Original Article

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The Relationship between Food Insecurity and Lifestyle in Women with Gestational Diabetes

Obstetrics and Gynaecology Section

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ABSTRACT

Introduction: Gestational Diabetes (GDM) is among the most prevalent disorders during pregnancy, affecting the health of mothers and infants.

Aim: To explore the relationship between food insecurity and lifestyle among women with GDM.

Materials and Methods: This cross-sectional study recruited 120 pregnant women with GDM who were in 24-28 weeks of pregnancy. They referred to gynaecology clinics of Alborz and Kamali Hospitals, Karaj, Iran, in 2017. The samples that had the inclusion criteria were enrolled in the study. Data collection tools included three questionnaires for evaluating Demographic Obstetrics Questionnaires (DOQ), Household Food Security Scale (HFSS) and Lifestyle Questionnaire (LSQ). The data were analysed using descriptive and inferential statistics in SPSS, version 16.0. p-value <0.05 was considered significant.

Results: Most pregnant mothers were food secure or food insecure without hunger. Results indicated that 63.9% of pregnant mothers with GDM who did not have children under 18 years were food secure, while 5.6% were food insecure with moderate hunger. There was a significant relationship between lifestyle and the level of food security in households without children under 18 years (p=0.009).

Conclusion: Food insecurity is a risk factor affecting lifestyle. Therefore, planners must focus on reducing food insecurity, especially among pregnant women.

Keywords: Food security, Mental health, Physical health, Social health, Sport

INTRODUCTION

Gestational Diabetes (GDM) is the most prevalent medical condition during pregnancy which begins or is diagnosed by carbohydrate intolerance starting in this period [1]. The prevalence of GDM has increased in the US in the past 15 years, occurring in 5%-6% of all pregnancies every year [2]. It can lead to numerous undesirable outcomes, including hypertension, pre-eclampsia, urinary infections, hydramnios, surgical interventions, and future type 2 diabetes for the mother, as well as macrosomia, increased birth trauma, congenital anomalies, metabolic disorders, neonatal hypoglycaemia and hypocalcaemia, respiratory distress, jaundice, childhood obesity, and growth disorder in infants [3,4]. Numerous factors, including social determinants of health, are associated with GDM, among which lifestyle has a major role [5]. Lifestyle is a way that a person chooses throughout his life and expresses the values of each individual or group. Healthy lifestyle contributes to the maintenance, preservation and promotion of health and well-being and a valuable resource to reduce the incidence and impact of health problems, promote health, adapt to stressors and improve quality of life [6]. Life style includes various dimensions such as nutrition, exercise, selfcare, use of cigarettes, alcohol, social relationships and stress control that linked to food security [7]. GDM prevention strategies have recently focused on promoting healthy lifestyles in the patients by encouraging physical activity and promoting healthy nutrition [8]. A good diet is highly important for the effective management of diabetes, while it is difficult to achieve for those with diabetes if they face food insecurity [9].

Food insecurity is a crisis defined as the limited or unreliable access to healthy and sufficient food in terms of nutrition, or limited access to food from socially acceptable ways, resulting in numerous undesirable health outcomes [10-13]. Food insecurity is associated with factors of lifestyle such as smoking, alcohol consumption, and inadequate physical activity [14]. If food insecurity continues, it damages women the most. Meanwhile, nutrition during pregnancy is of high importance, and the quantity and quality of food consumed by pregnant women affect the management of a successful pregnancy and the health of foetus and infant [15]. Research shows that populations suffering from food insecurity are more likely to suffer obesity, overweight, and hypertension because they consume cheap food with a high energy density but a low nutritional value [16]. The low consumption of fruits and vegetables deprives these individuals from the protective effects of these nutrients against diseases such as diabetes which occur as a result of incorrect nutritional behaviours [17,18]. Results of studies in the US revealed that the risk of diabetes is 50% higher in adults who live in families with food insecurity [19]. The provision of food security in the world is among the goals of economic and social development planning [20]. As this factor can lead to development, health and nutritional related problems, it is necessary to determine its related factors in every society [21]. Therefore, considering the importance of food security and a healthy lifestyle during pregnancy, especially for women with GDM, the present study examined the relationship between food insecurity and lifestyle in women with GDM.

MATERIALS AND METHODS

This cross-sectional study was conducted in Alborz and Kamali Hospitals in, Karaj, Alborz Province, Iran, from March 2017 to August 2017. Participants were 120 pregnant women with GDM who were in 24-28 weeks of pregnancy and were referred to gynecology clinics of Alborz and Kamali Hospitals. The sample size was determined as 120 using the G*Power software. (effect size=0.25, sample size=120).

The present study was approved by the Ethics Committee of Alborz University of Medical Sciences and Health Services (Abzums. Rec1396.76) on 22 July 2017. First, the researcher visited the selected centers; identified individuals who met the criteria, the study's aim and method were explained to the women. The participants were assured about confidentiality of collected data and they were

free to leave the study in any time without any affect on their care. Afterwards, the questionnaires were given to the participants.

Inclusion and Exclusion Criteria

Inclusion criteria were being Iranian, having GDM diagnosis is made if there is at least one abnormal value (≥92, 180 and 153 mg/dL for fasting, one hour and two hour plasma glucose concentration respectively), after a 75 g Oral Glucose Tolerance Test (OGTT) in their 24-28 weeks of gestation), the absence of other medical conditions, the absence of overt diabetes, being literate, and knowing Persian [22]. Exclusion criteria were unwillingness to continue participating in the study and returning incomplete questionnaires.

Measurement Tools

Data collection tools were three questionnaires. The first questionnaire was a DOQ; the second questionnaire was a LSQ and the third questionnaire was a HFSS.

1. **Demographic Obstetrics Questionnaire**: Demographic Obstetrics data including gestational age, women's age, women's education, husband's education, women's job, husband's job, BMI before pregnancy, weight gain during pregnancy, first Fasting Blood Sugar (FBS), control of diabetes (control by diet, oral drug, injection of insulin).
2. **Lifestyle Questionnaire (LSQ):** LSQ has 10 dimensions (physical health, exercise and fitness, weight control and nutrition, illness prevention, psychological health, spiritual health, social health, drug and alcohol avoidance, accident prevention, and environmental health) and 70 items. Total scores of answering the questions fall in two categories: inappropriate lifestyle (score less than 106), appropriate lifestyle (score 106-210), its psychometric properties were assessed by Lali M et al., in Isfahan, Iran, in the academic year of 2008-2009. The internal consistency of the components of lifestyle and the entire questionnaire was confirmed by the Cronbach's alpha of 0.76-0.86 [23].
3. **Household Food Security Questionnaire:** This questionnaire has two parts, the first part for the household and the second part for the children. If a household has children under 18, the second part must be completed, as well. The 18 item questionnaire examines the household's food security situation over the past 12 months. According to the rating, the questionnaire was divided into four subgroups i.e., food security, food insecurity without hunger, food insecurity with moderate hunger, and food insecurity with severe hunger. The maximum score for this questionnaire is 18 if the household has children under the age of 18 and otherwise the maximum score earned from the questionnaire will be 10 points. This scale was checked by the United States Department of Agriculture (USDA, 1995) and introduced as a valid scale for epidemiological studies [24]. The 18-item USDA scale was examined by Rafiei M et al., among households in Isfahan, Iran, confirming its validity [25]. Its reliability was also investigated and confirmed in another study on households in Shiraz, Iran [26].

DATA ANALYSIS

The SPSS software version 16.0 was used for data analysis. Qualitative data were presented as frequencies and percentages. Relationships between the food insecurity and the lifestyle were assessed by using inferential statistics including Kruskal Wallis test.

RESULTS

The present study recruited 120 pregnant women with GDM. Descriptive findings showed that most mothers were 30 to 35-year-old with a BMI of 18.5-25 mg/kg. The highest frequency of education level of participants and their husband's was high school with 82.5% and 72.5% respectively. The lowest and highest frequency of women's job was housewives 15 (12.5%) and employees 105 (87.5%), respectively [Table/Fig-1].

Variable		Number (%)
Women's age (years)	<25	11 (9.2)
	25-29	36 (30.0)
	30-35	73 (60.8)
Women's education	High school	99 (82.5)
	University	21 (17.5)
Husband's education	High school	87 (72.5)
	University	33 (27.5)
Women's jobs	Housewives	15 (12.5)
	Employees	105 (87.5)
Husband's jobs	Employees	39 (32.5)
	Self employed	76 (63.3)
	Missing data	5 (4.2)
BMI before pregnancy (kg/m^2)	<18.5	30 (25.0)
	18.5-24.9	75 (62.5)
	25-29.9	14 (11.7)
	≥30	1 (8.0)
Gain weight during pregnancy (kg)	<5	24 (20.0)
	5-10	76 (63.3)
	>10	18 (15.0)
	Missing data	2 (1.7)
First FBS	93-125	98 (81.7)
	>125	22 (18.3)
How control of diabetes	By diet	63 (52.5)
	By oral drug	6 (5.0)
	By injection of insulin	50 (41.7)
	Missing data	1 (0.8)

[Table/Fig-1]: The demographic obstetrics characteristics of the participants.
BMI: Body mass index; FBS: Fasting blood sugar

Most pregnant mothers were food secure or food insecure without hunger. Results indicated that 63.9% of pregnant mothers with GDM who did not have children under 18 years were food secure, while 5.6% were food insecure with moderate hunger. However, in the group with children under 18 years, 15.5% were food insecure with moderate hunger and 1.2% was food insecure with severe hunger [Table/Fig-2].

	With a child younger than 18 years	Without a child younger than 18 years
	Number (%)	Number (%)
Food security	22 (26.2)	23 (63.9)
Food insecurity without hunger	48 (57.1)	11 (30.6)
Food insecurity with moderate hunger	13 (15.5)	2 (5.6)
Food insecurity with severe hunger	1 (1.2)	0 (0)
Total	84 (100)	36 (100)

[Table/Fig-2]: Distribution frequency of the pregnant women in food security groups.

Results indicated a relationship between lifestyle and the level of food security in households without children under 18 years (p=0.009). Results also revealed a relationship between certain dimensions of lifestyle and the level of food security. There was a relationship between the scores of environmental health, disease prevention, and accident prevention on the one hand, and food security on the other (p=0.017, p=0.006 and p=0.009) in the group without children under 18-year-old. Moreover, mean scores of exercise and health were highest in the food secure group in households with children under 18-year-old (p=0.022) [Table/Fig-3].

Life style	Food security							
	Household with children under 18 yrs				Household without children under 18 yrs			
	Food secure	Food insecurity without hunger	Food insecurity with moderate hunger	Food insecurity with sever hunger	Food secure	Food insecurity without hunger	Food insecurity with moderate hunger	Food insecurity with sever hunger
Physical health	14.77±3.26	13.98±3.45	13.61±2.96	13±0	14±0.47	13.36±0.8	9.5±0.5	0±0
	p=0.62				p=0.076			
Sports and fitness	10.72±2.31	8.89±3.56	10.23±2.0	10±0	14±0.47	13.36±0.8	9.5±0.5	0±0
	p=0.022				p=0.131			
Weight management and nutrition	14.59±3.4	12.83±3.18	12.31±1.93	14±0	11.43±0.85	9.54±0.78	6.5±0.5	0±0
	p=0.132				p=0.072			
Disease prevention	16.36±1.7	15.67±2.8	15.08±2.39	13±0	16.3±0.46	14.09±0.76	11±1	0±0
	p=0.23				p=0.006			
Mental health	16.36±1.7	15.67±2.85	15.08±2.39	13±0	16.3±0.46	14.09±0.76	11±1	0±0
	p=0.23				p=0.058			
Spiritual health	14.27±2.14	12.87±3.39	12.54±3.43	12±0	13.96±0.52	14.9±3.47	9±1	0±0
	p=0.281				p=0.061			
Social health	15±3.49	15.04±3.04	15.31±2.95	16±0	15.52±0.74	15.18±0.97	11.5±0.5	0±0
	p=0.962				p=0.239			
Avoidance of drugs, alcohol and opiates	15.36±3.53	14.67±3.08	12.92±4.82	15±0	16.04±0.44	14.09±0.88	14.5±0.5	0±0
	P=0.233				p=0.099			
Accident prevention	19.54±2.36	18.44±3.98	17.38±4.17	23±0	19.56±0.5	15.9±1.12	18.5±0.5	0±0
	p=0.257				p=0.009			
Environmental health	19.95±2.75	17.46±3.86	17.69±2.93	17±0	18.87±0.57	15.54±1.24	13.5±0.5	0±0
	p=0.056				p=0.017			
Total score of lifestyle	152.45±13.32	141.10±23.22	138.92±15.73	145±0	150.91±3.58	7.83±7.83	111±2	0±0
	p=0.076				p=0.009			

[Table/Fig-3]: Relationship between food security and dimensions of lifestyle among women with gestational diabetes in households with and without children under 18 years.

DISCUSSION

Food insecurity affects various dimensions of health (physical, mental, and social). Previously, it was assumed that food security affects only nutrition. However, its effect on other health outcomes and behaviour are progressively understood [27]. Food insecurity is associated with obesity, hypertension, lipid disorders, anxiety, depression, high risk sexual behaviours, mental health problems, decreased academic performance, and pregnancy related negative outcomes [28,29]. The present study showed that most participants were food secure or food insecure without hunger. This study is similar to the study by Najibi N et al., in terms of the prevalence of food insecurity. In the noted study, the prevalence of food insecurity was 66.7% among patients with type 2 diabetes in Shiraz, Iran, and the prevalence of food insecurity without hunger, with moderate hunger and with severe hunger was 47.4%, 14.8%, and 4.4%, respectively [30]. However, in the study by Laraia BA et al., in North Carolina, the prevalence of food insecurity in pregnant women and marginal food security was 10% and 15%, respectively [31]. In the study by Sharifi N et al., the majority of pregnant women (64.9%) had food security and 35.1% had insecurities [32]. Also, Yadegari L et al., reported that the prevalence of food insecurity in pregnant women was 30.9% in Rasht [33]. The difference among studies in Iran may be attributed to local factors affecting the food security status of people living in those areas. In the present study, the prevalence of food insecurity was higher in households with children than those without children under 18, in line with the results of a study by Nnakwe N and Yegammia C, in India in which the prevalence of food insecurity was 57% among households with young children and 44% among households without young children [34]. Based on these results, it can be concluded that a relationship may exist between food insecurity and household size; higher household size leads to higher odds of food insecurity.

Results indicated a relationship between food insecurity and lifestyle among women with GDM in households without children under 18, with the score of lifestyle being the highest in the group with food security. Results also showed a significant relationship between food security and certain dimensions of lifestyle, including environmental health, disease prevention, and accident prevention. Although no significant relationship was observed between food security and lifestyle in the group with children under 18, mean scores of exercise and health was the highest in the food secure category in this group, as well. Results of the present study are consistent with those of a study by Markwick A et al., who investigated the relationship between food insecurity and risk factors of lifestyle in Australia. They concluded that some risk factors of lifestyle, e.g., smoking, lack of access to social support, obesity, and overweight were associated with food insecurity [35]. Mohammadi F et al., also found a relationship between food insecurity and the incidence of abdominal obesity and overweight [36]. Today, topics such as food security and lifestyle are highlighted in Iran and international associations, and this seems especially important in pregnant women. Results of the present study can guide health planners of mothers and children to design plans and solutions for factors affecting the health of pregnant women.

LIMITATION

The limitations of this study included failing to control diet in all participants; although, attempts were made to match their diet.

CONCLUSION

Today, food insecurity and an unhealthy lifestyle are major public health problems. Food security is an index of individual and household health and its absence can have undesirable social

and mental outcomes in addition to affecting physical health. The present study was, thus conducted on women with GDM. The results showed a significant relationship between food insecurity and some dimensions of lifestyle.

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