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## Vegetarianism among Jordan University Students

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**Abstract:** To determine the prevalence rate and reasons of vegetarianism as well as its relationship with selected demographic and lifestyle characteristics among Jordan University students. A cross-sectional survey was carried out at Jordan University, Amman, Jordan from March to September 2005. The survey included 1209 students aged 17-28 years. A multistage stratified sampling technique was used to recruit the participants from different majors at Jordan University. A self-administered questionnaire included information about demographic, lifestyle characteristics and vegetarian status. The response rate was 80.6%. The overall prevalence of vegetarianism among university students was 23.9%. Vegetarianism was statistically significant ( $p < 0.05$ ) with being female, younger age, lower family monthly income, nonsmoker, physically active, vitamin-mineral supplement user and normal BMI. The main important reasons for being vegetarian were weight control 39.2% and economic reasons 35.8%. A significant proportion of Jordan University students are interested in vegetarianism because of weight control and economic reasons. Vegetarians are more likely to be: females, younger age, with lower family monthly income, nonsmokers, physically active, vitamin-mineral supplement users and with normal BMI.

**Key words:** Vegetarian diet, epidemiologic transition, prevalence, prevention, body mass index, weight control, health behaviour

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### INTRODUCTION

During the last century, the majority of the world population consumed a largely plant-based diet mainly due to a limited availability of foods (Willett, 1999). The industrial revolution was accompanied by increased production and availability of food, particularly from animal sources which may resulted in a global public health challenges caused by various types of transitions such as epidemiologic, nutritional, demographic and socioeconomic transitions (Popkin, 1998). In developed countries and some developing countries such as middle-eastern countries particularly, Jordan, epidemiologic transition is characterized by an increase in Non-Communicable Diseases (NCD), such as cardiovascular diseases (CVD), diabetes mellitus and obesity. Also, nutritional deficiency diseases are prevalent in Jordan such as nutritional anemia and osteoporosis (Alwan, 1997; Alwan and Kharabsheh, 2006; MOH, 2006).

Currently, there are an increasing proportion of people in developed countries interested in plant based diets (ADA, 2003; Worsley and Skrzypiec, 1998; Perry *et al.*, 2002; Larsson *et al.*, 2001; Spencer *et al.*, 2007). Vegetarianism is a dietary pattern that is characterized by the consumption of plant foods and the avoidance of some or all animal products. Some vegetarians eat no animal products (vegans), whereas others eat both dairy products and eggs (lacto-ovo-vegetarians). Many self-identified vegetarians also eat some meat, particularly fish and chicken (semi-vegetarians) (White and Frank, 1994; Key *et al.*, 2006, 1999). Several studies have found the prevalence of vegetarianism among adults and youth in Western cultures to be 2.5-7% (ADA, 2003; Robinson, 2001), whereas among college students in USA the prevalence varied from 2 to 20.9% (Spencer *et al.*, 2007; Kim *et al.*, 1997; Klopp *et al.*, 2003).

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Several epidemiologic studies and scientific reports demonstrated that appropriately planned vegetarian diets are healthful, nutritionally adequate and can provide certain health benefits in the prevention and treatment of certain diseases and, hence, could lower morbidity and mortality (ADA, 2003; Key *et al.*, 1999; US Department of Health and Human Services, 2005). Several epidemiological studies in Western populations have indicated that vegetarians have been found to be better educated, of female gender, of younger age, with lower household income, less likely to smoke, physically active, more likely to use vitamin-mineral supplements and with normal or lower BMI (Larsson *et al.*, 2001; Spencer *et al.*, 2007; White and Frank, 1994; Perry *et al.*, 2001; Bedford and Barr, 2005; Baines *et al.*, 2007; White *et al.*, 1999).

Several studies have indicated a variety of reasons for adopting a vegetarian diet including health concerns, animal welfare, ethical and ecological reasons, economic reasons, sensory and taste preferences and weight control reasons (ADA, 2003; Robinson, 2001; Klopp *et al.*, 2003).

Since four decades, Jordan has witnessed a dramatic lifestyle changes due to modernization which led to changes in food habits from plant based diets to diets from both plant and animal sources. Since three decades, there was an increase in the prevalence of chronic diseases in Jordan (Alwan, 1997; Alwan and Kharabsheh, 2006; MOH, 2006), which may be attributed to an increase in the consumption of foods from animal sources. Also, nutritional deficiency diseases are prevalent in Jordan (Alwan, 1997; Alwan and Kharabsheh, 2006; MOH, 2006). There is a lack of scientific research about vegetarianism in Jordan. Therefore, this study was conducted to determine the prevalence and reasons of vegetarianism and their relationship with selected demographic and lifestyle characteristics among Jordan university students.

## **MATERIALS AND METHODS**

A cross-sectional survey on vegetarianism was conducted on 1500 students attending Jordan University between March 2005 and September 2005. Jordan University is a large sized and a public university consists of eleven faculties, located in Amman the capital of Jordan. A multistage stratified sampling technique was used to recruit the participants of the study which was approved by the deanship of student affairs. At the first stage of selection five faculties (Medicine, Dentistry, Agriculture, Science and Humanities) were selected using a systematic random sampling technique. At the second stage of selection one class from first, second, third and fourth years in each faculty were randomly selected.

Classes were visited by the research team to clarify the purposes of the study, the students showed their willingness to participate in the study. Then a schedule for the next visit was given to fill the questionnaire. At the second visit an informed consent was obtained from each participant and a self administered questionnaire was filled by the students in the presence of a member of the research team. A total of 1209 students aged 17 to 28 years (791 females and 418 males) completed the study. Students were excluded from the study due to: unwillingness to participate ( $n = 123$ ), handing in incomplete questionnaires ( $n = 66$ ) and non-attendance of class ( $n = 102$ ). Thus the response rate for sample respondents was 80.6% (1209/1500). Statistical analysis were carried out on 1209 participants.

A pre-tested questionnaire consisted of two sections. The first section of the questionnaire included general demographic information such as age, sex, family monthly income, as well as information about selected lifestyle characteristics such as smoking status, physical activity, vitamin-mineral supplement use and body weight and height. Age was categorized as, 17-20 years and 21-28 years. Sex was categorized as males and females. Family monthly income, in Jordaman Dinar (JD), was categorized as <300, 300-500 and >500 JD. Smoking status was categorized as never, former or current smoker. Physical activity was assessed by asking subjects how many times per week they exercised enough to work up a sweat. Subjects were classified as active if they exercised to a sweat three or more times per week. Subjects were classified as physically inactive if they did not exercise to a sweat with a frequency less than three times per week. Vitamin-mineral supplement use was assessed by asking the participant about use of vitamin-mineral supplement during the last year. Weight and height were self-reported by subjects. The Body Mass Index (BMI) was computed using the widely accepted method of weight (kg) divided by the square of height ( $m^2$ ). BMI was classified, based on (WHO, 1997) into three categories: normal ( $BMI = 18.5-24.9 \text{ kg m}^{-2}$ ), overweight ( $BMI = 25-29.9 \text{ kg m}^{-2}$ ) and obese ( $BMI = 30 \text{ kg m}^{-2}$ ).

The second section of the questionnaire included a series of questions about vegetarianism. To identify vegetarians, all students were asked on the survey to respond to the question Are you a vegetarian? (1) Yes; (2) No. Of those who answered yes, they were also asked to respond to additional questions. The first was as a vegetarian, do you eat any of the following? (1) eggs; (2) dairy food (such as milk, cheese); (3) chicken and (4) fish. Students who checked no to all four were categorized as vegan; while those who checked yes that they ate dairy foods were considered lacto-vegetarian and those who

checked yes that they ate eggs and dairy products were considered lacto-ovo vegetarian. Students who checked yes to either chicken or fish were considered semi-vegetarians. Self-reported vegetarians were also asked to answer what are your main reason(s) for eating a vegetarian diet? and to restrict their answers to the followings: (1) for health reasons; (2) for economic reasons; (3) for weight control; (4) dislike red meat and (5) for animal welfare.

Data entry and statistical analysis were performed using the Statistical Package for the Social Science (SPSS) program, for windows (version 11.5, SPSS Inc., Chicago, Illinois). Frequency and range checks were performed initially to detect errors in the data entry. Detected errors were corrected by rechecking the original data forms. Descriptive statistics such as Mean±SD were used to summarize the quantitative variables. Proportions and percentages were used to summarize category variables. Chi-square test ( $\chi^2$ ) examined the relation between demographic, lifestyle characteristics and vegetarianism. The p-values  $\leq 0.05$  were considered for statistical significance. Also, percentages were used to determine the prevalence rate of vegetarianism and reasons of vegetarianism among Jordan University students.

**RESULTS**

The study sample included a total of 1209 students, of this number 34.6% (n = 418) were males and 65.4% (n = 791) were females. The female to male ratio was (1.9:1.0). The mean age for all subjects was 20.3±1.5 years (range = 17 to 28 years). Nearly 62% of the students were between the ages of 17-20 years. Most (83.6%) were of normal weight. More than one quarter of students (25.6%) had a low level of family monthly income. Approximately, 18% of students were current smokers. Approximately, 28% of students were physically active compared with 72% of students who were physically inactive. Overall, the prevalence of vegetarianism in the sample was 23.9% (n = 289).

Table 1 shows the prevalence of vegetarianism among Jordan university students. The overall prevalence

of vegan, lacto-ovo-vegetarian and semi-vegetarian was 1.8, 10.7 and 11.4%, respectively. Among males, the prevalence of vegan, lacto-ovo-vegetarian and semi-vegetarian was 1.2, 7.9 and 8.4%, respectively. Regarding females, the prevalence of vegan, lacto-ovo-vegetarian and semi-vegetarian was 2.1, 12.1, 13.0%, respectively. The prevalence of lacto-ovo-vegetarian and semi-vegetarian is significantly higher (p = 0.02) among females than among males.

Table 2 shows selected demographic and lifestyle characteristics associated with vegetarianism among Jordan university students. Sex was significantly (p = 0.000) associated with vegetarianism. Females (27.3%) were more likely to be vegetarian than males (17.5%). Age was also significantly (p = 0.005) associated with vegetarianism. Students with an age group between 17-20 years (26.8%) were more likely to be vegetarian than students with an age group between 21-28 years (19.0%). There is a significantly (p = 0) decreasing pattern in being vegetarian with increasing family monthly income. Approximately, more than one third (36.1%) of students with incomes of <300 JD were vegetarians compared with 26.4% of vegetarian students with incomes between 300 and 500 JD and 18.2% of vegetarian students with incomes more than 500 JD. Smoking was significantly (p = 0.01) associated with vegetarianism. Non-smokers (25.8%) were more likely to be vegetarians than current smokers (18.3%) or former smokers (12.2%). In addition to that, physical activity was significantly (p = 0.005) associated with vegetarianism. Physically active students (31.4%) were more likely to be vegetarians than physically inactive students (21.8%). Also, vitamin-mineral supplement use was significantly (p = 0) associated with vegetarianism. Vitamin-mineral supplement users (31.2%) were more likely to be vegetarians than non-users of vitamin-mineral supplements (21.6%). Data analysis showed that vegetarianism was significantly (p = 0.041) associated with a normal BMI. Students with a normal BMI (24.9%) were more likely to be vegetarians than overweight (21.1%) or obese (10.0%) subjects.

Reasons for vegetarianism were: for weight control (39.2%), for economic reasons (35.8%), for health reasons (16.5%), dislike red meat (6.8%) and animal welfare (1.7%).

Table 1: Prevalence of vegetarianism among Jordan University students

Type of vegetarian diet	Prevalence (%)						p-value
	Males (n = 418)		Females (n = 791)		Total (n = 1209)		
	No.	%	No.	%	No.	%	
Vegan	5	1.2	17	2.1	22	1.8	0.52
Lacto-ovo-vegetarian	33	7.9	96	12.1	129	10.7	0.02
Semi-vegetarian	35	8.4	103	13.0	138	11.4	0.02
Total (all vegetarians)	73	17.5	216	27.3	289	23.9	

Table 2: Selected demographic and lifestyle characteristics associated with vegetarianism among Jordan university students

Characteristics	No.	%	p-value
Overall (n = 1209)	289	23.9	
Sex			0.000
Male (n = 418)	73	17.5	
Female (n = 791)	216	27.3	
Age (years)			0.005
17-20 (n = 746)	200	26.8	
21-28 (n = 452)	86	19.0	
Family monthly income (JD)			0.000
<300 (n = 299)	108	36.1	
300-500 JD (n = 231)	61	26.4	
>500 (n = 637)	116	18.2	
Smoking status			0.01
Non-smoker (n = 932)	241	25.8	
Former smoker (n = 57)	7	12.2	
Current smoker (n = 213)	39	18.3	
Physical activity			0.005
Physically active (n = 220)	69	31.4	
Physically inactive (n = 563)	123	21.8	
Vitamin-mineral supplement use			0.000
Users (n = 314)	98	31.2	
Non-users (n = 837)	181	21.6	
Body mass index (kg m <sup>-2</sup> )			0.041
Normal (<25) (n = 982)	245	24.9	
Overweight (25-<30) (n = 152)	32	21.1	
Obese (≥30) (n = 40)	4	10.0	

JD: Jordanian Dinar

Table 3: Reasons given by students for becoming a vegetarian

Reason	No.	%
Weight control <sup>a</sup>	474	39.2
Economic reasons	433	35.8
Health reasons <sup>b</sup>	199	16.5
Dislike red meat	82	6.8
Animal welfare	21	1.7
Total	1209	100.0

<sup>a</sup>Lose weight or keep from gaining weight; <sup>b</sup>Prevention of cardiovascular diseases, cancer, diabetes and obesity

There was no statistical significance (p>0.05) between males and females regarding reasons for being a vegetarian as shown in Table 3.

## DISCUSSION

To our knowledge this the first study conducted in Jordan about vegetarianism. The study found that the overall prevalence of vegetarianism among Jordan University students was 23.9%. The percentage of semi-vegetarians was 11.4%; the percentage of lacto-ovo-vegetarians was 10.7% and the percentage of vegans was 1.8% as shown in Table 1. Several studies conducted worldwide reported that overall prevalence of vegetarianism varied from 2 to 20.9% in USA (ADA, 2003; Perry *et al.*, 2002; Spencer *et al.*, 2007; Kim *et al.*, 1997; Klopp *et al.*, 2003; White *et al.*, 1999; Barr and Chapman, 2002), from 3 to 7% in UK (Robinson, 2001; Gilbody *et al.*, 1999), 4% in Canada (ADA, 2003), 15.6% in Sweden (Larsson *et al.*, 2001) and from 5 to 34% in Australia (Worsley and Skrzypiec, 1998; Baines *et al.*, 2007).

Results of present study as well as other studies indicate that the overall prevalence of vegetarianism is different from country to country which may be due to several factors such as beliefs, economic status, cultures and food availability.

In addition, study findings indicate that vegetarianism is significantly associated with being female, younger age, low family monthly income, nonsmoker, physically active, vitamin-mineral supplement user and normal BMI as shown in Table 2. These findings are consistent with several studies (Larsson *et al.*, 2001; Spencer *et al.*, 2007; White and Frank, 1994; Perry *et al.*, 2001; Bedford and Barr, 2005; Baines *et al.*, 2007; White *et al.*, 1999).

Present study results show that vegetarianism among university students is a female phenomenon. This may be due to the fact that females are more concerned about their body shape and weight control than males. Also, females overall appear to be more concerned about the financial and moral aspects of meat consumption. The study also showed that vegetarianism is more common among young students which may be due to the fact that young students are more educated; health conscious and more likely to seek healthy behaviours. Regarding the study finding that students with low family monthly income are more likely to be vegetarians, it could be pointed out that, this may be due to the high cost of food from animal sources. Furthermore, a dramatic increase in food prices occurring currently worldwide, including Jordan, had lead to a decrease in purchasing power of food which affected a higher proportion of Jordanian people and resulted in converting them from middle class to lower class.

Also, results of this study indicated that vegetarianism was significantly associated with health conscious behaviours such as nonsmokers, physically active, vitamin-mineral supplement users and normal BMI. These findings are consistent with Larsson *et al.* (2001), Spencer *et al.* (2007), Frank (1994), Perry *et al.* (2001), Bedford and Barr (2005), Baines *et al.* (2007) and White *et al.* (1999).

Results of this study (Table 3) indicated that the most common reasons for being vegetarian were weight control (39.2%), followed by economic reasons (35.8%) and health reasons (16.5%) such as, prevention of CVD, cancer, diabetes and obesity. Several studies in developed countries reported that the most common reasons of vegetarianism were health and weight control reasons (Worsley and Skrzypiec, 1998; Perry *et al.*, 2002; Larsson *et al.*, 2001; Spencer *et al.*, 2007; Kim *et al.*, 1997; Klopp *et al.*, 2003; Perry *et al.*, 2001; Bedford and Barr, 2005; Baines *et al.*, 2007; White *et al.*, 1999; Barr and

Chapman, 2002; Gilbody *et al.*, 1999), which is consistent with the results of this study, whereas economic reasons were found as the most common reasons for being vegetarian by studies conducted in developing countries (Worsley and Skrzypiec, 1998; Baines *et al.*, 2007). Study findings show that the overall prevalence, reasons and lifestyle factors of vegetarianism are mostly consistent with findings from other studies in developed countries (Perry *et al.*, 2002; Larsson *et al.*, 2001; Spencer *et al.*, 2007; Kim *et al.*, 1997; Klopp *et al.*, 2003; Perry *et al.*, 2001; White *et al.*, 1999; Barr and Chapman, 2002).

This may indicate that health policy makers in Jordan as in developed countries are encouraging plans to combat chronic diseases and their predisposing factors through health education. The study recommends that more efforts has to be devoted to nutrition education programs through government and private nutrition clinics for dietary planning and consultations to help in preventing and treating chronic diseases, as well as to get the best health benefits of vegetarianism and to avoid its deficiencies. An appropriately planned vegetarian diet is considered to be nutritionally adequate for all stages of the life cycle as well as for prevention and treatment of chronic diseases which may reduce the high economic cost of treatment of chronic diseases. In addition, vegetarianism will lead to a decreased consumption of foods from animal sources which are highly costly. Furthermore, due to the existing food crisis worldwide, particularly in Jordan, it is predicted that a large proportion of middle class Jordanians will adopt a plant based diet as before, but it should be appropriately planned to be adequate.

The study was limited by the self-reporting of vegetarianism and the cross-sectional design of the study. Also, the study was performed in a single university and therefore the sample may not be representative of the total population of university students in Jordan. It is highly recommended that a study on vegetarianism with a larger sample representing all Jordanian university students, as well as at the national level, be conducted in the near future.

In conclusion, a significant proportion of Jordan university students are interested in vegetarianism because of weight control and economic reasons. Vegetarians are more likely to be: females, younger age, with lower family monthly income, nonsmokers, physically active, vitamin-mineral supplement users and with normal BMI.

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