ORIGINAL RESEARCH

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Can nutrition education improve nutritional status in pregnant women?

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ABSTRACT

Background: Nutrition during pregnancy affects the health of the mother and the health and development of the fetus. The aim of this study was to evaluate the effect of a nutrition education program on the diet of pregnant women.

Methods: A total of 120 pregnant women (intervention group: 62, control group: 58) attending our centre at 16–35 weeks of pregnancy were enrolled in our study. A pretested questionnaire was used to collect data on demographics, job, age, medication use and educational level, and food records were collected weekly. Three similar educational sessions were held each week for 12 weeks. Data analysis was performed using SPSS software (version 16).

Results: There were significant improvements in diet diversity (p=0.0001) and nutrient intake ($p \leq 0.05$) in the intervention group after the educational program.

Conclusion: Nutrition education can improve the diet of pregnant women.

Keywords
Pregnant women
Nutrition
Education

Introduction

Pregnancy is accompanied by many physiological changes in women [1]. The mother's health during this period can affect her quality of life and the health of the fetus [2]. Nutrition during pregnancy is very important as it affects the health of the mother and the health and development of the fetus. A poor diet during pregnancy is associated with maternal excess weight gain, pre-eclampsia, preterm birth and even miscarriage [3]. In addition, excess weight gain and a low quality diet, particularly among obese women during pregnancy, have been identified as risk factors for abnormal glucose tolerance in the mother [4]. Poor infant outcomes have also been linked with poor maternal nutrition. These include poor development, low birth weight and an increased risk of developing chronic diseases later in life.

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Adult diseases proposed to have a fetal origin and linked with nutrition during pregnancy include cardiovascular diseases, diabetes, and issues associated with bone mass [5]. However, women show an increased awareness of nutrition status during pregnancy [6] as they know that their nutrition is important for the health of their babies [7]. Nevertheless, research suggests that pregnant women may not be receiving nutrition advice from their healthcare providers during pregnancy [8]. Studies also have reported that pregnant women are unaware of the availability of educational material (even when provided to them) unless emphasized by health professionals [9]. Nutrition education during pregnancy has been shown to be associated with positive pregnancy outcomes [4, 10] and the role of midwives in nutrition education is being increasingly recognized [11].

Currently there are limited data on the effects of nutrition education on diet diversity and nutrient intake during pregnancy. The purpose of this study was to evaluate the efficacy of a nutrition education program for pregnant women.

Materials and Methods

This was a quasi-experimental (interventional) study conducted in 2011 among pregnant women in Ardebil who were attending urban health centres for prenatal care at

16–35 weeks of pregnancy. A total of 120 pregnant women were alternately classified into an intervention group (62) or a control group (58).

Using a pretested questionnaire, a trained interviewer collected information on demographics, jobs, age, medication use and educational level. Food records were collected each week and the number of daily portions of each of five food groups was calculated.

Intervention

Three similar educational sessions were held each week so that the women could choose which session was most convenient for them. They were not allowed to attend more than one session per week. With the aim of encouraging positive dietary practices during pregnancy, the nutritionist used PowerPoint, discussed the food groups, and gave the women one small book and a CD that explained the food groups and their importance for the body [12]. The educational program lasted 12 weeks.

Measuring dietary diversity

Dietary diversity is the number of food groups consumed by an individual in a given period [13]. Data on the food intake of the subjects were collected using individual food records. Data analysis was performed using SPSS software (version 16). Data were analyzed using the independent sample *t*-test and paired samples *t*-test for comparing normal quantitative data. Descriptive statistical analysis (mean, standard error) was used to report normal quantitative data. The data were tested for normality with the Kolmogorov–Smirnov sample test. Non-normative quantitative data were compared using the Mann–Whitney test and Wilcoxon test. In all analyses, $p<0.05$ was considered significant. Nutrients were analyzed using Nutritionist IV software, which was modified for Iranian foods.

Results

Table 1 presents the demographic characteristics of the study participants. There were no significant differences between the two groups.

Table 2 indicates the nutrient intake of the study population before and after the educational program. In intervention group, there were significant difference in fibre, iron, calcium, vitamin C, B_{12}, B_1, B_5, B_9 and macronutrient intake before and after the program ($p<0.05$). No significant differences in nutrients were seen in the control group.

Discussion

The results of this study indicate that nutrition education had a positive impact on the diet of pregnant women and imply that such women lack adequate information on nutrient intake and health practices. This finding is in agreement with the study of Akeredolu *et al* [14] who suggested that nutrition education in pregnancy can improve pregnancy outcomes. In addition, Girard and Olude [15] observed that health workers often lack adequate information to counsel pregnant and lactating women on how to meet their increased nutrient requirements and are also uncertain on how to translate general requirements into individual recommendations. Our results showed that after the educational program, women in the intervention group had a better diet than those in the control group (Table 3). Meyers *et al* conducted a pilot study to assess the impact of a small-group, behaviour-based brief education intervention on food-buying habits and diet. Their results indicated that a brief intervention can have a positive impact on the dietary and food-buying habits of low-income, at-risk adolescents [16]. A longitudinal study of Spanish adolescents also showed that an ongoing classroom-based nutrition education intervention was successful in reducing obesity and improving various measures of metabolic function [17].

Limitations

The main limitation of the study was the lack of blinded randomization. Another limitation was that the amount of food consumed was declared but not verified, so the women could have given good answers to show that they had understood the lessons but without really changing their dietary habits.

Conclusion

Nutritional education delivered to pregnant women can improve their dietary status. Consequently, nutritionists in health centres could help improve the nutritional status of pregnant women.

Variable	Intervention group (n=62)	Control group (n=58)	*p* Value*
Age (years)	30.28±16.17	29.87±4.84	0.08
Weight (kg)	66.70±10.39	67.04±12.14	0.07
Height (cm)	160±23.30	159±30.23	0.185
BMI (kg/m^2)	26.01±4.46	25.08±9.54	0.250

*Based on the independent t-test

Table 1 - Baseline characters in the study population

Nutrients	Intervention group			Control group			*p* Value[b]
	Before	After	p Value[a]	Before	After	p Value[a]	
Energy (kcal/day)	1787±356.4	1675.7±408.96	0.011	1342.01±162.01	1346.7±408.96	0.39	0.02
Carbohydrates (g/day)	235.5±70.06	225.66±51.21	0.00	225.26±64.35	225.66±51.21	0.12	0.10
Protein (g/day)	65.93±19.72	72.48±18.21	0.03	129.3±27.5	130.02±18.25	0.17	0.04
Fat (g/day)	69.07±19.11	73.21±16.23	0.03	74.05±19.71	74.31±16.85	0.35	0.05
Fibre (g/day)	11.22±3.29	14.71±3.59	0.00	14.33±1.97	14.29±0.25	0.27	0.07
Vitamin A (µg/day)	498.90±44.89	948.30±77.19	0.00	633.88±54.44	972.08±98.83	0.00	0.04
Vitamin B_1 (mg/day)	13.86±1.09	10.22±0.20	0.02	14.69±0.010	14.36±0.25	0.33	0.00
Vitamin B_2 (mg/day)	0.98±0.05	1.31±0.35	0.00	2.76±0.79	2.68±0.25	0.17	0.02
Vitamin B_5 (mg/day)	1.93±0.14	2.90±0.97	0.00	2.54±1.06	3.5±0.12	0.02	0.01
Vitamin B_6 (mg/day)	0.720±0.215	0.976±0.01	0.00	0.720±0.215	0.730±0.03	0.562	0.00
Vitamin B_9 (µg/day)	73.31±14.15	138.12±32.82	0.00	73.31±14.15	73.56±16.26	0.082	0.00
Vitamin B_{12} (µg/day)	0.867±0.12	2.13±0.86	0.04	0.867±0.12	0.850±0.16	0.14	0.00
Vitamin C (mg/day)	65.40±12.28	74.24±4.38	0.02	65.40±12.28	65.56±10.09	0.092	0.04
Vitamin E (mg/day)	19.86±4.37	19.01±3.43	0.81	19.86±3.43	19.68±4.32	0.81	0.24
Calcium (mg/day)	422.7±20.16	748.37±25.14	0.00	701.13±192.96	700.06±156.32	0.60	0.01
Iron (mg/day)	19.46±6.48	18.14±3.62	0.05	20.51±0.972	20.02±0.814	0.16	0.00

[a]Based on the paired sample *t*-test
[b]Based on the independent sample *t*-test

Table 2 - Nutrient status in the study groups before and after education

	Diet diversity before intervention	Diet diversity after intervention	*p* Value*
Control	2.02±0.79	2.04±0.73	0.072
Intervention	2.82±0.79	4.41±0.70	0.0001

[a]Based on the paired sample *t*-test

Table 3 - Diet diversity of the study groups

Conflict of Interest

The authors declare that they have no conflicts of interest.

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Assessment of nutritional risk factors predisposing to autism among Saudi children

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ABSTRACT

Introduction: Autism is a neurodevelopmental condition of unknown aetiology which is usually diagnosed in the first 3 years of life. Several studies have linked reduced intake of some nutrients with autism and autism spectrum disorder (ASD).

Objective: To identify nutritional risk factors that predispose to autism among preschool and school children living in Al-Madinah Al-Monawarah city in Saudi Arabia.

Method: Thirty children with autism/ASD aged 2–12 years and 36 matched control children were compared regarding BMI and food intake, using 24-hour recall and a food frequency questionnaire.

Results: Both groups consumed similar amounts of carbohydrates, protein and other nutrients, many of which were below the international recommendations for children of their age. However, children with autism/ASD also consumed significantly less omega-3 and iron than the control group.

Conclusions: Children with ASD, like other children in Saudi Arabia, consume less than the recommended amounts of some nutrients. Autistic children have reduced intake of omega-3 and iron, together with limited intake of many food varieties which could be linked to autism in susceptible children.

Keywords

Autism
Autism spectrum disorder
Diet
Omega-3
Iron

Introduction

Autism is a neurodevelopmental condition which is usually diagnosed in the first 3 years of life.

Its features include abnormal or impaired social interaction and communication and a restricted repertoire of activity and interests. Manifestations of the disorder vary greatly depending on the developmental level and age of the individual [1].

Genetic factors seem to be important in the aetiology of autism. However, genetics alone cannot explain the 870% increase in the number of autism cases between 1990 and 2000 [2]. This leaves nutrients and toxins interacting with genetic factors as the most likely causes of this condition.

Deficiency in several nutrients including omega-3 fatty acids, vitamin D, folic acid and vitamin B12, has been implicated in causing autism [3].

Autism was unknown in ancient times and was first described only in 1943. Prevalence estimates have increased over the last two decades and range from 0.7 per 10,000 population to 72.6 per 10,000 with a mean of 20.6 per 10,000. The mean male:female ratio is 4.2:1 [4].

In the Arab world, prevalence ranges from 1.4 per 10,000 children in Oman and 4.3 per 10,000 in Bahrain, to 29 per 10,000 in the United Arab Emirates. These rates are lower than those in the developed world, which are 39 per 10,000 for autism and 77 per 10,000 for autism spectrum disorders (ASD). In Saudi Arabia, autism affects 60 in every 10,000 individuals [5–8].

Methods

We hypothesize that insufficiency of some nutrients in genetically predisposed children may be a risk factor in the aetiology of ASD. Our objective was to identify nutritional risk factors that predispose to autism among preschool and school children living in Al-Madinah Al-Monawarah city in Saudi Arabia.

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