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The relationship of food, water intake and esthetic changes during pregnancy

A relação entre a alimentação, ingestão hídrica e problemas estéticos durante a gestação

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Abstract

The most notable esthetic alterations observed during pregnancy occur to the skin, with an increase in thickness due to edema. It is believed that these problems are triggered and/or aggravated due to the small intake of some food items. The objective of this study was to evaluate the relationship of food consumption, water intake and the appearance of cutaneous and vascular alterations in pregnant women. Pregnant women participating in health programs in the municipality of Santos were enrolled, and answered questionnaires to verify healthy practices and attitudes, water intake and esthetic problems – cellulitis, striae, periorbital dark circles and varicose veins. To evaluate food consumption, a food frequency questionnaire (FFQ) adjusted for the study purpose was used. The sample was grouped in tertiles for food consumption and water intake related to each esthetic problem for performance of logistic regression models. 105 pregnant women at the mean age of 24.4 years participated in the study. The relationship between the consumption of food items which are source of protein, vitamin C and calcium were found as protective factors for striae (OR 0.62) in the tertile of highest consumption, as well as water intake for tertiles 2 (OR 0.62) and 3 (OR 0.61). As for varicose veins, cellulitis and periorbital dark circles this relationship was not statistically significant. It was observed that diets rich in protein, vitamin C, calcium and water intake (more than four glasses per day) was a protective factor against the appearance of striae in pregnant women.
Keywords: Food Habits. Esthetics. Pregnancy. Skin.

Resumo

As mais notavéis alterações estéticas durante a gestação ocorrem na pele com aumento da espessura em virtude do edema. Acredita-se que esses problemas podem ser engatilhados e/ou agravados devido à ingestão reduzida de certos alimentos. O objetivo do estudo foi avaliar a relação entre o consumo alimentar, ingestão hídrica e o aparecimento de alterações estéticas cutâneas e vasculares em gestantes. Participaram gestantes inseridas em programas de saúde municipal – Santos-SP, que responderam a questionários para verificar práticas e atitudes saudáveis, ingestão hídrica e problemas estéticos – celulite, estria, olheiras e varizes. Para avaliar o consumo alimentar foi utilizado questionário de frequência alimentar (QFA) ajustado para o propósito do estudo. A amostra foi agrupada em tercis de consumo alimentar e ingestão hídrica relacionados com cada problema estético para realização de modelos de regressão logística. Participaram 105 gestantes com média de idade de 24,4 anos. A relação do consumo de alimentos fonte de nutrientes funcionais com proteção aos problemas estéticos avaliados foram encontrados com valores significantes para estrias (OR 0,62) no tercil de maior consumo, assim como ingestão hídrica para os tercis 2 (OR 0,62) e 3 (OR 0,61) ajustadas por índice de massa corporal, idade, prática de atividade física e uso de protetor solar. Para varizes, celulite e olheiras essa relação apresentou valores de proteção, porém, o resultado não foi significativo. Foi observado que alimentação rica em proteína, vitamina C, cálcio e consumo de água (acima de quatro copos por dia) foram fatores protetores ao aparecimento de estrias nas gestantes.
Palavras-chave: Hábitos Alimentares. Estética. Gravidez. Pele.

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INTRODUCTION

Self-esteem comprises a complex psycho-social mechanism, susceptible to several phenomena and requiring several special care measures. The food and clothes industry may contribute to the esthetic culture of women, a fact which may explain the increase in the use of cosmetics, makeup and esthetic treatments observed over the past years[1-3]. Such data, therefore, meet the women's requirement for a defined beauty standard and maintenance of characterisitics of the youth[3].

Several factors may affect the body composition and perception, among which pregnancy, with constant transformations. In this period, the most notedly observed alterations occur with the skin, with an increase in thickness due to edema, resulting from an increase in capillary permability and water and sodium retention regulated by hormones[4-6]. Some skin modifications may take place in this stage, due to an increased gland activity besides an increased production of these steroid hormones depending on the pregnancy stage[7]. Among these alterations, some outstanding ones are the striae, which consist of a disruption of elastic fibers sustaining the skin intermediate layer[8], cellulitis which is defined as a pathological alteration of the hypodermis leading to edema and alterations in the venous-lymphatic functions[9], periorbital dark circles which are purple stains arising around the eyelids and the varicose veins characterized by tortuous paths and enlargement of veins, generally in the body lower limbs[10,11].

The concern to establish the relashionship of food and esthetic problems is recent. It is believed that these problems are triggered and/or aggravated due to the small intake of some food items. These food items contain specific nutrients which may act for protection of oxidative stress, restoration, inhibition of toxic substances, regulation of enzymatic systems, among other roles[12,13].

Each food item contains a significant amount of some nutrient featuring own characteristics and specific properties for different functions in the human organism. These nutrients, when present in the diet, may prevent the appearance of these disorders during pregnancy, mainly associated to adequate water intake[14].

Several environmental and behavioral factors can also affect the appearance of esthetic disorders. One of them is the protection against sunrays, a very important factor in the prevention of these problems also during pregnancy. The sunrays may cause damage to collagenous and elastic fibers in the skin, damage to the genetic material in the cells and several degradations in the skin which may lead to diseases and formation of free radicals[14,15]. A clinical trial with pregnant women demonstrated the efficacy of sunscreen in preventing esthetic disorders[16].

Despite the information found, the performance of this work is justified due to two main reasons: these researches relating nutrients to esthetic alterations have not been performed with pregnant women and many of these data are empirical, considering the "biological plausibility", with a limited scientific reasoning, and, therefore, research in this area for evidence of these data might be appropriate.

In light of the foregoing, this work aimed to evaluate the relationship of food consumption, water intake and the appearance of cutaneous and vascular alterations in pregnant women.

METHOD

Subjects

A descriptive, cross-sectional study with pregnant women taking part in the prenatal programs of seven Health Basic Units (UBS) in the municipality of Santos, Brazil. The pregnant women were randomly selected[17] and for the sample size a confidence interval of 95%, a sample error up to 10% and a prevalence of 50% were considered[18]. The sample was calculated by using a prevalence value of 50% since no studies were found presenting the prevalence of these cutaneous affections in the Brazilian population of pregnant women.

Data collection

The data was collected in June to October of 2010. The subjects answered a questionnaire applied by the researcher containing 28 questions to describe characteristics and habits: Age, use of sunscreen, stated weight and height, practice and frequency of physical activity, daily water intake (measured as glasses of water per day), besides

history of appearance or aggravation of esthetic alterations: striae, cellulitis, periorbital dark circles and varicose veins after pregnancy. These esthetic alterations were assessed according to the person's perception.

Afterwards, the subjects completed a form about food consumption – Food Frequency Questionnarie (FFQ), adapted for this study, with a qualitative aspect, containing 52 food items, giving an emphasis on food items considered as source of nutrients described as protective against the esthetic problems assessed (Table 1). Some studies indicate greater ease and precision in the responses of FFQ to individuals with higher education[19,20,21]. Therefore, considering that the studied public could present low education and difficulty in filling the FFQ, the questionnaire was simplified. The FFQ was designed with a scale with four options: daily consumption, three to five times per week, once or twice per week or never consumed.

Table 1. Relationship of nutrients considered as protective, the source foods researched by means of FFQ and esthetic problems evaluated

Esthetic problem	Nutrients	Source foods	References
Cellulitis	Complex carbohydrates	Flours and derivatives	Souza & Silva[22]; Durighetto & Martinelli[23]
	Soluble and insoluble fibers	Flours and derivatives, integral foods	Durighetto & Martinelli[23]
	Complex B Vitamins and Folic Acid	Meats, poultry, fish, crustaceans, fruits, oilseeds	Durighetto & Martinelli[23]; Schröeder & Santos[24]
	Iodine	Iodinated salt, crustaceans, fish, milk and eggs	Klein[25]
	Silicon	Banana, corn, oat and derivatives	Krupek & Costa[26]
	Flavonoids	Red fruits and oilseeds	Santos, et al[27]
	Potassium	Some fruits, mainly avocado, banana and red fruits, vegetables, oilseeds, fish	Klein[25]
Periorbital dark circles	Vitamin E	Vegetable oils, margarine, oilseeds	Muñoz, et al[28]
	Vitamin C	Citric fruits, tomato	Kishimoto, et al[29]
	Omega 3 and Omega 6	Vegetable oils, flax, fish, crustaceans	Muñoz, et al[28]
	Phenolic compounds	Fruits, teas, soybean	Muñoz, et al[28]
	Lignane	Flax	Muñoz, et al[28]
Striae	Proteins	Leguminous crops, meat, poultry, fish, crustaceans, eggs, milk and dairy products	Ziegler & Sgarbieri[21]; Barbul[22]; Brodsky & Persikov[23]; Phillip, et al[30]
	Vitamin C	Citric fruits, tomato	Ziegler & Sgarbieri[31]; Barbul[32]; Brodsky & Persikov[33]; Kishimoto, et al[29]
	Calcium	Milk and dairy products, dark green leaves	Guastaldi & Aparecida[34]
Varicose veins	Soluble fibers	Oat and derivatives, integral foods	Schröeder & Santos[24]
	Insoluble fibers	Wheat and derivatives, integral foods, lentils	Schröeder & Santos[24]
	Vitamin E	Vegetable oils, margarine, oilseeds	Salviano & Fiocccchi[35]
	Vitamin C	Citric fruits, tomato	Kishimoto, et al[29]
	Flavonoids	Citric fruits, red fruits, brassicas, onion and soybean	Salviano & Fiocccchi[35]

Data processing and analysis

The consumption of each food item was dichotomized based on its respective consumption frequency reported. The options "daily consumption" and "three to five times per week" were considered as frequent consumption (X = 1) and the options "once or twice per week" and "never" were considered as sporadic consumption / never (X = 0). The sum of X values generated an individual protective food consumption score for each esthetic problem.

The data concerning the women who presented the esthetic problem and consumption of food items considered as protective agaisnt the respective problem were compared (Table 1). The Table 1 was prepared considering the data observed in the scientific literature.

The sample was grouped in tertiles for food and water consumption related to the esthetic problems, where tertile 1 concerned people with the lowest consumption of food items considerd protective against the esthetic problem evaluated and tertile 3 concerned the highest consumption of these food items. The presence of esthetic problems was considered as the dependent variable, therefore four logistic regression models were prepared, one for each esthetic problem evaluated. The presence of the problem was considered as y = 1 and its absence as y = 0. Association tests were performed using Chi-square test with a Yates correction and stepwise logistic regression analysis with entry of the type (foward selection), using the independent variables of interest: food intake (as a tertile), water intake in glasses of water per day (as a tertile) and the control variables: body mass index (continuous), the use of sunscreen (yes or no), age (continuous), practice of physical activity (yes or no). The estimated risk measurement was the *Odds Ratio* (OR) and Hosmer-Lemeshow test was used for verifying the logistic model fit[36].

Such methods for data processing and analysis were based on studies which performed similar procedures using FFQ, consumption tertiles and risk measurements, although with different objectives from this study[37].

For all analyses a 95% confidence interval and a significant value of $p < 0.05$ were determined.

The data were analyzed with the aid of *software* Statistical Package for Social Sciences (SPSS) for Windows version 15.0.

Ethical issues

Research protocol n. 17158-2010/91, concerning this study, was approved by the Ethics Committee of the Continued Education Coordination of the Municipality of Santos-SP (COFORM). The research was carried out according to the Declaration of Helsinki and all participants gave written consent to participate.

RESULTS

A total of 105 pregnant women at the mean age (standard deviation) of 24.4 (6.7) years (ranging from 13 to 38 years) participated in the study. It was verified that 70.5% (n = 74) of them did no physical activity and 33.8% (n = 25) used sunscreen every day. Table 2 shows the characteristics of sample.

Table 2. Sample characteristics

	Mean	SD
Age	24.3	6.6
Pregnancy weeks	23	9.9
BMI (kg/m²)	23.7	3.6
Weight gain (kg)	5.7	4.3
Water intake (glasses / day)	6.2	3.5
Daily meals	3.8	1.1

SD = Standard deviation.

Concerning the mentioned esthetic problems: 52.4% presented striae, 51.4% had cellulitis, 27.6% presented varicose veins and 24.8% showed periorbital dark circles. No relationship was observed between the presence of esthetic problems and pregnancy weeks (Table 3).

Table 3. Presence of esthetic problems

Presence of esthetic problems	Pregnancy weeks			Total of cases	p
	1 to 12	13 to 24	25 to 40		
Striae	8 (14.5%)	24 (43.6%)	45 (42.9%)	55	0.80
Cellulitis	8 (14.8%)	20 (37%)	26 (48.1%)	54	0.52
Periorbital dark circles	5 (19.2%)	10 (38.5%)	11 (42.3%)	26	0.88
Varicose veins	3 (10.3%)	12 (41.4%)	14 (48.3%)	29	0.57

Table 4 shows the result for the logistic models considering the esthetic problems as dependent variables.

Table 4. Odds Ratio and confidence intervals of 95% (95% CI) for the esthetic problems: striae, cellulitis, varicose veins and periorbital dark circles in pregnant women

Esthetic problem	Variable	Category	Univariate Model		Multivariate Model*	
			Crude OR	CI (Crude OR)	Adjusted OR	CI (Adjusted OR)
Striae	Consumption of food items considered protective against striae	Tertile 1	1.00		1.00	
		Tertile 2	0.52	[0.19 ; 1.43]	0.32	[0.16 ; 2.04]
		Tertile 3	0.32	[0.11 ; 0.90]	0.17	[0.03 ; 0.83]
	Water intake	Tertile 1	1.00		1.00	
		Tertile 2	0.22	[0.07 ; 0.73]	0.14	[0.02 ; 0.67]
		Tertile 3	0.22	[0.07 ; 0.73]	0.12	[0.02 ; 0.69]
Cellulitis	Consumption of food items considered protective against cellulitis	Tertile 1	1.00		1.00	
		Tertile 2	0.77	[0.26 ; 1.82]	0.54	[0.16 ; 1.84]
		Tertile 3	0.59	[0.23 ; 1.52]	0.76	[0.23 ; 2.54]
	Water intake	Tertile 1	1.00		1.00	
		Tertile 2	0.57	[0.02 ; 1.61]	0.46	[0.12 ; 1.76]
		Tertile 3	1.04	[0.36 ; 2.93]	1.08	[0.25 ; 4,60]
Varicose veins	Consumption of food items considered protective against varicose veins	Tertile 1	1.00		1.00	
		Tertile 2	0.51	[0.14 ; 1.78]	0.60	[0.13 ; 2.68]
		Tertile 3	1.84	[0.66 ; 5.10]	1.82	[0.50 ; 6.61]
	Water intake	Tertile 1	1.00		1.00	
		Tertile 2	0.53	[0.16 ; 1.74]	0.82	[0.18 ; 3.74]
		Tertile 3	1.23	[0.40 ; 3.69]	1.92	[0.42 ; 8.74]
Periorbital dark circles	Consumption of food items considered protective against periorbital dark circles	Tertile 1	1.00		1.00	
		Tertile 2	2.12	[0.69 ; 6.43]	2.85	[0.61 ; 13.19]
		Tertile 3	0.96	[0.31 ; 3.00]	1.42	[0.33 ; 6.10]
	Water intake	Tertile 1	1.00		1.00	
		Tertile 2	0.88	[0.27 ; 2.85]	0.39	[0.09 ; 1.75]
		Tertile 3	0.94	[0.29 ; 3.05]	0.33	[0.07 ; 1.58]

* Adjusted for body mass index (BMI), pregnancy weeks, physical activity and age.

Food items considered protective against striae and water intake appeared to be independent variables associated as protective against the appearance of striae.

In the multivariate model, it is possible to verify a protection factor in the tertile for the highest consumption of protective foods (tertile 3) for the appearance of striae with OR = 0.17 [0.04 ; 0.76] corresponding to the consumption of food items considered as source of proteins, vitamin C and calcium such as meats, leguminous crops, eggs, citric fruits, leaves and dairy products, either daily or three to five times in the week. Concerning water intake, protective factors were observed in tertile 2 with OR = 0.13 [0.03 ; 0.76], and in tertile 3 with OR = 0.12 [0.02 ; 0.62]. Tertile 3 corresponds to the highest consumption of eight glasses of water per day and tertile 2 corresponds to four to eight glasses per day.

Hosmer and Lemeshow test showed a value of p = 0.84 for the food consumption model and p = 0.47 for the water intake model, thus indicating a good fitting of these models. The other models tested were not significant.

DISCUSSION

Positive results were found concerning the adoption of a balanced nutrition, containing a great variety of foods and nutrients, with the prevention of striae caused or aggravated by normal organic alterations during pregancy.

Protective factors have been verified with a statistical significance between the consumption of foods which are source of protein, vitamin C and Calcium when the problem analyzed was the presence of striae[37]. Calcium is a nutrient which is very present in the body's soft tissues, including the muscles; so, its deficiency weakens the tissue as a whole, thus favoring striae[38]. Other nutrients such as proteins and vitamin C act directly in the synthesis of collagen, an important component in the skin structure. They act directly on the specific functions acquired by the several combinations of structural amino acids and on the formation of hydroxylases which transform lysine and proline, nutrients which are responsible for the synthesis of this collagen[30,31,34,39,40].

A study performed in 2007 indicating the adequacy of micronutrients in pregnant women verified that only 30% of the interviewees showed a vitamin C consumption below the recommendation, for this phase[32].

The striae are also a characteristic esthetic problem in the last three months of pregnancy, that is, in this stage the woman normally already obtains further information about how to conduct nutrition in an suitable manner, she already knows about the need for modifications in her dietary habits into a diet rich in important nutrients and about the importance of intaking a minimum amount of liquids per day[41].

Concerning cellulitis, periorbital dark circles and varicose veins, no significant result was found.

The diet containing sources of complex carbohydrates, fibers, complex B vitamins, iodine, silicon, flavonoids and potassium, considered as a functional nutrition for cellulitis, does not preclude the normal weight gain for the woman in this phase, which may lead to a destructuring of the skin and venous-lymphatic circulation and consequently to a hydrolipodystrophy, important in the etiology of this esthetic alteration[42-44].

The largest source of nutrients considered as functional for periorbital dark circles are the vegetable oils which, as a counterpart, are food items with a large quantity of calories, source of vitamin E, omega 3 and omega 6. These characteristics of fats (oils) may make pregnant women reduce their consumption in order to prevent a weight gain above the expected in this phase[41,45]. It is also believed that the self-diagnosis of the interviewees may have compromised the assessment for the presence of periorbital dark circles, due to the fact that its characterization involves elements which are difficult to visualize. Another important factor was the low incidence of this esthetic alteration in the population studied.

The non-significant relationship of nutrition and the prevention of varicose veins may have occurred due to the great alterations in the structure of collagen and elastin in the venous wall, damaged valvar segments which compromised microcirculation, which is common in pregnancy. Such factors hamper the adequate arrival of nutrients at these veins with alterations mainly associated to increased venous pressure and exudation of liquids leading to edema[46-50].

It was observed that water intake was significant in the prevention of the appearance of striae. Protective factors were verified from the consumption of four to eight glasses (~1 liter to ~2 liters) and over eight glasses (> 2 liters) of water per day. It is worth emphasizing that the Institute of Medicine recommends the intake of three liters of liquids per day for pregnant women[51].

It is believed that the adequate water intake favors the arrival of blood and lymphatic nutrients at the skin and vessels, besides helping in the absorption of certain nutrients such as, for example, calcium, important for the skin balance and prevention of the appearance of striae. Together with fibers, water becomes essential for intestinal transit stimulation, thus eliminating toxic substances of the body. These properties may help to prevent disruption of elastic fibers which sustain the skin[52].

It is noteworthy, that a healthy diet is essential throughout life, not only during pregnancy, to prevent diseases. A woman, who has a healthy diet throughout your life, will have benefits during the gestational period with less vitamin and minerals deficiencies. These deficiencies can lead to problems in the fetus development, but also the aesthetic disorders[53,54].

The low adherence to physical activity observed is thought to be due to discomfort upon leisure activities requiring a large energy expenditure such as, for example, sports activities and walks in the park[55]. This regular activities, among other factors, improves muscle and skin mobility and flexibility, besides improving the body's blood circulation as a whole. These factors contribute for nutrition and rehabilitation of body soft tissues, thus influencing on the prevention of esthetic disorders arising from pregnancy[56,57].

The pregnant women's adherence to the habit of using sunscreen was low, since only 20.95% (n = 22) of them use sunscreen daily. These data are contrary to the women's concern about esthetics and health, since the use of sunscreen with this frequency is part of the skin care and preventive measures for this early skin aging, which leads to the importance of programs for awareness about the problem in all phases of the woman's life, including in pregnancy[58].

CONCLUSION

It was observed that nutrition rich in protein, vitamin C, calcium and water intake (more than four glasses per day) was protective factor against the appearance of striae in pregnant women. The search for alternatives based on healthy lifestyle can help pregnant women avoid aesthetic problems without undergo expensive and invasive treatments.

The absence of previous studies which draw this relationship has limited the discussion of the study, which is innovative. It is worth emphasizing that the results observed do not finish the discussion about food / disease relationship regarding skin alterations in the pregnant woman. The combination of experimental and epidemiological studies appears as a good strategy to investigate the effects of nutrition and physiological alterations. The use of other methods for nutrition surveys and diagnosis of vascular and cutaneous alterations is recommended for future studies, showing a new overview of these alterations. The data presented in this study may serve as a basis for new studies about esthetic alterations in pregnant women.

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