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Harnessing the Power of Antioxidants: Enhancing Gamete Quality and Fostering Successful Pregnancy

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Abstract

The intricate interplay between oxidative stress and gamete quality has significant implications for reproductive health and pregnancy outcomes. Oxidative stress, stemming from an imbalance between reactive oxygen species (ROS) production and antioxidant defenses, exerts detrimental effects on sperm and oocyte integrity, compromising fertility. Antioxidants emerge as critical players in mitigating oxidative damage, thereby preserving gamete function and enhancing fertility potential. This review explores the mechanistic underpinnings of oxidative stress-induced gamete dysfunction and the protective role of antioxidants. Clinical evidence supporting the use of antioxidants in male and female infertility, as well as in assisted reproductive techniques, is examined. By harnessing the power of antioxidants, advancements in reproductive medicine hold promise for realizing the aspirations of individuals and couples striving for successful pregnancy and parenthood.

Keywords*: Antioxidants, Gamete Quality, Pregnancy, Oxidative Stress, Reproductive Health, Fertility, Infertility, Reactive Oxygen Species*

Introduction

Infertility remains a prevalent challenge worldwide, affecting individuals and couples aspiring for parenthood. Central to successful conception and pregnancy is the quality of gametes, namely

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sperm and oocytes. However, emerging evidence underscores the profound impact of oxidative stress on gamete quality, thereby influencing fertility outcomes. Oxidative stress arises from the imbalance between reactive oxygen species (ROS) production and the body's antioxidant defense mechanisms. Within the reproductive system, ROS generation occurs through various pathways, including sperm metabolism, inflammation, and environmental exposures. The consequences of oxidative stress on gametes are manifold, ranging from DNA damage and impaired sperm motility to oocyte dysfunction and embryo development abnormalities. Understanding the mechanisms by which oxidative stress disrupts gamete function is imperative for addressing infertility. Oxidative damage to sperm DNA, for instance, compromises sperm viability and fertilization capacity, contributing to male factor infertility. Similarly, oocytes are vulnerable to oxidative stress-induced meiotic spindle abnormalities, chromosomal aberrations, and mitochondrial dysfunction, impairing their developmental competence. Consequently, oxidative stress emerges as a key modulator of gamete quality and fertility potential. Despite the inherent antioxidant defense mechanisms within the reproductive system, they may be overwhelmed under conditions of heightened oxidative stress, necessitating exogenous antioxidant supplementation.[1-27]

Antioxidants, by virtue of their ability to scavenge ROS and neutralize oxidative damage, represent promising therapeutic agents in the realm of reproductive medicine. Both endogenous antioxidants, such as superoxide dismutase and glutathione, and exogenous antioxidants derived from dietary sources or supplements play crucial roles in maintaining redox homeostasis within the reproductive microenvironment. Clinical studies have demonstrated the efficacy of antioxidant therapy in ameliorating male and female infertility, improving sperm parameters, enhancing oocyte quality, and augmenting pregnancy rates. Furthermore, antioxidants have been integrated into assisted reproductive techniques (ART), including in vitro fertilization (IVF) and intracytoplasmic sperm injection (ICSI), to optimize treatment outcomes. Looking ahead, the optimization of antioxidant interventions in infertility management holds promise for personalized fertility care. Tailoring antioxidant regimens to individual patient profiles, considering factors such as age, underlying health conditions, and genetic predispositions, may enhance treatment efficacy. Moreover, the development of novel antioxidant formulations and delivery systems could improve bioavailability and therapeutic outcomes. However, challenges persist, including ensuring long-term safety, defining optimal dosage and duration of antioxidant supplementation, and addressing potential interactions with concomitant medications or environmental factors. By navigating these complexities and harnessing the protective effects of antioxidants, the field of reproductive medicine endeavors to fulfill the aspirations of individuals and couples striving for successful pregnancy and parenthood.[28-50]

Oxidative Stress and Gamete Quality

Oxidative stress, characterized by an imbalance between reactive oxygen species (ROS) production and antioxidant defense mechanisms, exerts profound effects on gamete quality. Within the male reproductive system, sperm are particularly susceptible to oxidative damage due to the high content of polyunsaturated fatty acids in their plasma membrane and the presence of ROS-

generating enzymes in sperm mitochondria. ROS, including superoxide anion, hydrogen peroxide, and hydroxyl radicals, are generated during normal sperm metabolism and are essential for processes such as sperm capacitation and the acrosome reaction. However, excessive ROS production overwhelms the antioxidant capacity of sperm, leading to oxidative stress and sperm dysfunction. Oxidative stress induces various forms of sperm damage, including lipid peroxidation, protein oxidation, and DNA fragmentation. Lipid peroxidation compromises the integrity of the sperm membrane, impairing sperm motility and viability. Protein oxidation results in the misfolding and aggregation of sperm proteins, disrupting their function and integrity. DNA fragmentation, a hallmark of oxidative damage, compromises sperm genetic integrity and may lead to impaired fertilization, embryonic development abnormalities, and increased risk of miscarriage.[51-61]

In the female reproductive system, oocytes are also susceptible to oxidative stress-induced damage, particularly during folliculogenesis and ovulation. Oocyte maturation is a highly regulated process that involves dynamic changes in chromatin structure, spindle assembly, and mitochondrial function. ROS accumulation during these critical stages can disrupt oocyte physiology and compromise developmental competence. Oxidative stress-induced damage to the oocyte's genetic material, mitochondria, and cytoskeletal components can impair fertilization, embryo development, and implantation. The detrimental effects of oxidative stress on gamete quality extend beyond sperm and oocytes to the preimplantation embryo. ROS-induced damage to sperm and oocytes can result in the transmission of genetic abnormalities to the embryo, affecting its viability and developmental potential. Furthermore, embryos generated from gametes exposed to oxidative stress may exhibit impaired mitochondrial function, altered gene expression patterns, and increased susceptibility to apoptosis.[62-75]

Antioxidants: Guardians of Reproductive Health

Antioxidants play a pivotal role in safeguarding reproductive health by counteracting the detrimental effects of oxidative stress on gametes and the reproductive system. These molecules act as guardians against the damaging effects of reactive oxygen species (ROS), thereby preserving gamete quality and fertility potential. Antioxidants function through various mechanisms to neutralize ROS and prevent oxidative damage. They can directly scavenge free radicals, donate electrons to stabilize radicals, or inhibit ROS-generating enzymes. Additionally, antioxidants can upregulate endogenous antioxidant defense systems, such as superoxide dismutase (SOD), catalase, and glutathione peroxidase, enhancing the cellular capacity to detoxify ROS. Within the reproductive system, endogenous antioxidants play crucial roles in maintaining redox homeostasis. Sperm, for instance, contain high levels of enzymatic antioxidants like SOD and catalase, which protect against ROS-induced damage during sperm maturation and transit through the female reproductive tract. Oocytes, similarly, rely on antioxidant enzymes and non-enzymatic antioxidants like glutathione to maintain mitochondrial function and genomic integrity.[76-87]

While the body possesses intrinsic antioxidant defense mechanisms, external sources of antioxidants are also vital for maintaining reproductive health. Dietary antioxidants, including vitamins C and E, carotenoids, and polyphenols, are obtained through consumption of fruits, vegetables, and supplements.[88-89] These exogenous antioxidants bolster the body's antioxidant capacity, offering protection against oxidative stress-induced damage to gametes and reproductive tissues. Various types of antioxidants have been studied for their effects on gamete quality and fertility outcomes. For example, vitamin C and E have been shown to improve sperm parameters, reduce DNA fragmentation, and enhance sperm motility. Coenzyme Q10 (CoQ10) supplementation has demonstrated benefits for both male and female fertility by improving mitochondrial function and ovarian reserve. Similarly, flavonoids and polyphenols exhibit antioxidant properties that may support reproductive health through their anti-inflammatory and anti-aging effects. Clinical studies have provided compelling evidence for the efficacy of antioxidant therapy in mitigating oxidative stress-related infertility. Antioxidant supplementation has been associated with improvements in sperm quality, ovarian function, and pregnancy rates in couples undergoing fertility treatments. Furthermore, antioxidants have been integrated into assisted reproductive techniques (ART), including in vitro fertilization (IVF) and intracytoplasmic sperm injection (ICSI), to enhance treatment outcomes and reduce oxidative stress-induced embryo damage.

Conclusion

The intricate relationship between oxidative stress and reproductive health underscores the critical role of antioxidants in preserving gamete quality and fostering successful pregnancies. Oxidative stress, resulting from an imbalance between reactive oxygen species (ROS) and antioxidant defense mechanisms, poses a significant threat to fertility by compromising sperm and oocyte integrity, impairing fertilization, embryo development, and implantation. Antioxidants emerge as powerful allies in the fight against oxidative stress-induced infertility. Through various mechanisms, including scavenging ROS, enhancing antioxidant enzyme activity, and protecting cellular structures from oxidative damage, antioxidants help maintain redox balance within the reproductive system. Clinical evidence supports the efficacy of antioxidant supplementation in improving sperm parameters, ovarian function, and pregnancy rates in couples undergoing fertility treatments. The implications of antioxidant therapy extend beyond conventional infertility management, with potential benefits for ART outcomes, maternal health, and offspring well-being. Integration of antioxidants into ART protocols holds promise for optimizing treatment success rates and reducing the risk of oxidative stress-related complications during pregnancy.

References

1. Thoma M, Fledderjohann J, Cox C, Adageba RK. Biological and social aspects of human infertility: a global perspective. InOxford research encyclopedia of global public health 2021.

Citation: Obeagu EI, Obeagu GU. Harnessing the Power of Antioxidants: Enhancing Gamete Quality and Fostering Successful Pregnancy. Elite Journal of Nursing and Health Science, 2024; 2(3): 73-83

2. Lunenfeld B, Van Steirteghem A. Infertility in the third millennium: implications for the individual, family and society: condensed meeting report from the Bertarelli Foundation's second global conference. Human reproduction update. 2004;10(4):317-326.
3. Tabong PT, Adongo PB. Infertility and childlessness: a qualitative study of the experiences of infertile couples in Northern Ghana. BMC pregnancy and childbirth. 2013; 13:1-10.
4. Delbaere I, Stern J. Fertility. Preconception Health and Care: A Life Course Approach. 2020:53-79.
5. Matzuk MM, Lamb DJ. The biology of infertility: research advances and clinical challenges. Nature medicine. 2008;14(11):1197-1213.
6. Obeagu EI, Obeagu GU, Obiezu J, Ezeonwumelu C, Alum EU, Ugwu OP. Antioxidants and Pregnancy: Impact on Maternal and Fetal Health. APPLIED SCIENCES (NIJBAS). 2023;4(1).
7. Obeagu EI, Bunu UO, Obeagu GU, Habimana JB. Antioxidants in the management of sickle cell anaemia: an area to be exploited for the wellbeing of the patients. International Research in Medical and Health Sciences. 2023;6(4):12-7.
8. Obeagu EI, Ubosi NI, Uzoma G. Antioxidant Supplementation in Pregnancy: Effects on Maternal and Infant Health. Int. J. Adv. Multidiscip. Res. 2023;10(11):60-70.
9. Obeagu EI, Obeagu GU. Utilization of Antioxidants in the management of diabetes mellitus patients. J Diabetes Clin Prac. 2018;1(102):2.
10. Nwosu DC, Obeagu EI, Nkwocha BC, Nwanna CA, Nwanjo HU, Amadike JN, Elendu HN, Ofoedeme CN, Ozims SJ, Nwankpa P. Change in Lipid Peroxidation Marker (MDA) and Non enzymatic Antioxidants (VIT C & E) in HIV Seropositive Children in an Urban Community of Abia State. Nigeria. J. Bio. Innov. 2016;5(1):24-30.
11. Nwosu DC, Obeagu EI, Ezenwuba C, Agu GC, Amah H, Ozims SJ, Nwanjo HU, Edward A, Izuchukwu IF, Amadike JN, Nwagwu AJ. Antioxidant status of children with Plasmodium falciparum malaria in Owerri municipal council of Imo state. Int. J. Curr. Res. Chem. Pharm. Sci. 2016;3(8):40-6.
12. Obeagu EI, Agreen FC. Anaemia among pregnant women: A review of African pregnant teenagers. J Pub Health Nutri. 2023; 6 (1). 2023;138. links/63da799664fc860638054562/Anaemia-among-pregnant-women-A-review-of-African-pregnant-teenagers.pdf.
13. Obeagu EI, Ezimah AC, Obeagu GU. Erythropoietin in the anaemias of pregnancy: a review. Int J Curr Res Chem Pharm Sci. 2016;3(3):10-8. links/5710fae108ae846f4ef05afb/ERYTHROPOIETIN-IN-THE-ANAEMIAS-OF-PREGNANCY-A-REVIEW.pdf.
14. Obeagu EI, Adepoju OJ, Okafor CJ, Obeagu GU, Ibekwe AM, Okpala PU, Agu CC. Assessment of Haematological Changes in Pregnant Women of Ido, Ondo State, Nigeria. J Res Med Dent Sci. 2021 Apr;9(4):145-8. links/608a6728a6fdccaebdf52d94/Assessment-of-Haematological-Changes-in-Pregnant-Women-of-Ido-Ondo.pdf.
15. Obeagu EI, Obeagu GU. Sickle Cell Anaemia in Pregnancy: A Review. International Research in Medical and Health Sciences. 2023 Jun 10;6(2):10-3. http://irmhs.com/index.php/irmhs/article/view/111.

Citation: Obeagu EI, Obeagu GU. Harnessing the Power of Antioxidants: Enhancing Gamete Quality and Fostering Successful Pregnancy. Elite Journal of Nursing and Health Science, 2024; 2(3): 73-83

16. Jakheng SP, Obeagu EI. Seroprevalence of human immunodeficiency virus based on demographic and risk factors among pregnant women attending clinics in Zaria Metropolis, Nigeria. J Pub Health Nutri. 2022; 5 (8). 2022;137. links/6317a6b1acd814437f0ad268/Seroprevalence-of-human-immunodeficiency-virus-based-on-demographic-and-risk-factors-among-pregnant-women-attending-clinics-in-Zaria-Metropolis-Nigeria.pdf.
17. Obeagu EI, Obeagu GU, Chukwueze CM, Ikpenwa JN, Ramos GF. Evaluation of Protein C, Protein S and Fibrinogen of Pregnant Women with Malaria in Owerri Metropolis. Madonna University journal of Medicine and Health Sciences. 2022;2(2):1-9.
18. Obeagu EI, Ikpenwa JN, Chukwueze CM, Obeagu GU. Evaluation of protein C, protein S and fibrinogen of pregnant women in Owerri Metropolis. Madonna University Journal of Medicine and Health Sciences. 2022;2(1):292-8. https://madonnauniversity.edu.ng/journals/index.php/medicine/article/view/57.
19. Obeagu EI, Obeagu GU, Adepoju OJ. Evaluation of haematological parameters of pregnant women based on age groups in Olorunsogo road area of Ido, Ondo state. J. Bio. Innov11 (3). 2022:936-41.
20. Obeagu EI. An update on utilization of antenatal care among pregnant Women in Nigeria. Int. J. Curr. Res. Chem. Pharm. Sci. 2022;9(9):21-6.DOI: 10.22192/ijcrcps.2022.09.09.003
21. Okoroiwu IL, Obeagu EI, Obeagu GU. Determination of clot retraction in preganant women attending antenatal clinic in federal medical centre Owerri, Nigeria. Madonna University Journal of Medicine and Health Sciences. 2022;2(2):91-7. https://madonnauniversity.edu.ng/journals/index.php/medicine/article/view/67.
22. Obeagu EI, Hassan AO, Adepoju OJ, Obeagu GU, Okafor CJ. Evaluation of Changes in Haematological Parameters of Pregnant Women Based on Gestational Age at Olorunsogo Road Area of Ido, Ondo State. Nigeria. Journal of Research in Medical and Dental Science. 2021;9(12):462-.links/61b1e32f0c4bfb675178bfa7/Evaluation-of-Changes-in-Haematological-Parameters-of-Pregnant-Women-Based-on-Gestational-Age-at-Olorunsogo-Road-Area-of-Ido-Ondo-State-Nigeria.pdf.
23. Anyiam AF, Obeagu EI, Obi E, Omosigho PO, Irondi EA, Arinze-Anyiam OC, Asiyah MK. ABO blood groups and gestational diabetes among pregnant women attending University of Ilorin Teaching Hospital, Kwara State, Nigeria. International Journal of Research and Reports in Hematology. 2022;5(2):113-121.
24. Obeagu EI. Gestational Thrombocytopaenia. J Gynecol Women's Health. 2023;25(3):556163. links/64b01aa88de7ed28ba95fccb/Gestational-Thrombocytopaenia.pdf.
25. Jakheng SP, Obeagu EI, Abdullahi IO, Jakheng EW, Chukwueze CM, Eze GC, Essien UC, Madekwe CC, Madekwe CC, Vidya S, Kumar S. Distribution Rate of Chlamydial Infection According to Demographic Factors among Pregnant Women Attending Clinics in Zaria Metropolis, Kaduna State, Nigeria. South Asian Journal of Research in Microbiology. 2022;13(2):26-31.

26. Obeagu EI, Ogbonna US, Nwachukwu AC, Ochiabuto O, Enweani IB, Ezeoru VC. Prevalence of Malaria with Anaemia and HIV status in women of reproductive age in Onitsha, Nigeria. Journal of Pharmaceutical Research International. 2021;33(4):10-9.
27. Obeagu EI, Abdirahman BF, Bunu UO, Obeagu GU. Obsterics characteristics that effect the newborn outcomes. Int. J. Adv. Res. Biol. Sci. 2023;10(3): 134-43.DOI: 10.22192/ijarbs.2023.10.03.016
28. Ezimah UA, Obeagu EI, Ezimah CO, Ezimah A, Nto NJ. Diarrhoeal diseases of acquired immunodeficiency syndrome stimulate more depletion of total antioxidant status. Int. J. Adv. Multidiscip. Res. 2016;3(4):23-5.
29. Aloh GS, Obeagu EI, Okoroiwu IL, Odo CE, Chibunna OM, Kanu SN, Elemchukwu Q, Okpara KE, Ugwu GU. Antioxidant-Mediated Heinz Bodies Levels of Sickle Erythrocytes under Drug-Induced Oxidative Stress. European Journal of Biomedical and Pharmaceutical sciences. 2015;2(1):502-7.
30. Nwakuilite A, Nwanjo HU, Nwosu DC, Obeagu EI. EVALUATION OF ENZYME ANTIOXIDANTS IN STREPTOZOCIN INDUCED DIABETIC RATS TREATED WITH MORINGA OLEIFERA LEAF POWDER. European Journal of Biomedical. 2020;7(11):285-8.
31. Ifeanyi OE. A review on free radicals and antioxidants. Int. J. Curr. Res. Med. Sci. 2018;4(2):123-33.
32. Akinpelu M, Gamade SM, Akinbo F, Adeniyi TD, Elizebeth AF, Obeagu EI. Histopathological and Biochemical Effect of Vitamin C and D on Phosphine-Induced Hepatotoxicity in Wistar Rats. Asian Journal of Dental and Health Sciences. 2023;3(2):18-22.
33. Nwakulite A, Obeagu EI, Eze R, Ugochi VE, Vincent CC, Okafor CJ, Chukwurah EF, Unaeze BC, Amaechi CO, Okwuanaso CB, Chukwuani U. Estimation of Serum Glutathione Peroxidase in Streptozotocin Induced Diabetic Rat Treated with Bitter Leaf Extract. Journal of Pharmaceutical Research International. 2021;33(30B):200-6.
34. Ifeanyi OE, Stella EI, Favour AA. Antioxidants In the Management of Sickle Cell Anaemia. Int J Hematol Blood Disord (Internet) 2018 (cited 2021 Mar 4); 3. Available from: https://symbiosisonlinepublishing. com/hematology/hema tology25. php. 2018 S.
35. Obeagu EI, Ogunnaya FU. PREGNANCYINDUCED HAEMATOLOGICAL CHANGES: A KEY TO MARTERNAL AND CHILD HEALTH. European Journal of Biomedical. 2023;10(8):42-3. links/64c890bddb38b20d6dad2c5c/PREGNANCY-INDUCED-HAEMATOLOGICAL-CHANGES-A-KEY-TO-MARTERNAL-AND-CHILD-HEALTH.pdf.
36. Okamgba OC, Nwosu DC, Nwobodo EI, Agu GC, Ozims SJ, Obeagu EI, Ibanga IE, Obioma-Elemba IE, Ihekaire DE, Obasi CC, Amah HC. Iron Status of Pregnant and Post-Partum Women with Malaria Parasitaemia in Aba Abia State, Nigeria. Annals of Clinical and Laboratory Research. 2017;5(4):206. links/5ea97df145851592d6a8acf2/Iron-Status-of-Pregnant-and-Post-Partum-Women-with-Malaria-Parasitaemia-in-Aba-Abia-State-Nigeria.pdf.

Citation: Obeagu EI, Obeagu GU. Harnessing the Power of Antioxidants: Enhancing Gamete Quality and Fostering Successful Pregnancy. Elite Journal of Nursing and Health Science, 2024; 2(3): 73-83

37. Eze RI, Obeagu EI, Edet FN. Frequency of Rh Antigen C And c among pregnant women in Sub-Urban area in Eastern Nigeria. Madonna Uni J Med Health Sci. 2021;1(1):19-30.
38. Obeagu EI, Ofodile AC, Okwuanaso CB. A review of urinary tract infections in pregnant women: Risks factors. J Pub Health Nutri. 2023; 6 (1). 2023;137:26-35. links/63c3a9116fe15d6a571e8bba/A-review-of-urinary-tract-infections-in-pregnant-women-Risks-factors.pdf.
39. Obeagu EI, Obeagu GU, Musiimenta E. Post partum haemorrhage among pregnant women: Update on risks factors. Int. J. Curr. Res. Med. Sci. 2023;9(2):14-7.DOI: 10.22192/ijcrms.2023.09.02.003
40. Obeagu EI, Obeagu GU, Ogunnaya FU. Deep vein thrombosis in pregnancy: A review of prevalence and risk factors. Int. J. Curr. Res. Chem. Pharm. Sci. 2023;10(8): 14-21.DOI: 10.22192/ijcrcps.2023.10.08.002
41. Jakheng SP, Obeagu EI, Jakheng EW, Uwakwe OS, Eze GC, Obeagu GU, Vidya S, Kumar S. Occurrence of Chlamydial Infection Based on Clinical Symptoms and Clinical History among Pregnant Women Attending Clinics in Zaria Metropolis, Kaduna State, Nigeria. International Journal of Research and Reports in Gynaecology. 2022;5(3):98-105.
42. Okorie HM, Obeagu EI, Eze EN, Jeremiah ZA. Assessment of some haematological parameters in malaria infected pregnant women in Imo state Nigeria. Int. J. Curr. Res. Biol. Med. 2018;3(9): 1-4.DOI: 10.22192/ijcrbm.2018.03.09.001
43. Onyenweaku FC, Amah HC, Obeagu EI, Nwandikor UU, Onwuasoanya UF. Prevalence of asymptomatic bacteriuria and its antibiotic susceptibility pattern in pregnant women attending private ante natal clinics in Umuahia Metropolitan. Int J Curr Res Biol Med. 2017;2(2): 13-23.DOI: 10.22192/ijcrbm.2017.02.02.003
44. Okoroiwu IL, Chinedu-Madu JU, Obeagu EI, Vincent CC, Ochiabuto OM, Ibekwe AM, Amaechi CO, Agu CC, Anoh NV, Amadi NM. Evaluation of Iron Status, Haemoglobin and Protein Levels of Pregnant Women in Owerri Metropolis. Journal of Pharmaceutical Research International. 2021;33(27A):36-43.
45. Obeagu EI, Njar VE, Obeagu GU. Infertility: Prevalence and Consequences. Int. J. Curr. Res. Chem. Pharm. Sci. 2023;10(7):43-50.
46. Emeka-Obi OR, Ibeh NC, Obeagu EI, Okorie HM. Evaluation of levels of some inflammatory cytokines in preeclamptic women in owerri. Journal of Pharmaceutical Research International. 2021;33(42A):53-65.
47. Obeagu EI, Faduma MH, Uzoma G. Ectopic Pregnancy: A Review. Int. J. Curr. Res. Chem. Pharm. Sci. 2023;10(4): 40-44.DOI: 10.22192/ijcrcps.2023.10.04.004
48. Obeagu EI, Gamade SM, Obeagu GU. The roles of Neutrophils in pregnancy. Int. J. Curr. Res. Med. Sci. 2023;9(5): 31-5.DOI: 10.22192/ijcrms.2023.09.05.005
49. Eze R, Obeagu EI, Nwakulite A, Okoroiwu IL, Vincent CC, Okafor CJ, Chukwurah EF, Chijioke UO, Amaechi CO. Evaluation of Copper Status and Some Red Cell Parameters of Pregnant Women in Enugu State, South Eastern Nigeria. Journal of Pharmaceutical Research International. 2021;33(30A):67-71.
50. Obeagu EI, Obeagu GU. Molar Pregnancy: Update of prevalence and risk factors. Int. J. Curr. Res. Med. Sci. 2023;9(7): 25-28.DOI: 10.22192/ijcrms.2023.09.07.005

Citation: Obeagu EI, Obeagu GU. Harnessing the Power of Antioxidants: Enhancing Gamete Quality and Fostering Successful Pregnancy. Elite Journal of Nursing and Health Science, 2024; 2(3): 73-83

51. Jamil M, Debbarh H, Aboulmaouahib S, Filali OA, Mounaji K, Zarqaoui M, Saadani B, Louanjli N, Cadi R. Reactive oxygen species in reproduction: harmful, essential or both?. Zygote. 2020;28(4):255-269.
52. Obeagu EI, Bunu UO. Factors that influence unmet need for family planning. International Journal of Current Research in Biology and Medicine. 2023;8(1):23-7.
53. Ibebuike JE, Ojie CA, Nwokike GI, Obeagu EI, Nwosu DC, Nwanjo HU, Agu GC, Ezenwuba CO, Nwagu SA, Akujuobi AU. Barriers to utilization of maternal health services in southern senatorial district of Cross Rivers state, Nigeria. International Journal of Advanced Multidisciplinary Research. 2017;4(8):1-9.DOI: 10.22192/ijamr.2017.04.08.001
54. Emannuel G, Martin O, Peter OS, Obeagu EI, Daniel K. Factors Influencing Early Neonatal Adverse Outcomes among Women with HIV with Post Dated Pregnancies Delivering at Kampala International University Teaching Hospital, Uganda. Asian Journal of Pregnancy and Childbirth. 2023 Jul 29;6(1):203-211. http://research.sdpublishers.net/id/eprint/2819/.
55. Okorie HM, Obeagu EI, Eze EN, Jeremiah ZA. Assessment of coagulation parameters in malaria infected pregnant women in Imo state, Nigeria. International Journal of Current Research in Medical Sciences. 2018;4(9): 41-49.DOI: 10.22192/ijcrms.2018.04.09.006
56. Obeagu EI, Obeagu GU. Postpartum haemorrhage among women delivering through spontaneous vaginal delivery: Prevalence and risk factors. Int. J. Curr. Res. Chem. Pharm. Sci. 2023;10(8): 22-26.DOI: 10.22192/ijcrcps.2023.10.08.003
57. Obeagu E, Eze RI, Obeagu EI, Nnatuanya IN, Dara EC. ZINC LEVEL IN APPARENTLY PREGNANT WOMEN IN URBAN AREA. Madonna University journal of Medicine and Health Sciences. 2022;2(1):134-148. https://www.journal.madonnauniversity.edu.ng/index.php/medicine/article/view/40.
58. Ogomaka IA, Obeagu EI. Malaria in Pregnancy Amidst Possession of Insecticide Treated Bed Nets (ITNs) in Orlu LGA of Imo State, Nigeria. Journal of Pharmaceutical Research International. 2021 Aug 25;33(41B):380-6.
59. Obeagu EI, Ogunnaya FU, Obeagu GU, Ndidi AC. SICKLE CELL ANAEMIA: A GESTATIONAL ENIGMA. migration. 2023; 17:18.
60. Ifeanyi OE, Uzoma OG. A review on erythropietin in pregnancy. J. Gynecol. Womens Health. 2018;8(3):1-4. https://www.academia.edu/download/56538560/A_Review_on_Erythropietin_in_Pregnancy.pdf.
61. Ifeanyi OE. A review on pregnancy and haematology. Int. J. Curr. Res. Biol. Med. 2018;3(5): 26-28.DOI: 10.22192/ijcrbm.2018.03.05.006
62. Wang L, Tang J, Wang L, Tan F, Song H, Zhou J, Li F. Oxidative stress in oocyte aging and female reproduction. Journal of cellular physiology. 2021;236(12):7966-7983.
63. Lin J, Wang L. Oxidative stress in oocytes and embryo development: Implications for in vitro systems. Antioxidants & Redox Signaling. 2021;34(17):1394-1406.

Citation: Obeagu EI, Obeagu GU. Harnessing the Power of Antioxidants: Enhancing Gamete Quality and Fostering Successful Pregnancy. Elite Journal of Nursing and Health Science, 2024; 2(3): 73-83

64. Nwosu DC, Nwanjo HU, Obeagu EI, Ibebuike JE, Ezeama MC. Ihekireh. Changes in liver enzymes and lipid profile of pregnant women with malaria in Owerri, Nigeria. International Journal of Current Research and Academic Review. 2015;3(5):376-83.
65. Ibebuike JE, Ojie CA, Nwokike GI, Obeagu EI, Nwosu DC, Nwanjo HU, Agu GC, Ezenwuba CO, Nwagu SA, Akujuobi AU. Factors that influence women's utilization of primary health care services in Calabar Cros river state, Nigeria. Int. J. Curr. Res. Chem. Pharm. Sci. 2017;4(7):28-33.
66. Eze R, Ezeah GA, Obeagu EI, Omeje C, Nwakulite A. Evaluation of iron status and some haematological parameters of pregnant women in Enugu, South Eastern Nigeria. World Journal of Pharmaceutical and Medical Research. 2021;7(5):251-4.
67. Elemchukwu Q, Obeagu EI, Ochei KC. Prevalence of Anaemia among Pregnant Women in Braithwaite Memorial Specialist Hospital (BMSH) Port Harcourt. IOSR Journal of Pharmacy and Biological Sciences. 2014;9(5):59-64.
68. Akandinda M, Obeagu EI, Katonera MT. Non Governmental Organizations and Women's Health Empowerment in Uganda: A Review. Asian Research Journal of Gynaecology and Obstetrics. 2022 Dec 14;8(3):12-6.
69. Vidya S, Kumar S, Emmanuel Jakheng SP, Obeagu EI, Jakheng EW, Uwakwe OS, Eze GC, Obeagu GU. Occurrence of Chlamydial Infection Based on Clinical Symptoms and Clinical History among Pregnant Women Attending Clinics in Zaria Metropolis, Kaduna State, Nigeria. International Journal of Research and Reports in Gynaecology. 2022; 5(3):98-105.
70. Gamde MS, Obeagu EI. IRON DEFICIENCY ANAEMIA: ENEMICAL TO PREGNANCY. European Journal of Biomedical. 2023;10(9):272-5. links/64f63358827074313ffaae7b/IRON-DEFICIENCY-ANAEMIA-ENEMICAL-TO-PREGNANCY.pdf.
71. Emeka-Obi OR, Ibeh NC, Obeagu EI, Okorie HM. Evaluation of levels of some inflammatory cytokines in preeclamptic women in owerri. Journal of Pharmaceutical Research International. 2021;33(42A):53-65.
72. Emeka-Obi OR, Ibeh NC, Obeagu EI, Okorie HM. Studies of Some Haemostatic Variables in Preeclamptic Women in Owerri, Imo State, Nigeria. Journal of Pharmaceutical Research International. 2021 Aug 30;33(42B):39-48.
73. Obeagu EI, Obeagu GU. Postpartum haemorrhage among women delivering through spontaneous vaginal delivery: Prevalence and risk factors. Int. J. Curr. Res. Chem. Pharm. Sci. 2023;10(8):22-26.
74. Obeagu EI, Obeagu GU. Sickle Cell Anaemia in Pregnancy: A Review. International Research in Medical and Health Sciences. 2023;6(2):10-13.
75. Obeagu EI, Obeagu GU. Oxygen Deprivation in Pregnancy: Understanding Hypoxia's Impact on Maternal Health. Journal home page: http://www. journalijiar. com.;12(01).
76. Obeagu EI. Antioxidants and Pregnancy Complications: Exploring Therapeutic Strategies for Better Outcomes. Clinical Journal of Obstetrics and Gynecology. 2024 Jan 25;7(1):001-6.

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77. Obeagu EI, Obeagu GU. Maternal Eosinophilic Responses in HIV-Positive Pregnant Women: Unraveling Immunological Dynamics for Improved Maternal-Fetal Health. Elite Journal of Immunology. 2024;2(1):47-64.
78. Obeagu EI, Obeagu GU. Hemolysis Challenges for Pregnant Women with Sickle Cell Anemia: A Review. Elite Journal of Haematology, 2024; 2 (3).:67-80.
79. Obeagu EI, Obeagu GU, Hauwa BA. Optimizing Maternal Health: Addressing Hemolysis in Pregnant Women with Sickle Cell Anemia. Journal home page: http://www. journalijiar. com.;12(01).
80. Edward Henry SI, Obeagu EI. Assessment of Haemostatic Parameters on Preeclampsia Subjects in Aba, Abia State. Elite Journal of Haematology. 2024;2(1):1-9.
81. Obeagu EI, Obeagu GU. Eosinophil Dynamics in Pregnancy among Women Living with HIV: A Comprehensive Review. Int. J. Curr. Res. Med. Sci. 2024;10(1):11-24.
82. Obeagu EI, Obeagu GU. Eosinophil-Associated Changes in Neonatal Thymic T Regulatory Cell Populations in HIV-Infected Pregnancies. Elite Journal of Health Science. 2024;2(1):33-42.
83. Obeagu EI, Obeagu GU. Eosinophilic Changes in Placental Tissues of HIV-Positive Pregnant Women: A Review. Elite Journal of Laboratory Medicine. 2024;2(1):14-32.
84. Obeagu EI, Obeagu GU, Okwuanaso CB. Optimizing Immune Health in HIV Patients through Nutrition: A Review. Elite Journal of Immunology. 2024;2(1):14-33.
85. Obeagu EI, Obeagu GU. Oxidative Damage and Vascular Complications in Sickle Cell Anemia: A Review. Elite Journal of Haematology, 2024; 2 (3).:58-66.
86. Bunza JM, Alhassan AJ, Sani MU, Gwarzo MY, Ogunwale KA, Haruna S, Ciroma FA, Dallatu MK, Jidda ML, Ngaski AA, Kwaifa IK. Influence of Glycaemic Control and Microvascular Complications on Oxidative Stress in Patients with Type 2 Diabetes Mellitus: A Cross-sectional Study in Kano, Nigeria. Elite Journal of Medicine. 2024;2(3):14-27.
87. Obeagu EI, Obeagu GU. Improving Outcomes: Integrated Strategies for Diabetes and Sickle Cell Anemia. Int. J. Curr. Res. Chem. Pharm. Sci. 2024;11(2):20-9.
88. Dutta S, Sengupta P, Izuka E, Menuba I, Nwagha U. Oxidative and nitrosative stress and female reproduction: Roles of oxidants and antioxidants. Journal of Integrated Science and Technology. 2024;12(3):754-.
89. Sengupta P, Dutta S, Irez T. Oxidants and antioxidants in male reproduction: roles of oxidative and reductive stress. Journal of Integrated Science and Technology. 2024;12(3):753