ÁCIDO FÓLICO, PREVENÇÃO DE DEFEITOS DO TUBO NEURAL E FATORES ASSOCIADOS: UMA REFLEXÃO

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FOLIC ACID, PREVENTION OF NEURAL TUBE DEFECTS AND ASSOCIATED FACTORS: A REFLECTION

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RESUMO: Tem como objetivo discutir os fatores associados ao uso de ácido fólico durante a gestação. Estudo descritivo-reflexivo com embasamento teórico elaborado a partir de artigos científicos atualizados. Apesar dos benefícios do ácido fólico e mesmo se tratando de uma recomendação mundial, a prevalência de consumo deste suplemento é, ainda, insatisfatória. Alguns estudos têm mostrado que mulheres com gravidez não planejada, menor escolaridade e nível socioeconômico, sem companheiro e com pré-natal insuficiente são mais susceptíveis a não consumir esse suplemento durante a gestação. A suplementação com ácido fólico é uma intervenção imprescindível, atuando na prevenção primária dos defeitos do tubo neural. Assim, políticas públicas que venham a incentivar ainda mais a suplementação materna com ácido fólico são de grande valia, uma vez que reduzem a morbimortalidade neonatal. Também é necessário o planejamento de ações que visem minimizar a ação dos fatores associados ao uso de ácido fólico durante a gestação.

PALAVRAS-CHAVE: Ácido fólico. Defeitos do tubo neural. Gravidez. Enfermagem obstétrica. Educação em saúde.

RESUMEN*: Tiene como objetivo discutir los factores asociados al uso de ácido fólico durante la gestación. Estudio descriptivo-reflexivo con base teórica elaborado a partir de artículos científicos actualizados. Apesar de los beneficios del ácido fólico e incluso si se trata de una recomendación mundial, la prevalencia de consumo de este suplemento es todavía insatisfactoria. Algunos estudios han demostrado que las mujeres con embarazo no planificado, menor escolaridad y nivel socioeconómico, sin compañero y con prenatal insuficiente, son más susceptibles a no consumir ese suplemento durante la gestación. La suplementación con ácido fólico es una intervención imprescindible, actuando en la prevención primaria de los defectos del tubo neural. Así, las políticas públicas que fomenten aún más la suplementación materna con ácido fólico son de gran valor, ya que reducen la morbi-mortalidad neonatal. También es necesario la planificación de acciones que busquen minimizar la acción de los factores asociados al uso de ácido fólico durante la gestación.*

PALABRAS CLAVE*: Ácido fólico. Defectos del tubo neural. Embarazo. Enfermería obstétrica. Educación en salud.*

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***ABSTRACT**: Aims to discuss factors associated with the use of folic acid during gestation. A descriptive-reflective study with a theoretical basis elaborated from updated scientific articles. Despite the benefits of folic acid and, even if it is a worldwide recommendation, the prevalence of this supplement consumption is still unsatisfactory. Some studies have shown that women with unplanned pregnancies, lower schooling and socioeconomic status, without partners and with insufficient prenatal care are less likely to consume this supplement during gestation. Folic acid supplementation is an essential intervention, acting in the primary prevention of neural tube defects. Thus, public policies that further encourage maternal supplementation with folic acid are of great value, since they reduce neonatal morbidity and mortality. It is also necessary to plan actions that aim to minimize the action of the factors associated with the use of folic acid during gestation.*

***KEYWORDS**: Folic acid. Neural tube defects. Pregnancy. Obstetric nursing. Health education.*

Introduction

Folic acid, also known as vitamin B9 or folate, is predominantly found in dark green leaves/vegetables (kale, broccoli, asparagus, spinach, arugula, mustard), beans, lentils, chickpeas, citrus fruits, liver and animal viscera. These foods are natural sources of this vitamin and their preparation must be judicious, since a significant part of folic acid is oxidized (between 50% and 95%) and destroyed when the food goes through the cooking or preparation process. It is a water-soluble vitamin, hence the loss during food processing. This compound has a fundamental function in the cell multiplication process and is therefore essential during pregnancy.

There is consensus in the scientific literature on the effective role of this vitamin in preventing congenital malformations, such as neural-tube defects (NTDs). NTDs are congenital anomalies resulting from incomplete or incorrect closure of the neural tube and appear between the third and fourth week of embryonic development. They include anencephaly, spina bifida and encephalocele, the former being incompatible with life and the others associated with high perinatal morbidity and mortality. The etiology of NTDs is associated with a multifactorial inheritance resulting from the interaction between genetic and environmental factors. NTDs can be identified at birth by filling in field 34, “congenital malformation and/or chromosomal abnormality”, in the Declaration of Live Births (DNV, Portuguese initials) of the Live Birth Information System (SINASC, Portuguese initials). It is important to correctly fill in the DNV to establish the real prevalence of congenital anomalies in our country.

In Brazil, public policies for folic acid supplementation have been implemented to prevent NTDs and include the fortification of this micronutrient in wheat and corn flours (BRASIL, 2002), as well as the daily supplementation of this compound for pregnant women in the periconceptional period, according to the Technical Manual Prenatal and Puerperium. Positive results in relation to the first initiative were obtained in a study conducted in the State of São Paulo using SINASC, which analyzed the prevalence and spatial distribution of NTD, before and after the fortification of wheat and corn flours with folic acid. The prevalence decreased 35%, from 0.57 to 0.37 per thousand live births after fortification (OR = 0.65; IC95%: 0.59-0.72) (FUJIMORI *et al.*, 2013).

However, these preventive health actions may have their effectiveness compromised by the diversity of regional eating habits and unplanned pregnancies. Unplanned pregnancy is a risk factor for congenital malformations, according to data from the Latin American Collaborative Study of Congenital Malformations (ECLAMC). A Brazilian study of children and adolescents with spina bifida showed that 78% of mothers declared that their pregnancy was not planned and 80% of them stated that they had not used folic acid in the first gestational months (GAÍVA; CORRÊA; SANTO, 2011). Young Brazilian pregnant women (<20 years old) exhibited a high prevalence of newborns with NTD, explained by the non-periconceptional supplementation of folic acid in unplanned pregnancies, as is characteristic in adolescents (REIS *et al.*, 2015).

Still in relation to the prevention of NTDs, a study in the city of Juiz de Fora, Minas Gerais, with 118 health professionals (95 doctors and 23 nurses working in obstetrics), assessed the level of knowledge about the use of folic acid for prevention of NTDs (CONCEIÇÃO *et al.*, 2012). There was no difference between the level of knowledge when compared to their training and between the two classes of professionals evaluated. The majority (94.1%) of professionals said they knew the role of folic acid, however, 64.2% reported not knowing when to start prenatal supplementation (CONCEIÇÃO *et al.*, 2012). This finding is worrying, since these professionals work in the pregnancy-puerperal period. In relation to the surveyed pregnant women, 96.2% reported having heard of folate. Of these, only 27.6% knew the important role of folate in the prevention of NTD and only 20.1% of them had ingested folic acid during the periconceptional period (NOSRAT; SEDEHI; GOLALIPOUR, 2012). This latest survey revealed that health services (54.5%) were the main source of information on the benefits of folate, reinforcing the need for adequate knowledge of these professionals to promote maternal and child health (NOSRAT; SEDEHI; GOLALIPOUR, 2012).

Other congenital anomalies in which folic acid has a protective effect include preventing the occurrence of non-syndromic cleft lip and palate (SILVA *et al.*, 2019). NTDs and cleft lip and palate occur in embryologically similar periods and, in addition, the development of facial structures occurs from cells originating from the neural crest, originating from the closure of the neural tube (SILVA *et al.*, 2019).

NTDs represent an important cause of infant morbidity and mortality. Approximately 50% of affected children die in the first year of life and those who survive have significant physical and/or intellectual disabilities that require prolonged and costly rehabilitation for the family and society. A recent study (FRANCE *et al.*, 2017) that investigated the main causes of death in childhood in Brazil showed that congenital anomalies, which ranked 5th in 1990, started to figure as the 2nd main cause in 2015, although there was a slight decrease of the rates in the years analyzed - from 3.31 to 3.06/1,000 live births (FRANCE *et al.*, 2017).

Despite the benefits of folic acid, even though it is a worldwide recommendation, the prevalence of consumption of this supplement is still unsatisfactory. Brazilian studies have shown that women with unplanned pregnancies, less education and socioeconomic status, without a partner and with insufficient prenatal care are more likely to not consume this supplement during pregnancy (BARBOSA *et al.*, 2011; ESPOLADOR *et al.*, 2015; AMARAL *et al.*, 2016; LINHARES *et al.*, 2017). Knowing the factors that influence the consumption of folic acid during pregnancy allows strategies to be devised to minimize the effects of non-adherence to this practice, which is extremely important for the protection of the Central Nervous System of the fetus.

Given the above, the objective of the present study is to discuss the factors associated with the use of folic acid supplementation during pregnancy, since the benefits of this compound for the prevention of NTDs are well established in the literature. For the theoretical basis of this reflection, updated scientific articles that addressed this theme were used.

Factors associated with the use of folic acid supplementation during pregnancy

The results presented in Table 1 show that the factors that increased the use of folate were: number of prenatal consultations greater than seven; the fact that the pregnancy was planned; higher level of education and age among pregnant women; gestational age less than 11-12 weeks and; knowledge about folic acid (BARBOSA *et al.*, 2011; ESPOLADOR *et al.*, 2015; AMARAL *et al.*, 2016; LINHARES *et al.*, 2017). One of these studies mentioned the existence of negligence on the part of health professionals who accompany the pregnant

women, both in terms of prescribing and monitoring the consumption of this compound Barbosa et al. (2011). Another research concludes that it is necessary to implement more effective campaigns, aimed mainly at women with lower socioeconomic status, Linhares et al. (2017).

Table 1 - Summary of the main Brazilian studies that evaluated the factors associated with folic acid supplementation during pregnancy

Reference	**Objective**	**Casuistry**	**Main results**
Barbosa *et al*. (2011)	Estimate the prevalence of folic acid supplement consumption during pregnancy and identify factors associated with its consumption.	280 women from the city of Diamantina, MG.	Women with less education, adolescents and with a number of prenatal consultations (less than seven) presented, respectively, 1.61 (IC95%=1.34–1.93), 1.18 (IC95%=1.03–1.35) and 1.18 (IC95%=1.02–1.37) more chances of not consuming the supplement during pregnancy. The prevalence of folic acid consumption among pregnant women was low and associated with age, maternal education and the number of prenatal consultations.
Espolador *et al*. (2015)	Identify the factors associated with the use of folic acid supplementation during pregnancy.	120 prenatal pregnant women in the city of São José do Rio Preto, SP.	It was concluded that being older, having a prescription for folic acid supplementation and gestational age less than 12 weeks were factors that influenced the intake of folic acid.
Amaral *et al*. (2016)	To evaluate the prevalence of the use of folic acid supplementation in pregnant women and to identify factors associated with not performing this practice.	316 puerperal women of the city of Joinville, SC.	Completion of higher education increased the likelihood of folate supplementation by 3.5 times [OR 3.5 (IC 95%, 1.1-11.1)]. Pregnancy planning and the beginning of prenatal care before the 11th week also increased the chances of consuming folic acid by [OR 2.0 (IC 95%, 1.2-3.5)] and [OR 2.2 (IC 95%, 1.2-4.3)], respectively. Knowledge about folic acid was the greatest predictor of supplementation, increasing it by 10 times [OR 10.1 (IC 95%, 5.0-20.9)]. Among women who used folate, only 22 (19.6%) started before pregnancy. In addition, the average time of use (3.3 months ± 2.7) was below the recommended. The chances of adhering to folate supplementation were higher in pregnant women who had more education, planning pregnancy, beginning prenatal care before the 11th week and knowing about the role of folic acid.
Linhares *et al*. (2017)	Identify the prevalence and factors associated with the use of folic acid supplementation during pregnancy.	2,685 puerperal women in the city of Rio Grande, RS.	The prevalence of folic acid use was 54.2%. The factors associated with the use of folic acid were: white skin color, living with a partner, higher education and family income, being primiparous, having planned the pregnancy, having six or more prenatal consultations and having started prenatal care at first trimester of pregnancy.

* MG: Minas Gerais, SC: Santa Catarina, SP: São Paulo, RS: Rio Grande do Sul
Source: devised by the author.

The planning of pregnancy is a factor of difficult interference, since the neural tube, a precursor structure of the brain and spinal cord, closes between 22 and 28 days after conception,

a period in which many women are still unaware of their pregnancy status. The closure of this tube is essential for the formation of the skullcap and spine. Women who take folic acid after the result of the pregnancy test run the risk of this anomaly being already developing, as the time of appearance of this type of malformation is very early. The time of establishment of the different types of fetal malformations is: neural tube defects - 28 days; defects in the cardiac ventricular septum - 42 days; cleft lip - 36 days; cleft palate - 47 to 72 days. In planned pregnancies, the contact between the patient and the doctor is generally more extensive, which favors guidance about the newborn's protective vitamin complexes (AMARAL *et al.*, 2016).

Another interesting finding showed empowerment from the scientific knowledge possessed by pregnant women, something that can be considered a necessary condition for the prophylactic use of folate (AMARAL *et al.*, 2016). However, it is still necessary to carry out awareness campaigns for women of childbearing potential with regard to promoting the use of prophylactic folic acid. Such activities should be extended to health professionals involved in prenatal care and to society in general, through training courses and dissemination in the media.

Schooling is another important factor to be discussed. More educated pregnant women have greater access to information and, consequently, greater knowledge of the protective role of folate in the prevention of NTDs. Low schooling, on the other hand, is generally related to the late start of prenatal care and lower frequency of consultations (BARBOSA *et al.*, 2011). With pregnant women with less education, it is essential that health professionals use language that is easy to understand, that is, popularize scientific knowledge.

The results presented in Chart 1 raise some questions: is the purpose of prenatal diagnosis being achieved? In other words, are the guidelines on the use of vitamin-mineral supplementation being adequately addressed, aiming to provide a peaceful, healthy and safe pregnancy?

Folic acid and Nursing

The nursing professional, specifically the one who works in the pregnancy-puerperal cycle, has an unquestionable role in promoting maternal and child health. In addition, we must emphasize that the prevention of congenital anomalies is mainly done in preventive public health, that is, at the primary level. In this perspective, Nursing can act in Health Education through the promotion of educational campaigns on the importance of folic acid in the prevention of NTDs, focusing on women of childbearing age. However, a previous study showed an important level of ignorance by doctors and obstetric nurses about the use of folic

acid, related to the time of use, the beginning of supplementation and the ideal dosage, which are relevant points in the prevention of NTDs. Thus, the training of these professionals is necessary to minimize the risks of such anomalies (CONCEIÇÃO *et al.*, 2012).

Still, considering the high financial costs related to the treatment and monitoring of patients with NTDs, in addition to the serious personal, family and social consequences, in contrast to the efficiency and low cost of prevention, we hope that this work can effectively contribute for the development of other public health strategies, which directly interfere in the prevention of these serious congenital anomalies (CONCEIÇÃO et al., 2012).

Final considerations

Supplementation with folic acid is an essential intervention, acting in the primary prevention of neural tube defects. Thus, public policies that will further encourage maternal supplementation with folic acid are of great value, since they reduce neonatal morbidity and mortality. It is also necessary to plan actions that aim to minimize the action of factors associated with the use of folic acid during pregnancy.

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