

The importance of educational activities promoting health in obstetrics and gynaecology—selected issues taking into account nutritional aspects

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Objective: It is important in the context of gynaecology and obstetrics that the risk of many diseases can be significantly reduced by introducing a number of lifestyle changes, such as diet. **Mechanism:** An unhygienic lifestyle with an unbalanced diet, eating food of inadequate health quality, can have a significant negative impact on a woman's health. **Findings in brief:** It is essential to continue research on the influence of environmental and genetic factors on health, which is important in the context of gynaecology and obstetrics where any educational activities promoting women's health matter. **Conclusions:** Educational activities promoting a hygienic lifestyle and a proper diet play a huge role in protecting women's health.

Keywords

Gestational diabetes; Inflammation; Gynaecology

1. Introduction

For a long time, scientists have been making efforts to determine the influence of environmental and genetic factors on the incidence rate of the twenty-first century civilisation diseases, which is also extremely significant in the context of gynaecology and obstetrics. A significant fact is that in these areas, any pro-health educational activities and methods of passing on this knowledge are essential in disease prevention. For example, the method of passing on the knowledge on dietary factors and physical activity in prevention activities related to obesity and gestational diabetes are obligatory in health promotion. An appropriate lifestyle is important in prophylaxis, therapy, and as a complement to pharmacological treatment, and therefore should be taken into consideration in health-promoting educational activities [1–6].

Aside from the prevention of illness, restoration of the sick and rehabilitation, promotion of health is one of the four major pillars of medicine. The World Health Organisation (WHO) defines health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”. Health is a process of mutual conditions in the body-environment relationship that in the event of a lack of disease, maintain the equilibrium between the body and the environment. Health is the ability of a body to adapt to the environment.

2. Gestational diabetes as a difficult condition in obstetrics

Diet related issues play a significant role in health promoting activities, with diabetes prevention a real issue in this respect.

Diabetes has been considered a global epidemic, and poses a serious challenge in obstetrics. The World Health Organisation (WHO) estimates that the total number of people with diabetes will reach 522 million worldwide and 3.42 million in Poland by 2030. In women, the current estimate of type 1 diabetes is 2–3% and type 2 nearly 6%.

It should be strongly emphasised that six months prior to conception, women with diabetes need to plan the pregnancy to meet applicable standards in order to normalise carbohydrate levels.

Normal pregnancy involves a variety of hormonal and metabolic changes in a woman's body aiming at providing building and energy substrates for foetal development [7], and the major nutrient is glucose, transported across the pla-

centa by facilitated diffusion. Around the 9th week of pregnancy the pancreas of the fetus senses insulin, and around the 20th week β -cells secrete insulin in response to the increased level of glucose in the fetus. Prolactin and progesterone are responsible for changes in carbohydrate metabolism, and raise the level of blood glucose (insulin-antagonist effect), while placental lactogen regulates appetite and weight gain during pregnancy.

The first trimester is dominated by an anabolic state, where mainly fats are accumulated. The second half of pregnancy is a catabolic state, in which deposits of energy substances are released to cover the increased demand for energy for the fetus and placenta. In addition, maternal insulin resistance develops, where a rise in the level of progesterone causes an increase in glucotransporter 4 (GLUT-4) expression and inhibits glucose transport into adipose tissue and skeletal muscles [7, 8].

At the end of the pregnancy, increased concentrations of tumour necrosis factor (TNF- α) are secreted from the placenta and adipose tissue. TNF- α decreases skeletal muscle glucose uptake, and by lowering concentrations of adiponectin it leads to post-meal hyperglycaemia [9]. Increased insulin secretion compensates for insulin resistance as the consequence of the increased expression of prolactin receptors in the pancreas, binding the placental lactogen. Lactotrophic hormones stimulate multiplication of β -cells, contributing to the expression of genes for insulin and glucose-dependent insulin secretion. At the end of the pregnancy, the demand for glucose is 6 mg/min/kg BW.

It needs to be strongly emphasised that the first step for pregnant women suffering from gestational diabetes involves introducing a balanced diabetic diet, which is often sufficient to balance blood sugar levels and to avoid needing insulin therapy. It should be borne in mind that the goal of a diet in gestational diabetes is not to lose weight, but to achieve the appropriate level of blood glucose concentration and avoid complications in both the mother and fetus [10–15]:

- BMI—weight in kilograms divided by height in meters squared:
 - the average daily calorie intake for a pregnant woman is about 35 kcal/1 kg (1500–2400 kcal/day) at normal body weight before pregnancy;
 - 25–30 kcal/1 kg for an overweight pregnant woman.
- A diet for a pregnant woman based on 6–7 meals a day in carbohydrate exchanges (CE);
 - Breakfast I—20% of the daily energy requirement—4 CE
 - Breakfast II—10% of the daily energy requirement—2 CE
 - Lunch—10% of the daily energy requirement—2 CE
 - Teatime—10% of the daily energy requirement—2 CE
 - Dinner I—25% of the daily energy requirement—4 CE
 - Dinner II—10% of the daily energy requirement—2 CE

An important element in pro-health education that is essential for positive treatment outcomes is to teach patients

to count carbohydrates through an exchange system, which facilitates appropriate metabolic compensation and thus prevents later complications of diabetes that lead to chronic hyperglycaemia. It is not possible to dose the right amount of insulin without counting carbohydrates in meals [16, 17].

- Reducing total carbohydrate content to around 40–50% (ca. 180 g) of all the calories in the diet.
 - Recommended consumption of low glycaemic index products (<50%), sugars reduced to a minimum.
 - Fructose should not substitute saccharose.
- Fibre—25–50 g or 15–25 g/1000 kcal, particularly water-soluble fractions (beta-glucans and pectins), and reducing fructose to 50 g.
 - Daily consumption of cereal products rich in complex carbohydrates, proteins, iron, vitamin B, niacin, zinc, magnesium and fibre.
 - Fruit and vegetables—rich in vitamin C, mineral components, beta-carotene and fibre. Potassium lowers blood pressure, while fibre prevents constipation, improves glucose tolerance, lowers cholesterol levels, and regulates the function of the gastrointestinal tract.
 - Reducing consumption of sweets and sugar to prevent tooth decay and maintain normal body weight.
 - Carbohydrate exchange (CE)—the amount of a product in grams that contains 10 g of carbohydrates assimilated by the body (e.g., 1 slice of bread contains 2 CE, which is equivalent to 20 g of sugar) [18].
 - Fats—20–30% of energy in a 24 h diabetic diet;
 - Reducing saturated fatty acids to less than 10% of total energy intake.
 - Reducing mono-unsaturated fats (sesame and rapeseed oil, olive oil and nuts) to less than 10–15% of total energy intake;
 - Reducing polyunsaturated fats to 6–10% of the caloric content, e.g., 1–2% of Omega-3 acids and 5–8% of Omega-6 acids (sea fish, soya, corn, sunflower, saffron);
 - Cholesterol level below 300 mg/dL, or for patients with too high LDL fraction to below 200 mg/dL (20 g of saturated fatty acids, and 2 g of trans-isomers);
 - Bread with a thin layer of butter to prevent high cholesterol;
 - Proteins as building blocks of the body;
 - Daily protein content—30%
 - Maintaining a daily 50/50 proportion of animal protein to vegetable protein
 - Daily intake of protein—1.3 g/kg BW/day [9]
 - Drinking 4 glasses of milk a day
 - Meat as a source of protein, vitamin B2, iron and niacin, should be consumed in moderation
 - Oily fish—2–3 times a week as a replacement for meat
 - Folic acid supplementation—400 μ g a day to prevent neural tube defects
 - As pregnant women suffering from diabetes or taking insulin can experience a magnesium deficiency, they should

take magnesium supplements or consume more products containing magnesium

- Daily intake of salt from different sources should be reduced to 8 g.

Glycaemic index (GI) measures the extent to which a specific food raises blood glucose. It is expressed as a percentage, e.g., an apple has a glycaemic index of 39%, which means that after eating an apple the rate of glucose increase in the blood will be 39% of that observed after eating pure glucose.

Glycaemic index depends on a variety of factors, e.g., the method of food preparation. The more minced or overcooked the product, the higher the glycaemic index. Cooking or other heating increases the glycaemic index by breaking down the starch in the food. Proteins and fats reduce GI—fat inhibits stomach emptying and makes digestion and absorption of carbohydrates less effective. Protein lowers post-meal blood glucose levels by affecting the cells secreting intestinal hormones and insulin. Ripe fruit has a higher glycaemic index as starch is decomposed to a faster-absorbed glucose.

2.1 Self-control and self-observation as equal and integral components of treatment in women with gestational diabetes

Health education plays a crucial role in treating women with gestational diabetes. This process teaches people how to take care of their health and the health of others, and makes them conscious of the relationship between their health and lifestyle, as well as the physical and social environment.

Each method of gestational diabetes treatment is based on the fundamental pillar of education about the treatments, abilities, self-control and lifestyle. A diabetes care team consists of:

- the patient—a central figure;
- a diabetologist or GP trained in diabetes treatment;
- a nurse/obstetrician with a health educator certificate;
- a dietician to introduce the proper rules of nutrition and a nutritional plan;
- a rehabilitation specialist to implement physical exercise programmes;
- a psychologist to resolve any psycho-emotional problems;
- consultants, e.g., obstetrician, ophthalmologist, nephrologist, neurologist.

The tasks of the team include:

- presenting an individual gestational diabetes treatment plan:
 - ✓ dietary recommendations taking into account the amount, quality and time of meals [18];
 - ✓ guidelines on physical effort;
 - ✓ detailed instructions related to insulin administration, as well as the time and place for injections;
 - ✓ determining target values of serum glucose concentrations and weight gain during pregnancy;
 - ✓ implementing methods of intensive treatment of diabetes and comorbidities;
 - ✓ providing continuous therapy education for the woman, her family and friends;

- presenting the disease and its complications;
- presenting treatment possibilities;
- explaining and understanding the rules for following dietary recommendations;

It should be strongly emphasised that positive treatment outcomes in women with gestational diabetes can be obtained best in facilities that employ staff with relevant qualifications.

2.2 Probiotics, prebiotics and synbiotics in gynaecology

As already indicated, diabetes prevention is one of the most significant health promoting measures in dietary issues. It is also worth mentioning the importance of functional food such as probiotics, prebiotics and synbiotics, which have essential gynaecological implications [19–23].

“A food can be considered as functional when it has a proven beneficial effect for the human health beyond the normal nutritional effects. A functional food can improve the health and well-being of the consumer by reducing the risk of disease. Functional foods must be similar in appearance to conventional foods and demonstrate their effects in amounts that can normally be expected to be consumed in the diet: they are not pills, capsules or drops, but part of a normal food pattern” [19]. Functional foods such as probiotics, prebiotics and synbiotics show significant pro-health effects [20–23].

Considering proper functioning and the prevention of inflammation, it is incontestable that metabolic products (fats, proteins and carbohydrates) are delivered to the genitals through the blood and produce the mucus essential for moisturing the vagina. Unfortunately, it should be borne in mind that too many carbohydrates, especially simple sugars, contribute to the development of inappropriate vaginal flora, namely yeast-like fungi [24]:

- A diet rich in unprocessed food products,
- A diet deficient in sugars, particularly simple sugars, and fats.
- Organic food, without preservatives, containing whole-grain products (rye or spelt bread, cereals, dark paddy rice and potatoes); unsweetened natural yoghurts; lean beef and poultry; fish and eggs, vegetables (preferably seasonal), pickled cucumbers and cabbage (when subjected to fermentation, they are a natural source of lactic acid bacilli and vitamin C), and leaf vegetables.
- Intake of calcium (milk and dairy products: cheese, yoghurt), broccoli, spinach.
- Recommended olive oil, pumpkin and sunflower seeds (containing vitamins A, B, C, and minerals—calcium, magnesium, potassium, zinc, iron, selenium, manganese).
- Flaxseed, garlic and spices, such as oregano, cinnamon, salvia and cloves demonstrating antifungal activity.

Probiotics in kefir, yoghurt, cheese, cornflakes and juices support maintaining natural bacterial flora. These are microorganisms, mainly lactic acid bacteria (*Lactobacillus* spp., *Streptococcus* spp.), yeast strains (*Saccharomyces* spp.), mould cultures (*Aspergillus* spp.), and lactic acid bacteria with selected yeast strains. While producing lactic acid, probiotics neutralise the electro-chemical potential of cell mem-

branes and cause denaturation of intracellular proteins of harmful microflora. In addition, they can produce high quantities of H₂O₂, toxic for pathogens in response to the rivalry for nutrients and receptors in mucosa and epithelium [24–26].

These are heterogeneous chemical substances produced mainly by *Lactobacillus acidophilus*, that inhibit pathogens—*Staphylococcus aureus*, *Salmonella enteritidis*, *Bacillus cereus* and *Pseudomonas aeruginosa*. Probiotics stimulate the cellular and humoral immune response.

Aside from probiotics, prebiotics are used for developing normal microflora. They are defined as nondigestible food ingredients, selectively stimulating the growth or activity of one or a specified number of bacteria in the colon. Natural probiotics can be found in garlic (9–16%), chicory (13–20%), artichokes (15–20%), asparagus (10–15%), onion (2–6%), wheat (1–4%) and bananas (0.3–0.7%) [24].

Synergistic combinations of pro- and prebiotics are called synbiotics. By stimulating probiotics with prebiotics, synbiotics develop beneficial intestinal microflora, inhibit the growth of pathogenic intestinal bacteria, and reduce harmful microflora (*Clostridium perfringens* of other endopathogens), while multiplying beneficial bacteria. They lower the level of cholesterol and blood pressure, as well as improve the absorption of magnesium and calcium, which has a positive influence on the prevention of inflammation in gynaecology [26–29].

To sum up the analysis of these issues related to health promotion in obstetrics and gynaecology, such as the dietary aspects, it is worth emphasising that they are essential also in the context of developmental period medicine, i.e., the field of clinical and theoretical medicine that follows norms and disorders of human somatic and mental development from birth to the end of puberty. An open aspect for further studies, associated with the topic of this paper, is the statement that for centuries it has been assumed that the structure of the human body is genetically determined, while the mental structure is conditioned by society and culture. Despite this assumption, for centuries the essential correlation between human nature and human culture has not been noticed, and culture and nature are not opposites; rather, culture complements nature [30].

3. Summary

All educational health-promoting activities related to sharing knowledge on a healthy lifestyle, physical activity and diet are significant in gynaecology and obstetrics.

Women with diabetes who plan a pregnancy should remain under the constant care of a diabetic and obstetric team comprising specialists in diabetology, obstetrics, neonatology, ophthalmology and dietetics, along with a nurse educator.

Author contributions

KP-R, GJB, PM and MK designed the manuscript. WK, MM and AB-A provided help and advice on the manuscript. KP-R, GJB, PM, WK, AB-A MM and MK wrote the manuscript. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript.

Ethics approval and consent to participate

Not applicable.

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Conflict of interest

The authors declare no conflict of interest.

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