The Royal Australian and New Zealand College of Obstetricians and Gynaecologists
Excellence in Women's Health

Vitamin and Mineral Supplementation and Pregnancy

This statement has been developed and reviewed by the Women's Health Committee and approved by the RANZCOG Board and Council.

A list of Women's Health Committee Members can be found in Appendix A.

Disclosure statements have been received from all members of this committee.

First endorsed by RANZCOG: July 2008
Current: November 2014, Amended May 2015
Review due: November 2017

Objectives: To provide advice on the management of vitamin and mineral supplementation in pregnancy.

Outcomes: To ensure women are provided best practice advice on correct dosage of vitamin and mineral supplementation in pregnancy based on current recommendations.

Target audience: All health practitioners providing maternity care, and patients.

Evidence: Cochrane Library, CINAHL, EBM, MEDLINE via OVID, Google Scholar and PubMed were searched for systematic reviews, randomised controlled trials and cohort studies relating to vitamin and mineral supplementation in women's health, pregnancy, and fetal development (from January 2004 to October 2014).

Values: The evidence was reviewed by the Women's Health Committee (RANZCOG), and applied to local factors relating to Australia and New Zealand.

Background: This statement was first developed by Women's Health Committee in July 2008 and reviewed in November 2014. A minor amendment was made in May 2015.

Funding: The development and review of this statement was funded by RANZCOG.

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1. Patient summary

Pregnancy and breastfeeding are times when some women may need additional nutrients in their diet.

Maintaining a healthy, balanced diet is important but additional supplements have been shown to be important as well. Important supplements include folic acid and iodine in the doses recommended below. In some women supplementation with vitamins B12, D, and K, as well as iron, calcium, and omega-3 fatty acids can be important. The details of these recommendations are contained in this document.

2. Summary of recommendations

Recommendation 1	Grade
A healthy, balanced diet is strongly recommended before, during and after pregnancy.	Consensus-based recommendation References [1, 2]
Recommendation 2	**Grade**
The recommended dose of folic acid is at least 0.4mg daily to aid the prevention of neural tube defects (NTD). Where there is a known increased risk of NTD or a risk of malabsorption, a 5mg daily dose is recommended.	Consensus-based recommendation References [3-6]
Recommendation 3	**Grade**
Vegetarians and vegans should be supplemented with Vitamin B12 in pregnancy and lactation. The RDI of B12 in pregnancy is 2.6 mcg/day. The RDI of B12 during lactation is 2.8 mcg/day.	Consensus-based recommendation Reference [7]
Recommendation 4	**Grade**
Pregnant women with Vitamin D level below 50nmol/L For pregnant women with levels 30–49 nmol/L, commence 1,000 IU (25µg)/day. Pregnant women with levels < 30 nmol/L should commence 2,000 IU (50µg)/day. Repeat the Vitamin D level at 28 weeks gestation.3 **Pregnant women with Vitamin D level above 50nmol/L** These women should take 400 iu Vitamin D daily as part of a pregnancy multivitamin	Consensus-based recommendation References [8-11]
Recommendation 5	**Grade**
Vitamin K should be administered in late pregnancy to women with proven cholestasis of pregnancy, due to reduced Vitamin K absorption.	Consensus-based recommendation
Recommendation 6	**Grade**
Routine iron supplementation is not recommended in every pregnancy. All women should have their haemoglobin level checked at the first antenatal visit and again at approximately 28 weeks' gestation and any anaemia investigated and treated.	Consensus-based recommendation
Recommendation 7	**Grade**
The recommended dietary intake of calcium per day for pregnant women is 1300mg (ages 14-18 years) and 1000mg (19-50 years). If the woman avoids dairy in her usual diet and does not consume alternative high calcium foods, she should take a calcium supplementation of at least 1000mg per day.	Consensus-based recommendation Reference [11]

Recommendation 8	Grade
Women who are pregnant, breast feeding or considering pregnancy should take an iodine supplement of 150 micrograms each day.	Consensus-based recommendation Reference [12]
Recommendation 9	**Grade**
Women whose dietary intake of Omega-3 fatty acids is low, for example those who eat very little seafood, should consider a dietary supplementation which may be obtained from fish oil and some commercially available pregnancy supplements.	Consensus-based recommendation

3. Introduction

A healthy, balanced diet is strongly recommended before, during and after pregnancy.[1, 2] Good nutrition and appropriate weight gain can improve pregnancy outcomes. Although, in the general population, a healthy balanced diet should largely obviate the need for vitamin and mineral supplementation, pregnancy and lactation create extra nutritional demands that, for some individuals, may make supplementation advisable. For a comprehensive guide to supplementation in pregnancy the reader is referred to the references at the end of this statement.

Recommendation 1	Grade
A healthy, balanced diet is strongly recommended before, during and after pregnancy.	Consensus-based recommendation References [1, 2]

4. Discussion and recommendations

4.1 Vitamins

4.1.1 Folate

It is recommended that folic acid should be taken for a minimum of one month before conception and for the first 12 weeks of pregnancy. The recommended dose of folic acid is at least 0.4mg daily to aid the prevention of neural tube defects (NTD). Where there is a known increased risk of NTD (patients taking anticonvulsant medication, pre-pregnancy diabetes mellitus, previous child or family history of NTD or BMI >30), or a risk of malabsorption, a 5mg daily dose is recommended. While it is well established that pre-pregnancy and early pregnancy dietary supplementation with folic acid is effective in reducing the incidence of NTD; the most effective dose of folic acid is to be determined and is the subject of ongoing research.[3-6]

Women at increased risk of folate deficiency (e.g. multiple pregnancies, haemolytic anaemia) should have their full blood count monitored and be treated if evidence of folate deficiency.

Recommendation 2	Grade
The recommended dose of folic acid is at least 0.4mg daily to aid the prevention of neural tube defects (NTD). Where there is a known increased risk of NTD or a risk of malabsorption, a 5mg daily dose is recommended.	Consensus-based recommendation References 3-6

4.1.2 Vitamin B12

Vegetarians and vegans should be supplemented with Vitamin B12 in pregnancy and lactation. Untreated maternal B12 deficiency has been reported to cause neurological sequelae in exclusively breast fed infants (Recommended Daily Intake (RDI) 2.6 mcg/day in pregnancy and 2.8 mcg in lactation[7]).

Recommendation 3	Grade
Vegetarians and vegans should be supplemented with Vitamin B12 in pregnancy and lactation. The RDI of B12 in pregnancy is 2.6 mcg/day. The RDI of B12 during lactation is 2.8 mcg/day.	Consensus-based recommendation Reference 7

4.1.3 Composite B-group Vitamins

Hyperhomocysteinaemia is the commonest of the thrombophilias with approximately 1.5% of the population being homozygous for the MTHFR mutation and 25% heterozygous. The thrombophilic tendency is minimised by an adequacy of folate, riboflavin, B6 and B12. In the absence of any screening for this condition, some clinicians advise that all women should ensure an adequate intake of these vitamins.

4.1.4 Vitamin D

Studies of pregnant women attending antenatal clinics in Australia and New Zealand have found an increased frequency of Vitamin D deficiency in some communities. Women at increased risk of Vitamin D deficiency include (i) those with reduced sunlight skin exposure e.g. veiled women, (ii) those who use sunscreen on a regular basis, (iii) dark-skinned women, (iv) mothers of infants with rickets and (v) women with a BMI >30. In these circumstances, testing should be considered and supplementation instituted where needed. Low maternal serum levels of Vitamin D in pregnancy are associated with low neonatal Vitamin D serum levels.[8-10] .Vitamin D deficiency in the neonate and the infant is associated with impaired skeletal development and an increased incidence of hypocalcaemic seizures.[8, 9, 13] From the mother's perspective Vitamin D deficiency is known to be an important risk factor for the development of osteoporosis in later life.

Recommendation 4	Grade
Pregnant women with Vitamin D level below 50nmol/L For pregnant women with levels 30–49 nmol/L, commence 1,000 IU (25µg)/day. Pregnant women with levels < 30 nmol/L should commence 2,000 IU (50µg)/day. Repeat the Vitamin D level at 28 weeks gestation.3 **Pregnant women with Vitamin D level above 50nmol/L** These women should take 400 iu Vitamin D daily as part of a pregnancy multivitamin	Consensus-based recommendation References 8-11

4.1.5 Vitamin K

Vitamin K should be administered in late pregnancy to women with proven cholestasis of pregnancy, due to reduced Vitamin K absorption. It may be given orally or parenterally according to patient and clinician preference. It is also recommended for women on enzyme inducing anticonvulsant medication, although recent evidence casts doubt on the need for this.

Recommendation 5	Grade
Vitamin K should be administered in late pregnancy to women with proven cholestasis of pregnancy, due to reduced Vitamin K absorption.	Consensus-based recommendation

4.1.6 Other Vitamin Supplementation

There is little evidence to support "routine" supplementation of other vitamins in pregnancy such as Vitamin A, C and E and, not unexpectedly, excessive quantities of fat soluble vitamins may be harmful.

4.2 Minerals

4.2.1 Iron

The iron demands of pregnancy and lactation are particularly pronounced due to the expanded red cell volume, blood loss around the time of delivery and the demands of the developing fetus and placenta. Iron supplementation will generally be recommended for women at particular risk of iron deficiency. This includes vegetarians and women with a multiple pregnancy. Women with iron deficiency anemia, will need additional supplementation, with a specific iron supplement, containing at least 60mg of iron daily. All women should have their haemoglobin level checked at the first antenatal visit and again at approximately 28 weeks' gestation and any anaemia investigated and treated. Routine iron supplementation is not recommended in every pregnancy.

Recommendation 6	Grade
Routine iron supplementation is not recommended in every pregnancy. All women should have their haemoglobin level checked at the first antenatal visit and again at approximately 28 weeks' gestation and any anaemia investigated and treated.	Consensus-based recommendation

4.2.2 Calcium

The recommended dietary intake of calcium per day for pregnant women is 1300mg (ages 14-18 years) and 1000mg (19-50 years).[7] If the woman avoids dairy in her usual diet (e.g. lactose intolerant) and does not consume alternative high calcium food (e.g. calcium enriched soya milk), calcium supplementation is recommended at 1000mg/day. A Cochrane Systematic review has reported a benefit of calcium supplementation, of at least 1000mg/day during pregnancy, in reducing the incidence of hypertensive disorders and preterm labour. The effect on pre-eclampsia was greater for women with low baseline calcium intake.[11]

Recommendation 7	Grade
The recommended dietary intake of calcium per day for pregnant women is 1300mg (ages 14-18 years) and 1000mg (19-50 years). If the woman avoids dairy in her usual diet and does not consume alternative high calcium foods, she should take a calcium supplementation of at least 1000mg per day.	Consensus-based recommendation Reference [11]

4.2.3 Iodine

Iodine deficiency appears to be increasing in frequency. This may in part be related to a reduction in iodised salt intake and reduction of iodine in milk. Recent research suggests that even subclinical hypothyroidism may have clinical sequelae, making it imperative to avoid iodine deficiency in pregnancy. Iodine supplementation is mandatory in areas of regional deficiency. Women who are pregnant, breast feeding or considering pregnancy should take an iodine supplement of 150 micrograms each day.[12]

Recommendation 8	Grade
Women who are pregnant, breast feeding or considering pregnancy should take an iodine supplement of 150 micrograms each day.	Consensus-based recommendation Reference [12]

4.2.4 Other Minerals

There is little evidence to support "routine" supplementation of other minerals in pregnancy such as magnesium, fluoride, zinc or rare minerals.

4.3 Other Nutritional Supplements

4.3.1 Omega-3 fatty acids

Omega-3 fatty acids are known to be critically important building blocks for the developing fetal brain and retina. Their essential source is dietary intake, principally vegetable oils and seafood. Seafood is the richest source of the most biologically active Omega-3 fatty acids, docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA).[14]

While there are many nutritional benefits from eating fish in pregnancy, concerns have been raised regarding the intake of environmental pollutants, particularly mercury. This concern has prompted guidelines from Food Standards Australia New Zealand to recommend no more than 2-3 serves (150g / serve) of fish per week for pregnant women. Further, for large long living fish there are additional restrictions advised, for example one serve of shark per fortnight is recommended, with no other fish intake for the fortnight.[15]

Women whose dietary intake of Omega-3 fatty acids is low, for example those who eat very little seafood, should consider a dietary supplementation which may be obtained from fish oil and some commercially available pregnancy supplements.

The place of fish oil supplementation for pregnant women is a subject of ongoing research. While some studies have shown a benefit of dietary supplementation with fish oil during pregnancy with regard to improvement of neurodevelopmental outcome and reduction of pre-term labour, other studies have not. No conclusive evidence of benefit using fish oil supplements in pregnancy is yet confirmed and further meta-analysis and well powered, high quality trials are needed.[14, 16, 17]

Recommendation 9	Grade
Women whose dietary intake of Omega-3 fatty acids is low, for example those who eat very little seafood, should consider a dietary supplementation which may be obtained from fish oil and some commercially available pregnancy supplements.	Consensus-based recommendation

There is a deficiency of high quality to evidence that would support the use of other nutritional supplements in pregnancy. In the absence of such evidence, the best advice would be to avoid such supplements, particularly in the first trimester of pregnancy where any unanticipated adverse effect is more likely to occur.

4. Summary

Most proprietary pregnancy and lactation multivitamin preparations are adequate for the majority of pregnancies. The commonest exceptions will be the vegetarian/vegan needing additional iron and women for who high dose (5 mg) of folic acid or pharmacological doses of Vitamin D are recommended.

Couples undergoing fertility management may be provided with different supplementation protocols.

5. References

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2. NZ Ministry of Health. Food and Nutrition Guidelines for Healthy Pregnant and Breastfeeding Women: A background paper. 2008. Available from: http://www.health.govt.nz/publication/food-and-nutrition-guidelines-healthy-pregnant-and-breastfeeding-women-background-paper.

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7. National Health and Medical Research Council and New Zealand Ministry of Health. Nutrient Reference Values for Australia and New Zealand Including Recommended Dietary Intakes. 2006.

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11. Hofmeyr GJ, Lawrie TA, Atallah AN, Duley L, Torloni MR. Calcium supplementation during pregnancy for preventing hypertensive disorders and related problems. Cochrane Database Syst Rev. 2014(6):CD001059.

12. National Health and Medical Research Council. Iodine supplementation for Pregnant and Breastfeeding Women: Public statement. 2010.

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16. Gould JF, Smithers LG, Makrides M. The effect of maternal omega-3 (n-3) LCPUFA supplementation during pregnancy on early childhood cognitive and visual development: a systematic review and meta-analysis of randomized controlled trials. Am J Clin Nutr. 2013;97(3):531-44.

17. Makrides M, Gould JF, Gawlik NR, Yelland LN, Smithers LG, Anderson PJ, et al. Four-year follow-up of children born to women in a randomized trial of prenatal DHA supplementation. JAMA. 2014;311(17):1802-4.

18. National Health and Medical Research Council. NHMRC additional levels of evidence and grades for recommendations for developers of guidelines. Canberra2009.

6. Other suggested reading

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Paxton GA, Teal GR, Nowson CA, Mason RS, McGrath JJ, Thompson MJ, Siafarikas A, Rodda CP and Munns CF. Vitamin D and health in pregnancy, infants, children and adolescents in Australia and New Zealand: a position statement. Med J Aust 2013; 198 (3): 142-143.

7. Links to other College statements

Pre-pregnancy Counselling (C-Obs 03a)

Routine Antenatal Assessment in the absence of pregnancy complications (C-Obs 03b)

Evidence-based Medicine, Obstetrics and Gynaecology (C-Gen 15)

8. Patient information

A range of RANZCOG Patient Information Pamphlets can be ordered via:
https://www.ranzcog.edu.au/Womens-Health/Patient-Information-Guides/Patient-Information-Pamphlets

Appendices

Appendix A Women's Health Committee Membership

Name	Position on Committee
Associate Professor Stephen Robson	Chair
Professor Susan Walker	Deputy Chair - Obstetrics
Dr Gino Pecoraro	Deputy Chair - Gynaecology
Professor Yee Leung	Member
Associate Professor Anuschirawan Yazdani	Member
Dr Simon Craig	Member
Associate Professor Paul Duggan	Member
Dr Vijay Roach	Member
Dr Stephen Lyons	Member
Dr Ian Page	Member
Dr Donald Clark	Member
Dr Amber Moore	Member
Dr Martin Ritossa	Member
Dr Benjamin Bopp	Member
Dr James Harvey	Member
Dr John Tait	Member
Dr Anthony Frumar	Member
Associate Professor Kirsten Black	Member
Dr Jacqueline Boyle	Chair of IWHC
Dr Louise Sterling	GPOAC representative
Ms Catherine Whitby	Council Consumer representative
Ms Susan Hughes	Consumer representative
Ms Sherryn Elworthy	Midwifery representative
Dr Scott White	Trainee representative
Dr Agnes Wilson	RANZCOG Guideline developer

Appendix B Overview of the development and review process for this statement

i. Steps in developing and updating this statement

This statement was originally developed in July 2008 and was most recently reviewed in November 2014. The Women's Health Committee carried out the following steps in reviewing this statement:

- Declarations of interest were sought from all members prior to reviewing this statement.
- Structured clinical questions were developed and agreed upon.
- An updated literature search to answer the clinical questions was undertaken.
- The existing consensus-based recommendations were reviewed and updated (where appropriate) based on the available body of evidence and clinical expertise in July 2014 by the Women's Health Committee. At the October 2014 teleconference committee meeting further minor changes were made to the statement and the statement was forwarded to Council for approval in November 2014. Recommendations were graded as set out below in Appendix B part iii)

ii. Declaration of interest process and management

Declaring interests is essential in order to prevent any potential conflict between the private interests of members, and their duties as part of the Women's Health Committee.

A declaration of interest form specific to guidelines and statements was developed by RANZCOG and approved by the RANZCOG Board in September 2012. The Women's Health Committee members were required to declare their relevant interests in writing on this form prior to participating in the review of this statement.

Members were required to update their information as soon as they become aware of any changes to their interests and there was also a standing agenda item at each meeting where declarations of interest were called for and recorded as part of the meeting minutes.

There were no significant real or perceived conflicts of interest that required management during the process of updating this statement.

iii. Grading of recommendations

Each recommendation in this College statement is given an overall grade as per the table below, based on the National Health and Medical Research Council (NHMRC) Levels of Evidence and Grades of Recommendations for Developers of Guidelines.[18] Where no robust evidence was available but there was sufficient consensus within the Women's Health Committee, consensus-based recommendations were developed or existing ones updated and are identifiable as such. Consensus-based recommendations were agreed to by the entire committee. Good Practice Notes are highlighted throughout and provide practical guidance to facilitate implementation. These were also developed through consensus of the entire committee.

Recommendation category		Description
Evidence-based	A	Body of evidence can be trusted to guide practice
	B	Body of evidence can be trusted to guide practice in most situations
	C	Body of evidence provides some support for recommendation(s) but care should be taken in its application
	D	The body of evidence is weak and the recommendation must be applied with caution
Consensus-based		Recommendation based on clinical opinion and expertise as insufficient evidence available
Good Practice Note		Practical advice and information based on clinical opinion and expertise

Appendix C Full Disclaimer

This information is intended to provide general advice to practitioners, and should not be relied on as a substitute for proper assessment with respect to the particular circumstances of each case and the needs of any patient.

This information has been prepared having regard to general circumstances. It is the responsibility of each practitioner to have regard to the particular circumstances of each case. Clinical management should be responsive to the needs of the individual patient and the particular circumstances of each case.

This information has been prepared having regard to the information available at the time of its preparation, and each practitioner should have regard to relevant information, research or material which may have been published or become available subsequently.

Whilst the College endeavours to ensure that information is accurate and current at the time of preparation, it takes no responsibility for matters arising from changed circumstances or information or material that may have become subsequently available.