Few Danish pregnant women follow guidelines on periconceptional use of folic acid

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ABSTRACT

INTRODUCTION: Approximately 60-70 pregnancies are affected by neural tube defects (NTD) in Denmark annually. Folic acid (FA) deficiency can cause NTD. Periconceptional FA supplementation reduces the risk of NTD by up to 70-80%. Danish women planning pregnancy are recommended 0.4 mg of FA daily from at least one month before planned conception and continuing throughout the first 12 weeks of pregnancy. The aim of the present study was to examine the knowledge about and use of FA supplementation among Danish pregnant women.

METHODS: From 11 October 2012 to 15 November 2012, all women attending for a routine nuchal translucency scan were given a questionnaire regarding their knowledge and use of FA supplementation during their current pregnancy.

RESULTS: A total of 462 women answered the questionnaire. 95% had taken FA supplements at some point during their pregnancy, but only 10.4% as recommended. More than 80% stated knowledge about recommendations before the current pregnancy. Positive predictors of knowledge were: age > 30 years, multiparity, Danish origin and education > 3 years.

CONCLUSION: Despite national recommendations on periconceptional FA supplementation, our study showed that women do not follow these recommendations. Especially women with a low socio-economic status were likely to lack knowledge about FA supplementation in relation to pregnancy. There is a need for revision of the existing national recommendations and for other initiatives aiming to improve women's intake of FA, including FA fortification of flour and/or other food products.

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TRIAL REGISTRATION: The study was approved by the Danish Data Protection Agency (No.: 01855 HVH-2012-044).

Neural tube defects (NTD) are malformations including myelomeningocele, anencephaly and encephalocele. The malformations occur during the formation of the neural tube, which is completed around the 28th day from conception [1] and is most likely present before or around the time the woman discovers her pregnancy. The incidence of NTD in Denmark is around 1.2/1,000 pregnancies [2], which equals 60-70 cases annually, most of which result in termination of pregnancy.

Folic acid (FA) deficiency is associated with NTD. Randomised controlled trials have shown that periconceptional FA supplementation can reduce the incidence of these malformations with as much as 70-80% [3-5].

Since 1997, the Danish Health and Medicines Authority (DHMA) has recommended that Danish women take 0.4 mg of FA supplemantation daily, starting at least one month before planned conception and continuing throughout the first 12 weeks of pregnancy as a means of primary prevention of NTD. Women at high risk of NTD (women/husband has NTD, previous pregnancy with NTD, women with epilepsy) are recommended a daily dose of 5 mg. The DHMA and the Ministry of Food, Agriculture and Fisheries of Denmark have established a series of health promotion campaigns in agreement with national recommendations.

As secondary prevention of NTD, all pregnant women in Denmark are offered a nuchal translucency screening at gestational age 11-14 weeks and an anomaly scan in their second trimester (19-20 weeks).

Despite recommendations regarding periconceptional FA supplementation, several studies have shown that women do not take supplements according to the recommendations. Studies from other European countries find that only between 16.7 and 31% of women take FA supplements as recommended [6, 7]. A large Danish study examined the effect of national information campaigns on 19,989 women's intake of FA [8]. The study found an increase in compliance among women with planned pregnancies rising from 10-15% before campaigns were launched to 20-25% shortly after the campaigns. Another Danish study found that even though 82% of women had knowledge about FA supplementation in relation to pregnancy, only 51% took it as recommended by the DHMA [9].

In order to asses the need for a revision of the present Danish recommendations, we need to know the status of Danish women's experience and knowledge regarding FA. The aims of this study were to examine:

1. Pregnant women's knowledge of FA supplementation in relation to pregnancy
2. If Danish pregnant women take FA supplementation as recommended by the DHMA.

ORIGINAL ARTICLE

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TABLE 1

Characteristics of participants.

Participants, n	462
Age, yrs, mean (range)	31 (19-41)
BMI, n (%)	
< 18.5 kg/m²	13 (2.8)
18.5-25 kg/m²	311 (67.3)
> 25 kg/m²	137 (29.7)
Non-stated	1 (0.2)
Smokers, n (%)	28 (6.1)
Highest educational level, n (%)	
Elementary school	21 (4.5)
High school	30 (6.5)
Vocational education	15 (3.2)
Higher education, 1-2 yrs	57 (12.3)
Higher education, 3-4 yrs	192 (41.6)
Higher education, ≥ 5 yrs	145 (31.4)
Non-stated	2 (0.4)
Fertility treatment, n (%)	32 (6.9)

BMI = body mass index.

TABLE 2

Participants' knowledge about folic acid in current pregnancy.

	n (%)
Participants	462 (100)
Knew about the DHMA recommendations before current pregnancy	376 (81.4)
From where do you know about the recommendations? (Possible to give several answers)	
General practitioner	235 (50.9)
Friends/family	192 (41.6)
Midwife	46 (10.0)
Internet	203 (43.9)
Books/magazines	138 (29.9)
Others	39 (8.4)

DHMA = Danish Health and Medicines Authority.

METHODS

All pregnant women meeting for a nuchal translucency scan at the Fetal Medicine Unit at Copenhagen University Hospital Hvidovre in the period from 11 October 2012 to 15 November 2012 were invited to complete a questionnaire. The questionnaire included 23 questions about age, weight, height, smoking status, earlier pregnancies and deliveries, and information about knowledge of and use of FA supplementation in their current pregnancy.

Inclusion criteria:

- Women aged 18 years or more
- Women who were able to speak and write Danish.

The sonographers also collected information from women who did not want to participate in the questionnaire; specifically, they were invited to state their reasons for not participating for use in a later drop-out analysis. Before the final data collection, three pilot testing rounds had been performed to optimise and test the questionnaire.

Out of 557 women who were invited to participate, 462 women answered the questionnaire, which equals a 82.9% response rate.

A total of 83 women either did not want to participate in the questionnaire or were excluded because of lacking ability to speak or write Danish. None were excluded because they were younger than 18 years of age. The non-participating women had a mean age of 29 years, which is two years younger than the participating women ($p < 0.0005$). Twelve women never returned the questionnaire.

Before statistical analyses were performed, the questionnaire data had been entered twice in the database to avoid possible errors.

The probability that a woman had knowledge of recommendations in relation to age, parity, country of origin and educational level was tested by use of 2 × 2 tables calculating the relative risk (RR). The same was done for use of FA in current pregnancy and use of FA as recommended by the DHMA. p-values < 0.05 were regarded significant.

All analyses were performed in SPSS for MAC, version 20 (SPSS Inc, Chicago, IL, USA).

Trial registration: The study was approved by the Danish Data Protection Agency (No.: 01855 HVH-2012-044).

RESULTS

Table 1 shows the characteristics of the 462 participating women. In all, 251 of the women were primiparas, and 395 were born in Denmark. 82.3% of the women stated that the current pregnancy was planned.

As many as 95.0% of the women had taken FA supplements at some point during the current pregnancy. Of these, only 10.4% had taken FA supplements as recommended by the DHMA from one month before planned pregnancy. By far the largest proportion of women started with supplementation after the pregnancy was confirmed (54.8%).

More than 80% stated knowledge of the recommendations from the DHMA about FA supplementation before the current pregnancy, and 41.3% of the women knew the reason why it was recommended to take FA before/during early pregnancy.

Most of the women had their knowledge about FA supplementation either from their general practitioner, friends or from the internet, see **Table 2**.

TABLE 3

Knowledge and use of folic acid during the current pregnancy.

	Knowledge of DHMA recommendations		Use of FA supplementation in current pregnancy		Took FA supplementation as recommended	
	RR (95% CI)	p-value	RR (95% CI)	p-value	RR (95% CI)	p-value
Age < 30 yrs	0.81 (0.74-0.90)	< 0.005	0.95 (0.91-0.99)	0.008	1.05 (0.99-1.11)	0.134
Primipara	0.81 (0.75-0.89)	< 0.0001	1.05 (1.01-1.10)	0.024	1.01 (0.95-1.08)	0.742
Country of origin = Denmark	1.19 (1.01-1.40)	0.011	1.11 (1.01-1.23)	0.001	0.98 (0.91-1.07)	0.71
Education < 3 yrs	0.74 (0.65-0.85)	< 0.0001	0.92 (0.86-0.98)	0.001	1.03 (0.97-1.10)	0.35

CI = confidence interval; DHMA = Danish Health and Medicines Authority; FA = folic acid; RR = relative risk.

By analysing subgroups, we found the following positive predictors of knowledge of national recommendations regarding FA supplementation: age > 30 years, multiparity, Danish origin and education > 3 years.

Primiparous women and women of Danish origin were more likely to take FA supplementation in the current pregnancy. There was no association between the above-stated characteristics and the use of FA supplements as recommended, see **Table 3**.

DISCUSSION

The main finding in our study was that only 10.4% of the 462 women attending a nuchal translucency scan took FA supplements as recommended by the DHMA, despite the fact that more than 80% knew about the recommendations before their current pregnancy.

There will allways be some degree of uncertainty about the answers given in a questionnaire. In our study, we did not control for correct answers, and some degree of recall bias is probably present. One might expect that the women would tend to overestimate both their knowledge about and their use of FA during their current pregnancy.

That most of the women in this study did not take FA supplements as recommended by DHMA is in accordance with findings of other studies: A Norwegian study found that 58% took FA supplements at some point in pregnancy and only 16.7% took it as recommended [6]. A large Danish study found that up to 25% of women with a planned pregnancy took FA supplements as recommended, even after national campaigns about FA in relation to pregnancy [8]. Another Danish study from 2010 (n = 84) found that 51% took FA supplements in conformity with the DHMA recommendations [9].

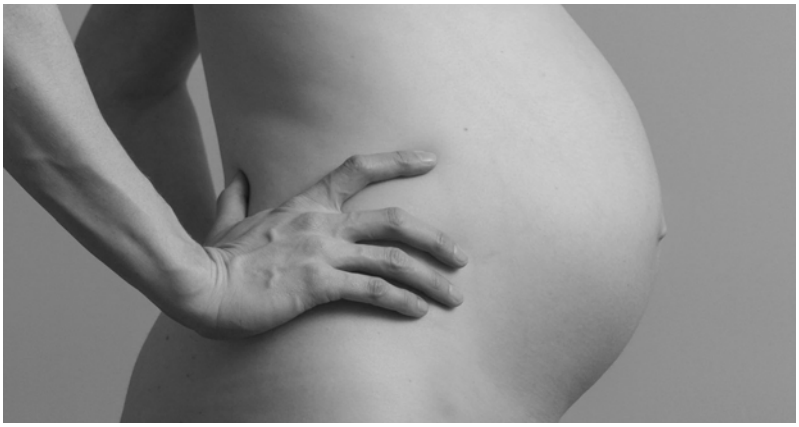
A newly published study from England examining FA intake among 466,860 women showed that only 31% of pregnant women took FA supplements before pregnancy [7].

Surprisingly, only 10.4% of the women in our study took FA supplements as recommended, even though 82% of the women stated that their pregnancy was planned. The proportion of planned pregnancies in our study was very high compared with that of other studies which found the incidence of planned pregnancies to be between 22% and 90% with a median of 58% [10]. This could be due to recall bias as most of the women coming for a nuchal translucency scan might state that their pregnancy was planned, even though this was not originally so.

There is a risk of selection bias in a study like ours. We know that approximately 90% of Danish pregnant women have a nuchal translucency scan made as part of the first trimester screening for trisomy 21 [11]. It is possible that the group of women not participating in the screening may harbour a higher proporption of non-compliers. Furthermore, 10-15% of early pregnancies are miscarried, and theese women do not attend the nuchal translucency scan either [12].

Previous studies find the following predictors for low compliance with FA supplementation in pregnancy: low educational level, young maternal age, unplanned pregnancy and immigrant status [6, 7, 9, 10]; all of which are factors that correlate with a lower socio-economic status, and a group of women that needs more focus in the prevention of NTD. Our study did find young age, low educational level, primiparity, and origin other than Danish to be associated with less knowledge about FA supplementation and pregnancy, but we found no association between theese characteristics and FA use as recommended.

Several studies have examined the effect of health promotion campaigns regarding women's knowledge about FA before and during pregnancy. A review of four studies found that even though women's use of FA supplementation rose with a factor 1.7 to 7.2 after health promotion campaigns, the share of women that took supplements as recommended stayed below 50% [10]. A large Danish study found that compliance with FA supplementation among women with planned pregnancies rose from 10-15% before health promotion campaigns to 20-25% shortly after [8]. Our study did not directly examine the effect of the campaigns initiated by the DHMA, but no matter how few women followed the recommendations before the campaigns, it does not ap-



Folic acid supplementation of 0.4 mg daily is recommended to all Danish pregnant women from one month before planned conception and throughout the first 12 weeks of gestation.

pear as if earlier campaigns made women take FA supplements as recommended.

When the proportion of women taking FA supplements as recommended continues to be unsatisfactorily low despite health promotion campaigns, other initiatives are needed. One possibility could be FA fortification of flour and/or cereal products. It has been decided to introduce mandatory FA fortification of food in more than 70 countries around the world [13]. In the USA and Canada [14, 15], FA fortification has led to a decrease in the incidence of NTD, but this step has not yet been introduced in Denmark or in any other EU country [16].

FA fortification would affect the non-targeted population also. There have been worries about FA fortification and possible masking of B12 vitamin deficiency and an increased risk of different cancer types, but no studies have been able to confirm these hypotheses [17, 18]. The European Scientific Committee on Food has not been able to find any harmful effects of a daily dose of 1 mg FA [19].

CONCLUSION

Most of the women in our study knew about the recommendations given by the DHMA regarding FA supplementation before and during pregnancy, but very few took FA as recommended. Danish origin, maternal age above 30 years and a high educational level were predictors for knowledge about FA supplementation but not for taking supplements as recommended.

This study implies a need for a revision of the Danish recommendations regarding periconceptional FA supplementation and/or FA fortification and a need for more research on how compliance with current recommendations is increased.

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