

The impact of extremely low maternal pre-pregnancy body mass index on pregnancy outcome: a brief report of two cases

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Background: malnutrition and extremely low body mass index (BMI) are neglected problems with many underlying obstetrics complications including infertility, miscarriage, low birth weight, intrauterine growth restriction, small head circumference, premature birth, increased risk of stillbirth, postpartum depression and anxiety. It's advisable a multidisciplinary approach to these patients, preferable before the pregnancy. **Cases:** we reported two cases of pregnant women with extremely low BMI, describing the management and perinatal outcomes. **Conclusions:** our aim was to emphasize the challenges in obstetric care in such specific group of patients and the impact of extremely low maternal BMI on early pregnancy outcome. A multidisciplinary approach in such a highly vulnerable group of pregnant women is necessary to ensure a favorable early perinatal outcome and to avoid a long term consequences.

Keywords

Low maternal BMI; Malnutrition; Low birth weight; Perinatal outcome

1. Background

Current trends are promoting skinny and most often under weight women. Most of these women are young women at reproductive age. It is considered that optimal maternal weight is related to fetal well-being and good perinatal outcome [1]. There is a strong correlation between maternal weight gain and birth weight, prematurity and maternal delivery complication [2–4]. Extremely low BMI is most often caused by reduced food intake because of some physical illness or mental health disorders like anorexia nervosa, bulimia nervosa or binge-eating disorders. These kinds of mental health disorders (also called eating disorders) typically affect women of reproductive age and may affect approximately 10–15% of pregnant women [5–7]. Extremely low BMI can also be caused by underlying chronic diseases, like inflammatory bowel disease and celiac disease. Treatment of pregnant women with extremely low BMI should be based on multidisciplinary approach with team of experts including gynecologist, gastroenterologist, psychiatrist, psychologist and nutritionist. During pregnancy, a lifestyle characterized by abal-

anced and diverse diet is a significant determinant of the antenatal course, the fetal development and the short and long-term morbidity of both mother and child [8, 9]. Maintaining an optimal weight before the conception is important for fetal programming and for reducing the risk of severe pregnancy outcomes [9–11].

In this paper, we highlighted the challenge of extremely low BMI on the course of pregnancy, the approach to treatment and the perinatal outcome.

2. Cases

2.1 Case 1

The patient was a 24-year-old primigravida. Pregnancy was previously monitored at a local general hospital. She presented to our Department in 34th week of gestation with fetal intrauterine growth restriction. She had menarche at sixteen and her menstrual periods were regular (4/28 days). The patient denies conducting the diet or active exercise. She conceived spontaneously and had hyperemesis gravidarum up to 14 weeks. She refused antenatal screening tests. On the day of admission her blood pressure was 100/70 mmHg, her body weight and height were respectively 35 kg and 154 cm, with a BMI of 14.8 kg/m². She gained 5 kg during antenatal course and had no other comorbidities. Ultrasound scan found growth restricted fetus with an EFW of 1440 g (<2.5 percentiles for a gestation); doppler pattern and amniotic fluid index were regular. Therefore we consulted gastroenterologist and dietician. Gastroenterologist prescribed high protein oral substitute 3 × 125 mL (3.2 kcal/mL), oral nutrition combined supplements 2 × 200 mL (carbs 16 g, fat, 3 g, protein 8 g), 6 drops of vitamin D3, folic acid 5 mg 1 × 1 and Omega-3 fatty acids 250 mg. Oral nutritional supplements were added to an adapted diet. Blood tests detected anemia and iron supplementation was also established. All other blood test were unremarkable. Psychiatric evaluation was provided but without any final diagnosis because the patient refused psychological testing. Cardiocotography was

performed twice a day and reported normal fetal heart rate until elective cesarean section was made at 38 weeks of gestation. A 2590 kg/47 cm male newborn was delivered with an Apgar score 7 in 1st and 8 in 5th minute. The newborn was admitted to NICU (Neonatal Intensive Care Unit) due to adaptation difficulties but without any other complications. Mother has developed severe form of maternity blues and psychiatric counselling was made prior to discharge from Department.

2.2 Case 2

This case presents a 37-year-old patient with a history of Crohn's disease and epilepsy. Crohn's disease was kept in a stage of remission with aminosalicylates in therapy. The patient was regularly checked by a gastroenterologist. As for her gynecological anamnesis, she had one spontaneous abortion in 7th week of gestation. A family history was unremarkable. She was admitted to our referral hospital in 15 weeks of gestation. The pregnancy was not planned. Before she became pregnant her body weight and height were respectively 43 kg and 160 cm, with a BMI of 16.8 kg/m². When the pregnancy was detected she stopped taking aminosalicylates on her own initiative. At the admission symptoms of malnutrition were present underweight, osteopenia and anemia. A multidisciplinary approach (gastroenterologist, psychiatrist, nutritionist and gynecologist) was established. Gastroenterologist prescribed the patient with high energy and high protein oral nutritional supplement in low volume 2 × 125 mL (3.2 kcal/mL), oral nutrition combined supplements (250 kcal, carbs 31 g, fat 6 g, protein 8 g) 2 × 1, vitamin D3 4 drops, folic acid 5 mg 1 × 1, ferrous fumarate 350 mg 1 × 1 and Omega-3 fatty acids 250 mg 1 × 1. Nutritionist provided a specifically tailored diet regimen with high caloric intake. Psychiatrist found no indicators of an underlying mental disorder, low BMI was interpreted as a result of underlying organic disease. Pregnancy was intensively monitored by the gynecologist. She gained 16 kg during pregnancy and gave spontaneous birth in 41 + 0 weeks. The newborn was a healthy female of 2860 kg/49 cm (5th percentile) with Apgar score 10 in 1st and 5th minute, respectively. The patient was breastfeeding and had no difficulties in early puerperium.

3. Discussion

Body weight is an extremely important factor for the course of pregnancy and delivery. There is increasing evidence showing that maternal dysregulated body weight have important effects on the course of pregnancy and perinatal outcomes [12, 13].

Not only obesity, but also being underweight may lead to complications in pregnancy such as preterm birth, lower-birth-weight neonates and more neonates with medical issues [12–14]. The retrospective cohort study by Girsen *et al.* [15] indicated increased risk of preterm birth depending on severity of maternal underweight. Interestingly, no association of gestational age at preterm birth and severity of underweight was found. Other study has shown lower preva-

lence of low-birth-weight neonates in mothers with gestational weight gain more than 50 g per week, especially in those with low BMI [16].

Extremely low pre-pregnancy BMI most often negatively influences perinatal outcomes while adaptive fetal programming mechanisms, such as small for gestational age (SGA), improve chances for better perinatal outcome [17]. Long term consequences such as higher prevalence of asthma, metabolic syndrome, cardiovascular disease, type 2 diabetes and neurologic disorders in children born to underweight mothers, especially those with fetal growth restriction, have been reported [18–20].

Therefore, it is recommendable to obtain a normal BMI before pregnancy with an appropriate and complete multidisciplinary evaluation of underlying underweight cause [13, 14, 21]. The perinatal period is a time of tremendous physical and psychosocial changes and must be recognized as a highly vulnerable time by those who provide perinatal care for severe underweight women [22].

These presented case reports emphasize that even in cases of critically low BMI, regardless of the underlying cause, patients can conceive spontaneously. We wanted to highlight the great importance of an adequate surveillance and support of pregnant women with extremely low pre-gestational BMI. It is important to underline the possible favourable perinatal outcome if a multidisciplinary approach is ensured.

Early detection of this vulnerable patients, admission to tertiary care centre, multidisciplinary tailor-made approach and intervention depending of the underlying disorder may result with good early perinatal outcomes. This should be considered when developing, tailoring or modifying support and services to better meet the health needs and priorities of pregnant women with extremely low BMI.

There is still a lack of studies investigating the impact of maternal extremely low pre-gestational body mass index on perinatal outcome. More research is needed to clarify this important, challenging and understudied issue.

Author contributions

VEG and SŠ were leading doctors in monitoring mentioned pregnancies and they conceived the presented idea. VEG, PB, MM and AV wrote the paper with input from all authors. MN, GBon, GBuz and MND revised and edited the manuscript with a significant intellectual contribution to the final version of the paper. All authors discussed topic/cases and contributed to the final manuscript.

Ethics approval and consent to participate

Both patients gave their signed informed consent for inclusion before they participated in the study. Data publishing was approved by the Ethics committee of Clinic for Gynecology and Obstetrics, University Hospital Centre Zagreb (Approval number: 2020/00144-12).

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Conflict of interest

The authors declare no conflict of interest. MN is serving as one of the Editorial Board members of this journal. We declare that MN had no involvement in the peer review of this article and has no access to information regarding its peer review. Full responsibility for the editorial process for this article was delegated to MHD.

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