MetS among male Kuwaiti students. These findings emphasize the importance of acknowledging the risk factors that contribute to MetS and suggest ways to minimize and postpone the morbidity consequences of these risk factors. The data demonstrated that more than half of the male students who were surveyed weighed above the normal body weight. Overweight male students represented 32.4% of the sample, and obese male students comprised 21.8%. These findings were consistent with the results of similar studies in Arabian Gulf countries. For example, in the Kingdom of Saudi Arabia, a high prevalence of overweight (21.8%) and obesity (15.7%) was identified among male college students in Qassim University (Al-Rethaiaa, Alaa-Eldin, & Al-Shwaiyat, 2010); among Kuwaiti university students, Al-Isa (1999) reported that 32% were overweight and 8.9% were obese; in the United Arab Emirates, overweight and obesity accounted for about 35% of the male college students (Musaiger, Lloyd, Al-Neyadi, & Bener, 2003). These findings indicate the urgent need to initiate multisectorial integrated health programs between the Gulf Cooperation Council, Universities, and the Ministry of Health to

provide students with workshops, classes, and behavioral intervention programs that operate as viable procedures to encourage healthful lifestyles. Also, the high prevalence of obesity among university students in Arabian Gulf countries allows for important comparative work with existing and future investigations that involve both medical and social science faculty to evaluate the causes of obesity and offer solutions based on a particular community's socio-cultural structure.

The current study demonstrated that Kuwaiti students with a higher level of income had elevated mean levels of blood glucose than did lower income students. This finding is comparable to the finding of Barbosa et al. (2016) among university students in São Luis, Brazil, which demonstrated a higher prevalence of MetS risk factors among middle- and high-income students. This finding can be attributed to the impact of higher economic status on students' lifestyle, for example, consuming fast foods, an unhealthy diet that contains high fat and high carbohydrates, eating between meals or eating at the end of the day, adopting a sedentary lifestyle, and most of the time relying on cars for transportation.

The current study findings also identify that students' mean values of total blood cholesterol, TG, and LDL cholesterol are higher among older male Kuwaiti students, which is similar to Brevard and Ricketts's (1996) study among college students. Brevard and Ricketts (1996) reported older college students' lifestyle habits and the

quality of their food consumption were responsible for the students' higher lipid serum levels. This finding can be attributed to many factors such as the participants' BMI, as well as their marital and occupational status. For example, the current study findings identify that the older participants had higher BMI than did the younger participants; and the older participants were usually married and employed. More than one third of the students were employed in sedentary office jobs and had significant elevation in their TG levels. This health outcome may be due to the nature of their occupation, which made the students spend more than 8 hours at work that did not require much physical activity, in addition to spending 3 to 4 hours per day in class.

Marital status also appears to make a difference in participants' TG and cholesterol levels: 63.4% of the male college students were married and they had significantly higher TG and total blood cholesterol levels than did the nonmarried students, which can be attributed to Kuwaiti culture that emphasizes visiting one's parents' home on average twice a week for lunch or dinner, or both. In these weekly visits all kinds of traditional Kuwaiti foods rich in fats, carbohydrates, and sweets are served. Usually the main meals contain between five and six kinds of dishes, followed by tea and four or five kinds of Arabic sweets that are high in sugar content. These findings are similar to those of Al-Kandari's (2006) study that reported 71.2% of Kuwaiti participants who live with their family and who have a large social network were obese. Al-Kandari attributed that finding to the individuals' social network and relationships. The participants stated that they enjoy sharing and eating their meals in a friendly environment and prefer to eat the same dishes with their family members. Married students usually are employed and do not assign a time for physical exercise, which is relevant to Al-Isa, Campbell, and Desapriya's (2013) study that reported married male Kuwaiti students are significantly inactive, more so than those who are not married. The current study's findings illustrate that more than half of the Kuwaiti students reported middle to no exercise when they evaluated their daily physical activities, which is comparable to the findings of Al-Isa (2004) among Kuwaiti university students, Lowry et al. (2000) among U.S. college students, and Oguntibeju, Orisatoki, and Truter (2010) among medical students in Saint Lucia—all of whom reported that the majority of university students spend less than 7 hours per week engaged in physical activity.

The students' religious affiliation also demonstrated a significant difference in mean levels of total blood cholesterol. Shia Muslim male students reported higher mean values of total blood cholesterol than did Sunni male students, which can be attributed to genetic and cultural factors, lifestyle, eating habits, and daily levels of physical activity. Further studies need to examine the portions and types of foods that the participants consume, as well as whether the students' parents have chronic diseases that

might contribute to the differences in health outcomes between Shia versus Sunni students.

The findings of the current study contradict Al-Kandari's (2006) finding that reports a positive association between individuals' BMI and the number of family members living in the same household. This study reveals a negative association between the number of family members living in the same household and the male students' mean levels of total cholesterol. This finding could be attributed to the students' scattered schedules between classes and work, which leads to irregular meal patterns, eating between meals, and consuming fast foods. The high prevalence of MetS detected among the male Kuwaiti university students in the current study may reflect the impact of socioeconomic acceleration among the younger population in Kuwait.

The present study did not identify a significant association between physical activity and MetS among Kuwaiti male university students; this finding may be attributed to the participants' reported moderate daily physical activity for the one-item research question. The data of the current study indicated that students who smoke cigarettes had higher rates of TG levels than did nonsmoking students. This finding is comparable to that of Håglin, Lindblad, and Bygren (2001) among Swedish participants, whose data revealed an association between participants' BMI and cholesterol level

### *Strengths and Limitations*

This study has some limitations, the data on dietary habit and physical activity were collected using self-reported questionnaires which might have introduced some recall bias or error. Also, the present study is a cross-sectional study that represented one point in time, therefore, do not reflect any changes in participants' lifestyles over time. Despite these limitations, this is the first known study that attempts to investigate the association between Kuwaiti male university students' eating habits and physical activity and MetSs from biocultural approach. Also, the current study reveals that most of the students have never previously had a blood profile test, and the few of them that have did so a few years ago, even though there are no expenses for the blood test profile in the government health center.

### *Conclusion*

The current study results reveal elevation of blood lipids serum (TGs, total cholesterol, LDL cholesterol), and reduction of lower HDL cholesterol among Kuwaiti male university students which are vital lipid risk factors for coronary heart disease. Some implications might be useful in order to reduce the medical and financial cost of chronic diseases caused by MetS and increase students'



life expectancy such as: health educational programs need to be addressed in classes, public health workshops need to be offered by nutritionists and cardiologists, and sports and gym classes need to become part of the curriculum on the Kuwait University campus. Moreover, behavioral intervention curriculums need to be introduced to the students by qualified instructors to modify students' lifestyle behaviors and encourage them to adopt to healthy dietary habits and physical activity. Further studies that aim to detect the barriers of not adopting healthy lifestyles among university students are encouraged, as well as longitudinal studies for university students' physical activity and dietary patterns worth being performed by researchers to examine further variables that might contribute to MetSs that the current study overcomes.

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