

From preconception to postpartum: Women's perceptions and attitudes regarding the use of vitamin supplements – A qualitative cross-sectional study

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ABSTRACT

Background: Vitamins and mineral supplementation is key in the various stages of a woman's reproductive life.

Objective: To analyze the perceptions and behaviors of women of childbearing age in a developed country regarding the use of vitamin supplements from preconception to postpartum.

Methods: This was an observational cross-sectional study of women of childbearing age conducted in Portugal between April and May 2023. Sample size and recruitment were planned to ensure national geographic representativeness of this population. Participants completed a questionnaire designed specifically for study purposes to characterize their perceptions and attitudes toward preconception and pregnancy-related vitamin supplementation. Data were analyzed in Microsoft Excel and SPSS Statistics 20.0.

Results: A total of 1,033 women aged 20-49 completed the study survey. The gynecologist (72.3%), followed by the general practitioner (63.3%), were the main sources of information on preconception, pregnancy, and postpartum care for women with children. Only about half of these women (51.4%) had attended a preconception appointment for a median of 6 months before becoming pregnant. More than 80% of women (84%) had taken vitamin supplements as recommended by their doctor during their previous pregnancy, and two-thirds (65%) did it for more than three months. Among those who took folic acid, this figure was 76.9%. Folic acid was the most commonly used supplement (87%), followed by iron (66%), iodine (25%), vitamin D (13%), and others (16%). Most women (96.1%) had no history of fetal or infant congenital anomalies. Postnatally, although most women had attended appointments with the general practitioner or gynecologist (91.7%), only 35.6% used postpartum supplementation, mainly iron (34.5%), but also folic acid (17.3%) and others (iodine, vitamin D, among others; 37.7%).

Conclusions: This real-world study provides valuable insights into women's perceptions and behaviors regarding the use of dietary supplements from preconception to postpartum.

KEYWORDS

Attitude, perception, postpartum, preconception, pregnancy, supplementation, vitamin, woman.

Introduction

In developed countries, maternal and newborn health is an important indicator of population well-being, and adequate maternal and child nutrition is an integral part of this concept. The early environment, especially its nutritional state, has been shown to influence both mother and child health and disease outcomes throughout life^[1-5], with malnutrition in pregnancy being associated with complications such as maternal anemia, preterm birth, low birth weight, birth defects, and developmental disorders^[3,6,7].

The risks of not achieving adequate nutrient supply are higher for selected subgroups of women of childbearing age, such as those with previous adverse pregnancy outcomes, prior multiple pregnancies, short intervals between pregnancies, on exclusion diets, underweight or overweight, smokers, and adolescents^[5].

Growing evidence shows that starting nutritional interventions before conception can improve the prevention of adverse outcomes such as spontaneous abortions and fetal malformations^[8].

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It is therefore widely advocated that interventions targeting maternal health and nutrition should begin before pregnancy, as part of a preconception care plan^[8-10].

According to the literature, women who receive preconception care are more knowledgeable and aware of risk-reducing

behaviors ^[11,12] and also folic acid use, a key supplement in reproductive health, more often throughout the advised time frame ^[13].

Vitamins and minerals play a key role in the various stages of a woman's reproductive life, from preconception to pregnancy, postpartum, and breastfeeding. Folate plays a crucial role in nucleic acid synthesis, cell division, gene expression regulation, and neurotransmitter synthesis ^[14], and the relationship between blood folate levels in pregnant women and neural tube defects and other congenital anomalies in the offspring is well documented ^[15-17]. A high level of evidence supports the association between maternal preconception exposure to folate supplementation and a reduction in the risk of neural tube defects and anomaly-related terminations ^[18]. Folate intake is thus recommended by several international entities – as the National Health Service UK ^[19] and the World Health Organization (WHO) – for all pregnant women from before conception until at least the first pregnancy trimester ^[20]. In their most recent recommendations, the WHO state that “daily oral iron and folic acid supplementation with 30 mg to 60 mg of elemental iron and 400 µg (0.4 mg) folic acid is recommended for pregnant women to prevent maternal anemia, puerperal sepsis, low birth weight, and preterm birth”, emphasizing that folic acid should be started as early as possible (ideally before conception) to prevent neural tube defects ^[20].

On the other hand, iodine is essential for the maintenance of thyroid homeostasis, which is crucial in pregnant women and fetuses for the development of brain tissue, acquisition of intelligence, and learning ^[21]. The WHO recommendation regarding iodine intake is 220-250 µg/day during pregnancy ^[22].

In Portugal, the health authority (Direção-Geral da Saúde [DGS]/Directorate-General of Health) recommends supplement intake of folic acid 2 months during preconception to the 3 first months of pregnancy (daily dose of 400 µg/day for all women and a higher dose of 5 mg/day for those with an increased risk of having a child with a neural tube defect) and iodine throughout pregnancy and breastfeeding (daily dose of 150-200 µg/day for all women) ^[23].

Other supplements such as vitamin B12, vitamin D, calcium, and omega-3 fatty acids are recommended for special subgroups including women with a diagnosed deficiency, risk of preeclampsia, or with dietary restrictions (i.e. meat or others) ^[21,24].

Despite increasing evidence regarding the benefits of supplementation in preconception, pregnancy, postpartum, and breastfeeding, this opportunity is often missed. Maternal health literacy has been shown to play a role in positive prenatal self-care behaviors, including better nutrition, physical activity, dietary supplement intake, and avoidance of alcohol, smoking, and drugs ^[25].

Understanding the awareness, perceptions, and behaviors of women of childbearing age regarding the use of vitamin supplements before, during, and after pregnancy may help develop strategies tailored to the specific needs of this population. Hence, the aim of this study was to analyze the perceptions and behaviors of women of childbearing age in a developed country on the use of vitamin supplements in preconception, pregnancy, and postpartum.

Methods

This was a national, observational, and cross-sectional study of women of childbearing age, carried out in Portugal between April and May 2023. The study aimed to reflect the Portuguese reality, so the sample size and recruitment were planned to ensure national geographic representativeness of women of childbearing age. To this end, a target sample size of 784 women was estimated taking into account the number of women of childbearing age (i.e. aged 20-49 years) in Portugal and the resident population in each of the country's 18 districts and two autonomous regions (Azores and Madeira), according to 2021 data provided by Statistics Portugal ^[26]. The target sample size for each district was estimated taking into account the different population densities of each district ^[26].

A questionnaire targeting women of childbearing age was developed specifically for study purposes. The questionnaire included questions about (i) sociodemographic characteristics, (ii) knowledge and behaviors regarding preconception, pregnancy, and postpartum care (including sources of information and supplementation practices), (iii) obstetric history, and (iv) postnatal follow-up. Respondents were recruited through random face-to-face street interviews and online dissemination of the questionnaire through social groups and platforms. Informed consent was obtained in writing from all study participants.

As all questionnaires were anonymous, this research did not require ethics committee approval.

Statistical analysis was performed using Microsoft Excel and SPSS Statistics 20.0. Responses were analyzed using descriptive statistics, using frequencies and percentages for categorical variables and mean or median and interquartile range for continuous variables.

Results

Sociodemographic characteristics of the study population

A total of 758 women completed the survey in face-to-face street interviews and 275 completed the survey online, resulting in a final sample of 1,033 respondents aged between 20 and 49 years. The sociodemographic characteristics of the study population are shown in **Table 1**. Briefly, most women were in the age range of 40-49 years (38.6%; $n=399$) and held a bachelor's degree (36.2%; $n=374$) or had completed high school (27.8%; $n=287$), and most had children (77.3%; $n=798$). The study population was representative of the national geographic distribution and population density of each of the 18 districts and the autonomous regions of Azores and Madeira in Portugal, with most respondents living in Porto (18.9%; $n=196$) and Lisbon (18.1%; $n=187$).

Women's knowledge and behaviors regarding preconception, pregnancy, and postpartum care

According to women with children (77.3%; $n=798$), information on preconception, pregnancy, and postpartum care was mostly provided by the gynecologist (72.3%; $n=577$), followed by the general practitioner (63.3%; $n=505$), and less often by the health center nurse (32.3%; $n=258$) or retrieved from the Internet (30.7%; $n=245$).

Table 1. Sociodemographic characteristics of the study population ($n = 1,033$).

Characteristics	n (%)
Age (years)	
20-29	192 (18.6)
30-34	207 (20.0)
35-39	235 (22.7)
40-49	399 (38.6)
Education	
Elementary education	95 (9.2)
Secondary education	287 (27.8)
Technical/professional course	71 (6.9)
Graduation	374 (36.2)
Master's degree	189 (18.3)
Doctoral degree	16 (1.5)
Post doctorate	1 (0.1)
Dietary habits	
No dietary restrictions	613 (59.3)
Vegetarian diet	31 (3.0)
Mediterranean diet	326 (31.6)
Dietary restrictions (i.e. gluten/lactose intolerant)	63 (6.1)
Smoking habit	
Yes	224 (21.7)
No	809 (78.3)
Children	
Yes	798 (78.3)
No	235 (21.7)
Data are presented as frequencies n (%)	

Only about half of this subgroup (51.4%; $n=410$) had attended a preconception appointment for a median of 6 months before becoming pregnant. At this appointment, blood tests and a gynecological examination were performed, data on medical history and lifestyle habits (smoking, exercise, sleep) were collected, and 60% ($n=247$) of the women received advice on dietary habits, supplements, and vitamins.

More than 80% of women (84%; $n=666$) reported having taken vitamin supplements as recommended by their doctor during their last pregnancy, and two-thirds (65%) did it for more than 3 months. Among those taking folic acid, this figure was 76.9%. Folic acid was largely the most used supplement (87%; $n=582$), but also iron (66%; $n=439$), iodine (25%; $n=169$), vitamin D (13%; $n=86$), and others (16%; $n=108$).

Obstetric history

Most women with children (96.1%; $n=767$) had no prior history of fetal or infant congenital anomalies, although six (0.8%) reported a history of chromosomal anomalies, three (0.4%) of neural tube defects, and 15 (1.9%) of other anomalies. Most women (81.8%; $n=653$) also had no history of other pregnancy complications, although 9.6% ($n=77$) reported spontaneous abortion up to 20 weeks of gestation, 3.4% ($n=27$) reported preterm delivery, 1.1% ($n=9$) reported fetal growth restriction, and 0.5% ($n=4$) reported sudden intrauterine fetal death.

About one third of the respondents who had children ($n=798$), 31.3% ($n=250$) had complications during the last pregnancy, mainly nausea and vomiting (40.0%; $n=100/250$), but also diabetes (20.0%; $n=50/250$), overweight (18.8%; $n=47/250$), hypertension (16.4%; $n=41/250$), and anemia (16.0%; $n=40/250$), and to a lesser extent cramps (10.8%; $n=27/250$) and nutritional deficits (2.8%; $n=7/250$).

Postnatal follow-up

Although most women with children surveyed in this study underwent postnatal appointments with the general practitioner or gynecologist (91.7%; $n=732$), only 35.6% ($n=284$) used postpartum supplementation, mainly iron (34.5%; $n=98$), but also folic acid (17.3%; $n=49$) and other supplements (iodine, vitamin D, among others; 37.7%; $n=107$). Most women with children had breastfed (87.8%; $n=701$).

Approximately half of the women surveyed in this study did not want to have any more children (52.2%; $n=539$). Of the women who wanted to have more children, 89.7% ($n=278$) said they would attend a preconception appointment before the next pregnancy.

Discussion

The evidence shows that adequate nutrient supply is crucial for maternal and child health before, during, and after pregnancy. In this cross-sectional real-world study, 1,033 women aged 20-49 years, representative of the Portuguese geographic distribution of women of childbearing age, with a relatively high level of education (more than a third with a bachelor's degree and about a quarter with a high school degree) and mostly with children, completed a questionnaire to characterize their perceptions and attitudes towards preconception and pregnancy-related vitamin supplementation.

The results of the study show that one out of two Portuguese women with children (51%) plan their pregnancy by attending a preconception appointment 6 months before becoming pregnant. This is a higher proportion than that reported in the Spanish counterpart of this study (GESTMUJER), where only one out of four women (24%) planned their pregnancy on average 7 months before conception^[27].

Although this difference between the two studies may be related to the ten-year gap between them and the possibility that women in 2014 may have been less informed and aware of reproductive health measures and the need for pregnancy planning, the lack of an optimal adherence to reproductive planning in this and the GESTMUJER study is consistent with findings

from other studies showing that, although women are aware of healthy lifestyle behaviors prior to pregnancy (i.e. regular physical activity, keeping a healthy diet, reducing alcohol intake, and even taking pre-pregnancy vitamin supplementation), they do not always engage in formal preconception appointments or screening with health professionals ^[28].

In Portugal, as in other countries, women are recommended to take folic acid supplementation at a dose of 400 µg/day and iodine supplementation at a dose of 150-200 µg/day in the periconceptional period ^[23]. Folic acid should be taken for at least the first 3 months of pregnancy ^[23]. In addition, 30-60 mg of daily iron supplementation is recommended during pregnancy ^[23,29].

Despite the suboptimal engagement in formal preconception, this study shows that a relatively high proportion of Portuguese women who attended preconception appointments (60%) received advice on diet and supplementation, and most (84%) had taken a vitamin supplement (mainly folic acid [87%] or iron [66%]) before becoming pregnant. This contrasts with the markedly low proportion of only 28.6% of Spanish women who had taken a folic acid supplement prior to pregnancy in the GESTMUJER study as a consequence of a lack of planning ^[27]. Conversely, in a recent prospective Australian family cohort pilot study, compliance with nutrient intake targets for folate, zinc, and iodine was >94%, with this intake being mainly from supplementation ^[30].

The importance of adequate folate supplementation in the periconceptional period is well established in the literature, with numerous studies demonstrating the association between folate deficiency and neural tube defects and congenital anomalies in the offspring ^[15-17,31]. In addition, periconceptional folate intake has also been linked to obstetric outcomes such as birth weight ^[32]. In the present study, most women had no history of previous congenital anomalies in the fetus or baby (96%) or other pregnancy complications (82%).

Most women in the present study were aware of the value of taking vitamin supplements during pregnancy, as shown by the 65% who took prenatal supplements for >3 months and the 77% who took folic acid specifically for >3 months. This contrasts with the reality in other countries, where retrieved data show that, despite being aware of the benefits of vitamin supplementation, very few women take supplements for the entire recommended periconceptional period ^[13,33-36]. After childbirth, although more than 90% of women underwent postnatal appointments with the general practitioner or gynecologist, only about a third (36%) took nutritional supplements after delivery, mainly iron (35%), but also folic acid (17.3%) and other supplements (38%). Despite the national recommendations for iodine supplementation during breastfeeding ^[23], this recommendation was largely unattended, as only 2.5% of women in this study took iodine postpartum.

The reasons why women fail to engage in reproductive care are not fully understood, but some studies suggest that periconceptional behaviors and healthcare engagement vary with women's educational, sociodemographic, and economic level. In a study conducted in the United States, women in less specialized occupations (such as service occupations) were significantly more likely to engage in risk periconceptional behaviors

(lack of folic acid supplementation, lack of early prenatal care, smoking, and drinking) than women in more specialized occupations ^[37]. In a more recent Australian study, women who planned their pregnancy were more likely to use folic acid, to have access to information, to engage in healthcare, and to follow preconceptional recommendations ^[38].

Health information can be complex, and accessing and understanding it can be challenging for many women seeking healthcare guidance. Although the use of technological resources and the Internet to access information about preconception and pregnancy is becoming more common and widespread ^[28,39]. Indeed, healthcare professionals, and particularly doctors, remain the preferred source of information for women of childbearing age, as shown in this and other studies ^[28,40-42]. In the present study, women favoured the gynecologist (72%) or general practitioner (64%) as their main source of information on preconception, pregnancy, and postpartum care. In an Australian qualitative study, women's information preferences also included their general practitioner, but also the Internet ^[28].

Primary care has been shown to be the most common setting in which preconception health services are provided ^[5], and general practitioners play a crucial role in the provision of preconception care and the allocation of resources to support this service ^[13]. However, the time and effort required to contact a doctor for consultation as well as worry and anxiety can be barriers to its uptake by women ^[5].

Although consulting with a healthcare professional remains the preferred source of health information for women ^[28,40-42], they appear to be increasingly willing to use technology and online platforms to access this information. In the present study, 30% of respondents used the Internet to look for information about preconception, pregnancy, and/or postpartum. Noteworthy, the need for accurate and reliable information is increasingly being recognized and valued by women. The need for governmental or professional body endorsement of online health platforms have been identified as a means of increasing trust in those sources, but challenges in obtaining trustworthy information have been shown to be a barrier to health behavior change ^[28]. Access to information may also be age-related, as young women have been shown to be less likely to access information from healthcare professionals than older counterparts ^[38]. Understanding how women access information and the barriers and facilitators they encounter can allow the design of effective interventions that help to improve their pregnancy outcomes. In addition, improving maternal health literacy can help increase the impact of existing maternal and child health interventions and programs.

This real-world study provides valuable insights into Portuguese women's perceptions and behaviors regarding the use of dietary supplements during preconception, pregnancy, and postpartum according with established national guidelines, considering the national population with a typical Mediterranean diet ^[23].

The random sampling of the study population and its national representativeness are study strengths that contribute to its robustness and validity. This study provides valuable insights into women's perceptions and behaviors regarding the use of dietary supplements from preconception to postpartum and how

to design a future health program for intervention. Tailored communication strategies, delivered not only by healthcare professionals but also through community programs and maternal health information resources, can be beneficial in engaging women in their own reproductive care at all stages of preconception and pregnancy.

Conclusion

Despite national recommendations only half of women had attended a preconception appointment and received advice on dietary habits, supplements, and vitamins. But during the pregnancy the majority of the women had taken vitamin supplements, being folic acid the most commonly used supplement, followed by iron and iodine. There is still a need to educate and counsel women of childbearing age about reproductive health care and to emphasize the importance of vitamin supplementation before, during, and after pregnancy to improve pregnancy outcomes.

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Conflicts of interest

Authors declare no conflict of interest.