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A Call to Action: Gaps in Dietary Awareness among Pregnant Women in North Eastern Romania

Ioana-Sadiye SCRIPCARIU[1], Mihaela GRIGORE[2], Lorena BALCAN[3], Antoneta Dacia PETROAIE[4]

Abstract

Living in a digital era when most women can enjoy the benefits of easy access to a wealth of online information does not guarantee that mothers-to-bear aware of healthy dietary and nutrition recommendations for pregnancy and the lactation period. Our study aimed to survey the awareness of pregnant women from urban and rural North Eastern Romania in order to identify potential knowledge gaps or misconceptions and suggest solutions to achieve adequate information. A cross-sectional study was conducted among 100 women in the third trimester of pregnancy from both rural and urban parts of NE Romania. A questionnaire was designed to collect data on general socio-demographic characteristics and the women's ability to recognize relevant recommendations for diet and nutrition during pregnancy and lactation. The survey was conducted in 2018 and the data was analysed with SPSS version 16. The mean age of the respondents was 29.8. Overall, they were not entirely aware of the appropriate weight gain during pregnancy, the role of iodine or vitamin D in fetus development, the recommended daily intake of dairy products, or the food sources for iron, folic acid, and fatty acids. Moreover, urban women (51%) seemed better informed overall than those from the countryside (49%) ($p<0.001$): significant knowledge discrepancies were found regarding awareness of recommended caloric increase during pregnancy ($p=0.0087$), number of meals per day (0.0230), or the benefits of iron ($p<0.0001$), calcium ($p=0.0192$), and folic acid ($p=0.0238$) in the diet. Our study provides

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insight into the awareness of pregnant women in NE Romania with regard to relevant diet and nutrition topics, as well as certain disparities between women from urban vs. rural areas. The results can help inform educational measures aiming to address knowledge needs and promote healthy dietary habits during such important periods as pregnancy and lactation.

Keywords: nutrition, diet, pregnancy, folic acid, questionnaire, survey, awareness, lifestyle.

Introduction

Diet and nutrition during pregnancy and lactation have been shown to bear significant influence on the fetus and new-born. For instance, an unhealthy maternal diet may increase the risk of neural tube defects (in case of deficient folic acid intake) or of preterm delivery (De-Regil *et al*., 2010; Englund-Ogge *et al.*, 2014). It may also impact the weight of the new-born and increase the risk of cardiovascular disease, impaired glucose metabolism, dyslipidemia and high blood pressure later on in life (Canani *et al.*, 2011). Additionally, excessive weight gain during pregnancy constitutes a risk factor for future overweightness and obesity in both mothers and babies. There are many factors that can influence nutrition habits during pregnancy and lactation, and knowledge is a noteworthy one (Lee *et al*., 2018). Until recently, healthcare professionals would inform mothers-to-be on what they needed to know, but lately the Internet has become a very popular source of health-related information for pregnant women, as several studies showed (Romano, 2007; Lagan, Sinclair & Kernohan, 2010; Gao, Larsson & Luo, 2013). For example, in the USA, more than three quarters of childbearing women reported having turned to the Internet for information about pregnancy and birth (Huberty *et al.,* 2013). The multitude of online sources can, in theory, facilitate women's awareness, knowledge, and understanding on topics of interest. However, because so much of the online content is not shared or curated by professionals, some information can be inaccurate and mislead women into adhering to false beliefs or unhealthy habits.

The aim of this study was to assess what pregnant women in NE Romania know about their nutrition in the context of the current digital era. More specifically, we sought to identify potential knowledge gaps or inaccuracies for which we could identify solutions for more adequate and effective information in the future.

Methodology

This cross-sectional study was conducted during April-July 2018 on 100 women pregnant in the third trimester, originating from both rural and urban areas in NE Romania. Written consent was obtained from all the participants after they were informed about the study. The pregnant women were invited to fill out a questionnaire in Romanian designed by the authors as a survey tool to assess awareness of recommended nutrition and dietary habits during pregnancy and lactation, as well as facilitate contextualized data analysis. The questionnaire consisted of three parts: (1) socio-demographic and lifestyle factors (age, marital status, level of education, number of children, smoking, alcohol consumption) – 8 items; (2) awareness and knowledge about diet during pregnancy - 22 items, and (3) awareness and knowledge about diet during lactation - 6 items. The questionnaire was pretested on 20 women before being used in the main study in order to verify comprehension from the perspective of the target group. The demonstrated diet-related knowledge was analyzed also in conjunction with the socio-demographic characteristics of the respondents.

Statistical analysis

Data analysis was performed using SPSS for Windows, Version 16.0. Chicago, SPSS Inc. The questionnaire data were entered into SPSS and checked for accuracy. All the variables were assessed descriptively (means and frequencies). Then, the Chi square test was performed to explore the relation between socio-demographic data and variables of main interest to the study (awareness and knowledge).

Population

The information on socio-demographic and lifestyle factors is summarized in *Table 1*. On average, our participants were 29.8-year-old women, of whom 49 (49%) were from rural areas and 51 from urban ones (51%).

*Table 1. S*ocio-demographic and lifestyle characteristics

Category	Item	%
Age	Under 20 years old	12
	20-29 years old	45
	30-39 years old	41
	Over 40 years old	2

Education	Primary school level (up to 5 years)	5
	Gymnasium or middle school level (5-8 years)	21
	High school education (9-12 years)	33
	College education	41
Marital status	Married	63
	Single/union	27
Smoking	Non-smoker	80
	Smoker	20
Alcohol consumption	Non-drinker	81
	Occasional drinker	

Results

The women's awareness regarding diet during pregnancy is summarized in *Table 2*. These items were related to healthy food habits, nutrient and vitamin supplementation, food sources of nutrients, normal weight gain during pregnancy, and the risks associated with drinking alcohol. To facilitate understanding, below we are providing a non-standardized English version of the items, translated from Romanian by a certified medical translator.

Table 2. Awareness regarding diet during pregnancy

Code	Item	Yes	No	I don't know
A1	During pregnancy a varied diet is recommended	90 (90%)	-	10 (10%)
A2	A pregnant woman should not eat for two	79 (79%)	3 (3%)	17 (17%)
A3	During pregnancy, bread, cereals, fresh fruits and vegetables are recommended	98 (98%)	-	2 (2%)
A4	The amount of milk and dairy products recommended during pregnancy is 600 mg/day	17 (17%)	2 (2%)	81 (81%)
A.5	Pregnant women are recommended to increase theire intake of proteins	80 (80%)	5 (5%)	15 (15%)
A.6.	During pregnancy, a weight gain of 9-12.5 kg is recommended	59 (59%)	1 (1%)	40 (40%)
A.7.	Pregnant women should eat 4-5 times a day	81 (81%)	1 (1%)	18 (18%)

N1	Foods that contain high-protein are: meat, eggs, milk	92 (92%)	1 (1%)	7 (7%)
N2	Healthy fats are: olive oil, olives, soy	50 (50%)	8 (8%)	42 (42%)
N3	Foods rich in iron: eggs, meat, spinach, liver, beans	82 (82%)	0	18 (18%)
N4	Green vegetables are foods rich in folic acid	54 (54%)	0	46 (46%)
N5	Foods rich in calcium are: milk, fish, green vegetables.	89 (89%)	0	11 (11%)
R1	Folic acid is important for the development of the nervous system	63 (63%)	0	37 (37%)
R2	A diet low in iron causes anemia.	78 (78%)	0	22 (22%)
R3	Calcium is important for the development of teeth and bones.	95 (95%)	0	5 (5%)
R4	Iodine is important for the intellectual development of the child.	32 (32%)	0	68 (68%)
R5	Alcohol consumption during pregnancy is harmful to the child.	96 (96%)	0	4 (4%)
R6	Breast milk is the best food for the baby.	98 (98%)	0	2 (2%)
R7	The lack of iron in the baby's diet causes anaemia.	80 (80%)	0	20 (20%)
R8	Anaemia occurs in children fed with pastry flour.	7 (7%)	4 (4%)	89 (89%)
R9	The lack of vitamin D in children causes rickets.	52 (52%)	0	48 (48%)
R10	A diet poor in protein decreases child growth.	42 (42%)	0	58 (58%)

Table 3 illustrates our search for statistically significant differences between women from urban areas versus from the countryside regarding their awareness of nutrition during pregnancy.

Table 3. Awareness regarding nutrition during pregnancy - comparison urban/rural area

Code	Item	Urban patients who responded yes	Rural patients who responded yes	p- value
A1	During pregnancy a varied diet is recommended	48 (97.95%)	42 (82.35%)	<0.0001
A2	A pregnant woman should not eat for two	47 (95.91%)	32 (62.74%)	0.01
A3	During pregnancy, bread, cereals, fresh fruits and vegetables are recommended	49 (100%)	49 (96.07%)	0.1593
A4	The amount of milk and dairy products recommended during pregnancy is 600 mg/ day	14 (28.57%)	3 (5.88%)	0.03
A.5	Pregnant women are recommended to increase theire intake of proteins	40 (81.63%)	40 (78.43%)	0.7834
A.6.	During pregnancy, a weight gain of 9-12.5 kg is recommended	34 (69.38%)	25 (49.01%)	0.0758/
A.7.	Pregnant women should eat 4-5 times a day	45 (91.83%)	36 (70.58%)	0.02
N1	Foods that contain high-protein are: meat, eggs, milk	47 (95.91%)	45 (88.23)	0.13
N2	Healthy fats are: olive oil, olives, soy	31 (63.26%)	19 (37.25%)	0.01
N3	Foods rich in iron: eggs, meat, spinach, liver and beans	46 (93.87%)	36 (70.58%)	0.002
N4	Green vegetables are foods rich in folic acid	37 (75.51%)	17 (33.33%)	<0.0001
N5	Foods rich in calcium are: milk, fish, green vegetables	44 (98.79%)	45 (88.23%)	0.81
R1	Folic acid is important for the development of the nervous system	42 (85.71%)	21 (41.17%)	0.02
R2	A diet low in iron causes anaemia	47 (95.91%)	31 (60.78%)	<0.0001

R3	Calcium is important for the development of teeth and bones	49 (100%)	46 (90.19%)	0.02
R4	Iodine is important for the intellectual development of the child	27 (53.06%)	5 (9.80%)	0
R5	Alcohol consumption during pregnancy is harmful to the child	49 (100%)	47 (92.15%)	0.04
R6	Breast milk is the best food for the baby	49 (100%)	49 (96.07%)	0.1593
R7	The lack of iron in the baby's diet causes anaemia	47 (95.91%)	33 (64.70%)	<0.0001
R8	Anaemia occurs in children fed with pastry flour	4 (8.16%)	3 (5.88%)	0.75
R9	The lack of vitamin D in children causes rickets	41 (83.67%)	11 (21.56%)	<0.0001
R10	A diet poor in protein decreases child growth	32 (65.30%)	10 (19.60%)	<0.0001

The participant's answers to the items regarding the role of lactation and dietary recommendations in this period are summarized in *Table 4*. Then, *Table 5* illustrates the differences between women from urban versus rural area on this issue.

Table 4. Awareness regarding diet during the lactation period

Code	Item	Yes	No	I don't know
LU1	Up to 6 months of age, breastfeeding is the only recommended diet	96 (96%)	0	4 (4%)
LU2	Human milk provides an adequate amount of nutrients and energy	95 (95%)	2	3 (3%)
LU3	Breast milk protects the baby from infections	88 (88%)	0	12 (12%)
L1	Decreased calorie intake reduces lactation	52 (52%)	0	48 (48%)
L2	Protein consumption should be increased during the breastfeeding period	43 (43%)	0	57 (57%)
L3	During the breastfeeding period it is recommended to drink 2-3 liters of liquids	95 (95%)	0	5 (5%)

Table 5. Awareness regarding diet during the lactation period - comparison urban/ rural area

Code	Item	Urban patients who responded yes	Rural patients who responded yes	p-value
LU1	Up to 6 months only breastfeeding is recommended	49 (100%)	47 (92.15%)	0.04
LU2	Human milk provides an adequate amount of nutrients and energy	49 (100%)	46 (90.19%)	0.0565 /ns
LU3	Breast milk protects the baby from infections	48 (97.95%)	40 (78.43%)	0,0024
L1	Decreased calorie intake lowers lactation	38 (77.55%)	14 (27.45%)	<0.0001
L2	Protein consumption should be increased during breastfeeding	28 (57.14%)	15 (29.41%)	<0.0001
L3	During the lactation period it is recommended to consume 2-3 liters of liquids	48 (97.95%)	47 (92.15%)	0.1827/ ns

Discussion

Insufficient awareness of nutritional recommendations in pregnancy and lactation is linked with an inadequate diet during these important periods in the development of the fetus and newborn. In the digital era that we are currently living in, many women are a few clicks away from vast and varied amounts of information on the Internet. Apart from the undeniable advantage of accessibility, there is also the risk that some of this information is incorrect, misunderstood or both. Therefore, it is important to periodically assess the level of women's awareness, knowledge and understanding of such key topics, and then to address any gaps or misconceptions accordingly.

In our study, most of the participants (90%) knew that pregnant women were recommended to adhere to a diversified diet rich in proteins, cereals, fresh vegetables and fruits, and 81% knew that they needed 4-5 meals per day. Moreover the majority (96%) where aware that alcohol consumption during pregnancy posed a danger to the fetus, although 19% also reported drinking alcohol while pregnant.

Excessive weight gain during pregnancy represents an important risk factor for future overweightness in both mothers and babies. A large proportion of the women who participated in our study (79%) considered that doubling caloric intake during pregnancy was necessary (95.91% from urban areas, 62.74% from

rural areas, p=0.0087*)*. However, only 59% of the women knew to recognize the appropriate weight gain during pregnancy (69.38% from urban areas, 49.01% from rural areas, p=*0.0758)*. In the literature, the percentage of women reporting correct figures regarding weigh gain varies between 11.7% and 47% (Shub *et al.,* 2013). By studying 664 women <20 weeks pregnant, De Jersey showed that, in Australia, more than one third of women gained too much weight during pregnancy. Notably, when their knowledge was probed 16 weeks into their pregnancies, 47% of participants were unsure what weight gain recommendations would apply to them (De Jersey, Nicholson, Callaway & Daniels, 2012).

Most of the pregnant women in our study recognized the foods containing calcium or iron (89% and 82%, respectively). Almost all of them pointed to the importance of increased protein intake during pregnancy and they correctly identified the sources for proteins (meet, eggs, and dairy products). However, they did not know the recommended daily amount of dairy products (28.57% urban women, 5.88% rural women, p=*0.0258).* Only 43% indicated that increased protein intake remains relevant also during lactation (57.14% urban women, 29.41% rural women, *p<0.0001)*.

Although 76% of women recognized the usefulness of folic acid for the development of the nervous system, there was a statistically significant difference between women from urban versus rural areas, with the former appearing to be more informed (p<0.0001*).* Only 54% of participants knew green vegetables to be an important source of folic acid (85.71% urban women, 41.17% rural women, p=*0.0192)*. In the literature, the knowledge and practice of folic acid supplementation during pregnancy varies according to different authors. Conlin MacLennan & Broadbent (2006) showed that, although 73% of women knew about the role of folic acid in pregnancy, only 18% also knew the recommended dose. By contrast, Sen *et al.* (2001) analysis of 100 women pointed to both good awareness of the role of folic acid and of how it should be administered.

In our study, women's awareness regarding iodine intake was limited: only 32% of the participants pointed the role of iodine in the development of the nervous system. In this case, we found no significant difference between women from urban versus rural areas, both demonstrating insufficient awareness (53.06% urban women, 9.80% rural women, p=0.0004*).* Our results are consistent with data from the literature. In a cross-sectional study on 200 pregnant women, Martin, Savige & Mitchell (2014) showed that the women lacked knowledge about iodine and the need for supplementation, and only 18.5% indicated they thought they needed an iodine supplement. In another study, Garnweidner-Holme *et al.* (2017) revealed insufficient knowledge about the importance of iodine in pregnant and lactating women, as well as about the most important dietary sources.

About the role of folic acid, our study showed that pregnant women in NE Romania seem more aware of the importance of folate in comparison with iodine, and other authors report similar data from elsewhere. Charlton *et al*. (2012), for

instance, found that pregnant and lactating Australian women know more about folate and other dietary recommendations than iodine. Also, regarding lactation, the women we surveyed could recognize its positive role in protection from infections and normal baby development. Overall, we were able to observe that pregnant women from urban areas appeared well informed than those from rural areas regarding nutrition during lactation, but also pregnancy, but that all women could benefit from relevant public education campaigns and more specifically targeted measures.

One approach to optimize a healthy diet during pregnancy is to facilitate knowledge of pregnancy nutrition guidelines through the provision of nutritional counseling. Better knowledge is important in that it informs women's daily decisions about food and underpins positive changes to dietary behaviors. In fact, women are generally highly motivated to improve their lifestyle during pregnancy, and this is especially true for women from urban areas and with a more prosperous socio-economic status. Ferraro, Rutherford, Keely, Dubois & Adamo (2011) showed that almost all (93%) pregnant women would like to receive information from a care provider. Concurrently, healthcare practitioners who interact with pregnant women are shown to play a central role in providing education and supporting women's intentions and efforts toward a healthy lifestyle and diet (van der Pligt *et al*., 2011). In a similar vibe, Martin *et al.*, 2014) found that the medical practitioner was indicated as the main source of information for general health information and for providing advice regarding nutrition supplementation. As such, medical practitioners are ideally placed to provide pregnant women with both information and prescription for supplements in support of a healthy pregnancy. During prenatal visits, practitioners have the opportunity to discuss nutrition with women, and recommendation should be issued as early as the first antenatal visit, or even during preconceptional visits (Martin *et al*, 2014; Lee *et al.*, 2018). Moreover, midwives are an important category of healthcare provider who can contribute to women improving their lifestyle during pregnancy. By employing both dietary knowledge and counseling skills, the wider care team can ensure that pregnant women attain healthy habits (Wennberg *et al.,* 2013). With regard to breastfeeding, too, counseling is an effective public health intervention to promote more breastfeeding practices (Trandafir *et al.*, 2018). The systematic review performed by McFadden *et al*. (2019) showed that breastfeeding counseling should best be provided face-to-face, but also by telephone, both antenatally and postnatally, to all pregnant women and mothers with young children.

However, when information received from health care practitioners is perceived as insufficient, women seek out information for themselves (Downs, Savage, & Rauff, 2014). Nowadays, in the digital era, most women use the Internet to access pregnancy-related nutrition information, but the quality of online information is not always appropriate. For instance, much online content is biased, based on personal opinion, not grounded in scientific evidence or in line with the latest guidelines issued by professional bodies with knowledge and authority in the field.

For women out there, it can be difficult to distinguish accurate from inaccurate sources on the Internet. Sometimes, online information can be confusing and overwhelming, or it can even be harmful (Skinner, Biscope & Poland, 2003). The Internet can also offer women a platform for interaction on shared interests, but it does not necessarily prevent such exchanges from causing anxiety (De Santis *et al*., 2010).

Apart from providing insight on mothers-to-be in this part of the world (NE Romania), the strength of our study lies with the analysis of how women's urban vs. rural background may interact with their level of awareness of important diet and nutrition topics. We acknowledge that our study is also limited in certain respects, such as that we have not surveyed women's misconceptions and preferred information channels regarding the same topics. Last but not least, the questionnaire itself may be subject to further improvements and to subsequent applications on larger numbers of participants for more substantial statistical analysis.

Conclusion

Our study showed that in NE Romania awareness regarding nutrition during pregnancy and lactation seems to be better among women from urban areas in comparison to women from the countryside. Healthcare professionals need to know about such awareness gaps in order to address them effectively. Educational measures should include women from both main environments, but focus more on reaching rural pregnant women. For the Internet to play a positive informative role, healthcare professionals should guide pregnant women with regard to where to find and how to extract correct information available online.

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