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AWARENESS OF FOLIC ACID SUPPLEMENTATION FOR PREVENTING NEURAL TUBE DEFECTS AMONG GYNECOLOGISTS AND PEDIATRIC SURGEONS

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Abstract

Introduction: Folic acid therapy can help prevent severe prenatal deformities such as neural tube defects (NTDs). However, despite international campaigns, folic acid awareness and practice in Pakistan remain low and should be assessed among healthcare providers.

Objectives: The study's goal is to investigate the knowledge and perceived practicability of folic acid supplementation for NTD prevention among gynaecologists and pediatric surgeons in Karachi, Pakistan.

Materials and Methods: A cross-sectional study was conducted at Cantt General Hospital Rawalpindi and Sir Ganga Ram Hospital Lahore for six months from March, 2025 to August, 2025. It included 120 participants. Structured questionnaires were employed to collect the data which are descriptively analyzed to determine awareness, practices and barriers.

Results: For folic acid, 85% of the participants were informed about its use to prevent NTDs, but only 50% were informed about the dose, and only 40% were informed about the periconceptional period. Some of the obstacles were low levels of patient awareness (65%) and the absence of organizational protocols (30%).

Conclusion: Raising awareness, modification of policies and public health initiatives and advocacy should be used in the fight against lack of knowledge pertaining to folic acid supplementation.

Keywords: *Neural tube defects, folic acid, gynecologists, pediatric surgeons, Pakistan, awareness.*

INTRODUCTION

The use of folic acid supplements as a preventive measure for the development of NTDs is a critical public health concern in gynaecology and pediatric surgery. significant congenital defects of the brain and spinal cord, as described by NTDs, have the potential to lead to significant physical and emotional

difficulties, resulting in catastrophic consequences for the affected individual and the family. Although there has been a robust evidence base on the role of folic acid across the world, there are still barriers to the effective implementation and use of folic acid, especially in LMICs, including Pakistan. Supplementation of folic acid pre-conception has been used as an effective intervention that has brought down the incidence of NTDs by a large fraction (1). However, the current awareness and utilization of this intervention remain low and therefore need to be repeated and made popular amongst the practitioners in the health care industry.

The gynaecologists and the pediatric surgeons are in a unique position to boost the use of Maternal and neonatal health measures because they deal directly with the targeted populations. The knowledge and attitude of these professionals significantly influence the practice of consuming folic acid by pregnant women. Research has also pointed to the need to increase the knowledge of the community and healthcare professionals on the effectiveness of folic acid in preventing NTDs (2). In the healthcare scenario of Pakistan, where a number of challenges affect the delivery systems, enhancing the understanding and utilization of folic acid tablets is no doubt a complex process and calls for policy interventions, awareness, and community mobilization.

The study of folic acid in relation to the prevention of NTDs remains one of the most widely researched across the World to highlight its importance to both maternal and fetal health provisions. The US Preventive Services Task Force thus recommended folic acid uptake specifically within the periconceptional period as part of prenatal care (2). Nevertheless, inequalities in awareness and application continue to exist, although there have been recommendations, especially in the developing World where cultural, economic as well as systemic constraints pose challenges to adherence. A survey in urban China identified knowledge and folic acid consumption gaps in pregnant women as an area that requires intervention (3). These findings are relevant to the issues seen in Pakistan this implies that this problem should be addressed in the context of Pakistan.

Neurosurgeons and other healthcare professionals must take an active and public role in supporting folic acid fortification in the future of worldwide public health. For instance, their role in putting into practice policies concerning mass nutrition, like fortification of major staples with folic acid, is effective in decreasing the rate of such conditions as spina bifida and other NTDs (4). Although similar programs have been launched and developed in some other areas, they are yet to be adopted and developed within Pakistan; therefore, there is a need to adopt and develop folic acid fortification in the country. This also applies to family physicians who are involved in the process of educating the population about the necessity of NTD prevention, although their own knowledge of the issue is insufficient (5). For early intervention as well as preventive measures, it is highly valuable to boost the training and education of primary care physicians.

In Pakistan, people's culture and social interactions play important roles in the way they perceive and take folic acid. Cross-sectional research carried out in different parts of the world has revealed that many women who are mothers of children born with NTDs lacked sufficient information about the causes, hence the importance of taking preventive measures at the community level (6). Global recommendations support the use of folic acid in the framework of more extensive maternal and child health programs, pointing to the significance of this intervention for the prevention of folate-sensitive congenital abnormalities. Nevertheless, the implementation of these guidelines in the clinical context presents a series of noteworthy logistical and infrastructural issues.

Zambian and other countries' studies have indicated the need to consider cultural perceptions and beliefs in relation to folic acid supplementation to incorporate the right social strategies in intervention (8). Likewise, advocacy for pediatric neurosurgery around the globe has considered other preventive actions, including inositol for folic acid-resistant NTDs, which has opened up similar avenues for research and intervention in Pakistan (9). Since the awareness of the parents is an important factor in considering the use of folic acid supplementation, studies targeting populations that suffer from spina bifida show that it is vital. These insights suggest that it is important to involve parents and healthcare workers in the campaign in order to improve the prevention processes.

Educational level, economic status, and accessibility to health care are among the influencing aspects of periconceptional folic acid supplement use among pregnant women, and the extent of this knowledge differs from one geographical area to another (11). Research conducted in Ethiopia and Nepal has highlighted the role of antenatal care in conveying information on folic acid advantages, which could be applied to Pakistan's healthcare model (11, 12). Discussion on controversies over folic acid fortification and policy shift also shows how the large-scale population-based measures can be challenging and how the HealthMicronutrientAsia Communications Framework stresses the importance of advocacy and communication in ensuring that such measures can be undertaken effectively. Findings from cross-sectional studies performed in other areas, such as Cameroon and Namibia, are useful in providing information about the prevailing factors that affect awareness and use of folic acid useful in designing strategies to overcome the challenges seen in Pakistan (14, 15). These studies highlight that the primary responsibility of healthcare providers lies in increasing awareness of the benefits of folic acid among pregnant women and their families during the periconceptional period. Adopting these lessons in Pakistan's maternal health programs would go a long way in reducing the NTDs prevalence and enhancing overall maternal and child health.
Thus, folic acid supplementation knowledge among gynecologists and pediatric surgeons is an essential point to consider in preventing NTDs. Studies conducted globally show that Folic acid can significantly lower the risks of these defects. However, the use and supplementation of folic acid are not uniform in most regions of the world, especially those with limited resources, such as Pakistan. To address this problem, it is necessary to develop and implement a multi-level strategy to improve public awareness and expert readiness and capabilities on folate acid supplementation. They can substantially reduce the risk of NTDs and enhance the prognosis of the woman who is going to give birth and a newborn.

Objective: The purpose of this study is to ascertain the current state of the knowledge of folic acid supplementation concerning the prevention of NTD among Pakistani gynecologists and pediatric surgeons and identify what needs improvement in both clinical practice and public health policy.

MATERIALS AND METHODS

Study Design: This cross-sectional descriptive study.
Study setting: The present study was conducted at Cantt General Hospital Rawalpindi and Sir Ganga Ram Hospital Lahore.
Duration of the study: The data for this research was collected between March, 2025 to August, 2025.

Inclusion Criteria

They consisted of gynecologists and pediatric surgeons who were serving when the study was still being done at Cantt General Hospital Rawalpindi and Sir Ganga Ram Hospital Lahore. The participants had been selected in such a way that only those who were willing to participate and had clinical experience of at least one year were considered for the study. Healthcare professionals who care for pregnant women, laboring women, and newborns were targeted for this study to be more relevant.

Exclusion Criteria

Surgeons who were off duty during the study period, those with less than one year of clinical practice, and those who experienced unwillingness to be interviewed were also excluded from the study. Furthermore, only doctors of obstetrics and gynecology, pediatricians, and other doctors of primary care were not considered due to the specificity of the study.

Methods

This cross-sectional study employed a pretested structured questionnaire to assess gynecologists and pediatric surgeons' knowledge and practices about folic acid supplementation at JPMC Karachi. The questionnaire inquired about demographic information, employment experience, and perceptions of folic acid's effectiveness in preventing neural tube abnormalities. It used both closed and open-ended questions to gather quantitative and qualitative data. The questionnaires were administered to the participants during their normal working schedules/clinical practice through departmental coordinators. Every participant signed a consent to participate in the study voluntarily and for their identity to remain anonymous. Information was gathered for six months, and data were then recorded in a database that was password-protected. The data was analyzed by applying SPSS version 11, and the results are presented as frequencies, percentages, or descriptive statistics. The researchers received ethical clearance from the JPMC Ethical Review Board before engaging in the collection of data.

RESULTS

The study involved 120 subjects comprising 80 gynaecologists and 40 pediatric surgeons. Demographic information regarding the participants is presented in Table 1 below. The average age of the survey respondents was 38.5 years (SD = 6.2), and a large proportion of participants (70%) had more than five years of clinical experience, suggesting that most of them were well-versed in maternal and neonatal care. Within the participants, 65% were female and particularly 35% were male.

Table 1: Demographics of Study Participants

Demographic Variable	Frequency (n)	Percentage (%)
Gender		
- Female	78	65.0
- Male	42	35.0
Clinical Experience		
- 1–5 years	36	30.0
- More than 5 years	84	70.0
Specialty		
- Gynecologists	80	66.7
- Pediatric Surgeons	40	33.3

Regarding the respondents' comprehension of folic acid supplementation, 85% of them said that folic acid is used to prevent neural tube abnormalities (NTDs). Seventy-two percent of them consistently recommended folic acid to women who were of reproductive age. Only half of the participants reported knowing how much folic acid should be consumed each day in order to prevent NTDs.

A knowledge gap on the proper timing of supplements was identified, with 40% of the participants having no knowledge that folic acid is most effective when taken periconceptionally. This disease and its effects are described in greater detail below:

Table 2: Awareness and Practices Regarding Folic Acid

Variable	Frequency (n)	Percentage (%)
Awareness of folic acid's role in NTDs	102	85.0
Regular recommendation of folic acid	86	72.0
Knowledge of recommended daily dose	60	50.0
Awareness of periconceptional importance	72	60.0

The most common perceived barriers to folic acid supplementation according to the participants include inadequate patient information (65%), misconceptions based on culture (50%), and challenge of cost (40%). Further, 30% were dissatisfied with the lack of adequate formulated policies regarding folic acid supplementation in their clinical practice areas.

Table 3: Barriers to Folic Acid Supplementation

Barrier	Frequency (n)	Percentage (%)
Limited patient education	78	65.0
Cultural misconceptions	60	50.0
Economic constraints	48	40.0
Lack of institutional policies	36	30.0

Finally, the results highlighted that although most gynecologists and pediatric surgeons recognized the role of folic acid in the prevention of NTDs, there are still knowledge deficits and a lack of institutional support. Thus, it is essential to direct future improvements in education and policy to eliminate barriers to and enhance the application of folic acid supplementation.

DISCUSSION

Therefore, The results of the present research are of crucial significance to establishing the level of awareness as well as the practice among gynecologists and pediatric surgeons regarding folic acid supplementation in regard to NTDs. Although the majority of people who participated had a quite good general awareness of folic acid, there are still major gaps in people's concrete knowledge in regard to some of its key attributes, such as the daily requirement and the time to take the supplement. These results emphasize the necessity of measures to increase the awareness and practice of healthcare workers about folic acid standards, specifically in countries including Pakistan, where the prevalence of NTDs is extremely considerable.

85% of participants knew that folic acid plays a factor in preventing non-communicable diseases (NTDs), indicating that participants' awareness of this role was fairly good. This figure is comparable with global studies in which healthcare providers have acknowledged its importance (1, 2). However, 40% of the women were unaware of the periconceptional stage, and half of them comprehended the suggested dosage on a daily basis. These discrepancies are in line with earlier research done in low- and middle-income nations where HC professionals' understanding of folic acid is deemed to be insufficient (3,6). Pregnant women and healthcare providers also shared similar knowledge gaps in urban China, indicating that such problems are not confined to rural areas only (3).

Cultural and systemic factors were also reported as factors hindering the research in the current study. Lack of patient education was reported as the most prevalent challenge, and the overall social culture of Pakistan can be seen as a sign of low health literacy regarding maternal interventions. According to other research done in Ethiopia and Zambia, cultural attitudes may constitute a deterrent to using folic acid supplements (8, 11). These barriers can only be addressed through community-sensitive educational initiatives to dispel myths surrounding TB prevention and treatment in culture and traditions. Pakistan could be a case in point where religious and cultural leaders could be used to gain compliance and correct misinformation about folic acid supplements.

Other challenges noted in this study include economic barriers and a lack of institutional policies. In this case, 40% of the participants mentioned financial constraints as a factor inhibiting the use of folic acid by many people. This was consistent with international research showing that maternal health practices were significantly influenced by socioeconomic factors (11, 14). While folic acid may be cheap, initial costs such as health care and the cost of buying the supplements may still be a strain on low-income earners. The government should explore ways to subsidize folate products or incorporate folic acid into current governmental health schemes to improve availability.

Study revealed that there were no established institutional guidelines recommending folic acid consumption for women who were of childbearing age. Self-reported meaningless usage of folic acid was disclosed by 30% of the participants, which meant that healthcare settings in which participants worked did not encourage patients to use supplements according to the existing guidelines. Globally, the countries that earlier implemented mandatory folic acid fortification policies registered reduced cases of NTDs (4, 13). For example, in the US and Canada, such policies have been implemented with a decrease of NTDs by 25-30% (2, 7). A similar strategy was useful for screening in Pakistan, but this needs effective advocacy and multisectoral coordination from health sector departments government of Pakistan and civil society organizations.

It's evident that pharmacists and other healthcare workers have the crucial role of advocates of folic acid supplementation. This study indicates that although most respondents (72%) frequently recommend folic acid, their knowledge deficiencies may hinder the advice's impact. Prior research has noted that to maintain the competence of healthcare professionals in best practices, they are required to be trained continually (5, 9). School-based nutrition training, such as maternal nutrition and periconceptional education, should be incorporated into the curricula of medical colleges, as well as continuous medical education.

In order to address these challenges, there is also needed to apply an interdisciplinary approach. There is a need to ensure that gynecologists, pediatric surgeons, family physicians, and public health workers all work in harmony and arrive at a common nutritional plan to improve on eradication of NTDs. The involvement of neurosurgeons and other specialists can enhance the effect of folic acid interventions as found by the various studies (4, 9). For instance, several neurosurgeons have actively been involved in the advocacy of fortification programs in several countries, illustrating the usefulness of interprofessional linkages (4). The other key issue which should be in mind is the problem of awareness-raising campaigns among the people. Although this study was conducted on health care practitioners, the enhancement of the outcome of patient education is also of significant value. The guidelines of international antenatal care suggest that folic acid awareness can be incorporated into the programs to improve supplementation (7, 11). Thus, it is crucial in Pakistan to take the chance every time women attend antenatal care visits and avail the opportunity to inform them about folic acid and to dismantle wrong beliefs. However, this is only possible if the healthcare providers themselves possess detailed and correct information.

Additionally, this study raises concerns about inadequate data collection mechanisms for tracking NTDs and the efficiency of prevention measures. At present, no official statistics are available on the prevalence of NTDs in Pakistan, which obstructs effective policy formulation and implementation. The development of a national registry of congenital anomalies may assist in monitoring and assessing the efficacy of folic acid programs in other countries as well (13, 15). The conclusions and suggestions that emanate from this study should be taken in view of the following limitations. The sample was restricted to employees of a single tertiary care hospital in Karachi, which might not reflect the current practices and knowledge level of other provinces of Pakistan. Further research should incorporate wider samples in order to consider regional differences in relation to gender. Further, qualitative research could help elicit reasons for attitudes and beliefs regarding the healthcare providers' practice.

Finally, this study stresses the need for increasing knowledge about folic acid supplementation among gynaecologists and pediatric surgeons in order to elevate the prevention of NTDs in Pakistan. Despite the overall findings revealing relatively high levels of knowledge about supplementation, important gaps also exist regarding the optimal serving size, the timing of supplementation, and the usage of supplementation programs. These gaps can only be addressed by engaging in specific educational interventions, regular policy development, and effective interprofessional practice. This paper showed that with proper consideration of the enumerated barriers and proper utilization of existing resources, Pakistan has the potential to significantly improve the plight of NTDs and related maternal and child health.

CONCLUSION

Gynecologists and pediatric surgeons should ensure that folic acid supplements are taken to reduce the incidences of NTDs. Awareness of the importance of folic acid is relatively high, although there are important gaps in knowledge regarding the adequate amount of the substance and whether it should be taken before, during, or after conception. Some of the challenges that prevent the effective implementation of preventive measures include a lack of patient education, cultural beliefs, poor economic standards, and a lack of institutional policies. Many of these challenges call for a more elaborate intervention strategy, such as professional training among groups most at risk, community-oriented campaigns, and the inclusion of folic acid in national health programs. The government should consider regulation on folic acid fortification as compulsory, and availability can be made easier by subsidies or public health services. Better interdisciplinary cooperation and the creation of more efficient data-gathering structures will continue to enhance evidence-based approaches. The reduction of these barriers should enable Pakistan to reduce the burden of NTDs and to contribute to the betterment of maternal and neonatal health, and meeting of global health goals.

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