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A population-based survey of knowledge and use of folic acid among Irish women

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ABSTRACT

Background**:** It is widely accepted that folic acid helps prevent neural tube defects (NTDs), yet little is known about levels of use and knowledge among Irish women. Ireland has long had higher rates of NTDs than many other countries; prevention should be a priority. This is the first population-based survey of folic acid knowledge and use in Irish women. The goal of this study was to survey a representative sample of Irish women in order to determine their levels of knowledge and use of folic acid. Methods: A stratified sample of 500 Irish women of reproductive age, designed to represent the Irish population in age and education was interviewed in 2002-3. Results**:** Almost all women had heard of folic acid (95.2%) and more than half knew that it prevented birth defects (52.0%). Yet intake of folic acid tablets was low (5.5%). Older women, women with third level education and those married or living with a partner were significantly more likely to be taking folic acid pills. Smokers were significantly less likely to know about folic acid and less likely to be taking it. Conclusions: This study suggests that public health messages promoting folic acid are reaching Irish women. However, this awareness does not translate into action for most women, especially those younger, less well educated and women who smoke. More aggressive efforts by the public health community to change behaviour, especially among women most likely to have children, should be encouraged.

INTRODUCTION

Folic acid in the form of daily periconceptional supplementation has been shown to prevent more than half of new cases of neural tube defects [1]. NTD rates in Ireland were almost one percent of all births in the 1950s [2], and since then have dropped precipitiously. Data from the Eurocat registry [3] indicate a drop of five-fold from a level of 46.5 in 1980 to 9.0 per 10,000 births in 2000. Previous studies of knowledge and use of folic acid among relatives in Irish families where a child has been born with a neural tube defect (NTD) found that knowledge was very high, but use of supplemental folic acid in the form of daily pills was low; an intervention study designed to increase both knowledge and use of folic acid was successful in raising folic acid use among relatives from 9% to 19% (4). However, interpretation of these results was hampered by the lack of information on levels of knowledge and use among the general population of Irish women. Dietary studies in Ireland suggest that only 2% of Irish women are getting the correct amount of folic acid from their diets (5). There has been no systematic survey of levels of knowledge and use of folic acid among Irish women of reproductive ages. This study set out to measure knowledge and use of folic acid among a stratified sample of women designed to represent the age and education structure of all women in the Republic of Ireland. Our hypothesis was that both knowledge and use would be less in the general population than among NTD relatives. The objectives were to determine what women knew about the benefits of folic acid and its sources, and how many were taking folic acid supplements as recommended by public health authorities.

METHODS

Sample

A random sample of Irish women would be the most scientifically rigorous way to obtain a representative sample, but would have been financially prohibitive. We set

out to determine if women in the town of Drogheda would be similar enough to all Irish women so that they could serve as a proxy for the country as a whole. In order to determine how similar women in Drogheda were to Irish women, we requested from the Irish Central Statistics Office a set of tables for women aged between 18 and 44 years from the 2002 Census of Ireland. Each table was a two-way tabulation of ages in five-year age intervals by education. Tables were supplied for all Irish women, for women in Leinster (the province containing Drogheda), from County Louth (the county containing Drogheda), and finally from the borough of Drogheda.

We compared the populations of the four progressively smaller regions by age and education and found some differences. Women in Drogheda were 1.29 times more likely than all Irish women to have not completed secondary school (<LC: the Leaving Certificate is the national certificate earned by completing secondary school), and 1.13 times more likely to be aged between 18 and 24. Thus, Drogheda women are slightly younger and less well educated than Irish women. However, the differences are not great; we concluded that Drogheda women can validly represent Irish women for the purposes of this report.

We applied the percentage distribution for three categories of age by three categories of education, yielding 9 cells, to the total of 500 to obtain the number of women in each cell. Nine groups of women were enrolled by age intervals (18-24, 25-34, 35-44) and by education (less than Leaving Certificate, Leaving Certificate and more than Leaving Certificate. The resulting numbers are shown in Table 1. To be eligible, women had to be aged between 18 and 44 years at the time of the interview and resident in or near the town of Drogheda.

Recruitment Methods
We assembled a quota sample (6) of 500 women from sources such as local hospital clinics and doctors' waiting rooms, from local businesses and self-help groups and, most successfully, from among women attending Weight Watchers groups. Women were interviewed between October, 2002 and March 2003.

Interview
The interview sought information on folic acid knowledge ("Have you ever heard of folic acid? Have you heard of the benefits of folic acid? What are the benefits? When is the best time to take folic acid? Other ways to get folic acid?") and use ("Are you currently taking folic acid tablets daily?), the folic acid brand, taking multivitamin tablets daily and the brand, and source of information on folic acid. Demographic information (age, education, marital status and children, plan to have children, cigarette smoker) was also obtained.

Statistical Analysis
Simple descriptive statistics were compared using chi-square tests and t-tests, as appropriate, with alpha set at 0.05 and a two-tailed test. For the analysis of the data we used SAS (a package of programs for statistical analysis, SAS Institute, Cary, NC, USA), and Epi-Info, a package of programs for epidemiological studies provided free by the Centers for Disease Control, Atlanta, GA, USA (www.cdc.gov).

RESULTS

Characteristics of the sample of 500 women are set out in Table 1. Most women (65.2%) were married or living with a partner, and a minority (21.6%) were planning to start a family now, or continue a family. Most (73%) had children; most were non-smokers (64.6%). Nearly all the respondents had heard of folic acid (95.2%). Very few (26, or 5.5%) were currently taking folic acid tablets daily. The most popular brand of folic acid mentioned was Clonfolic, being taken by 19 of 26 women, 5 were not sure of the brand, one took Sona and one other Centrum. Multivitamins were being taken by 28.6% of women. A large proportion did not know the name of the brand (19.3%). The most common brand mentioned was Seven Seas (17.0%) followed by Centrum (13.3%), Multibionta (8.1%) and Vivioptal (8.1%).

We asked a number of questions to evaluate level of knowledge about folic acid (Table 2). Most respondents (52%) had heard that folic acid prevents birth defects and a larger proportion, 72.3%, had heard that it prevents spina bifida. A small proportion of women said that folic acid prevents Down syndrome (15.3%). The single correct answer for when is the best time to take folic acid (before and during early pregnancy) was given by less than half of the respondents (41.3%); slightly more said that before pregnancy was the best time and a small proportion said during pregnancy (6.7%). One-quarter of women knew the other sources of folic acid; a large group knew that folic acid came from foods (44.4%), and fewer knew that folic acid was included in breakfast cereals (31.7%).

Their source of information about folic acid was identified as the doctor or nurse by the largest group (45.3%), from TV or radio by 24.9%, from friend/relative or word of mouth by another quarter, with magazine/newspaper ranking last, before 'other'.
The high proportion of people who had heard of folic acid varied little according to their demographic characteristics (Table 3). There was no trend by either age or education level. Women who were married or living with a partner and women who had children were more likely to have heard of folic acid, though not significantly more so. Planning to start a family made no difference.

The same factors were used as stratifying variables to determine if there were differences in current intake of folic acid tablets (Table 4). Despite the small numbers of users there were significant discriminating factors. Older women and women with more education were more likely to take folic acid. Women who were married and those planning a family and all six women who were currently pregnant were more likely to be taking folic acid tablets.

Women who were smokers were significantly less likely to have heard of folic acid as non-smokers (odds ratio, OR,=0.40, 95% CI 0.17 , 0,97), less likely to have heard of the benefits of folic acid (OR=0.57), less likely to be currently taking folic acid tablets (OR=0.42) and less likely to know that folic acid prevents birth defects (OR=0.67). There were no significant differences between smokers and non-smokers on knowledge of the best time to take folic acid or sources of folic acid (Table 5).

Figure 1 shows the proportion of women in each age/education cell who had heard of folic acid; Figure 2 shows the same breakdown for current intake of folic acid tablets.

DISCUSSION

This sample of women designed to represent all Irish women showed that level of knowledge about folic acid was high, but current intake of folic acid tablets was very low. This is the first survey undertaken in Ireland with the aim of determining the level of knowledge and use of folic acid in the general population of women of reproductive age. We found that neither age nor level of education were associated with knowledge or use of folic acid. However, women who smoked were less likely to know of the benefits of folic acid and less likely to be taking folic acid pills.

Previous surveys of Irish women have been limited regionally or to ante-natal clinics, and as such, are not representative of all Irish women of reproductive age. However, they suggest that knowledge is increasing, yet use remains low. A survey in a Dublin ante-natal clinic [7] indicated that knowledge and use of folic acid was higher among private than public patients; folic acid was being taken by 5% of public and 20% of private ante-natal patients. Sayers et al [8] in a survey of Dublin women reported in 1997 indicated that only 9 of 337 women (2.7%) surveyed were currently taking folic acid supplements. An All-Ireland nutrition survey carried out between 1997 and 1999 indicated that only 2% of women aged 18-35 achieved the recommended folate intake and these women were supplementing their diets with folic acid tablets [5]. Awareness among Dublin women attending an ante-natal clinic and reported in 2001 [9] was very high at 92%, yet periconceptional use was reported by only 18%.

Surveys undertaken in 2000 in the United States indicated that 75% of US reproductive-age women had heard of folic acid, but only 14% knew it prevented birth defects. In spite of this 31% said that they were taking a vitamin supplement containing folic acid [10] [CDC website: www.cdc.gov/ncbdd/folicacid/locamp.htm]. Similarly, in the Netherlands, 76% of women of childbearing age surveyed had heard of folic acid yet only half were using it as recommended [11]. The gap between knowledge and use seen in our study seems to be widespread.

Public health campaigns designed to increase knowledge and use of folic acid have been reported and are successful. For instance, an intense intervention campaign to increase folic acid awareness in four southwestern Virginia (USA) counties during the 12 months of 1997 significantly raised awareness of benefits from 31% beforehand to 54% afterwards [12]. Reports from Mexico of a public health campaign recommending a 5.0 mg folic acid tablet weekly suggested that this campaign was associated with a 50% drop in NTDs [13]. A more active intervention campaign, consisting of a mailed-out package of information and vouchers doubled use of folic acid among relatives in Irish families with a neural tube defect [4]. However, even among women most at risk for an NTD pregnancy, that is, women who have already had an affected pregnancy, rates of folic acid usage are not high [14, 15].

Our study has a number of strengths and weaknesses. The large number of women surveyed lends credibility to the results. This study uses market research methods to obtain a sample representative of all Irish women, and the sample was satisfactorily validated.

In contrast to other studies [16 – 18] we were unable to demonstrate an association between either age or education and knowledge and use of folic acid. We used three large groupings of age and education for our sample; it is possible that finer gradations of age and education might have revealed a difference, or the levels of knowledge were uniformly high and of intake uniformly low, leaving little room for variability. Irish women in this age range may be culturally homogeneous, despite socio-economic

differences. On the other hand, we found that married women, non-smokers and women with children or planning a family were more likely to be taking folic acid, consistent with previous results [16, 18].

Smokers as a group particularly merit the attention of public health authorities. In addition to their low use of folic acid and low serum folate levels smokers have poor diets with low intake of foods having anti-carcinogenic properties [19 – 21]. Public health campaigns to reduce smoking would have a large impact on many aspects of women's health.

Given the low level of usage of folic acid in the Irish population, and the gap between knowledge and use seen both here and overseas, fortification of flour with folic acid would be an effective way to increase usage without having to increase level of information. In Nova Scotia. A significant drop in NTD rates in Nova Scotia is attributed to food fortification [22]. Unless food in universal use, like flour, is fortified more aggressive and interventional public health campaigns will be needed in order to increase folic acid intake.

It may be worth noting that there may be a backlash against folic acid among the public that health care providers need to anticipate. As folic acid usage becomes more widespread, and NTD rates continue to fall, the proportion of new NTD cases born to women taking folic acid, and therefore folate-resistant, will increase. Women who have taken folic acid as recommended and who nevertheless have an NTD-affected pregnancy may not understand that folic acid only prevents a proportion of NTDs. Disappointed women may reach the airwaves with the opposite message - that folic acid's promise is untrustworthy – and persuade others that public health messages are misleading. Health care personnel should anticipate this problem and educate the public accordingly.

In common with other studies, this survey of Irish women shows that public health messages are successful in raising awareness and information, but do not persuade women to take folic acid on a large scale. Relatively passive campaigns in the form of billboards, media spots and leaflets have raised awareness considerably, but seem to do little to increase intake. In contrast, simple interventions are successful and could be implemented on a wide scale at relatively little cost. Some groups of women, for instance, smokers and women of low socioeconomic status, are less likely to be reached by a national campaign and merit special attention. Simply increasing knowledge may not raise folic acid use to acceptable levels. Food supplementation may be the only way to ensure that all women get adequate levels of folic acid.

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Table 1 Characteristics of the Sample

Characteristic		N	%
Age at interview, years	18 – 24	105	21.0
	25 – 34	187	37.4
	35 – 44	208	41.6
Education level	Less than Leaving Certificate	262	52.4
	Leaving Certificate	137	27.4
	More than Leaving Certificate	101	20.2
Married, or living with a partner	Yes	326	65.2
	No	174	34.8
Do you plan to start a family now*	Yes	108	21.6
	No	316	63.2
	Don't know	76	15.2
Do you have children?	Yes	365	73.0
	No	129	25.8
	Currently Pregnant	6	1.2
Do you smoke?	Yes	177	35.4
	No	323	64.6
Have you ever heard of folic acid?	Yes	476	95.2
	No	23	4.6
	Don't know	1	0.2
Are you currently taking folic acid tablets daily?	Yes	26	5.5
	No	450	94.3
	Don't know	1	0.2

* Question continues 'or continue a family'?

Table 2 Knowledge of folic acid

Question		N	%
What are the benefits of folic acid?	Helps prevent birth defects	248	52.0
	Helps prevent spina bifida	345	72.3
	Helps prevent Down syndrome	73	15.3
	Not sure, don't know	48	10.1
	Other	10	2.1
Best time to take folic acid	Before and during early pregnancy	197	41.3
	Before pregnancy	215	45.1
	During pregnancy	32	6.7
	Not sure, don't know	33	6.9
Beside pills, other ways to take folic acid	Foods, such as broccoli and orange juice	212	44.4
	Take a daily multivitamin with folic acid	112	23.5
	Take both folate-rich foods and multivitamins	76	15.9
	Breakfast cereals	151	31.7
	Don't know, not sure	121	25.4
Where did you hear about folic acid?	TV/radio	119	24.9
	Doctor/nurse	216	45.3
	Magazine, newspaper	101	21.2
	Friend/relative; word of mouth	120	25.1
	Other	28	5.9

Table 3 Factors affecting knowledge of folic acid

	Ever heard of folic acid		
	Yes		
	N	%	p
Age at interview, years			
18 – 24	99	94.3	
25 – 34	182	97.3	
35 – 44	195	94.2	0.7
Education level			
Less than Leaving Certificate	245	93.9	
Attained Leaving Certificate	136	99.3	
More than Leaving Certificate	95	94.1	0.5
Married, or living with a partner			
Yes	315	96.6	
No	161	93.1	0.07
Do you plan to start a family now*			
Yes	104	96.3	
No	301	95.6	
Don't know	71	93.4	0.4
Do you have children?			
Yes	351	96.4	
No	119	92.3	
Currently Pregnant	6	100.0	0.1
Do you smoke?			
Yes	163	92.6	
No	313	96.9	0.03

* Question includes: 'or continue a family'?

Table 4 Factors associated with use of folic acid

	Use of folic acid		
	Yes		
	N=26	%	p
Age at interview, years			
18 – 24	0	0	
25 – 34	17	9.3	
35 – 44	9	4.6	0.004
Education level			
Less than Leaving Certificate	11	4.5	
Attained Leaving Certificate	4	2.9	
More than Leaving Certificate	11	11.6	0.01
Married, or living with a partner			
Yes			
No	25	8.0	
	1	0.6	0.002
Do you plan to start a family now*			
Yes			
No	20	19.2	
Don't know	5	1.7	
	1	1.4	<.001
Do you have children?			
Yes	13	3.7	
No	7	5.9	
Currently pregnant	6	100.0	<0.001
Do you smoke?			
Yes	5	3.1	
No	21	6.7	0.14

* Question continues 'or continue a family'?

Table 5 Knowledge and use of folic acid among smokers

Question	Smokers N=177 %	Non-Smokers N=323 %	Odds Ratio	95% Confidence Intervals	P
Have you heard of folic acid?	92.6	97.0	0.40	0.15, 0.97	0.04
Have you heard of the benefits of folic acid	80.7	87.9	0.57	0.34, 0.98	0.04
Are you currently taking folic acid?	2.9	7.0	0.42	0.13, 1.21	0.12
Benefits:					
♦ prevents birth defects	43.2	53.3	0.67	0.45, 0.98	0.04
♦ prevents spina bifida	67.1	70.3	0.86	0.57, 1.30	0.51
♦ prevents Down syndrome	10.8	16.7	0.60	0.33, 1.09	0.10
Best time to take folic acid: before and during early pregnancy	43.2	37.5	1.27	0.86, 1.88	0.25
Other ways to take folic acid:					
♦ foods	39.2	44.3	0.81	0.55, 1.20	0.32
♦ multivitamins	26.1	20.4	1.38	0.88, 2.17	0.18
♦ both food & multivitamins	15.3	15.2	1.01	0.59, 1.74	0.94
♦ cereals	26.7	32.2	0.77	0.50, 1.18	0.24

Figure 1 Knowledge of folic acid among 500 Irish women according to age and educational level

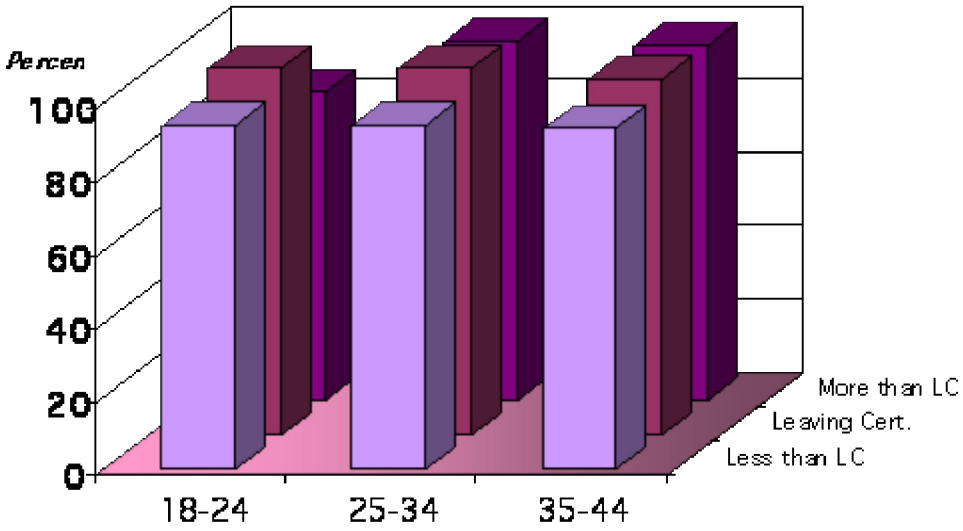

Figure 2 Use of folic acid supplements among Irish women by age and educational level