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The Impact of Pica on Maternal Cardiovascular Health: A Review

Akah Roland Tiagha[1], Enoh Jude Eteneneng[1], and Benedicta Nkeh-Chungag[1]*

ABSTRACT

Pica, the compulsive consumption of non-food substances, is a behavior observed in various populations across the world, particularly during pregnancy. This review explores the relationship between pica and maternal cardiovascular health, focusing on the potential physiological, nutritional, and psychological implications of pica during pregnancy. Although pica may stem from nutritional deficiencies, especially of iron and other essential minerals, consumption of non-food items can exacerbate maternal health risks, particularly cardiovascular complications. Ingesting materials such as soil, clay, or chalk poses risks of heavy metal exposure, toxicities, and gastrointestinal disturbances, which may contribute to adverse cardiovascular outcomes, including increased blood pressure and elevated stress on the heart. Moreover, the nutritional deficiencies associated with pica can lead to anemia, further straining cardiovascular health and increasing the likelihood of complications such as preeclampsia. This review underscores the importance of understanding the intersection between pica and cardiovascular health in pregnant women, advocating for further research to elucidate the underlying mechanisms and to develop effective screening and intervention strategies. Increased awareness and tailored nutritional support during prenatal care can mitigate the cardiovascular risks associated with pica, promoting healthier maternal and fetal outcomes.

Keywords: Cardiovascular health, nutritional deficiencies, pica, pregnant women.

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1*Corresponding author: Akah Roland Tiagha, Enoh Jude Eteneneng, and Benedicta Nkeh-Chungag, Cardio-Metabolic Health Research Group Department of Biological and Environmental Science, Faculty of Natural Sciences, Walter Sisulu University (WSU), Nelson Mandela Drive, Private Bag X1, MTHATHA 5117 Eastern Cape, South Africa, Email: Akah Roland Tiagha Email: rakah@wsu.ac.za, ORCID ID: 0009-0002-1579-4854,Tell : (+27) 687581635.

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INTRODUCTION

Pica is the craving for and consumption of non-nutritive substances, such as dirt, clay, or soil, and it may be of particular concern in pregnant women due to potential health risks for both the mother and the developing fetus.[1] Pica has been reported in all races and cultures, but is prevalent in economically disadvantaged areas, among children, and pregnant women.[2, 3] The prevalence of pica generally ranges from 4% to over 30%, depending on the population and region surveyed.[4] The rates are exceptionally high among pregnant women, with estimates suggesting that 10% to 70% of pregnant women may engage in pica, influenced mainly by physiological changes, nutritional deficiencies, and cultural customs.[5, 6] This practice is common among women in various African countries such as Ghana, Nigeria, Cameroon, Uganda, Mozambique, and South Africa and a higher prevalence of approximately 73% in Kenya.[5, 7, 8] Chalk and soil are the most consumed, believed to be an appetite suppressant, and in anorexia nervosa.[9] In India, pica has been documented in up to 27% of pregnant women, and the most common form of pica is ash and dust,[1, 2] while in Iran, the rate was 8.33%, and pagophagia (ice and freezer frost) was the most common form of pica.[10] Lower prevalence rates, around 5.7%, have been documented in Brazil, the most common forms of pica are geophagia (earth) and pagophagia (ice), and between 8% and 12% in Western countries such as the United States and the United Kingdom, and the most common form of pica is pagophagia.[11, 12] Although most cultures in Africa and South Asia believe that pica helps to increase breast milk production, improve fertility, and reduce nausea and vomiting,[1, 2, 9] it is the leading cause of iron deficiency anemia in pregnant women.[9, 13] According to the World Health Organization (WHO), pregnant women are among the most vulnerable population groups affected by anemia,[14] with Africa and Southeast Asia being the most affected regions. Africa has the highest prevalence (41.7%) of anemia in pregnancy, with the highest rate reported in Sudan (53.0%), Ethiopia 46.2%, Nigeria (56.3%), and Tanzania 83.5%.[15-17] Pregnant women may experience cravings for these substances due to physiological, psychological, and cultural factors.[16] Pica can have significant implications for maternal health, especially regarding cardiovascular health, as it often coexists with nutritional deficiencies, such as iron deficiency anemia.[7]Cardiovascular health is a vital aspect of maternal well-being, and any disruptions in nutritional status during pregnancy can lead to significant cardiovascular complications.[18] For instance, iron deficiency anemia, which is common among women who engage in pica, can result in increased cardiac output, higher blood pressure, and preeclampsia.[19] The consumption of non-food items may expose pregnant women to toxic substances, such as heavy metals and pathogens, which can further cause cardiovascular risks and lead to adverse pregnancy outcomes.[20] Given the potential consequences of pica on maternal and fetal health, there is a need to explore the relationship between pica and maternal cardiovascular health. In this review, our objectives were to study the implication of pica in cardiovascular health during pregnancy, establish the risk factors of pica and maternal cardiovascular health, assess the effects of pica on pregnancy outcomes, and recommend possible interventions and management for reducing pica.[20]

Health implications of pica-related behaviors on maternal and fetal outcomes among pregnant women.

1. Maternal Health Implications

Pica can significantly impact maternal cardiovascular health during pregnancy, often being associated with iron deficiency that leads to anemia. This condition results in fatigue and reduced oxygen delivery to tissues, increasing the risk of complications during labor and delivery and placing additional strain on the heart, possibly leading to cardiovascular complications.[4, 13, 21] Beyond iron, pregnant women may also experience deficiencies in essential nutrients such as calcium, magnesium, and vitamins. Calcium is particularly important, as it

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plays a critical role in maintaining a healthy cardiovascular system by regulating blood pressure, supporting normal heart function, and contributing to the overall health of blood vessels. Insufficient calcium levels can lead to complications such as elevated blood pressure, increased heart rate, and preeclampsia, a serious pregnancy condition characterized by high blood pressure and damage to other organ systems.[22] Pregnant women with pre-existing cardiovascular issues may experience worsened conditions due to the physiological changes associated with pica and related nutritional deficiencies, which can lead to reduced blood volume and oxygen delivery, potentially leading to increased blood pressure and heart rate.[22] Gastrointestinal complications, including constipation, intestinal obstruction, or perforation due to consuming non-food items, can indirectly influence cardiovascular health by causing systemic stress and inflammation.[1, 2, 23] Pica, especially soil consumption, can contain harmful pathogens, toxins, or heavy metals that can affect maternal and fetal health. Exposure to these substances may lead to infections or toxic exposure that can adversely affect cardiovascular function. Heavy metal toxicity can lead to hypertension and other cardiovascular problems.[4, 9] Furthermore, ingesting soil or other contaminated materials can increase the risk of gastrointestinal infections, including those caused by geohelminths (parasitic worms), which can impact maternal health and fetal outcomes.[23] Ingesting non-nutritive substances can lead to electrolyte imbalances, particularly if women consume clay or other materials that may contain harmful components.[9] These imbalances can affect cardiac function and vascular health, further complicating pregnancy. Pica may be linked to various pregnancy complications, including preterm birth, low birth weight, and developmental issues in the fetus, potentially due to the impact of nutritional deficiencies or infections.[4]

2. Fetal Health Implications

Pica can have profound implications for fetal health during pregnancy, mainly as it often indicates nutrient deficiencies, such as iron or calcium, which can directly impact fetal growth and development. Insufficient maternal nutrition may lead to low birth weight or intrauterine growth restriction (IUGR).[1, 24] Research conducted in various regions of Africa highlights that pregnant women engaged in pica are at an elevated risk of developing anemia, especially if they are consuming non-nutritive substances that do not contribute essential nutrients. Anemia in pregnancy can lead to inadequate oxygen supply to the fetus, potentially affecting its development.[22] Studies from sub- Saharan Africa, South Asia, and other regions have shown that pica practices can vary widely and are influenced by cultural norms and dietary habits.[1, 2, 23] For example, in Ghana, Kenya, Uganda, and in Sudan, soil consumption is more common and linked to regional deficiencies in minerals like iron and calcium.[7-9, 11, 25, 26] in contrast, studies in parts of North America have indicated that pica behaviors are more often associated with stress and psychological factors rather than nutritional deficiency alone.[27] Some of these non-food substances may contain harmful substances, such as heavy metals or toxins, that can lead to teratogenic effects, resulting in malformations or developmental issues in the fetus. Consuming contaminated soil, clay, or other non-food items can increase the risk of infections, including parasitic and bacterial infections.[23] These infections can complicate pregnancy and pose risks to fetal health.[21] The relationship between nutritional deficiencies related to pica behavior and adverse fetal outcomes is concerning.[3,4] Such deficiencies can increase the risk of preterm labor and delivery, which can have various short- and long-term health implications for the newborn.[3] Inadequate nutrition during critical fetal development stages can lead to neurodevelopmental problems, potentially affecting the child's cognitive and motor skills later in life.[3,4] Compromised maternal nutrition can affect placental health, leading to conditions such as placental abruption or placenta previa, which can endanger fetal well-being.[4, 9] Adequate maternal nutrition is critical for developing the fetal immune system and can impair fetal immune development, increasing susceptibility to infections and diseases in

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infancy.[28] Some studies suggest that pica may be linked to long-term health risks for the child, including an increased risk of obesity and metabolic disorders later in life, potentially due to a history of inadequate maternal nutrition.[4, 29]

3. Psychosocial, cultural, and behavioral implications of pica on the maternal health

Pica is often referred to as a "mediator of stress" because it can function as a coping mechanism for individuals experiencing psychological or emotional distress. Pregnant women engaging in pica may face multiple challenges that contribute to cardiovascular risks, including stress, nutritional deficits, and the influence of cultural beliefs that can adversely impact maternal cardiovascular health during pregnancy.[1-3] Engaging in pica can influence the body's immune response, and the substances consumed, most notably non-food items, can interact with the immune system in complex ways.[1,2,13] For instance, ingesting pica may alter immune function, potentially leading to changes in inflammation levels. Chronic stress can activate inflammatory pathways within the immune system, which may subsequently affect the cardiovascular health of the fetus.[2, 30] culturally, pica can be normalized in various societies, where traditional beliefs may downplay the associated cardiovascular risks.[20] In contrast, and religious beliefs may further complicate perceptions of its safety. In some regions of India, for instance, the consumption of pica is believed to enhance physical and spiritual health.[19] For example, craving ash is associated with the expectation of delivering a baby girl, while craving for dust is thought to signify a baby boy.[1, 2] In Nigeria, many women who practice pica (clay consumption) believe it enhances beauty, alleviates morning sickness, and may even boost fertility. [26] Similarly, in Sudan and Uganda, women who consume soil may believe these practices facilitate smoother deliveries and improve the skin pigmentation of their babies.[7,8] Such beliefs reflect the intricate interplay between cultural practices, maternal health perceptions, and behavior.[26]

4. Awareness of pica in maternal health

Awareness and education about pica in maternal health are essential for improving health outcomes for both mothers and infants, given the risks associated with this behavior. Understanding the definition, prevalence, causes, and risk factors of pica can enhance screening and intervention efforts.[31] Education should address the maternal and fetal health implications, including potential nutritional deficiencies and the impact of mental health conditions like stress and anxiety. Nutritional education about maintaining a balanced diet and the importance of supplementation can help mitigate risks linked to pica.[24, 32] Culturally sensitive and community-engaged programs are vital in recognizing the cultural aspects of pica, fostering a supportive environment while breaking down stigma. Training healthcare providers to identify pica and employ effective interventions is also crucial. Overall, informed and proactive strategies can empower women to make healthier choices during pregnancy, promoting safer outcomes for both mothers and their children.[32]

5. Management of Pica in Maternal Health

Effective management of pica in maternal health is essential to ensure the well-being of both the mother and the fetus. The management approach involves nutritional, psychological, cultural, and behavioral aspects.[1, 13, 33] Routine screenings for pica during prenatal visits should be conducted to identify women engaging in this behavior. Dietary habits and cravings should be included in maternal health assessments. Secondly, it evaluates pregnant women's nutritional status, particularly micronutrients such as iron, calcium, and zinc. Identifying deficiencies is crucial for addressing the underlying causes of pica.[4] Nutritional education and counseling: Pregnant women should be educated on the importance of a well-balanced diet that meets their increased nutritional needs during pregnancy.[1,2] Providing accessible information about nutrient-rich foods can help mothers make healthier choices. Iron, calcium, and other necessary supplements should be recommended based on individual needs, particularly if deficiencies are identified.[28] Regular monitoring should be conducted to assess the effectiveness of supplementation and adjust as needed. The

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consumption of safe, nutritious foods that can serve as healthier alternatives to the non-food items being craved should be encouraged to help satisfy cravings without the risks associated with pica.[26]

Psychological Support: Integrate mental health screenings into prenatal care to identify anxiety, depression, or stress that may contribute to pica behaviors.[2] Counselling services or support groups are where women can discuss their experiences and develop coping strategies for stress and emotional challenges, allowing them to connect with other women who understand their unique struggles, seek guidance from professionals, and find healthier alternatives to manage their cravings.[1,2] Cognitive-behavioral therapy (CBT) can be particularly effective in addressing compulsive behaviors like pica. Cultural Sensitivity and Community Engagement: Educational programs should be designed to respect cultural beliefs and practices surrounding pica.[2] Engaging with local community leaders can help tailor interventions to meet the specific needs and values of the population.[25] Organizing community workshops or informal gatherings to address pica, share knowledge, and foster supportive environments for women experiencing this behavior can enhance awareness, reduce stigma, and provide a safe space for individuals to exchange experiences, learn from one another, and access resources that promote healthier coping mechanisms and overall well-being. This may include techniques such as habit reversal training, where women learn to recognize triggers for pica and replace the behavior with healthier alternatives. Encouraging stress reduction techniques, such as mindfulness, yoga, or relaxation exercises, can help mitigate the stressors contributing to pica behaviors. Train healthcare providers to recognize and understand pica, its implications for maternal health, and effective communication strategies. This can enable providers to approach the topic sensitively and empathetically with patients, fostering collaboration among healthcare providers, nutritionists, and mental health professionals to create comprehensive care plans tailored for pregnant women experiencing pica, ensuring that their physical, nutritional, and emotional needs are adequately addressed.[26]

CONCLUSION

Pica, the compulsive consumption of non-food substances, poses significant risks to maternal cardiovascular health, particularly during pregnancy. This behavior is often linked to nutritional deficiencies, increased stress, and mental health challenges, all of which affect both maternal and fetal growth. Pica implications extend beyond nutritional aspects, as they involve psychosocial and cultural factors that can influence dietary choices and health outcomes. Given the potential adverse effects of pica on cardiovascular health, such as anemia, hypertension, preeclampsia, renin-angiotensin pathway, and other complications, effective intervention and management strategies are crucial for safeguarding the health of mothers and their babies.

RECOMMENDATIONS

1. Enhanced Screening and Awareness: Healthcare providers should implement routine screening for pica behaviors during prenatal visits, ensuring that pregnant women are informed about the risks of consuming non-food substances. Educational materials should be made available that clearly outline the implications of pica on cardiovascular health and overall pregnancy outcomes.
2. Nutritional Support: Pregnant women should receive comprehensive nutritional counseling on the importance of a balanced diet rich in essential nutrients. Regular assessments of nutritional status and appropriate supplementation (e.g., iron, calcium) should be encouraged to address deficiencies that may contribute to pica behaviors.
3. Psychosocial Support: Mental health screenings should be integrated into prenatal care to identify stress, anxiety, or depressive symptoms that may drive pica. Providing access to mental health support services, such as counseling or support groups, can help address the emotional and psychological factors related to pica.
4. Culturally Sensitive Interventions: Education and intervention programs must be culturally sensitive, recognizing the diverse beliefs and practices surrounding pica in various communities. Collaborating with community leaders can enhance

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program effectiveness and ensure that messages resonate within the cultural context of the targeted population.

5. Employing a more integrated approach that includes both psychosocial factors and cultural understandings could enhance the knowledge of pica's implications for maternal health. Comparative studies across regions could identify effective interventions and educational initiatives tailored to specific cultural contexts, promoting healthier practices during pregnancy and helping to mitigate potential health risks associated with pica.

6. Training for Healthcare Providers: Continuous education and training for healthcare providers about pica, its implications for maternal cardiovascular health, and effective communication strategies are essential. Providers should be equipped to approach discussions about pica non-judgmentally, fostering trust and open dialogue with patients.

7. Community Engagement: Initiatives that engage communities through workshops, health fairs, and open forums can promote awareness of pica and its health implications. Such community-driven efforts can help reduce stigma and encourage women to seek support if they engage in pica behaviors.

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