



Opinion

Ohio pharmacy students' knowledge of folic acid and neural tube defects

Crystal M. Boykin, PharmD^{a,1}, Natalie A. DiPietro Mager, PharmD, MPH^{b,*}

^a Cincinnati VA Medical Center, Cincinnati, OH

^b Department of Pharmacy Practice, Raabe College of Pharmacy, Ohio Northern University, Ada, OH

Abstract

To evaluate Ohio pharmacy students' knowledge about folic acid for the prevention of neural tube defects (NTDs), a 15-item multiple-choice survey was sent electronically to pharmacy students in their final year of study at all accredited pharmacy programs in the state. The survey, previously utilized to assess knowledge of folic acid in non-pharmacist health care provider groups, was adapted with permission from researchers at the National Center on Birth Defects and Developmental Disabilities, Centers for Disease Control and Prevention (CDC), and the March of Dimes. The cover letter did not disclose the topic of the survey. The survey was completed anonymously. A link at the conclusion of the survey directed students to the CDC website for further information about folic acid. In total, 147 pharmacy students completed the survey. Nearly 99% of survey respondents knew that folic acid can prevent birth defects, and of those, 86% could correctly specify NTDs. However, students were not able to consistently identify food sources, recommended doses, or timing of folic acid intake to prevent NTDs. Sources of information about folic acid included didactic (86%) and experiential (44%) education. Among this sample of pharmacy students, most were aware of folic acid for prevention of NTDs. However, some gaps in knowledge remain. More robust evaluations of pharmacy students' knowledge of folic acid and NTDs should be performed and educational interventions implemented as needed. Pharmacy educators must ensure students receive information necessary to promote prevention and improve public health.

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Background

Pharmacists and pharmacy students under their direction are well positioned to implement public health functions of primary, secondary, and tertiary prevention and improve patient-specific and population-based outcomes.^{1–3} Many public health-related topics are essential elements of pharmacy education,^{4,5} and there is growing recognition that these topics should be given priority in the curriculum.^{6,7} Therefore, it is

vital that pharmacy students receive adequate knowledge and training through Doctor of Pharmacy (PharmD) programs to assume necessary roles in public health.

One public health priority that pharmacists and pharmacy students can impact is improvement of maternal and child health outcomes.⁸ Counseling women of childbearing potential about folic acid for the prevention of neural tube defects (NTDs) is one example of an opportunity to provide primary prevention in this area.⁸ NTDs such as spina bifida and anencephaly affect approximately 3000 pregnancies each year in the United States (U.S.); more than 300,000 babies are born with NTDs annually worldwide.⁹ These birth defects of the brain and spinal column are serious and result in lifelong morbidity or mortality.⁹ Studies have shown that 50–70% of NTDs are preventable by consuming 400 mcg of folic acid daily before conception and during the first-trimester of

* Corresponding author. Natalie A. DiPietro Mager, PharmD, MPH, Department of Pharmacy Practice, Raabe College of Pharmacy, Ohio Northern University, 525 S. Main St., Ada, OH 45810.

E-mail: n-dipietro@onu.edu

¹At the time of the study, Crystal Boykin was a PharmD Candidate at Ohio Northern University Raabe College of Pharmacy.

pregnancy.¹⁰ Women with certain risk factors, such as diabetes, anti-epileptic drug use, or a previous NTD-affected pregnancy, should take higher doses.¹¹ As it may be difficult to obtain sufficient amounts of folic acid through diet alone and rates of unplanned pregnancy in the U.S. are high, supplementation in the form of a folic acid tablet or multi-vitamin containing sufficient folic acid is recommended for all women of childbearing potential.¹²

Increasing the number of women of childbearing potential who take folic acid supplementation is one of the objectives included in Healthy People 2020.¹³ Currently, many women in the U.S. are still not aware of the need of daily folic acid intake to prevent NTDs.¹⁴ While only 33% of women responding to a March of Dimes survey indicated that a health care provider had informed them about the importance of folic acid, nearly 90% reported they would be likely to take a daily folic acid supplement if a health care provider advised them to do so.¹⁴ As accessible and trusted members of the community, there are numerous ways that pharmacists and pharmacy students can fill these unmet needs. For example, in the U.S., national observances such as National Birth Defects Prevention Month and Folic Acid Awareness Week provide opportunities to involve pharmacy students in counseling and outreach activities to raise awareness about folic acid.¹⁵ In addition, these future pharmacists can incorporate counseling and recommendations about folic acid into daily practice, potentially as part of medication therapy management (MTM) once licensed.¹¹

However, as there have been no systematic evaluations of knowledge about folic acid or NTDs among pharmacy students at more than one school in the U.S., it is not currently known whether pharmacy students are well prepared to discuss this important public health issue with women or whether additional training is required. The purpose of this study was to evaluate knowledge of folic acid and NTDs among pharmacy students in Ohio in their final year of school.

Methods

Over a two-month period, pharmacy students ($n = 636$) enrolled in their final year of study at one of six PharmD programs in the state of Ohio accredited by the Accreditation Council for Pharmacy Education were administered a survey about folic acid and NTDs. The survey consisted of 15 multiple-choice questions (13 knowledge items and two demographic items). The survey was previously utilized to assess knowledge of folic acid in non-pharmacist health care provider groups and was adapted with permission from researchers at the National Center on Birth Defects and Developmental Disabilities, Centers for Disease Control and Prevention (CDC) and the March of Dimes.¹⁶ Before distributing the survey to the study sample, it was pilot-tested among pharmacy students at Ohio Northern University currently enrolled in therapeutics modules. The purpose of the pilot-testing was to ascertain face validity

and to identify potential technical difficulties in the online survey. The pilot-testing resulted in no changes to the wording of any questions or to the design of the survey.

After successful pilot-testing, the survey was distributed electronically via the QualtricsTM survey software system. A cover letter that did not disclose the topic of the survey was included. The cover letter and a link to the survey were sent via e-mail to the experiential director of each accredited pharmacy program in Ohio who then forwarded the e-mail to all pharmacy students enrolled at his/her institution in their last year of study. Two additional e-mails were sent to the experiential directors to remind the students eligible for the study to take the survey if they had not yet completed it. The experiential directors confirmed that they sent the e-mails to the students when requested to do so.

Once the students completed the survey anonymously, a link directed them to the CDC website for more information about folic acid. Data were analyzed with descriptive statistics utilizing IBM SPSS Statistics Version 20 for Windows and Microsoft Excel 2010 for Windows. Cramer's V test was utilized to examine whether there were differences among schools A, B, D, and E (Table 1) in the number of students answering each question correctly. The survey and the methods for distribution and analysis were approved by Ohio Northern University Institutional Review Board.

Results

A total of 147 pharmacy students from six accredited schools in the state of Ohio completed the survey. Table 1 displays the distribution of the responses. Among them, 47 (32%) respondents indicated they were male, and 89 (61%) were female. There were 11 students who did not answer the demographic question. All respondents answered that they were in their final year of pharmacy school.

Overall, 145 students (nearly 99%) knew that folic acid can prevent birth defects. Respondents who answered this question correctly then received a follow-up question to type in a free text box which specific birth defects can be prevented with adequate folic acid intake; 125 students (86%) typed an answer such as "neural tube defects," "spina bifida," "spinal cord problems," or other terms that could be classified as related to a NTD. In addition, 86 students

Table 1
Distribution of survey responses from each accredited pharmacy school in Ohio

School	<i>n</i>	Response rate, %
A	40	25
B	52	65
C	1	1
D	31	24
E	21	22
F	2	3
Total	147	23

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