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Prenatal control of pregnant women in the First Level of Care

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Abstract

Introduction: Normal pregnancy is the physiological state of the woman that begins with fertilization and ends with the labor process and birth with physiological changes present. However, there may be complications that seriously affect the binomial; Self-care refers to the human capacity of individuals to perform actions whose purpose is to care for themselves and others.

Results: During the study period of March 2023, 19 cases of pregnant women entitled to Issste were recruited. The average age was 32.5 years, and the standard deviation was 5.4; weeks of gestation had a mean of 27 SDG and a standard deviation of 10.6. Five patients (26.3%) attended prenatal care for the first time, followed by 14 pregnant women (73.6%). Regarding their protection vaccination, 19 pregnant women received the anti-influenza vaccine (100%) and the TDPa vaccine in only six cases (31.5%).

Discussion: Prenatal care providers are encouraged to assess maternal weight at each prenatal visit, monitor progress toward meeting weight gain goals, and provide individualized counseling if significant deviations from a woman's goals occur. Today, nearly 50% of women exceed their weight gain goals, and overweight and obese women have the highest prevalence of excessive weight gain. The risks of inadequate weight gain include low birth weight and failure to initiate breastfeeding. In contrast, the risks of excessive weight gain include cesarean section deliveries, postpartum weight retention for the mother, large-for-gestational-age babies' macrosomia, and childhood overweight or obesity for the offspring. Vitamins and minerals are essential for normal fetal development. The World Health Organization recommends supplementing iron, folic acid, vitamin A, calcium, and iodine during pregnancy.

Introduction

Normal pregnancy is the physiological state of the woman that begins with fertilization and ends with the labor process and birth with present physiological changes. However, complications may seriously affect the binomial (1).

Nicotine use by mothers during pregnancy is associated with numerous deleterious effects in children, especially concerning obesity. Children exposed to nicotine prenatally tend to have a lower birth weight, with an elevated risk of becoming overweight throughout development and into adulthood (2).

Alcohol is perhaps the most widely used and socially accepted psychoactive

substance. Alcohol consumption is highly addictive, and evidence indicates that it can cause severe systemic side effects, such as heart and lung disease, and increase the risk of cancer and susceptibility to some infectious diseases (3).

Cannabis is the most common illicit drug used by pregnant women; Prevalence rates during pregnancy range from 3-10% in the United States, with some variability depending on the legal status of cannabis in all states. Some women use cannabis on purpose during pregnancy to combat symptoms such as nausea and pain, although recent reports suggest that cannabis use may cause nausea and vomiting (4).

Anemia has been a significant public health problem worldwide, especially in developing countries. The WHO has defined anemia in pregnancy as hemoglobin < 11 g/dL. The most common cause of anemia in pregnancy is iron deficiency anemia, defined as serum ferritin < 15 µg/L (5).

HIV remains a significant global public health problem. Worldwide, approximately 37.7 million people are living with HIV, of whom 1.7 million were children aged 0-14 at the end of 2020. In addition, women are at increased risk of acquiring HIV during pregnancy or breastfeeding, and those women who acquire HIV during pregnancy or the postpartum period have more likely to transmit the infection to their offspring (6).

Preeclampsia (PE) is one of the leading causes of maternal and perinatal morbidity and mortality worldwide, affecting approximately 2-5% of pregnant women. These patients present with hemolysis, elevated liver enzymes, low platelet syndrome, and cardiovascular disease later in life. PE contributes to approximately 10% of stillbirths and 15% of preterm deliveries (7).

Material and method

40 pregnant patients were recruited who attended the first level care Health Unit of the ISSSTE in Playa del Carmen, Q. Roo, for pregnancy control during the study period. A descriptive analysis was carried out with measures of central tendency, measures of dispersion, and percentages.

Results

During the study period of March 2023, 19 cases of pregnant women entitled to ISSSTE were recruited. The mean (X) age was 32.5 years, and the standard deviation (S) was 5.4; weeks of gestation had a mean of 27 SDG (X) and standard deviation (S) of 10.6. Five patients (26.3%) attended their prenatal check-up for the first time, and 14 subsequent ones (73.6%). Regarding their protection vaccination, 19 pregnant women received the 100% anti-influenza vaccine and the TDPa vaccine in only six cases (31.5%). All pregnant women (100%) received folic acid

from the first trimester of pregnancy.

Discussion

Vitamins and minerals are essential for normal fetal development. The World Health Organization (WHO) recommends supplementation with iron, folic acid, vitamin A, calcium, and iodine during pregnancy. The American College of Obstetricians and Gynecologists also recommends supplementation with choline and vitamins B6, B12, C, and D. Prenatal vitamins do not have a standard formulation. However, most contain calcium, iodine, omega-3 fatty acids, zinc, and vitamins A, and also eat more iron and B vitamins and about twice as much folic acid as multivitamins (8).

Regarding prenatal factors, studies have shown that poor maternal exercise, exposure to tobacco smoke and secondhand smoke, unhealthy dietary pattern, maternal BMI before pregnancy, maternal weight gain during pregnancy, as well as poor birth outcomes, such as low birth weight or small for gestational age and preterm birth, are associated with an increased likelihood of childhood obesity (9).

Preterm birth remains a global epidemic, with a global incidence of 15 million births annually. Globally, preterm birth is the leading cause of death in children under 5 years of age. According to data from several countries, premature births have increased. According to the WHO, around 1 million children are estimated to die each year due to complications of preterm birth (10).

Prenatal care providers are encouraged to assess maternal weight at each prenatal visit, monitor progress toward meeting weight gain goals, and provide individualized counseling if significant deviations from a woman's goals occur. Currently, nearly 50% of women exceed their weight gain goals, and overweight and obese women have the highest prevalence of excessive weight gain. The risks of inadequate weight gain include low birth weight and failure to initiate breastfeeding. In contrast, the risks of excessive weight gain include cesarean deliveries and postpartum weight retention for the mother and large-for-gestational-age babies, macrosomia, and childhood overweight or obesity for the offspring. Prenatal care providers have many resources and tools they can use to incorporate weight counseling and other health behaviors health in their routine prenatal practices. Because many women are motivated to improve their health behaviors, pregnancy is often considered the optimal time to intervene in eating habits and physical activity issues to prevent excessive weight gain. Weight gain during gestation is a potentially modifiable risk factor for some adverse maternal and neonatal outcomes, and meta-analyses of randomized controlled trials report that diet or exercise interventions during pregnancy may help reduce excessive weight gain. However, health behavior interventions for gestational

weight gain have not significantly improved other maternal and neonatal outcomes and have limited effectiveness in overweight and obese women (11, 12).

Since 1990, exposure to air pollution has been one of the significant health risks influencing the global burden of disease and injury, and the trend has been increasing. Globally, only 7% of children live in environments with air pollution levels, according to WHO guidelines, indicating a lifetime impact of air pollution exposure on most children. In addition, the increasing prevalence of allergic diseases in recent decades represents a significant challenge for children's Health and imposes a global economic burden. Emerging evidence indicates that specific forms of ambient air pollution, such as particles 2.5 or 10 mm in diameter, sulfur dioxide, nitrogen oxides, nitrogen dioxide, and oxides of nitrogen, are associated with the development of asthma in the pediatric population. Besides direct inhalation exposure during childhood, prenatal ambient air pollution exposure during the fetal stage might increase the risk of childhood asthma (13).

There is increasing evidence that prenatal environmental exposure to chemicals affects pubertal development. Many chemicals are present in the environment because of their extensive use, resistance to biological and chemical degradation, and bioaccumulation in the food chain. Exposure to these persistent organic pollutants continues for long periods after their production and use have been prohibited by law. Humans are exposed to environmental chemicals through food, drinking water, and air. POPs include polychlorinated biphenyls (PCBs), polybrominated diphenyl ethers, dichloroethane, pentachlorophenol, hexabromocyclodecane, and others. PCBs are chemicals produced between 1929 and 1985 for application in various products, including refrigerants in heat transfer systems and lubricants in plastics. The prenatal period is vulnerable because many developmental processes are initiated, and disruption of these processes can influence outcomes in later life. Prenatal exposure to polychlorinated biphenyls has been shown to interfere with children's neurological, immunological, metabolic, and endocrine development. Development is a multifaceted process under the control of various hormonal mechanisms; PCB exposure could interfere with pubertal development. Evidence shows that hormone disruptors can advance or delay puberty (14).

Pregnancy is the psychologically most vulnerable period for women. During pregnancy, women are prone to varying degrees of stress due to changes in hormone levels and many other factors, such as brief bouts of fear, nervousness, and the possible long-term persistence of negative emotions. Negative emotions in women, such as stress, anxiety, and depression, are common during pregnancy.

Negative emotions during the prenatal period can present potential risks to maternal Health and the Health of the newborn. Antenatal stress, anxiety, and depression are not only associated with fetal development and adverse pregnancy outcomes, such as low birth weight, preterm delivery, and fetal distress but also have more lasting effects, directly or indirectly, on growth and the development of children. Children of women who experience one or more negative emotions during pregnancy are more likely to have behavioral and emotional changes, attention deficit hyperactivity disorder, and autism in childhood. They are also more likely to have depression, impulsivity, and cognitive disorders in adolescence and suffer from schizophrenia in adulthood. In addition, women with prenatal symptoms of anxiety, depression, perceived stress, and post-traumatic stress disorder may experience more severe pain and be at higher risk of developing pregnancy complications, such as diabetes and preeclampsia, during childbirth and are more likely to suffer from postpartum depression (15).

Prenatal maternal stress can arise from malnutrition, major life events, bereavement, catastrophic events, depression, or anxiety. Selye described stress as a physiological response pattern that occurs in response to an external or internal stressor and will last if the stimulus persists. The stress response is a homeostatic process and involved in this response is the neuroendocrine system called the hypothalamic-pituitary-adrenal (HPA) axis, which regulates various physiological processes, including energy expenditure and storage, digestion, the immune system, mood, and the emotional response to stress through the release of glucocorticoids. The acute stress response does not produce long-term changes in the stress response axis, whereas chronic stress can exert long-lasting effects. Dysregulation of the HPA axis caused by repeated or extreme exposure to stress is associated with elevated cortisol levels and may be related to the anxiety and pathology of depression. Maternal prenatal stress increases fetal plasma cortisol to levels that overwhelm the metabolic capacity of placental 11β -hydroxysteroid dehydrogenase. This enzyme usually protects the fetus from higher maternal glucocorticoid levels by converting cortisol to inactive cortisone. Elevated levels of circulating fetal cortisol bind to glucocorticoid and mineralocorticoid receptors that are expressed at high levels in multiple regions of the fetal brain, including the limbic system, hypothalamus, and cortex, where it impacts neurogenesis, gliogenesis, and synaptogenesis, suggesting its role in influencing cognitive, behavioral, and morphological development. These structures have been implicated in aggressive behavior, a phenomenon defined by Moyer (1971) as "overt behavior that is intended to inflict physical harm on another person" (16-19).

Exome sequencing (ES) is becoming increasingly available in prenatal diagnosis. However, data on its clinical utility and integration into clinical management remain limited. The BACs-on-Beads™ (BoBs) prenatal assay was introduced to rapidly detect abnormalities of chromosomes 13, 18, 21, X, and Y and nine specific significant microdeletion syndromes. According to the WHO, congenital disabilities affect 4 to 8% of births worldwide, and their incidence varies between countries. Non-invasive prenatal testing is widely used to detect common fetal chromosomal abnormalities. However, the ability of NIPT-Plus to detect copy number variation (CNV) is debatable (20). Skeletal dysplasia is a group of rare genetic disorders associated with cartilage and bone abnormalities. Skeletal disorders are clinically and genetically heterogeneous, with more than 350 genes that explain the diversity of phenotypes of these diseases. Non-invasive prenatal screening has the potential to detect the maternal X chromosome that causes X-linked ichthyosis and may guide prenatal diagnosis of ichthyosis and reflect the family history to improve the pregnancy as well as the management of the Health of children and family members. An optimal intrauterine environment is essential to maintain fetal development. Harmful regents have been identified to be associated with significant congenital malformations, primarily neurological and cardiovascular congenital disabilities. The current view suggests that various cardiovascular diseases in adulthood are related to prenatal exposure to toxins such as glucocorticoids, antibiotics, antidepressants, antiepileptics, etc. HBB-associated hemoglobinopathy, with its two general subtypes as thalassemia and abnormal hemoglobin (Hb) variants, is one of the most prevalent inherited Hb disorders worldwide. Fetal macrosomia is common in pregnancy and associated with several adverse maternal and neonatal prognoses. Although, the accuracy of the prediction of fetal macrosomia is still poor (21). Exposure to environmental stressors during pregnancy plays a vital role in influencing and later susceptibility to certain chronic diseases through the modulation of epigenetics, including DNA methylation. Diagnosis of a microdeletion of chromosome 22q11.2 and its associated deletion syndrome (22q11.2DS) is optimally made early. Definitive diagnosis by chorionic villus or amniocyte genetic testing using a chromosome microarray will detect clinically relevant microdeletions. Maternal genetic effects can be defined as the effect of a mother's genotype on her offspring's phenotype, regardless of the offspring's genotype (22, 23).

This research contributes to the emerging evidence of the impact of community health workers on coordinated systems of antenatal care. It may guide policymakers, practitioners, and administrators to target effectively. Resources and enrollment to potentially reduce the cost

burden for health systems. In Arizona, this study provides strong evidence for the sustainability of investing in rural health worker home visits to ensure continuity of Maternal Child Health care and equity among geographically diverse women. Investment in Health should begin engaging with nulliparous young women (including adolescents) throughout the municipality. They could improve reproductive health planning and preconception Health and reduce unwanted pregnancies through adequate engagement with prenatal care (24).

Conclusions

The first-level health units must have support personnel such as psychologists, dentists, and nutritionists. Services already established must cover all shifts 24 hours a day, 365 days a year. The supplies of medicines, laboratory, dental, etc., must be sufficient. Nevertheless, health personnel must primarily understand the importance of treating patients who require their services.

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References

1. Alcántara-de Jesús O, Solano-Solano G, Ramírez-González TB, et al. Impacto de una intervención educativa en mujeres embarazadas con respecto a su autocuidado. *JONNPR*. 2018; 3(11):875-86 Doi: 10.19230/jonnpr.2621
2. White O, Roeder N, Blum K, Eiden RD, Thanos PK. Prenatal Effects of Nicotine on Obesity Risks: A Narrative Review. *Int J Environ Res Public Health*, 2022; 19, 9477. <https://doi.org/10.3390/ijerph19159477>
3. Alhowail, A. Mechanisms Underlying Cognitive Impairment Induced by Prenatal Alcohol Exposure. *Brain Sci*. 2022; 12: 1667. <https://doi.org/10.3390/brainsci12121667>
4. Abd Rahman R, Idris IB, Md Isa Z, Abd Rahman R. The effectiveness of a theory based intervention program for pregnant women with anemia: A randomized control trial. *PLoS ONE*, 2022; 17(12): e0278192. <https://doi.org/10.1371/journal.pone.0278192>
5. Astawesegn FH, Conroy E, Mannan H, Stulz V. Measuring socioeconomic inequalities in prenatal HIV test service uptake for prevention of mother to child transmission of HIV in East Africa: A decomposition analysis. *PLoS ONE*, 2022; 17(8): e0273475. <https://doi.org/10.1371/journal.pone.0273475>
6. Huang T, Rashid S, Priston M, Megan P, et al. Prenatal screening for preeclampsia: the roles of placental growth factor and pregnancy-associated plasma protein A in the first trimester and Placental growth factor and soluble fms-like tyrosinekinase1-placental growth factor ratio in the early second trimester. *Am J Obstet Gynecol Glob Rep* 2023; XX:x.ex-x.ex.
7. Dou JF, Middleton LYM, Zhu Y, et al. Prenatal vitamin intake in first month of pregnancy and DNA methylation in cord blood and placenta in two prospective cohorts. *Epigenet Chromat*, 2022; 15:28 <https://doi.org/10.1186/s13072-022-00460-9>
8. Lu Q, Strodl E, Liang Y, Huang L-H, Hu B-J, Chen W-Q. Joint Effects of Prenatal Folic Acid Supplement with Prenatal Multivitamin and Iron Supplement on Obesity in Preschoolers Born SGA: Sex Specific Difference. *Nutrients*, 2023; 15:380. <https://doi.org/10.3390/nu15020380>
9. Damalita AF, Dewi YLR, Budihastuti UR. Excess Weight Gain in

- Pregnant Women and Prematurity: A Meta-Analysis. *J Matern Child Health*, 2022; 07(02): 159-170. <https://doi.org/10.26911/thejmch.2022.07.02.05>.
10. Kominiarek MA, Peaceman AM. Gestational Weight Gain. *Am J Obstet Gynecol*, 2017 December; 217(6): 642-51. doi:10.1016/j.ajog.2017.05.040.
 11. Robertson OC, Marceau K, Duncan RJ, et al. Prenatal Programming of Developmental Trajectories for Obesity Risk and Early Pubertal Timing. *Dev Psychol*, 2022 October; 58(10): 1817-31. Doi: 10.1037/dev0001405.
 12. Chung H-W, Hsieh H-M, Lee C-H, et al. Prenatal and Postnatal Exposure to Ambient Air Pollution and Preschool Asthma in Neonatal Jaundice Infants. *J Inflamm Res*, 2022; 15:3771-81.
 13. Gao Y, Tang X, Deng R, Liu J, Zhong X. Latent Trajectories and Risk Factors of Prenatal Stress, Anxiety, and Depression in Southwestern China—A Longitudinal Study. *Int J Environ Res Public Health*, 2023; 20: 3818. <https://doi.org/10.3390/ijerph20053818>
 14. Mbiydzennyuy NE, Hemmings SMJ, Qulu L. Prenatal maternal stress and offspring aggressive behavior: Intergenerational and transgenerational inheritance. *Front Behav Neurosci*, 2022; 16:977416.
 15. Zhang M, Chen L, Chen M, et al. Application of the prenatal BACs on Beads™ assay for rapid prenatal detection of sex chromosome mosaicism. *Mol Genet Genom*, 2022; 297:1423-38. <https://doi.org/10.1007/s00438-022-01931-0>
 16. Zhang H, Xu Z, Chen Q, et al. Comparison of the combined use of CNV-seq and karyotyping or QF-PCR in prenatal diagnosis: a retrospective study. *Scientific Reports*, 2023; 13:1862 <https://doi.org/10.1038/s41598-023-29053-6>
 17. Fang Y, Li S and Yu D Genetic analysis and prenatal diagnosis of short-rib thoracic dysplasia 3 with or without polydactyly caused by compound heterozygous variants of DYNC2H1 gene in four Chinese families. *Front Genet*, 2023; 14:1075187. Doi: 10.3389/fgene.2023.1075187
 18. Tang X, Wang Z, Yang S, et al. Maternal Xp22.31 copy-number variations detected in noninvasive prenatal screening effectively guide the prenatal diagnosis of X linked ichthyosis. *Front Genet*, 2022; 13:934952. Doi: 10.3389/fgene.2022.934952
 19. Wu T, Zhou K, Hua Y, Zhang W and Li Y. The molecular mechanisms in prenatal drug exposure-induced fetal programmed adult cardiovascular disease. *Front Pharmacol*, 2023; 14:1164487. Doi: 10.3389/fphar.2023.1164487
 20. Luo H, Huang T, Lu Q, et al. Molecular prevalence of HBB associated hemoglobinopathy among reproductive-age adults and the prenatal diagnosis in Jiangxi Province, southern central China. *Front Genet*, 2022; 13:992073. Doi: 10.3389/fgene.2022.992073
 21. Lu Q, Guo Z, Zhang J, et al. Performance of whole-genome promoter nucleosome profiling of maternal plasma cell-free DNA for prenatal noninvasive prediction of fetal macrosomia: a retrospective nested case-control study in mainland China. *BMC Pregnant Childbirth*, 2022; 22:698 <https://doi.org/10.1186/s12884-022-05027-w>
 22. Stoccoro A, Nicoli V, Coppedè F, et al. Prenatal Environmental Stressors and DNA Methylation Levels in Placenta and Peripheral Tissues of Mothers and Neonates Evaluated by Applying Artificial Neural Networks. *Genes*, 2023; 14, 836. <https://doi.org/10.3390/genes14040836>
 23. Guo Y, Yu D, Zhou K, et al. The effect of hemolysis on quality control metrics for noninvasive prenatal testing. *BMC Medical Genomics*, 2022; 15:125. <https://doi.org/10.1186/s12920-022-01280-2>
 24. McCue K, Sabo S, Wightman P, et al. Impact of a Community Health Worker (CHW) Home Visiting Intervention on Any and Adequate Prenatal Care among Ethno-Racially Diverse Pregnant Women of the US Southwest. *Matern Child Health J*, 2022; 26:2485-95. <https://doi.org/10.1007/s10995-022-03506-2>