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Knowledge, Attitudes, and Behaviors Among College-Aged Females Regarding Nutrition Before and During Pregnancy

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Abstract

Objective: To examine the nutrition-related knowledge, attitudes and behaviors of women of childbearing age and factors which might affect future pregnancies. **Participants:** University of Northern Colorado undergraduate, non-pregnant females between the ages of 18-24 (n=138). **Methods:** A valid and reliable survey was administered in March 2012 to assess participants' demographics, knowledge concerning prenatal and pregnancy nutrition, and behaviors and attitudes towards body image, weight, and diet. **Results:** Half of participants were currently sexually active, 73% were currently using or had used birth control; 35% responded correctly regarding adequate food sources of folate/folic acid; 30 to 50% of participants did not meet recommended daily intakes of vegetables, fruits, grains and fish. **Conclusion:** College females may need more education on preconception and prenatal nutrition. Information gathered will be used to implement intervention programs and develop an appropriate nutrition education toolkit to be used on college campuses.

Keywords: College Health, Prenatal Nutrition, Smoking, Alcohol, Sexual Activity

Introduction

The typical American diet does not meet the recommended daily servings of fruits and vegetables, is moderately unhealthy, and primarily contains energy-dense foods rich in starches, sugar, and saturated fats (Morrison, Elliot, Knuppel, Sibai, Pill, 2011). This type of diet can be associated with nutritional deficiencies. Nutritional deficiencies resulting from suboptimal diets increase the risk of serious medical complications in pregnant women and their developing infants (Morrison et al., 2011). These complications can also be impacted by the mother's lifestyle choices during pregnancy, including pre-pregnancy BMI, alcohol, caffeine, and recreational, prescribed, and over-the-counter drugs (Brown, Isaacs, Krinke, Murtaugh, Sharbaugh, Stang, Wollidridge, 2008). Some of these complications include iron deficiency anemia, gestational diabetes, high blood pressure, and morning sickness in pregnant women. Infants can be born at low birth weight and with neural tube defects most often due to a folic acid deficiency during the first few weeks of pregnancy (Brown et al., 2008; Morrison et al., 2011). One of the most common birth defects associated with neural tube defects is spina bifida. The neural tube is an embryonic structure that develops in the brain and spinal cord of the infant, and typically folds and closes by the 28th day after conception. When the structure fails to close completely it can cause defects of the spinal cord and vertebrae. According to the March of Dimes, spina bifida affects about 1,500 babies each year and may be prevented with adequate intake of the B-vitamin, folic acid ("Birth Defects," 2009).

Increased risks also occur for intrauterine growth restriction, birth defects, developmental delays, and the development of chronic health problems during childhood and later in life (e.g. heart disease, Type 2 Diabetes, high blood pressure, and high cholesterol) (Morrison et al., 2011). Intrauterine growth restriction, also referred to as impaired fetal growth, is characterized

by an infant who does not grow to its potential as a result of disturbances in normal growth, and is associated with increased risk of perinatal death, adverse neurological outcomes, and poor long-term outcomes of neurodevelopment (Grivell, Wong, Bhatia, 2012). Fetal alcohol syndrome is a complication seen in infants whose mothers drink alcohol while pregnant, resulting in distinct alternations in craniofacial features, stunted growth, and abnormalities in behavior (Brown et al., 2008; De Sanctis, Memo, Pichini, Tarani, Vagnarelli, 2011). Smoking during pregnancy may also influence birth defects and poor pregnancy outcomes. Quinton, Cook, and Peek (2008) conducted a study on the relationship between endothelial function and intrauterine growth restriction in human pregnancy to investigate the negative effects smoking inflicts during pregnancy, finding that infants who were growth restricted (<10th percentile) had mothers with significantly lower flow-mediated dilation (FMD), also referred to as endothelial dysfunction, and infant birthweights were significantly decreased in the smoking group (3090 ± 596 g) compared with the nonsmoking group (3501 ± 396 g). Smoking also increases the risk of miscarriage early in pregnancy, preterm birth, placental dysfunction/abruption, and placenta praevia, all as a result of reduced blood flow and decreased perfusion to the placenta with resultant placental injury (Quinton et al., 2008).

Weight gain is an important factor throughout every pregnancy stage. Weight gain recommendations are based off of each woman's pre-pregnancy BMI and whether she is bearing multiple infants (Rasmussen & Yaktine, 2009). According to the Institute of Medicine's (IOM) current recommendations all women should gain appropriate weight during pregnancy through adequate caloric intake regardless of her pre-pregnancy BMI (Rasmussen & Yaktine, 2009; Fowles, 2004). During a woman's pregnancy, she must ingest more calories than her usual daily consumption (increasing by 300 calories per day). This increased energy need is related to

increased work of the heart, respiration, accretion of breast tissue, uterine muscles, the placenta, and the growing fetus (Brown et al., 2008). A 50% increase in the need for some vitamins and minerals occurs during pregnancy, especially for folic acid, iron, omega-3 fatty acids, vitamin D, and calcium (Wardlaw & Smith, 2009, p. 534; "Eating and Nutrition," 2009).

According to the American College Health Association National College Health Assessment of 2011 (2012), 13-61% of female participants engaged in unhealthy dietary and lifestyle practices that may increase their risk of poor pregnancy outcomes and birth defects in their infants if they were to become pregnant. Within a 30-day period, the report showed that 61.6% of female students had consumed alcohol in the past and 13.1% used cigarettes (*National College Health Assessment of 2011*, 2012). A total of 17.2% of female students reported having unprotected sex, which increases the risk of becoming pregnant and contracting sexually transmitted diseases (*National College Health Assessment of 2011*, 2012). Within the previous 12 months the study was conducted, 1.7% of females reported experiencing an unintentional pregnancy (*National College Health Assessment of 2011*, 2012). In regards to the average body mass index (BMI) of students, 5.1% of females were underweight (BMI <18.5), 18.4% were overweight (BMI 25-29.9), and 8.3% were listed as obese (BMI \geq 30) (*National College Health Assessment of 2011*, 2012; *WHO Tech Report Series*, 2000). The 2010 Dietary Guidelines for Americans recommends that Americans consume at least 2 ½ cups of vegetables and fruits per day to reduce their risk for chronic diseases such as cardiovascular disease and some types of cancers; however, 59.5% of female students were only eating 1-2 (1 cup) servings of fruits and vegetables per day while only 29.4% were consuming 3-4 servings (*National College Health Assessment of 2011*, 2012; *Dietary Guidelines for Americans*, 2010). According to the physical activity and public health recommendations for adults from the American College of Sports

Medicine and the American Heart Association, adults should engage in moderate-intensity cardio or aerobic exercise for at least 30 minutes on 5 or more days per week or vigorous-intensity cardio or aerobic exercise for at least 20 minutes on 3 or more days per week (Haskell, Lee, Pate, Powell, Blair, Franklin, Macera, Heath, Thompson, Bauman, 2007). Only 45.1% of female participants were meeting these guidelines (*National College Health Assessment of 2011, 2012*).

Assessing women of childbearing age (15-45 years of age) to develop education programs based on their needs is crucial. By targeting the importance of healthful eating and lifestyle behaviors during pregnancy, women can reduce their risk of pregnancy complications and increase the probability of delivering a healthy baby. This research study was designed to examine the knowledge, attitudes, and behaviors regarding nutrition before and during pregnancy among college females between the ages of 18 and 24. The knowledge of key nutrients, preconception behaviors and attitudes was examined to see if a future nutrition intervention should be implemented.

Methods

Study approval was received by The University of Northern Colorado's Institutional Review Board before the start of the project. A written survey was developed to collect data on knowledge concerning prenatal and maternal nutrition, and behaviors and attitudes towards body image, weight, and diet. Fifty-one (51) questions were asked to gather demographic information including age, height, weight, ethnicity, year in college, and questions regarding knowledge, attitudes and behaviors of current dietary habits and lifestyle choices. BMI was calculated for each participant using weight and height information. The survey was self-reported and included yes-or-no, multiple choice, and open-ended questions. The multiple choice section targeted the

knowledge the participants knew about weight gain, calorie needs, specific nutrients, and mother or infant concerns or complications that can occur during and after pregnancy.

Open-ended questions tested participant knowledge regarding food sources of specific nutrients, normal weight gain recommendations during pregnancy (for healthy pre-pregnancy BMI), and daily extra caloric needs during pregnancy. Participants were asked to list as many responses as able to the best of their knowledge, leading to a higher number of responses related to the total number of participants in this study. Specific questions on nutrient-rich foods were included for folic acid, iron, omega-3 fatty acids (docosahexaenoic acid), vitamin D, and calcium. The nutrients were assessed using evidence-based recommendations from the IOM's Dietary Reference Intakes (Rasmussen & Yaktine, 2009; *Dietary Guidelines for Americans*, 2010). To further assess dietary intake of folic acid, all participants were asked to list their favorite breakfast cereals, with the option of including more than one choice. Participants were also assessed regarding their attitude towards certain nutrition and pregnancy scenarios. In example, diet patterns and attitudes towards weight gain during pregnancy was assessed. Once fully developed, experts specializing in maternal nutrition and dietetics students reviewed the survey for face and content validity. Reliability testing was conducted via a test-retest format with a group of 23 students. Students completed the survey twice, with a 7-day period between each testing. All questions scored a correlation level at or above 0.7; no major changes were completed to the survey based on the reliability testing.

Informed consent was provided by the participants before survey administration. Subjects consisted of a convenience sample to acquire adequate participation. The study was conducted through the Greek Life community, residence halls, and classes through the College of Natural and Health Sciences at the University of Northern Colorado. Surveys were distributed to the

subjects during weekly sorority chapter meetings, at residence hall meetings, or after class.

Participants were given 15-20 minutes to complete the surveys. Incentives (drawing for one of ten, \$10 gift cards) were given after completion of the all surveys.

Data analysis to detect differences were completed. Data collected from the surveys were analyzed using the SPSS data analysis program (17.0) through frequency distributions and independent samples t-tests (used because of interval variables). Survey responses to open-ended questions were split into 3 different forms of coding: correct, incorrect, and “don’t know.” Incorrect responses were taken from participants who provided inaccurate answers to the open-ended questions. Participants were given the choice to write “don’t know” if they had no idea of the answer and did not have a guess. Non-correct answers were coded separately to reflect the difference between a participant who may have thought they knew the answer and guessed incorrectly versus a participant who was fully aware they did not know the answer. Answers to open-ended questions were analyzed for consistent themes using the triangulation method with three individuals, the primary and secondary authors of the research study as well as a public health professional (Registered Dietitian) who is trained on the triangulation method.

Results

A total of 136 participant surveys were received. The characteristics of the participants are displayed in Table 1. All were female, with ages ranging between 18 and 24. Over half were between ages 19-21 (72%); the remaining were 18 (11%), 22 (13%), 23 (3%), and 24 (1%). Most participants (101; 74%) had a healthy BMI between 18.5-24.9 kg/m²; 35 (26%) of BMIs were categorized as unhealthy (underweight, overweight, obese; BMI \leq 18.4 or \geq 25 kg/m²). Participants with a healthy BMI were more likely to eat fish throughout the week than those with an unhealthy BMI ($p < 0.05$; $t = 2.223$) and agree with the statement that it is important to consume

a healthful diet, including elimination of alcohol or tobacco consumption, when becoming pregnant ($p=0.05$; $t=1.965$).

Race/ethnicity was collected from participants, with 124 (91%) identifying with White or Caucasian, 6 (4%) as Latino or Hispanic, 2 (1.5%) as Asian, 1 (1%) as African American or Black, 1 (1%) as American Indian or Alaska Native, and 2 (1.5%) as Native Hawaiian or other Pacific Islander. The years participants were in school were distributed similarly with 33 (24%) first year students, 30 (22%) sophomores, 39 (29%) juniors, and 33 (24%) seniors. Among the participants, 37 (27%) were nutrition/dietetics majors; 99 (73%) were different majors such as psychology, sports and exercise science, elementary education, communications, and business management.

There was no significant difference in the BMI of dietetics/nutrition majors versus the BMI of participants of a different major ($p=0.506$; $t=-.667$). In relation to current attitude towards weight, dietetics/nutrition majors were more likely to select “maintain weight” among a list of options including “lose weight”, “maintain weight”, and “gain weight”; non-dietetics/nutrition majors were more likely to select “lose weight” ($p<0.05$; $t=-2.164$). Dietetics/nutrition majors were less likely to describe themselves as “chubby” compared to participants of a different major ($p<0.05$; $t=2.118$). Regarding an average daily diet, dietetics/nutrition majors were more likely than non-dietetics/nutrition majors to drink more water ($p<0.05$; $t=2.453$), consume more vegetables ($p<0.001$; $t=4.091$), consume more dark green leafy or deep orange vegetables (e.g., broccoli, carrots, squash, sweet potatoes) ($p=0.000$; $t=4.338$), and consume more fruits ($p=0.001$; $t=3.353$). They also were more likely to eat fish more frequently throughout the week ($p<0.05$; $t=2.012$). If participants were to become pregnant right now, dietetics/nutrition majors were more likely to agree with the statement that they would

be able to support a healthy pregnancy vs. participants of a different major, who were more likely to feel neutral towards or disagree with the same statement ($p < 0.05$; $t = 2.469$). Participants who were not dietetics/nutrition majors were less likely to be interested in learning more about nutrition and how it affects the body before, during and after pregnancy compared to participants who were dietetics/nutrition majors ($p = 0.001$; $t = 3.368$).

Seventy-five participants (55%) reported taking a college-level nutrition course. They were more likely to take a multivitamin/mineral supplement 2-3 times a week versus non-course takers, who were more likely to take a multivitamin/mineral supplement only 1 time a week ($p < 0.05$; $t = -2.085$). Course-takers were more likely to consume 3 meals per day ($p < 0.05$; $t = 2.319$), more cups of caffeinated soda per day ($p = 0.008$; $t = 2.693$), more vegetables per day ($p = 0.001$; $t = -3.463$), more dark green leafy or dark orange vegetables per day ($p < 0.001$; $t = -4.312$), and more fruit per day ($p < 0.05$; $t = -2.457$). They also were more likely to exercise for 30 minutes a day 3-4 days out of the week ($p = 0.005$; $t = 2.842$). These participants were more likely to disagree with the statements that they did not care about the foods they eat ($p < 0.001$; $t = 4.541$) and that they did not need to eat more food to gain weight while being pregnant because the baby would have all the nutrients he/she needs to grow on their current diet now ($p < 0.05$; $t = 2.482$). They were more likely to agree with the statements that they would be able to support a healthy pregnancy if they were to become pregnant now ($p = 0.004$; $t = -2.921$) and that they are interested in learning more about nutrition and how it affects the body before, during and after pregnancy ($p = 0.005$; $t = -2.855$).

Results from the survey regarding diet/nutrition behaviors of the participants are included in Table 2. Sixty-five (48%) of the 136 participants currently were not taking a multivitamin/mineral supplement. While 114 (84%) recorded that their average diet consisted of

eating 3 meals a day, 86 (63%) typically snacked twice a day. On average, participants primarily ate out (including sit-down or fast food restaurant) 1-2 times a week (65%). Approximately half of participants reported they did not drink coffee (54%), tea (62%), soda (70%) nor energy drinks (96%) on an average day. Only 18% of participants drank more than 6 cups of water (\geq 48 fluid ounces) in an average day. Half of participants (58%) consumed less than 2-3 cups of vegetables per day; based on daily vegetable consumption, over half of the participants (57%) consumed 1-3 cups of dark green leafy or deep orange vegetables (e.g., broccoli, carrots, squash, sweet potatoes) per day. Less than half of the participants were consuming 2-3 cups of fruits per day (48%). Thirty-six percent (49) of all participants consumed only 1 cup per day of dairy products. The top three cereal choices participants listed most included Cheerios[®] (n=32), Special K[®] (n=18), and Honey Bunches of Oats[®] (n=12). Approximately half of participants were consuming less than 4 ounces of grains (including whole and regular grains) per day (49%). Thirty-nine percent (53) of participants surveyed were not consuming any fish in their average weekly diet, with only 15% of participants consuming fish 2-3 times per week.

The distribution of the accuracy of answers regarding appropriate food sources of various nutrients/minerals and pregnancy recommendations is displayed in Figure 1. Participants were able to list more than one response to each knowledge question. Correct food sources of folic acid compromised 35% of total responses (n=150) and included enriched grains/cereal, dark leafy green vegetables, and orange juice; majority of participants (51%) were unable to list any adequate food sources of folate/folic acid and listed “DK” (Don’t Know) in the blank. Appropriate food sources of iron included meat, red meat, steak, and beef and compromised 40% of total responses (n=146). Of the 148 total responses regarding appropriate food sources of docosahexaenoic acid (DHA), correct responses (66%) included fish, salmon and tuna. Correct

food sources of Vitamin D compromised 48% of total responses (n=149) and included milk, fortified milk, vitamin D milk and whole milk. Appropriate food sources of Calcium compromised 94% of total responses (n=170) and included milk, dairy, cheese, yogurt, and fortified orange juice. Only 19% of total participant responses (n=137) listed the appropriate maternal weight gain recommendations for healthy BMI prior to pregnancy (between 25-35 lbs). Only 18% of total participant responses (n=138) listed the appropriate amount of extra calories that women should consume daily during pregnancy (300 kcal).

Over half of participants (67%) surveyed listed having one or more alcoholic drinks in an average week. Nearly all participants (95%) reported they did not smoke cigarettes on an average day, with 4% of participants listing they only smoked when they drank alcohol. On average, 118 participants (87%) responded they exercised for 30 minutes for one or more days out of the week; 68% listed that they exercised for 60 minutes for one or more days out of the week. Nearly one-third of participants (44; 32%) listed that they did not exercise at all throughout the week for 60 minutes a day. Approximately 14% of participants surveyed listed that they have or had an eating disorder (including bulimia, anorexia nervosa, binge eating, or multiple disorders).

The majority of participants (77%) reported they had been sexually active in the past, with 53% reporting they were currently sexually active. Survey results showed that those who were currently sexually active drank more cups of caffeinated tea per day ($p<0.05$; $t=-2.560$), consumed 3 or more alcoholic drinks per week ($p<0.05$; $t=2.591$), and smoked one or more cigarettes per day ($p<0.05$; $t=2.193$). These participants were more likely to be using a form of birth control ($p<0.001$; $t=-6.490$) and were more likely to be using oral contraception ($p<0.001$; $t=4.632$).

Four participants (3%) reported having been pregnant in the past. Three-fourths (73%) of participants responded that they are currently using or have used some form of birth control in the past (may or may not have included condoms). Over half of participants (59%) listed using (or had used in the past) oral contraception (the Pill) as a form of birth control. Thirteen participants (10%) listed “other” when asked which type of birth control they were currently using or had used in the past (e.g., condoms, implants into the arm, Levora, Mononessa, Microgestin, Lutera, Amethyst, or Implanon).

When participants were assessed regarding their attitude towards certain nutrition and pregnancy scenarios, the majority agreed with the statement that it is important to consume a healthful diet, which included eliminating alcohol or tobacco consumption when becoming pregnant (98.5%). Seven participants (5%) “agreed” that they did not really care about the foods they ate; 27 participants (20%) felt neutral towards the statement. Most participants (125, 92%) disagreed with the statement that they would not need to eat more food to gain weight while pregnant because the baby will have all the nutrients he/she needs to grow on their current diet now. Two-thirds of participants (68%) felt they would be able to support a healthy pregnancy if they became pregnant now; however, 16% of participants disagreed. Most participants (89%) agreed with the statement that they would like to have children someday and 79% agreed they were interested in learning more about nutrition and how it affects their bodies before, during and after pregnancy.

Discussion

Data were collected to assess the level of nutrition education, dietary and lifestyle behaviors, and attitudes among college-aged females and allow for connections to be made on current nutritional status and risk factors for future pregnancy outcomes. Sexual activity was

collected to analyze the likelihood and percentage of students increasing their chances of becoming pregnant. Over half of participants currently were sexually active, with over a fourth of them not using any form of birth control. Over half of the overall survey participants were consuming alcohol in an average week, and if currently sexually active, were likely to consume 3 or more alcoholic drinks in a week and smoke one or more cigarettes per day. Consuming alcohol and smoking during pregnancy is detrimental to the development of the fetus and may influence birth defects and poor pregnancy outcomes.

Some participants listed they currently had or at one time had experienced an eating disorder. Eating disorders may lead to malnutrition and vitamin deficiencies, which could influence poor pregnancy outcomes especially in women who deprive themselves of the nutrients they need and are afraid to gain weight. Women need to understand the importance of eating healthfully and gaining adequate weight to influence a healthy pregnancy. Regardless of a woman's pre-pregnancy BMI, all women should gain weight during pregnancy based on each woman's pre-pregnancy BMI and whether she is bearing multiple infants (Rasmussen & Yaktine, 2009; Fowles, 2004). Complications of preterm delivery and infants born at low-birth-weights are associated with women who are underweight before pregnancy, and are more likely to occur when underweight woman are not achieving adequate weight gain during pregnancy. Insufficient weight gain leads to increased metabolism of energy stores, resulting in ketone production, which in turn impairs the neurological development of the fetus (Fowles, 2004). A number of participants were not engaging in the recommended amount of exercise per week as stated by the 2007 physical activity and public health recommendations for adults from the American College of Sports Medicine and the American Heart Association (Haskell et al., 2007).

Healthful diets and exercise are important for good health and can assist a woman in achieving or maintaining a healthy BMI prior to and during pregnancy.

The overall nutritional quality of diet in participants was sub-optimal, with only half of participants meeting the 2010 USDA Dietary Guidelines for Americans for fruits and vegetables (at least 2 ½ cups per day) and grains (6 ounces per day). Women should be consuming at least 12 of fish ounces (2 fish meals) per week to meet the recommended intake levels of omega-3 fatty acids for women of childbearing age (1.1 g/day) and for pregnant women (1.4 g/day) (Gardiner, Nelson, Shellhaas, Dunlop, Long, Andreist, Jack, 2008). For pregnant women, these 12 ounces should be of low-mercury fish (e.g. Carp, Trout, Salmon, Tilapia). Participants were not drinking enough water, which is critical in preventing effects of dehydration. Although the majority of participants felt that they could support a healthy pregnancy, a number of students felt they could not. This is concerning, particularly because of the high number of females who were sexually active and their overall poor diet quality. None of the participants included in the study were eating out every day throughout the week. Participants choosing to cook for themselves and eat at home may be able to watch their food and nutrient intake more closely, possibly influencing a more healthful diet. The top three cereal choices acquired from the survey included adequate sources of folic acid (166-136 micrograms per serving), however, nearly half of participants were consuming less than 4 oz of grains per day. It is important for women to have enough folic acid in their system before pregnancy and during the early weeks after conception to influence positive development of neural tubes in the infant(s) during pregnancy and prevent spina bifida.

The majority of participants were unable to provide correct responses to the open-ended questions regarding food sources of specific nutrients, weight gain recommendations during

pregnancy, and daily extra caloric needs during pregnancy. The exception to this occurrence was calcium, for which many students provided adequate food sources in their survey responses including milk, cheese, yogurt, and fortified orange juice. This strengthens the need for further education regarding general nutrition knowledge and factors influencing healthy pregnancies, particularly of weight gain and calorie intake. Data collected confirmed that participants who were dietetics/nutrition majors and/or had received education through a college-level nutrition course participated in more healthful dietary practices. These practices included drinking more water, eating more vegetables, fruits, and fish, taking a multivitamin more often, eating three meals/day, and engaging in exercise more times throughout the week. They were more likely to disagree with the survey statement, “I don’t really care about the foods I eat,” and were aware of the importance of a weight gain through a higher caloric daily intake when they become pregnant. One fourth of the total participants were neutral and did not show concern for the foods that they eat. This could influence poor dietary habits and lead to weight gain or increased risk for nutrition-related chronic diseases in life if they do not follow the dietary guidelines set for Americans (*Dietary Guidelines for Americans*, 2010). There was also a greater interest for further nutrition education related to before, during and after pregnancy in participants that were dietetics/nutrition majors or had taken a college-level nutrition course. This raises a point of how colleges can develop ways to increase interest in healthful eating in students who have not taken a nutrition course. Unexpectedly, students who had taken a nutrition course were more likely than those who had not to consume more caffeinated soda. This raises a possible need to emphasize the effects of consuming large quantities of caffeinated soda on nutritional status in college-level nutrition courses.

Some limitations exist to this research. Participants were recruited for this survey by individual choice, which may infer they had a greater interest in nutrition prior to the study. This may have affected data collected regarding percentage of participants who were interested in learning more about nutrition. Self-reported height and weight values may have been under- or over-reported actual values. Measuring these anthropometric assessments may have led to greater accuracy in the analysis of data collected from the surveys. In survey development, “condoms” was not listed as a response to forms of birth control that participants (both sexually active and non-sexually active) were using or had used. Some participants listed “condoms” as a written response for “other”, but this may not infer that no one else was using or had used condoms in the past. The survey did not include a response to examine how many participants were or had engaged in unprotected sex, which would have served as valuable information for this research study.

Conclusions

Based on the results of this research study, a nutrition intervention is recommended to further educate women of childbearing age (15-45 years of age) on the importance of healthful eating and lifestyle behaviors before and during pregnancy to reduce the risk of complications and increase the probability of delivering a healthy baby. Examples of future applications include requiring nutrition courses be taken by all students, developing a specific college-level nutrition course relative to pregnancy, and/or the production of a nutrition education toolkit for college females. The majority of participants were interested in learning more about nutrition and how it affects their bodies before, during and after pregnancy; however, due to the number of students who showed no or little interest, a need exists to discover ways to increase their concern and awareness of the effects of nutrition and lifestyle choices during these times. More research

is needed to investigate factors that promote the adoption of healthful diet and lifestyle practices to ensure successful implementation of nutrition interventions to females among college campuses to support future healthy pregnancies.

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Table 1

Demographics of Female College Participants

Total Sample Size =136		
Age (yr)	Number (n)	Percentage (%)
18	15	11
19	36	26.5
20	30	22.1
21	32	23.5
22	18	13.2
23	4	2.9
24	1	0.7
BMI (kg/m ²)		
Healthy: 18.5 – 24.9	101	74.3
Unhealthy: <18.4 or ≥25	35	25.7
Ethnicity		
White or Caucasian	124	91.2
Latino or Hispanic	6	4.4
Asian	2	1.5
African American or Black	1	0.7
American Indian or Alaska Native	1	0.7
Native Hawaiian/Pacific Islander	2	1.5
Year in School		
Freshman	33	24.3
Sophomore	30	22.1
Junior	39	28.7
Senior	33	24.3
Other	1	0.7
Major		
Dietetics/Nutrition	37	27.2
Other	99	72.8

Table 2

Diet/Nutrition Behaviors of Female College Participants

Total Sample Size = 136		
Category	Number (n)	Percentage (%)
# of Meals		
One	2	1.5
Two	37	27.2
Three	84	61.8
More than three	13	9.6
Snacking		
Never	2	1.5
Once	44	32.4
Twice	63	46.3
Three or more times	27	19.9
Went out to eat (sit-down or fast food restaurants)		
More than 7 times a week	0	0
6-7 times a week	4	2.9
3-5 times a week	29	21.3
1-2 times a week	89	65.4
Never	12	10.3
Coffee		
3 or more cups a day	6	4.4
2 cups a day	17	12.5
1 cup a day	40	29.4
I do not drink caffeinated coffee	73	53.7
Tea		
3 or more cups a day	1	0.7
2 cups a day	6	4.4
1 cup a day	45	33.1
I do not drink caffeinated tea	84	61.8
Soda		
3 or more cups a day	2	1.5
2 cups a day	6	4.4
1 cup a day	33	24.3
I do not drink caffeinated soda	95	69.9
Energy Drinks		
3 or more cups a day	0	0
2 cups a day	2	1.5
1 cup a day	4	2.9
I do not drink energy drinks	130	95.6

Water		
More than 60 ounces (more than 6 cups)	24	17.6
49-60 ounces (5-6 cups)	25	18.4
34-48 ounces (4-5 cups)	22	16.2
25-32 ounces (3-4 cups)	28	20.6
17-24 ounces (2-3 cups)	15	11.0
8-16 ounces (1-2 cups)	19	14.0
Less than 8 ounces (less than 1 cup or none at all)	3	2.2
Vegetables		
3 or more cups a day	11	8.1
2 cups a day	46	33.8
1 cup a day	46	33.8
Less than 1 cup a day	31	22.8
I do not eat/drink vegetables	2	1.5
Dark green leafy or deep orange vegetables		
3 or more cups a day	4	2.9
2 cups a day	19	14.0
1 cup a day	55	40.4
Less than 1 cup a day	48	35.3
I do not eat dark green leafy or deep orange vegetables	10	7.4
Fruit		
3 or more cups a day	16	11.8
2 cups a day	49	36.0
1 cup a day	48	35.3
Less than 1 cup a day	22	16.2
I do not eat/drink fruit	1	0.7
Dairy		
3 or more cups a day	23	16.9
2 cups a day	44	32.4
1 cup a day	49	36.0
Less than 1 cup a day	14	10.3
I do not eat/drink dairy products	6	4.4
Grains		
1 ounces	10	7.4
2-3 ounces	57	41.9
4-5 ounces	53	39.0
6 ounces or more	16	11.8
Fish (weekly)		
3 or more times	4	2.9
2 times	16	11.8
1 time	63	46.3
I do not eat fish	53	39.0

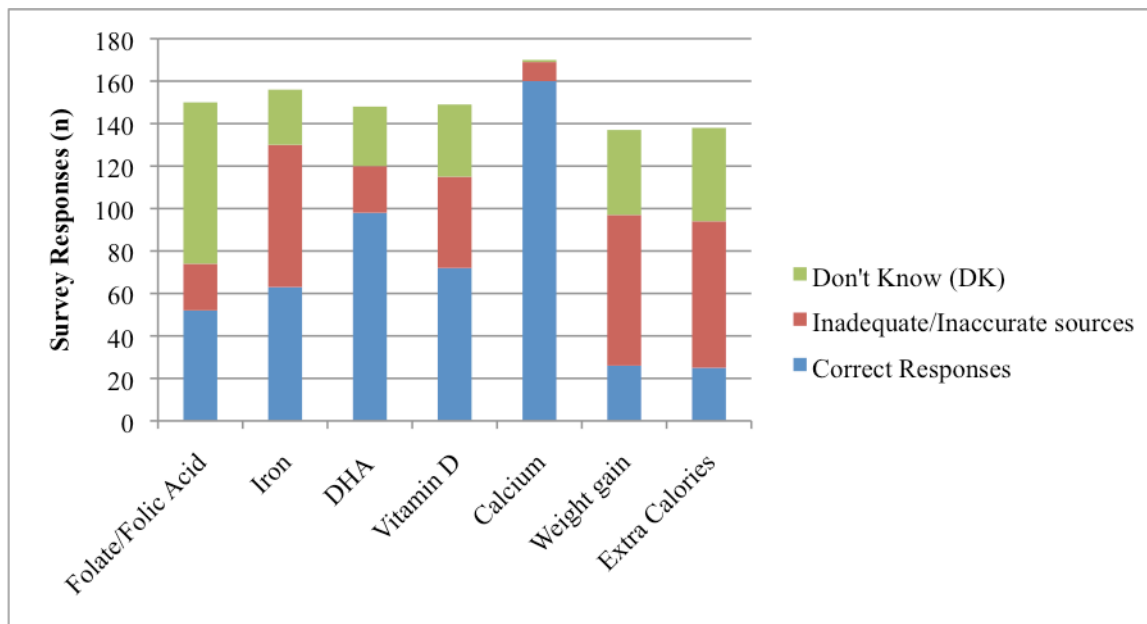


Figure 1. Number of Participants who Responded Correctly when Asked About Appropriate Foods for Critical Nutrients During Pregnancy