P-ISSN: 2664-3685
E-ISSN: 2664-3693
Impact Factor (RJIF): 5.92
www.paediatricjournal.com
IJPG 2026; 9(1): XX-XX
Received: 02-11-2025
Accepted: 05-12-2025

Dr. Mudhafar Abdulhussein
Faculty of Medicine, Jabir IBN Hayyan University for Medical and Pharmaceutical Sciences, Kufa, Iraq

Corresponding Author:
Dr. Mudhafar Abdulhussein
Faculty of Medicine, Jabir IBN Hayyan University for Medical and Pharmaceutical Sciences, Kufa, Iraq

Types of twins

Mudhafar Abdulhussein

DOI: https://www.doi.org/10.33545/26643685.2026.v9.i1a.273

Abstract
Twins refer to two embryos developing within the same pregnancy, originating either from a single fertilized oocyte (monozygotic twins) or from two separate oocytes fertilized by different sperms (dizygotic twins). Monozygotic twins, commonly termed identical twins, possess identical genetic material and are always of the same sex, whereas dizygotic or fraternal twins may be of the same or different sex due to genetic dissimilarity. Globally, twin pregnancies occur in approximately 1 out of every 80 live births, with marked regional variations. Higher rates are observed in African populations, followed by Europe and the United States, while lower incidences are reported in Asia and India. The prevalence of dizygotic twinning has increased significantly since the 1980s, largely attributable to the widespread use of fertility drugs and assisted reproductive techniques such as in vitro fertilization (IVF). Twin pregnancies are associated with a higher incidence of obstetric complications, including preterm birth, intrauterine growth restriction, twin-to-twin transfusion syndrome, congenital anomalies, and increased perinatal mortality when compared with singleton pregnancies. Placental morphology and fetal membranes play a crucial role in classifying twin types and determining clinical outcomes. Dizygotic twins typically develop with separate placentas and membranes, whereas monozygotic twins may share placental structures depending on the timing of embryonic division. Understanding the embryological basis, placental configurations, and epidemiological patterns of twin pregnancies is essential for accurate diagnosis, risk assessment, and effective clinical management of multiple gestations.

Keywords: Twins, Monozygotic twins, Dizygotic twins, Placenta and membranes, In vitro fertilization, Assisted reproductive techniques, Congenital anomalies

1. Introduction
Twins, refers to embryos for the same pregnancy that arise from either one fertilized oocyte or from different oocytes fertilized by different sperms, monozygotic and dizygotic, respectively. All monozygotic would be the same sex, both of them are a boys or both are a girls, while the dizygotic half of them are same sex, and the other half are deferent sex [1].
Term Identical refers to monozygotic twins, this is because their genetic makeup would be identical, this depend on the monozygotic come from the same zygote (one oocyte fertilized by one sperm).thus, the environment factors are main reason to differences between twins of this type. While in the other type dizygotic twine known as fraternal twins (two oocytes fertilized by two sperm), the environmental and genetic factors contribute to differences between twins [2, 3]. Pregnant with twins is not rare, the rate of the twins in live births is 1 in 80,ie, in 40 babies there is 1 is twin [4]. The rate of the dizygotic twins different from rate of the monozygotic twins, so there is a large discrepancy between the two rates [5, 6]. In the USA and Europe there about 10-20 from 1000 live births are twins, in African- Americans about 26 in 1000 newborn babies are a twins, in Africa approximately 40 in 1000, also in Asia about 6 in 1000 live births [7], 1 to 2 % in Australia [8]. Per 1000 newborn there are less than 9 twin births, in India [9]. Increased rate conceptions with twins livebirths (dizygotic twins) due to increase use of the infertility drugs and *in-vitro fertilization* (IVF) since from 1980_s [10, 11]. The rate of pregnant with more than one embryo by assisted pregnant (Assisted Reproductive Techniques (ART)) is 2.25 times more than normal pregnant [12]. Also should be noted, that abnormalities (congenital anomalies) associated with twins higher than with the singleton fetus [13]. The mortality rate in the twins higher than in the singleton conception, because preterm birth, twin to twin transfusion, intrauterine growth restriction, death of the one of the twins, and increased incidence of medical complications in the twin more than in the singleton pregnant [14]. Congenital anomalies such as neural tube defects, trisomies and gastrointestinal tract structural anomalies [15], dislocation hips, clubfeet, and greater moulding

of the head [16, 17], occur in twins more than singleton conception [15].

Placenta and membranes in twins Dizygotic twin

Membranes of the placenta are formed in the early stages of the embryonic development. Distinguish the type of the twins may depend on their placental membranes. indeed, twins are currently being classified according to their membranes [18-20].

This type of twin result from shedding of two ovum in same time and fertilization by two sperm forming two zygotes (fertilized oocyte) [21]. Every month, during ovarian cycle mature more than 15 follicle in same ovary that may cause ovulation more than one ovum leading to pregnant with dizygotic twins [22, 23] each of them individually implantation in the endometrium of the uterus, and form own amniotic membrane, chorionic membrane, and own placenta figure (1), sometimes may fuse the placentas because are so close together, also may fuse its chorionic membrane [21]. Certainly, each embryo of fraternal twins it's have own placenta and membrane (Dizygotic twins have separate placentas and membranes) [7]. According to that, the genetic constitutions is different. So, the sex of twins may or may not different, different blood groups and different of external appearance [21]. One of the most important factors associated with spontaneous dizygotic twin is increase concentration of the follicular stimulating hormone (FSH), there are more than cause lead to increase FSH such as old, heavy, and tall mother, and season, geography, and ethnic origin [24, 23]. When studying all pregnancy cases with dizygotic twin noted increased in concentration of the FSH, this increase is associated with using the fertility drugs [26, 27]. Also noted the increased in pregnancy with dizygotic twin in the summer months. In other hand, decrease in spontaneous dizygotic twin with starvation and urbanization [23].

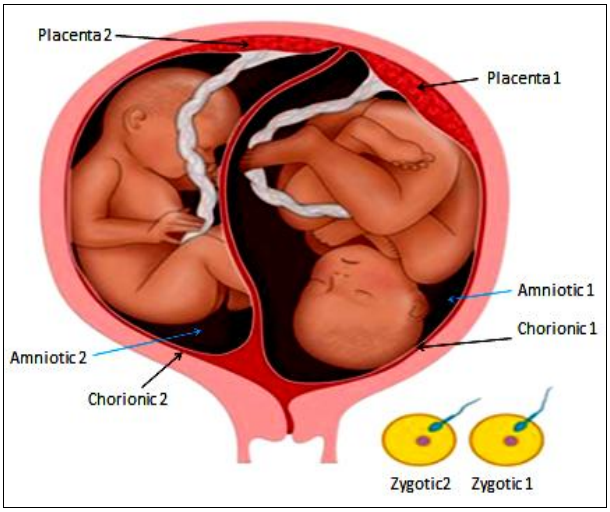

Fig 1: Dizygotic twins; each of them have own placenta, chorionic, and amniotic

Monozygotic twin

As mentioned earlier, this type of twins arise from single oocyte fertilized by single sperm and form zygote. Then, separated its cells at different stage of development, the separation might be in blastomeres (two cells) or even after formation of the primitive streak. So, there are different forming of placenta and its membranes for these twins. 70-75 % of this type of twins intrauterine live with common placenta and separate amnion and chorionic membranes, while 25-30 of these twins have separate placenta, amnion, and chorionic membranes. In rare cases, 1-2% the twins intrauterine live with common placenta and membranes [7] figure (2). In human, the causes of the conception with monozygotic twins are unknown [28]. This type of twin represent approximately third of the spontaneous twins [29]. Increase conception with monozygotic twin 2-5 times by *In Vitro* fertilization (IVF) because the breaks in the zona pellocida for any reason. Monozygotic twins by IVF are usually were dichorionic and diamniotic, that mean the separation was in early stage [30]. From these, understand there are many causes to pregnant with monozygotic twins in human such as IVF, break in zona pellocida, damage to the inner cells mass, drugs (for fertilization or ovulation) and others [31, 12].

Can be divided of this type of twine according to type of placenta [10]. It is possible to estimate time of twins events through their placenta and its membranes. When the each embryo have its own placenta, amnion, and chorionic, this type usually occurs before third day of development, but if the placenta is common for two embryos and separate amnion and chorionic, this type of monozygotic twins occurs between fourth and sixth day of development. Last, if the both embryos common placenta common membranes, in this case the separation occurs after form primitive streak, this case is rare [7].

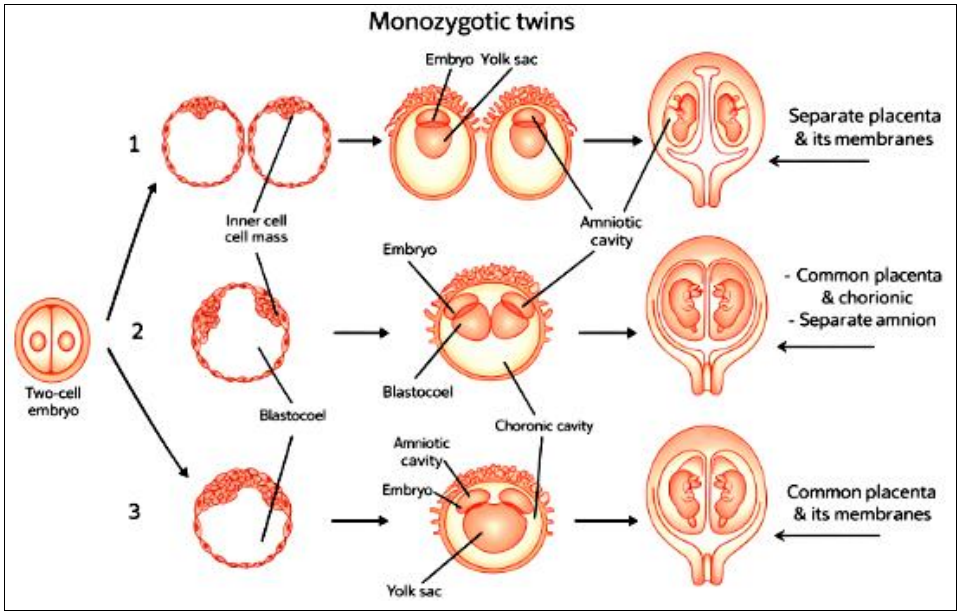

Fig 2: Monozygotic twins; types of placenta, chorionic, and amnion

The conjoined twin are incomplete twin (incomplete separation), it´s usually monozygotic twin figure (3), for every 400 monozygotic twin births there is 1 is conjoined twin [32, 2]. This case usually event after 2 week of embryonic development, ie, after formation of primitive streak [33]. Approximately 40 to 60 % of the conjoined twin, in the past, they are stillborn, now the rate has decreased due to the health care, early diagnosis, and advances in surgical. Major of the conjoined twin (50%) have structural anomalies.

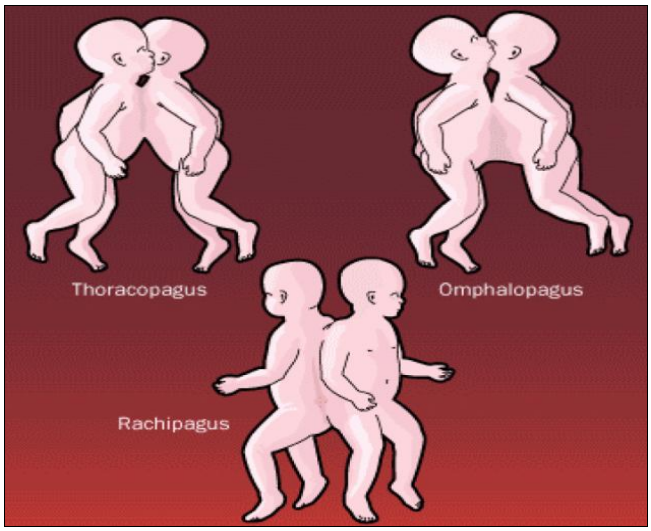

Fig 3: Types of the conjoined twins

Congenital anomalies divided into malformations, deformations, and disruptions [34], all these types might be frequency in monozygotic twins. These abnormalities such as disruptions may be lead to death one twins. Approximately 10% of monozygotic twins are born (liveborn and miscarriages) with a congenital anomalies [35].

References

1. Weinberg W. Beiträge zur physiologie und der pathologie der mehrlingsgeburten beim menschen. Archiv für Physiologie. 1902;88:346-360.
2. Phelan M. Twins. In: Stevenson R, Hall JG, Goodman R, editors. *Human malformations and associated anomalies*. Oxford: Oxford University Press; 1993. p. 1047-1079.
3. Galton F. The history of twins, as a criterion of the relative powers of nature and nurture. Journal of the Anthropological Institute. 1875;12:566-576.
4. Nylander PPS. Frequency of multiple births. In: MacGillivray I, Nylander PPS, Corney G, editors. *Human multiple reproduction*. London: W B Saunders; 1975. p. 87-98.
5. Kiely JL, Kiely B. Epidemiological trends in multiple births in the United States, 1971-1998. Twin Research. 2001;4:131-133.
6. Murphy M, Hey K. Twinning rates. Lancet. 1997;349:1398-1399.
7. Hall JG. Twinning. Lancet. 2003;362:735-743.
8. Laws PJ, Sullivan EA. Australia's mothers and babies 2002. Sydney: Australian Institute of Health and Welfare National Perinatal Statistics Unit; 2004.
9. Smits J, Monden C. Twinning across the developing world. PLoS One. 2011;6(9):e25239.
10. Machin GA, Keith LG, Bamforth F. *An atlas of multiple pregnancy: biology and pathology*. New York: Parthenon; 1999.
11. Tong S. Dizygotic to monozygotic twinning ratio at the Royal Women's Hospital, Melbourne 1947-1997, compared with Australian national twinning incidence. Twin Research. 2000;3:12-16.
12. Vitthala S, Gelbaya TA, Brison DR, Fitzgerald CT, Nardo LG. The risk of monozygotic twins after assisted reproductive technology: a systematic review and meta-analysis. Human Reproduction Update. 2009;15:45-55.
13. Dodd JM, Grivell RM, Crowther CA. Multiple pregnancy. In: James DK, Steer PJ, Weiner CP, Gonik B, editors. *High risk pregnancy: management options*. 4th ed. St Louis: Saunders; 2011.
14. Dodd JM, Robinson JS, Crowther CA, Chan A. Stillbirth and neonatal outcomes in South Australia, 1991-2000. American Journal of Obstetrics and Gynecology. 2003;189:1731-1736.
15. Doyle P. The outcome of multiple pregnancy. Human

Reproduction. 1996;11(Suppl 4):110-120.
16. Hall JG. Twinning mechanisms and genetic implications. Current Opinion in Genetics and Development. 1996;6:343-347.
17. Machin GA, Keith LG, Bamforth F. *An atlas of multiple pregnancy: biology and pathology*. New York: Parthenon; 1999.
18. Benirschke K. Accurate recording of twin placentation: a plea to the obstetrician. Obstetrics and Gynecology. 1961;18:334-347.
19. Benirschke K, Kim CK. Multiple pregnancy I. New England Journal of Medicine. 1973;288:1276-1284.
20. Benirschke K, Kim CK. Multiple pregnancy II. New England Journal of Medicine. 1973;288:1329-1336.
21. Sadler TW. *Langman's medical embryology*. 14th ed. Philadelphia: Wolters Kluwer; 2019.
22. Keith LG, Papiernik E, Keith DM, Luke B. *Multiple pregnancy: epidemiology, gestation and perinatal outcome*. New York: Parthenon; 1995. p. 192-410.
23. Nylander P. The factors that influence twinning rates. Acta Geneticae Medicae et Gemellologiae. 1981;30:189-202.
24. Nylander PPS. Frequency of multiple births. In: MacGillivray I, Nylander PPS, Corney G, editors. *Human multiple reproduction*. London: W B Saunders; 1975. p. 87-98.
25. Campbell DM, Campbell AL, MacGillivray I. Maternal characteristics of women having twin pregnancies. Journal of Biosocial Science. 1974;6:463-469.
26. Kiely JL, Kiely B. Epidemiological trends in multiple births in the United States, 1971-1998. Twin Research. 2001;4:131-133.
27. Tong S. Dizygotic to monozygotic twinning ratio at the Royal Women's Hospital, Melbourne 1947-1997, compared with Australian national twinning incidence. Twin Research. 2000;3:12-16.
28. Richards CS, Watkins SC, Hoffman EP, *et al*. Skewed X inactivation in a female monozygotic twin results in Duchenne muscular dystrophy. American Journal of Human Genetics. 1990;46:672-681.
29. Murphy M, Hey K. Twinning rates. Lancet. 1997;349:1398-1399.
30. Edwards RG, Mettler L, Walters DE. Identical twins and *In Vitro* fertilization. Journal of *In Vitro* Fertilization and Embryo Transfer. 1986;3:114-117.
31. Hall JG. Twins and twinning. In: Rimoin DL, Connor JM, Pyeritz RE, editors. *Emery and Rimoin's principles and practice of medical genetics*. 4th ed. New York: Churchill Livingstone; 2001. p. 501-513.
32. Machin GA. Conjoined twins: implications for blastogenesis. Birth Defects Original Article Series. 1993;29:141-179.
33. Boklage CE. Twinning, nonrighthandedness and fusion malformations: evidence for heritable elements in common. American Journal of Medical Genetics. 1987;28:67-84.
34. Opitz JM, Czeizel A, Evans JA, Hall JG, Lubinsky MS, Spranger JW. Nosologic grouping in birth defects. Human Genetics. 1987;76:382-385.
35. Myrianthopoulos NC. Congenital malformations in twins: epidemiologic survey. Birth Defects Original Article Series. 1975;11:1-39.