



E-ISSN: 2278-4136

P-ISSN: 2349-8234

<http://www.phytojournal.com>

JPP 2023; 12(4): 01-04

Received: 01-04-2023

Accepted: 05-05-2023

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## A review of Nigerian plants and their bioactive constituents that increase chances of multiple pregnancies

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DOI: <https://doi.org/10.22271/phyto.2023.v12.i4c.14685>

**Abstract**

The current occurrence of twin births is beyond previous generational records. Many countries in the world have records that confirm a significant increase in twin births from the 1980s; out of forty two individuals born, one is a twin which gives rise to the birth of one million and six hundred thousand children per year. This implies that, the mean global rise in twin birthrate is one-third over the past four decades. In 2022, Africa had the highest rate of naturally conceived twin births from two different eggs with 80% of twin births recorded in Africa or Asia. Igbo-Ora, a Yoruba town in Oyo state, Nigeria is currently tagged “the melting pot of twin birth” due to the multiple birth record of twins and triplets in virtually every household believed to be due to their environment or the food they eat, making the town “the world’s twin capital”. Multiple pregnancies occur when a female carries two or more babies in her womb. The aim of the study was to review some Nigerian plants claimed to have chances of increasing multiple pregnancies in women and determine their responsible bioactive constituents. Articles published in English were gathered electronically from database such as PubMed and Medline using scientific keywords such as multiple pregnancies and multiple births, and terms like nutrients, dietary, supplements and genetics. Medical articles such as randomized controlled trials and guidelines from the Food and Agricultural Organization, World Health Organization, United Nation University Press, and peer reviewed Journals, locally and internationally were consulted. Individuals that are well recognized to have wealth of knowledge and scientific training in Obstetrics and Gynaecology, and Traditional Birth Attendance were sought for professional advice. Descriptive analysis was employed. Relevant data and useful information were compiled and taken as results. The study lasted for six months; from January to June, 2023. Foods such as yam, cassava, okra leaf, beans, grains, maca root, pineapple, dairy products, fruits and vegetables were determined and found to contain bioactive constituents such as phytoestrogen, gonadotropin, insulin-like proteins, follicle stimulating and luteinizing hormones, complex carbohydrates, an enzyme-bromelain, zinc and folic acid that could increase the chances of multiple pregnancies. Other contributory factors include the age, height, weight genetics and race of the mothers.

**Keywords:** Multiple pregnancies, *in-vitro* fertilization, identical twins, fraternal twins, food, bioactive constituents

**Introduction**

The current occurrence of twin births is beyond previous generational records [1, 2, 3]. One of the earliest researches on twin births revealed a significant increase from many countries in the world from the 1980s; out of forty two individuals born, one was a twin which gave rise to the birth of one million and six hundred thousand children in one year [1, 2, 3]. The study posited that the mean global twin birthrate was about one-third over the past four decades [1, 2, 3, 4]. Although the rise in twin birth has been a global trend, it might have reached its zenith as some nations have begun to observe a decrease from their historic records [1, 2, 3, 4]. Christiaan Monden, a Professor of sociology and demography at Oxford University noted that the twin birth trends were obvious as their rise in advanced and developed nations resulted in more twin births than had been recorded over four to five decades [1, 2, 3, 4, 5]. Professor Monden and his peers discovered that twin birth rise stemmed from global medically assisted reproductive technology [1, 2, 3, 4, 5]. Enhanced available and accessible hormone treatment, *In vitro* fertilization and other medical fertility services were identified key factors in the rise of twin births [1, 2, 3, 4, 5]. This analysis of twin birth span from 2010-2015 in over 164 nations of the world and 99% of its population [1, 2, 3, 4, 5, 6]. Since the 1980s, the world experienced a 9 to 12% rise in twin births but the rate varied among the countries of the world [1, 2, 3, 4, 5, 6].

North America, Europe and Asia experienced the greatest rise in twin birth by 71%, 60% and 32% respectively. Twin birth rate in the UK increased up to 62% but dropped due to the impact of the Human Fertilization and Embryology Authority (HFEA) in 2007 whose activities targeted a reduction in multiple births [1, 2, 3, 4, 5, 6]. Although the study recorded increased twin rates in some countries, seven others had decreased twin birth rates by more than 10% over the same period of the survey [1, 2, 3, 4, 5, 6]. Africa had the highest rate of naturally conceived twin births from two different eggs with 80% of twin births recorded in Africa or Asia [1, 2, 3, 4, 5, 6]. North America and Africa had increased twin birth rates by more than 80%, and the rise in Africa could be attributed to population growth [1, 2, 3, 4, 5, 6]. Raj Mathur, a consultant gynaecologist at St. Mary's Hospital in Manchester and chair of the British Fertility Society connected the enhanced multiple birth to the availability of assisted reproduction and the time the average older age women have their first birth. Although some countries reached their peak twin birth rates through medical interventions, one of such intervention, the in vitro fertilization (IVF) does not have the same spread and access in Africa and South America [1, 2, 3, 4, 5, 6, 7]. How the IVF can be made accessible to people and not increase twin birth rates in these areas remain a challenge. Mathur acknowledged that in as much as many twin births and babes were all right, twin pregnancy could present great risks for the baby and the mother [1, 2, 3, 4, 5, 6, 7]. When a woman is pregnant with two or more babies, it is called multiple pregnancies. The birth of two babies is twins and the birth of three babies is triplets. Multiple pregnancies occur when a zygote divides before implantation in the womb or when different ova are fertilized by different spermatozoa at a time [2]. These may result in either identical or fraternal siblings [7, 8]. When an ovum divides, identical twins or triplets result that are a replica and are of the same gender [3, 4]. Fertilized ova by different spermatozoa at a time results in fraternal multiples, unidentical, with different genomes and they may be of different gender [9, 10]. Factors that increase the chances of multiple births include: age; the use of fertility medicines such as clomiphene citrate, letrozole, gonadotropin, etc.; height; heredity; race; foods; and fertility techniques like in vitro fertilization (IVF) which often involves implanting fertilized ova into the womb to increase the chances of fertilization [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]. Ultrasound examination with healthcare providers is one of the ways women could tell if they are pregnant with two or more zygotes/fetus during their gestation period [1, 3, 6]. The examination provides images of the internal parts of the uterus to confirm the numbers of babies. Suspected symptoms of multiple pregnancies include increased weight in the first three months, increased levels of human chorionic gonadotropin (hCG), hyperemesis gravidarum (HG), very tender breasts, and enhanced levels of the protein-  $\alpha$ -fetoprotein in the blood [1, 3, 6]. Furthermore, a fetal Doppler scan may be used to detect fetal heartbeats to signal multiple pregnancies [7, 8, 12, 13]. Multiple pregnancies are thought to have increased risks than single pregnancies by health professionals [14, 16]. This does not imply that every female with multiple pregnancies is necessarily going to develop medical complications. Preterm birth is a potential complication and the babies that are born prematurely stand the danger of low birth weight [14, 15, 16]. Other complications include: gestational hypertension/preeclampsia [1, 2, 3, 4, 5, 6, 10, 11]; gestational diabetes mellitus [11, 12]. These could be linked with the rise in hormone levels from the placenta [1, 3, 6, 17, 18]. Therefore the placenta size or magnitude is important in

multiple pregnancies [11, 12]. There could be an increased resistance to insulin with two placentas that might lead to diabetes mellitus [2, 4, 5, 17, 18, 19]; placenta abruption; this condition occurs when the placenta detaches (separates) from the wall of the uterus before delivery [18, 19]; fetal growth restriction: this condition can also be called intrauterine growth restriction (IUGR) or small for gestational age (SGA) [1, 9, 12, 14, 18, 19, 20, 21]. Fraternal twins always have two placentas while identical twins may have a placenta (in 7 out of 10 cases) or two (in 3 out of 10 cases) [1, 3, 7, 8, 10, 14]. Where identical twins have two placentas, they may experience similar risks as the fraternal twins. Monochorionic twins share a placenta and have peculiar risks [1, 3, 7, 8, 10, 14, 18, 21, 24]. The risks include twin-twin-transfusion-syndrome (TTTS) which occurs in 5 to 15% of monochorionic twins [1, 3, 7, 8, 10, 14, 21, 25, 26]. In the absence of medical assistance, TTTS may result in a 90% risk of death of the unborn twins. Twin-anemia-polycythemia sequence (TAPS) is another complication of monochorionic twins [1, 3, 7, 8, 10, 14, 15, 23, 26]. The TAPS could result in anemia and polycythemia for the twins where one twin may have low levels of red blood cells and the other high levels of red blood cells. Monochorionic twins may have selective intrauterine growth restriction (sIUGR), another complication [1, 3, 7, 8, 10, 14, 15, 26] where one twin does not grow well. Monochorionic twins may also experience twin-reversed-arterial-perfusion syndrome that results in the death of one twin without a heart is a rare and manageable syndrome. [1, 3, 7, 8, 10, 14, 15, 21, 25, 26]. Monochorionic twins may also be in the same gestational sac, [1, 3, 7, 8, 10, 14, 15], called monoamniote. This is considered a high risk for the twin(s) and occurs in 1 out of 100 multiple pregnancies. All the aforementioned conditions can be diagnosed using ultrasound [1, 3, 7, 8, 10, 14, 15]. A cesarean section (C- section) is usually recommended for multiple births as most often; the babies are not well positioned for birth [1, 3, 10, 12, 13, 14, 15, 16]. Taking nutritional foods, having enough rest and regular visitation to healthcare providers are important during multiple pregnancies [10, 14, 16]. It is also important to eat enough protein, take plenty of fluids and extra calories for the unborn [14, 16]. It is recommended that women with multiple pregnancies eat an extra 300 calories a day for each baby [4, 5, 6, 14, 16, 19, 23, 24, 27]. There is need for continuous, comprehensive and thorough antenatal care in multiple pregnancies. To stay in good health and shape through multiple pregnancies, low-impact exercises are recommended and they include prenatal yoga, walking and swimming [1, 2, 6, 14, 15, 16, 17, 18, 19, 25, 26, 27]. Although being active is wonderful during pregnancy, there is a need to speak with a health specialist about the best activities to embark on as some strenuous activities including jogging, and aerobics that involve jumping might not be great during multiple pregnancies [14, 15, 16, 17, 18, 19]. As multiple pregnancies gestational period progresses, it is important to note that exercise routine might be altered especially where any complications are experienced [1, 2, 5, 6, 14, 15, 16, 17, 18, 19, 20, 21, 26, 27].

## Materials and Methods

Articles published in English Language were searched in PubMed and Medline using scientific keywords such as multiple pregnancies and multiple births, in conjunction with terms like nutrients, dietary, supplements and genetics. Medical articles such as randomized controlled trials and guidelines from the Food and Agricultural Organization, World Health Organization, United Nation University Press, as well as peer reviewed International Journals were keenly

put into consideration. Individuals that are well recognized to have wealth of knowledge, understanding and scientific training in Obstetrics and Gynaecology (O/G); and Traditional Birth Attendants (TBAs) that are well accepted in their communities to specialize in childbirth, women-related disease associated with pregnancies and treatments were also consulted. Relevant data and useful information were compiled and taken as results. The study lasted for 6 months (2023).

## Results

According to the studies, eight (8) foods in addition to factors like age, height, hereditary and race have been identified to enhance the chances of multiple pregnancies in Nigeria if eaten regularly since the use of fertility medicines such as clomiphene citrate, letrozole, and gonadotropin that stimulate the ovaries to release multiple eggs that could increase the chances for multiple fertilization; and fertility techniques such as in vitro fertilization which are involved in implanting fertilized ova into the womb in order to increase the chances of fertilization are still limited on a per capita basis. These foods include: yam, cassava, okra leaf, beans, grains (maize, millet, and guinea-corn), maca root, dairy products, fruits and vegetables (pineapple, water melon, banana, mango, and leafy greens).

## Discussion

Yam is rich sources of progesterone and phytoestrogens which may lead to hyper ovulation thus increase the chances of multiple pregnancies [1, 2, 3, 4, 5]. Hyper ovulation occurs when a woman releases more than one egg during ovulation period. It is no surprise that the Igbo-ora people of Oyo State, Nigeria have a huge number of naturally conceived twin births earning it the nickname 'twin capital of the world' [20, 25]. The high amount of yam either eaten boiled or fried with palm oil, pounded and eaten with okra soup, or made into 'amala' and eaten with okra soup almost on a daily basis, was a reasonable cause of twin or multiple births contributing to a twin birthrate four time higher than the entire global average [20, 25]. Cassava like yam is also known for increasing fertility [20, 25, 26]. It also helps in increasing the chances of getting twins due to its hyper ovulative properties [20, 25, 26, 27]. According to studies, natural hormones in cassava may stimulate the brain as though there were deficit estrogen, causing the brain to release more gonadotropin hormones that enhance ovulation rate [20, 25, 26, 27]. Cassava can be consumed in the form of 'abacha' with red oil, 'alubo' with okra soup, 'garri', tapioca and 'lafau'. Okra leaf is a great source of protein, calcium, iron, fibres and vitamin c [17, 18, 19, 20, 25, 26, 27]. A soup of okra leaf, served with yam flour (amala) or cassava flour and eaten regularly is believed fervently by Igbo-ora natives to be a successful recipe for conceiving twins [20, 25]. Beans, grains and vegetables are great source of complex carbohydrates [1, 2, 3, 4, 5]. They increase fertility and prevent neural birth defects in babies [1, 2, 3, 4, 5, 6, 7]. Complex carbohydrates help in gaining weight and studies have shown that tall and/or overweight women have more chances of getting twins than women who are shorter or have average weight [1, 2, 3, 4, 5, 6, 7]. Beans and grains are also rich in zinc [1, 2, 3, 4, 5, 6, 7]. Both male and female fertilities are enhanced by zinc [1, 2, 3, 4, 5, 6, 7]. Zinc increases the chances of twins by increasing sperm motility and sperm counts [1, 2, 3, 4, 5, 6, 7]. Nutrient rich foods that encourage twin conception and keep babies healthier in the womb include banana, watermelon, kiwis, mango, cruciferous vegetables and leafy greens [1, 2, 3, 4, 5].

Beans and grains are folic acid rich foods [1, 2, 3, 4, 5]. Folic acid is a soluble vitamin that has many functions in the body. It is a supplement recommended for pregnant women as it promotes fetal growth and reduces the risk of birth defects in newborns [1, 2, 3]. Research has shown some connections between folic acid and enhanced chances of multiple conceptions [1, 2, 3]. It is reported that 4 in 10 women who take extra folic acid may have marginally increased chances of conceiving and birthing twins [1, 2, 3]. Pineapple core promotes fertility and pregnancy [1, 2, 3]. Bromelain, an enzyme that lessens inflammation and encourages blood flow to the uterus, is abundant in the core of pineapple and studies have shown it to increase chance of multiple pregnancies [1, 2, 3, 4, 5]. Maca root, over the years has proven to be also beneficial in boasting fertility [1, 2, 3]. The treatment with maca root also helps balance and regulates women follicle stimulating and luteinizing hormones that are said to contribute to the release of multiple eggs that could increase the chances of fertilization. It can be consumed by adding the dried powdered form to smoothie, tea, or yoghurt. Furthermore, a 2006 research showed that frequent consumption of dairy products, caused women to be five times likely to have twins [1, 2, 3, 4, 5, 6, 7, 8]. This finding is thought to be due to insulin growth factor (IGF), a growth protein found in cow milk and other animal products [1, 2, 3, 4, 5, 6, 7, 8]. When a woman consumes large quantity of dairy products, she is prone to releasing more than one egg during ovulation and this increases her chances of conceiving fraternal twins [1, 2, 3, 4, 5, 6, 7, 8]. Other factors that could contribute to multiple pregnancies in Nigeria may include: age; this is because, at ages between 35-39 years, a woman's body releases multiple eggs due to the signal of menopause [5, 6]; height: taller women than the average height or women that have higher body weight have more tendencies of having multiple pregnancies than shorter and thinner women [5, 6, 7, 8, 9, 10, 11]; genetics: there is an enhanced potential of multiple pregnancies if a woman is a multiple herself, or if multiple births run in her family [5, 6, 7, 8, 9, 10, 11]. The heredity trait could generally be passed down through the maternal side of the family and or race: if the woman is from Africa; particularly, Igbo-ora in Oyo state in the western Nigeria [20, 25].

## Conclusion

According to this study, foods such as yam, cassava, okra leaf, beans, grains, maca root, pineapple, dairy products, fruits and vegetables were known to contain bioactive constituents that could increase the chances of multiple pregnancies. Other contributory factors include the age, height, weight genetics and race of a woman.

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