

German National Consensus Recommendations on Nutrition and Lifestyle in Pregnancy by the ‘Healthy Start – Young Family Network’

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Key Words

Child health · Metabolic programming · Nutrition · Physical activity · Pregnancy · Supplements

Abstract

Diet and physical activity before and during pregnancy affect short- and long-term health of mother and child. The energy needs at the end of pregnancy increase only by about 10% compared to nonpregnant women. An excessive energy intake is undesirable since maternal overweight and excessive weight gain can increase the risks for a high birth weight and later child overweight and diabetes. Maternal weight at the beginning of pregnancy is especially important for pregnancy outcome and child health. Women should strive to achieve normal weight already before pregnancy. Regular physical activity can contribute to a healthy weight and to the health of pregnant women. The need for certain nutrients increases more than energy requirements. Before and during pregnancy, foods with a high content of essential nutrients should be preferentially selected. Supplements

should include folic acid and iodine, iron (in case of suboptimal iron stores), the ω -3 fatty acid docosahexaenoic acid (in case of infrequent consumption of ocean fish) and vitamin D (in case of decreased sun exposure and decreased endogenous vitamin D synthesis). Pregnant women should not smoke and not stay in rooms where others smoke or have smoked before (passive smoking). Alcohol consumption should be avoided, since alcohol can harm unborn children.

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Introduction

Prior to and during pregnancy, women and their partners need clear information on and support of a health-promoting lifestyle. Here, we present practice guidelines that were developed with and are supported by the German professional associations and scientific societies for obstetricians and gynecologists, midwives and pediatricians. These recommendations apply to pregnant women in Germany and should form a uniform and harmonized basis for nutrition recommendations during pregnancy for all health care professionals and organizations that provide advice to expecting parents. While many of these recommendations may also be appropriate for other populations, it is necessary to take the specific dietary, lifestyle and other conditions of the targeted population into account.

For expecting parents, pregnancy is an intense, exciting and challenging time. Generally, they aim at doing the right things for a healthy development of their child and its best possible start in life. The topics of nutrition during pregnancy and the prevention of child allergy receive particular attention by expecting parents. However, expecting parents are often confronted with and confused by conflicting advice provided by different sources. Therefore the 'Healthy Start – Young Family Network' aimed at developing harmonized practice recommendations as a common basis for communication by health care professionals as well as for the distribution by network media. From 2009 to 2011, relevant publications, meta-analyses and guidelines, as well as recommendations and reference values for nutrient intakes from professional organizations and institutions that make statements about the nutrition and health of pregnant women and/or allergy prevention (Association of German Gynecologists, German Federal Institute for Risk Assessment, German Federal Center for Health Education, Cochrane Library, German Nutrition Society, German Society for Obstetrics and Gynecology, German Society for Pediatrics and Adolescent Health, German Midwife Organization, European Commission, European Bureau for Food Safety, Research Institute for Child Nutrition, Institute of Medicine (IOM; USA), National Institute for Health and Clinical Excellence (UK) and National Commission for Breast-Feeding at the Federal Institute for Risk Assessment, World Health Organization) were systematically collected and evaluated by the Network Scientific Advisory Board, whose members are authors of this publication. The recommendations were developed based primarily on existing guidelines, meta-analyses and systematic summaries. In the framework of the *Network*, systematic literature

searches were not performed. Formulated under group consensus, the key statements represent the evidence level of expert recommendations. These should be updated at regular intervals (at least every 5 years) to maintain their validity. The authors consider that a systematic literature review would be desirable for future recommendations.

The 'Healthy Start – Young Family Network' (www.gesund-ins-leben.de) is a project of the Federal Government's National Action Plan IN FORM – Germany's national initiative to promote healthy diets and physical activity, and of the National Action Plan against Allergies of the Federal Ministry for Food, Agriculture and Consumer Protection. The *Network* is financed by this ministry. Medical and scientific professional societies, professional associations, as well as professionally focused institutions collaborate in this network in order to provide parents with information on pregnancy and childbirth. The project is coordinated by the 'aid infodienst e.V.', Bonn, Germany.

Key Statements and Practice Recommendations

Energy and Nutrient Needs in Pregnancy

Recommendations

- Energy needs increase only slightly during the course of pregnancy. Energy needs during the final months of pregnancy are about 10% higher than before pregnancy.
- Compared to the increase in energy needs, the need for certain vitamins and minerals/trace elements in pregnancy show a much greater increase. Therefore, pregnant women should pay special attention to the quality of their diet.

Resting energy expenditure increases only slightly during pregnancy, primarily in the second and third trimester. There is a high amount of variability in energy needs, which are in part related to the level of physical activity. This appears to be one reason for the considerable differences in the published reference values on additional energy needs during the course of pregnancy [1–6]. The recommendation of providing about 10% more energy in the final months of pregnancy underlines that the energy needs increase only slightly, which is covered by relatively small food portions (table 1). Pregnant women often overestimate their energy needs. A diet providing too much energy can have unfavorable effects on the

Table 1. Examples of foods with high nutrient densities meeting the modestly increased energy needs

The estimated 10% increased energy needs at the end of pregnancy can be covered, for example, by either:

- A piece of whole-grain bread (without fat spread) with a slice of cheese (45% fat) and a tomato (~260 kcal)
- Or one serving of low-fat yogurt (1.5% fat) with a handful of berries and three tablespoons of whole-grain cereal (~210 kcal)
- Or a plate of vegetable soup with noodles (around 40 g dry weight; ~250 kcal)

weight gain in and the course of the pregnancy and on the health of the unborn child [7–10].

Relative to energy needs, the needs for many vitamins and some minerals increase much more (fig. 1). For many nutrients, a marked increase in needs occurs only after the 4th month of pregnancy, but an increased intake even before the beginning of pregnancy is recommended for folic acid, iodine and iron [2].

Given the only small increase in energy needs, nutrient-dense foods (i.e. foods with a high content of essential nutrients relative to the energy content) are desirable in the diet of pregnant women to supply adequate amounts of minerals, vitamins and other micronutrients. During counseling, the concept of ‘think for two, but do not eat for two’ (do not eat double portions) should be emphasized and illustrated by examples of foods with high nutrient densities providing for the modestly increased energy needs (table 1).

Weight Gain in Pregnancy

Recommendations

- The weight before pregnancy is important for fertility, the course of pregnancy and childbirth, as well as for child health. Women should strive to approach a normal body weight before becoming pregnant.
- The adequate gestational weight gain for normal-weight women is between 10 and 16 kg.

The body weight at the beginning of pregnancy appears to have a greater impact on the health of the mother and child than the weight gained during the pregnancy [4, 11]. In Germany, around 20% of women aged 20–39 years are overweight and another 9–14% are obese [12]. Overweight and obese women have an increased risk for gestational diabetes, high blood pressure, premature de-

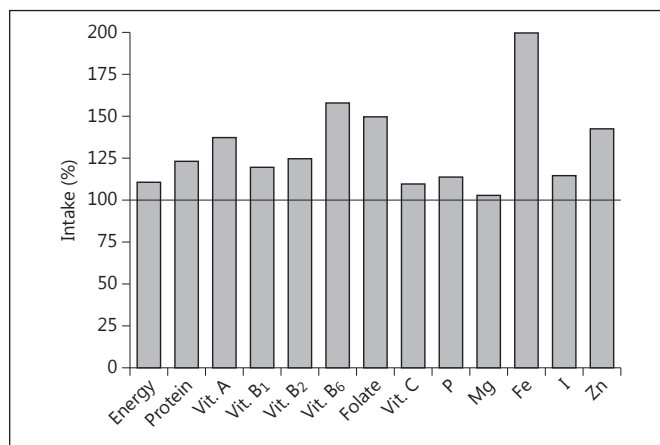


Fig. 1. Reference nutrient intakes for pregnant women expressed as percentage of reference intake values for nonpregnant women. The recommended intake for several nutrients shows a much greater increase than the recommended energy intake [data derived from ref. 29].

livery and complications during delivery [7, 8]. Children of overweight mothers carry an increased risk for later overweight and for congenital disorders, such as spina bifida, and heart and other birth defects [8, 13]. Over- and underweight women should aim to reach a normal weight before becoming pregnant.

From the second trimester onwards, a considerable weight gain commences, which comprises the weight of the fetus, placenta, amniotic fluid, the gain of maternal tissue, such as breast and uterine tissue, an increase in blood volume and extracellular fluids, as well as fat deposits. A normal weight gain during pregnancy lies between 10–14 kg [6] and 10–16 kg [14].

The United States IOM recommended different levels of weight gain during pregnancy according to the body mass index before pregnancy: underweight and normal weight women should gain more than overweight or obese women [15]. For normal weight women, the IOM recommends a weight gain of 11.5–16 kg. More recent study results question the basis for a general clinical practice application of these recommendations that are based on observational studies in the United States, especially the application for overweight and obese women [4]. Data from the nationwide German Child and Adolescent Health Study (KiGGs) show that the risk for later childhood overweight is indeed higher when normal-weight women gain a lot of weight during pregnancy; however, the magnitude of the effect is limited. With 1 kg of additional weight gain, the risk for childhood overweight in-

creases only by about 1% [16]. For overweight and obese pregnant women in Bavaria, a weight gain according to the IOM recommendations was associated with a lower incidence of preeclampsia and nonelective cesarean sections, but with a higher number of diabetes, premature births and low birth weight, as well as higher perinatal mortality [17]. A further retrospective observational study showed a reduced risk for complications in very severely obese women (body mass index >40) who lost weight during pregnancy. These results underline that collectively, the available data do not suffice for the adoption of the IOM recommendations into standard clinical practice in Germany. Future recommendations for a desirable weight progression during pregnancy may arise from ongoing intervention studies [18]. However, overweight and obese pregnant women may be advised to adopt a balanced diet and regular physical activity.

Nutrition in Pregnancy

Recommendations

- A balanced and varied diet is important for the health of pregnant women and their children.
- Regular meals are desirable during pregnancy and contribute to the well-being of the pregnant woman.
- Pregnant women should pay special attention to include vegetables, fruit, whole grains, low-fat milk and low-fat meat products and oily fish in their regular diet. The use of supplements is recommended to ensure an adequate intake of iodine and folic acid. In a well-balanced diet, certain food groups are weighted differently:
 - Abundant amounts of water or other low-calorie beverages and plant-based foods should be consumed.
 - Moderate amounts of animal-based foods should be eaten, with a preference for low-fat milk and milk products, low-fat meats and oily fish.
 - Foods with a high content of saturated fats as well as sweets and snack products should be eaten sparingly.

A well-balanced diet and regular exercise before and during pregnancy not only benefits the mother and the child in the short term, but can also have long-term positive effects on health and well-being [19]. Choosing appropriate foods can meet the higher need for a number of nutrients during pregnancy, with the exception of folic acid and iodine. The consumption of special dietetic foods is usually not necessary. Taking supplements cannot replace a well-balanced diet. Regular meals spread throughout the day promote well-being, although the ex-

act number of meals depends on the needs and preferences of the particular pregnant woman.

The weighting of different food groups recommended for abundant, moderate or sparing consumption should indicate that these food groups contribute differently to nutrient and energy needs during pregnancy. The high needs of folic acid and iodine in pregnancy cannot be provided for by a well-balanced diet alone, therefore the use of supplements providing these nutrients is recommended.

The fluid requirements during pregnancy increase in proportion to energy requirements by about 300 ml per day during the last few months of pregnancy [20]. The reference intake value for the total amount of water consumed from foods and drinks for 19- to 50-year-olds is 35 ml/kg body weight and day, which also applies to pregnant women [2]. Hence, fluid intake should not be less than 1.5 liters of water per day [2]. Higher amounts of fluid intake may be necessary in hot environments or during heavy physical activities.

Nutrient-dense foods such as vegetables, fruits, whole grains and low-fat milk products should be preferentially consumed to help meeting the increased needs for vitamins and minerals. The consumption of five portions of fruits and vegetables per day is desirable [21]. Grain products, especially from whole grains, and potatoes have a high content of vitamins, minerals and fiber and should be preferentially consumed during pregnancy. Low-fat preparations of potatoes and grains are preferred.

Low-fat milk and milk products provide protein, calcium, iodine and other nutrients, and are important components of a well-balanced diet. Meat provides well bioavailable iron and should be included in the diet of pregnant women. A preference for certain iron-rich meat types is not necessary in mixed diets. However, low-fat meats and meat products are preferred.

Sweets and snack products with a high energy content and low nutrient density should only be consumed in small quantities.

In order to reach the recommended levels of long-chain ω -3 fatty acids, an average intake of 200 mg of docosahexaenoic acid (DHA) per day should be reached during pregnancy. Two portions of fish should be consumed per week, with one portion of an oily fish like mackerel, herring, sardines or salmon [12, 22]. A high consumption of carnivorous fish types like tuna and swordfish, which are at the end of the maritime food chain and may exhibit a high amount of toxic or harmful substances, should be avoided [23]. It is recommended that pregnant women who do not regularly eat seafood take a supplement providing the ω -3-fatty acid DHA

[24]. Plant oils should be consumed regularly because of their high amount of monounsaturated and essential polyunsaturated fatty acids. In contrast, fats with a high portion of saturated fatty acids (fats that are solid at room temperature) should be consumed sparingly.

Vitamin D. Seafood (especially oily fish) contributes to the provision of iodine and vitamin D. The vitamin D status of a pregnant woman directly affects the vitamin D status and health of the child, especially bone mineralization [25–27]. Vitamin D is obtained from the diet and is also synthesized in the skin during exposure to sunlight. An adequate time spent outdoors can help to provide a sufficient supply of vitamin D. Regarding light skin types, it is sufficient to expose the face and arms to sunlight for 5–10 min without sun protection around midday. Sunburn should be avoided. The German Nutrition Society recommends a daily vitamin D supplement of 20 µg (800 IU) for pregnant women who do not synthesize sufficient vitamin D because of lack of or insufficient exposure to sunlight [2]. The average intake of vitamin D through the diet is around 2–4 µg daily [12]. This amount is not enough to reach desirable serum concentrations of 25-hydroxycholecalciferol of at least 50 nmol/l through the endogenous synthesis of vitamin D in winter, and in summer in case of limited sunlight exposure. Pregnant women who rarely spend time in the sunlight, cover their skin or use sunscreen lotions, as well as women with darker skin types should supplement their diet with vitamin D to reach a desirable serum concentration.

Supplements: Folic Acid

Recommendations

- Women planning a pregnancy should take a folic acid supplement (400 µg folic acid daily) in addition to a well-balanced diet in order to meet the higher need for folic acid. They should continue supplementation at least until the end of the first trimester.

Folate status is important for cell division and growth processes. Plant-based foods like green leafy vegetables, cabbage, legumes, whole-grain products, tomatoes or oranges are good sources of folate.

The average folate intake in the German population lies clearly below the reference values, and 86% of German women do not meet intake recommendations [12]. During pregnancy, the reference intake value for folate (calculated as folate equivalents) increases by 50% to 600 µg/day [2]. A supplement with at least 400 µg of folic acid (alone or in combination with micronutrients) was shown

to markedly reduce the risk for serious birth defects, namely neural tube defects, in numerous studies and in a Cochrane meta-analysis [28, 29]. In some studies, also a risk reduction for other congenital birth defects, including congenital heart disease and cleft palate, were reported [28, 30–34], even though no significant effects for the prevention of these birth defects were found in the cited Cochrane meta-analysis [28].

Closure of the neural tube occurs 3–4 weeks after conception [28, 35]. Therefore, folic acid supplementation should start prior to conception to reach an optimal preventive effect. Women planning a pregnancy or who cannot rule out becoming pregnant should take a supplement including 400 µg folic acid daily in addition to a well-balanced diet, and they should continue supplementation at least until the end of the first trimester [36]. When supplementation begins shortly before or just after conception, supplements should contain more than 400 µg folic acid, since this leads faster to tissue concentrations that are considered effective for prevention [37]. A daily intake of up to 1,000 µg of folic acid is considered as the maximum safe level of intake by the European Food Safety Authority [38].

The German Nutrition Society reference values for folate equivalent intake during pregnancy can hardly be reached through diet alone [2, 12]. In Germany, there is no systematic fortification of common foods with folic acid [39]. Even if certain food manufacturers fortify foods with folic acid, women are still advised to supplement their diet with folic acid before and during pregnancy. Currently, only a small portion of women achieves an effective preventive folic acid supply before and during pregnancy [40].

Supplementation with folic acid can be continued after the 12th week of pregnancy. Further research is required to explore the reported possible benefits of multivitamins with folic acid supplementation concerning the reduction in the risk of preeclampsia, improvement in the often poor vitamin D status and its consequences for mother and child, in addition to the reduction in the risk for congenital birth defects and low birth weight. When pregnant women take multivitamins, they should ensure that the multivitamins contain 400 µg of folic acid.

Supplements: Iodine

Recommendations

- A sufficient iodine intake should be promoted before and during pregnancy. The use of iodized table salt, the consumption of seafood twice weekly, as well as the

regular consumption of milk and milk products is advisable.

- In addition, pregnant women should take a supplement containing 100–150 µg of iodine daily. Women with thyroid disease should consult their physician.

A good iodine status is not only important during pregnancy, but is already important for fertilization. Women wishing to become pregnant should be counseled on the significance of iodine supply. In order to support a good iodine status, iodized salt should be used in households, restaurants and canteens, and for the preparation of ready-made foods such as bread.

In pregnancy, the iodine reference intake value increases from 200 to 230 µg/day [2]. On average, about 120 µg of iodine is consumed through foods and iodized salt per day. Even a mild iodine deficiency can have negative effects on the child [41], therefore, pregnant women should take a daily iodine supplement in addition to dietary iodine supply. An iodine supplement of 100–150 µg per day seems sufficient. This equates to the lower to middle area of the safe range (100–200 µg/day) of iodine supplementation during pregnancy, as defined in the German Motherhood Guidelines [42]. If multivitamin preparations containing sufficient iodine are taken, no additional iodine supplement should be used. The use of dried algae or seaweed supplements with possible excessive iodine amounts that may affect thyroid function is discouraged [43].

Supplements: Iron

Recommendations

- Pregnant women should ensure an adequate intake of iron with their diet.
- Iron supplementation should be determined individually based on medical advice.

Iron needs increase during pregnancy, because more iron is needed for the fetus, placenta and increased blood volume of the expectant mother [44]. However, during pregnancy, iron loss during menstruation ceases, and intestinal iron absorption increases [45]. Different recommendations have been given for iron supply in pregnancy. The reference values for iron intake during pregnancy for Germany of 30 mg/day are about twofold higher than for nonpregnant women [2], which are usually not covered by diet alone [12]. Other expert groups consider about equal iron needs for pregnant as for nonpregnant women [45, 46].

Pregnant women should ensure an adequate intake of foods with well-absorbable iron. These include meat, meat products and fish. Some plant-based foods such as whole grains and dark types of vegetables have a large amount of iron, however, with a lower bioavailability. Simultaneous consumption of vitamin C-rich foods (like citrus fruits) along with iron-rich grains or vegetables can improve iron absorption.

A general prophylactic iron supplementation is not recommended during pregnancy, since an increased iron intake in women with an adequate iron status may have adverse effects [45, 47]. Iron supplementation during pregnancy should always be considered individually based on a medical consultation that includes history and blood tests.

Vegetarian Nutrition during Pregnancy

Recommendations

- A vegetarian diet that includes consumption of milk, milk products and eggs (ovo-lacto vegetarianism) with adequate food choices can cover most nutrient needs even during pregnancy.
- To ensure an adequate iron intake, iron supplements should be considered based on a blood test and medical counseling.
- If seafood consumption is avoided, the long-chain ω-3 fatty acid DHA should be supplemented.

An ovo-lacto vegetarian diet with adequate food choices can achieve an overall good nutrient status during pregnancy, with the exception of vitamin D, folic acid and iodine, which should always be supplemented, as well as iron, which should be supplemented when medically advised. Pregnant vegetarian women who do not eat fish should take a supplement with the ω-3 fatty acid DHA, since synthesis of α-linoleic acid from some plant-based oils is marginal and meeting the needs is not guaranteed [48, 49]. Low-fat milk and milk products, eggs, legumes and grain products usually provide a sufficient protein intake. Eggs, legumes, whole-grain products and some types of vegetables can contribute to iron intake. However, the risk for an insufficient iron supply is increased in ovo-lacto vegetarians [50, 51]. Pregnant women who already followed a vegetarian diet for a prolonged time before they became pregnant also show an increased risk for deficiencies in vitamin B₁₂ and zinc [50, 52–54]. Counseling of pregnant, vegetarian women should therefore consider micronutrient intakes, and these women should be counseled to supplement when necessary.

Vegan Nutrition during Pregnancy

Recommendations

- With a purely plant-based (vegan) diet, a sufficient nutrient intake during pregnancy, even with careful food choices, is not possible without supplementation. A vegan diet proposes serious health risks, especially for the development of the child's nervous system.
- Pregnant women consuming vegan diets need specific medical counseling and require micronutrient supplementation.

With a strictly plant-based, so-called vegan diet during pregnancy, intake of energy, protein, long-chain ω -3 fatty acids, iron, calcium, iodine, zinc, vitamin B₂, vitamin B₁₂ and vitamin D are often critical, with considerable health risks for the child and the pregnant woman. A vitamin B₁₂-deficient vegan diet lasting several years can lead to severe and long-lasting damage to the child's nervous system during pregnancy [52, 55, 56]. Women who choose to stick to a vegan diet before and during pregnancy require qualified nutrition counseling. Vegans need supplementation in order to cover the nutrient needs of the mother and child.

Protecting against Food-Borne Illnesses during Pregnancy

Recommendations

- Pregnant women should not eat raw, animal-based foods. This includes raw meat or meat which is not thoroughly cooked, raw sausages like salami, raw ham, raw fish, raw seafood, unpasteurized milk, raw eggs, as well as foods made of products which are not thoroughly cooked. Also, soft cheese and smoked fish should be avoided.
- Raw fruit and vegetables as well as lettuce should be washed well before consumption, be prepared freshly and be eaten soon after preparation. Foods grown in or near the ground should be peeled. These foods, like all perishable foods, should be freshly prepared and consumed soon after preparation. Preprepared, packaged salads should not be eaten by pregnant women.
- Foods that are grown in or near to the ground should be stored separately from other foods to avoid cross contamination.

Food-borne illnesses can be harmful to health. During pregnancy, listeriosis and toxoplasmosis can be transmitted to the unborn child if the pregnant woman is antibody

negative and can lead to severe illness, premature birth or stillbirth. In Germany, the Robert Koch Institute registers 10–40 cases of congenital toxoplasmosis [57] and around 20–40 cases of neonatal listeriosis [58] per year (www.rki.de). Pregnant women should take precautionary measures in order to avoid these infections.

Concerning toxoplasmosis, the consumption of not fully cooked meats (e.g. raw sausages, salami and ham) from pork, lamb and game is particularly problematic [59–61]. Beef also plays a role and should also not be consumed uncooked as a precautionary measure.

Raw meat products, smoked fish and soft cheeses, also those made from pasteurized milk, present a high risk of containing pathogenic listeria; unpasteurized milk and products containing unpasteurized milk products, and vegetables and salads also carry this risk [62–66]. Listeria can also be found in heated foods. Listeria can grow at cool temperatures, such as those found in a refrigerator, and also in and on foods that were packed under protected or vacuum-sealed environments. For this reason, pregnant women should not eat sausages and cheeses that have not been freshly sliced.

Pregnant women should consume meals as soon after as possible preparation. In restaurants and cafeterias, they should consume meals that have been heated directly prior to consumption.

Raw, animal-based foods present a higher risk for other disease-causing agents, for example salmonella, which can endanger the health of pregnant women and their unborn children.

In addition to choosing safe foods, hygiene and the safe storage of foods play an important role in protecting against food-borne illnesses. Sanitary food preparation includes washing hands before and after coming into contact with raw foods, and washing fruits and vegetables before use (disease-causing agents are also present in the soil). In order to prevent cross contamination, the same kitchen utensils should not be used for both cooked and raw meals without being washed in between.

Exercise during Pregnancy

Recommendations

- Exercise during pregnancy is desirable and supports the health of both mother and child.
- Pregnant women should be active every day through daily routine activities or exercise.
- Athletic training should only be practiced with moderate intensity during pregnancy. This intensity is defined by the ability to converse while exercising (talk test).

During pregnancy, exercise with moderate intensity (not increasing the strength and endurance of the women) appears to be beneficial. For example, physical exercise is considered to reduce the risk for gestational diabetes and preeclampsia, and to help prevent excessive weight gain. Regular, moderately intense exercise is recommended as long as there are no medical contraindications [4, 67–69].

Women should not begin new types of sports during pregnancy with movements that they are not accustomed to. For pregnant women, inappropriate types of sports include those with a high risk for injury and falls, for example, team, contact or fighting sports, and diving. Sports that draw upon big muscle groups like biking, swimming and water aerobics, hiking and Nordic Walking are recommended. Healthy pregnant women can be active at elevations up to 2,000–2,500 m, especially when they are accustomed to these altitudes [70, 71].

Regular exercise outdoors is desirable with respect to supporting an adequate vitamin D status [72]. Pregnant women often show low blood vitamin D levels, which are associated with poor child bone mineralization and muscle mass during school age [18, 27, 73–76]. Vitamin D status can be improved through vitamin D formation in the skin, which is induced by sunlight exposure.

Alcohol during Pregnancy

Recommendations

- Pregnant women should avoid drinking alcohol. The safest option is to avoid any alcohol consumption during pregnancy.

Alcohol during pregnancy can lead to birth defects, growth restriction, damage of tissues and nerve cells as well as to an irreversible decrease in the child intelligence development, and it can also have adverse effects on the child's later behavior (hyperactivity, impulsivity, distraction, risky behavior, disorders of mental and social development and disorders of social maturity) [77, 78]. The individual risk is influenced by maternal and fetal characteristics and is difficult to predict. A safe and risk-free amount of maternal alcohol consumption for the fetus, or a time window during pregnancy which does not present a risk from alcohol consumption, cannot be defined based on the available evidence. The recommendation to completely avoid alcohol during pregnancy can promote uncertainty and feelings of guilt in women who consumed alcohol early in pregnancy before they were aware of the pregnancy. The risks and their assessment should be addressed during the continu-

ing education of health care professionals. The statements of an Australian report seem appropriate [79]: The risk to harm the fetus is highest when frequent and large amounts of alcohol are consumed. The risk to harm the fetus is low when women only consumed a small amount of alcohol before they became aware of their pregnancy.

Smoking during Pregnancy

Recommendations

- Pregnant women should not smoke and not stay in rooms where people are smoking or have smoked.

Smoking can increase the risk for premature birth and miscarriage, birth defects, early placental abruption, low birth weight, and the later risk for allergies and overweight [80–84]. Pregnant women should not smoke and should avoid passive smoke exposure. Obstetricians, midwives and other health professionals should explicitly address pregnant women and their partners regarding tobacco consumption, motivate them to quit and advise them that pregnancy is a good opportunity to stop smoking. Women from lower socioeconomic groups, single mothers and mothers under age 20 smoke more often during pregnancy [84], therefore these groups should be specifically targeted. Special materials for smoking cessation during pregnancy and for health professionals counseling pregnant women in smoking cessation, as well as counseling hotlines are available.

Caffeinated Beverages during Pregnancy

Recommendations

- Pregnant women should only drink caffeinated beverages in moderate amounts. Up to 3 cups of coffee per day are acceptable.
- The consumption of caffeinated energy drinks are discouraged during pregnancy.

The data are inadequate for quantifying caffeine amounts that do not present a risk for mother and child and for conclusive assessment of possible detrimental effects. A Cochrane meta-analysis based only on two studies showed no detrimental effects to the length of gestation or to birth weight of the consumption of up to 3 cups of coffee per day during pregnancy [85]. As a precautionary measure, high caffeine intake is discouraged. For this reason, pregnant women are discouraged from consuming so-called energy drinks, which usually have high amounts of caffeine [86].

Medication Use during Pregnancy

Recommendations

- In pregnancy, medications should only be started or stopped after consulting a physician.

This recommendation includes not only prescription drugs but also over-the-counter medications. Medications that were taken before pregnancy should not be stopped by the women without previous consultation with a doctor [87]. Information about the safety of medications during pregnancy and breast-feeding can be found under: www.embryotox.de.

Preparation for Breast-Feeding

Recommendations

- Expectant parents should inform themselves about breast-feeding already during pregnancy and should obtain counseling. Breast-feeding is the best choice for mother and child.

The advantages of breast-feeding are outlined in the *Guidelines for Infant Nutrition and the Nutrition of Breast-Feeding Mothers* [88]. Since an early latch and timely breast-feeding are very important for successful breast-feeding, and since insecurities often lead to premature weaning [89–91], women and their partners should obtain breast-feeding counseling already during pregnancy. Skilled personnel who counsel expectant parents should actively approach the subject and motivate pregnant women to breast-feed.

Nutrition during Pregnancy for the Prevention of Allergies in the Child

Recommendations

- The avoidance of certain foods during pregnancy is not beneficial for the prevention of later allergy in the child.
- Regular consumption of oily fish during pregnancy is recommended, also for the prevention of allergies.
- The consumption of pre- and probiotics during pregnancy does not offer proven benefits for allergy prevention in children.

These recommendations are based on the National Guidelines for Allergy Prevention [92]. There is no evidence that a low-allergen diet during pregnancy leads to a reduced allergy risk in the child. Dietetic restrictions aim-

ing at allergy prevention in the child are not recommended, and they can induce increased risks of insufficient nutrient intake. Avoidance of foods to which pregnant women show an allergic reaction should be continued.

In order to prevent allergies in children, pregnant women should avoid smoking and areas where there is smoke or where there has been smoking previously. In families with a medical history of allergies, the acquisition of cats or other animals with fur should be avoided. Pregnant women should avoid high exposure to air pollutants and mold accumulation in order to protect their health.

Practice Recommendations as a Base for Counseling

Expectant parents are generally open for health-promoting changes in their lifestyle, particularly if they expect benefits for the child. Doctors, midwives and other health care professionals should utilize this opportunity and actively approach couples who wish to have a child and expectant parents to inform and motivate them on health-promoting dietary and lifestyle choices. These practice recommendations developed in consensus with the relevant professional societies can serve as a basis for counseling on nutrition and physical activity during pregnancy, and for responding to questions and concerns of the target group. Doctors, midwives and other distributors of health information should take the questions and concerns of the target group seriously. Positive messages should be emphasized, and the joy regarding the expected child should be supported.

Clinical and Practical Implications

- The energy needs during the course of pregnancy increase only about 10%, while the need for micronutrients increases much more. Adherence to a balanced diet and good food choices are of great importance.
- Normal weight should be strived for, when possible even before pregnancy ensues.
- Adherence to a balanced diet and wise food choices are important. Folate/folic acid and iodine must always be supplemented. It should be checked if further nutrients need to be supplemented. Special attention should be given to pregnant women who follow vegetarian or vegan diets.
- Alcohol and smoking should be avoided during pregnancy. Women who smoke should be supported to cease smoking.
- During pregnancy, regular, daily exercise (exercise of moderate intensity) is desirable.

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