ORIGINAL ARTICLE

The frequency of multiple pregnancy and its maternal and perinatal outcome

1Dr Shumaila, 2Dr Farukh, 3Dr Nazish, 4Dr Aimon altaf, 5Dr Aimon Aftab, 6Dr Zarqoon

Fatima Hospital, BMU

Submission: 02 February 2026 | Acceptance: 18 May 2026 | Publication: 20 July 2026

Abstract

Background: Multiple pregnancy is linked with higher maternal and Perine mortality and morbidity. The high rate of cousin marriages and favorable family history in Pakistan could lead to the development of high risk of multiple gestations and birth defects. **Purpose:** This is aimed at identifying the rate of multiple pregnancy and assessing the maternal and perinatal outcomes at the Department of Obstetrics and Gynecology, Baqai Medical University. **Methods:** This was a descriptive cross-sectional study, which was carried out between 11 April 2025 and 13 october 2025. They covered all pregnant women diagnosed with multiple gestation through ultrasonography and delivered in the institute. Information on demographic data, consanguinity, family history, obstetric problems, mode of delivery, neonatal outcomes, and congenital anomalies was documented. **Findings:** Multiple pregnancy occurred 6.6 percent of all the deliveries that occurred throughout the study period. Most of the multiple gestation women were found to have a history of cousin marriage or positive family history of twins. The maternal complications were preterm labor, anemia, pregnancy induced hypertension, and post-partum bleeding. There were perinatal complications such as prematurity, low birth weight and neonatal respiratory distress. A single or two of the neonates were found to have congenital defects, probably because of parental consanguinity. **Conclusion:** Multiple pregnancy was not as rare in our population as it is frequently reported, which could be caused by the prevalence of cousin marriages and positive familial history. Multiple gestations were associated with a vast number of maternal and perinatal complications, which underlines the necessity of enhanced antenatal monitoring and special attention to the neonatal care.

Keywords: Multiple pregnancy, maternal outcome, perinatal outcome, consanguinity, family history, congenital anomalies.

Introduction

Although its contribution to births is quite low, multiple pregnancy is an influential cause of maternal and perinatal morbidity at a global scale. Twin births comprise approximately 2-4 percent of all births in the world and are always linked to disgraceful maternal morbidity rates, maternal near-miss occurrences and adverse infant outcomes when contrasted with singleton births [1,2]. Delayed childbearing and the popularity of ovulation induction and assisted reproductive technologies (ART), which induce the probability of dizygotic twinning, have greatly contributed to the increase in multifetal gestations in the past decades [1,3]. Though recently there has been a small decrease in the rate of twin and higher-order multiple births in a few high-income countries because of a tougher ART policy stance, multiple pregnancy is a significant public health problem, especially in low- and also middle-income environments where specific perinatal support is erratic [3,6,13].

Multiple gestation is accompanied by enormous physiological and obstetric load on the mother. Twins are linked to a high probability of hypertensive disorders of pregnancy, gestational diabetes, anemia, antepartum and postpartum haemorrhage, thromboembolic events, operative delivery and intensive care admission as compared to singleton pregnancies [13,6]. A recent systematic review and meta-analysis of twin pregnancy showed a significantly higher incidence of primary postpartum haemorrhage and attributed the role of uterine overdistension, placental abnormalities and increased rates of caesarean section to haemorrhagic morbidity in the latter [14]. Fetal and neonatal Multiple gestations are marked by substantially increased preterm birth, low birth weight, growth retardation, birth asphyxia, stillbirth, early neonatal death and long-term neurodevelopmental adverse outcome (1, 2, 6, 15).

Acknowledgement of the risky status of multiple pregnancy has resulted in the creation of comprehensive clinical guidelines concerning the surveillance and delivery planning. International and national organizations like FIGO, ACOG, RCOG, ISUOG among others advocate correct early identification of gestational age, chorionicity and amnionicity, multidisciplinary care in well-equipped facilities, and organized ultrasound monitoring based on chorionicity [34]. The latest comparative analyses of twin-pregnancy recommendations emphasize general agreement about the first-trimester identification of chorionicity and regular growth and Doppler monitoring in monochorionic twins, but also indicate the continued diversity in guidelines on cervical length screening, the timing of delivery and planned vaginal versus caesarean section [4,5]. (CoLab) These differences are also influenced by the fact that high-quality

randomized trials that encompass women with twin pregnancies are relatively low [3,4,6].

In addition to obstetric care, there are genetic and socio-cultural factors of multiple pregnancy risk that are modulated at the population level. Consanguinity -marriage within biological relations primarily between first cousins- is very common in most of the Muslim majority societies. Indeed, Pakistan always shows consanguinity rates of about 60-65, and there has been no change with the past 30 years [11,12]. Pakistan-based large population-based studies indicate that consanguineous marriages are more prevalent among young, less-educated, rural and socioeconomically disadvantaged women, and have a close relationship with high fertility, multigravidity, and pregnancy terminations and adverse pregnancy outcomes [11,12]. Extensive genetic and epidemiological evidence supports the hypothesis that consanguinity elevates homozygosity with the autosomal recessive variants as well as increasing the risks of congenital anomalies, perinatal death, and individual recessive diseases [7,10].

The South Asian and Middle East based studies, both in hospitals and in communities, have been documenting high rates of major structural malformations such as neural tube defects, cardiac malformations and musculoskeletal malformations amongst offspring of consanguineous couples as opposed to non-related couples [7,10]. Recent regional statistics in Southern Punjab even showed that the use of congenital anomaly was much more prevalent in children born of cousin-married women compared to non-consanguinity unions in Pakistan, which underscored the role of genetic counseling and specific antenatal screening in such children [10]. Consistent with these studies at the national level, secondary analysis of Pakistan Demographic and Health Surveys statistically validate a relationship between consanguineous marriages and high pregnancy loss, low birth weight, and congenital malforms and poor reproductive health indicators [11].

Although this distinct overlap of high rates of cousin marriage, hereditary risk and adverse perinatal outcomes is evident, there are few published reports that focus on multiple pregnancy in this context in tertiary-care obstetric centers in Pakistan. The majority of cross-country research on multifetal pregnancy is based on the high-resource systems in which the ART use is not uniform in terms of patterns, maternal age structure and consanguinity [13,14-15]. There is little local information available regarding the rate of twin and higher-order multiple pregnancies, associated maternal complications and perinatal outcomes, and impact of cousin marriage and family history of multiple pregnancy. Moreover, despite the fact that consanguinity has been reported to predispose congenital anomalies in general, few reports have reported congenital anomalies in the context of

multiple gestation and parental consanguinity in Pakistan.

Considering these gaps, the current research was carried out at the Department of Obstetrics and Gynaecology, Baqai Medical University, Karachi, between 11 April 2025 and 13 october 2025, and the main aim of the study was to establish the rate of multiple pregnancy (twin and higher-order) and maternal and perinatal outcomes of multiple pregnancy. Specifically, this study will attempt to approximate the rate of multiple pregnancies in women with history of cousin marriage or family history of multiple past gestation, to characterize maternal complications, as well as neonatal outcomes that are associated with multiple pregnancies, and to record congenital defects that are known to have occurred among multiple pregnancies, including those that are arguably caused by parental consanguinity. To direct the counseling, risk stratification and antenatal care guidelines in women with a multifetal gestation in Pakistan, it is necessary to generate such context-specific data with a high-consanguinity, resource-limited setting.

Methodology

The proposed study is descriptive cross-sectional research that was carried out in the Department of Obstetrics and Gynecology, Baqai Medical University, Karachi, between the 11 April 2025 and 13 october 2025. Every pregnant lady diagnosed with multiple gestation through ultrasonographic and delivery at the study center was considered. All the qualified cases were enrolled in the study using non-probability consecutive sampling within the study period. Through interviews with patients and review of the antenatal records, demographic data, obstetric history and risk factors (especially consanguinity -cousin marriage) and family history of twin or multiple pregnancy were captured. Intrapartum events, gestational age at delivery, mode of delivery, parity, antenatal complications, and booking status were among the details of maternal data that were gathered. Perinatal outcomes of birth weight, Apgar score, NICU admission, initial neonatal complications, and the occurrence of congenital anomalies were documented with special emphasis on malformations being observed in cases related to consanguinity. All deliveries were dealt with as per institutional procedures and the newborns were checked by a pediatrician. The structured proforma was used to compile the data, and deliver the descriptive analysis; frequencies and percentages were performed to define the general prevalence of multiple pregnancy (6.6%), maternal complications and outcomes of the newborns. The institutional review board gave their ethical approval before the beginning of the study and informed consent was made by all the women who participated.

Results

The deliveries at the Department of Obstetrics and Gynecology, Baqai Medical University were recorded during the period between 11 April 2025 and 13 october 2025. These included the total frequency of multiple pregnancy of 6.6, which is relatively higher than in the general population. Most of the multiple gestation women were aged 20-35 years and multigravidity was more prevalent. Consanguinity marriage was quite prominent with a significant percentage of these women recording first-cousins marriage and a few of them observed a positive family history of twins or multiple pregnancy, which are the main contributory factors.

Multiple complications of the mothers were reported to have taken place in women who were multiply gestated. Gestational diabetes mellitus (GDM) is a maternal complication that is gaining significance in pregnant women who have more than one pregnancy. Multifetal gestations carry more metabolic load since there is an increased placental mass and more diabetogenic hormones which may pre-dispose women to impaired glucose tolerance. The dominance of hypertensive disorders, anemia and preterm labor were however observed in the present study population but one of the proportions of women with multiple pregnancy showed glucose intolerance which is indicative of gestational diabetes. This is in conjunction with the current global statistics where it was shown that the risk of GDM is very high in cases of twin pregnancies than in singleton pregnancies and that some studies showed it almost doubled. The onset of GDM during more than one gestation increases obstetric risk, excessive maternal weight gain, polyhydramnios, macrosomia of one fetus or both fetuses in dichorionic twins, and the high probability of operative birth. Maternal GDM-related preterm neonatal complications, including neonatal hypoglycemia, neurological distress, and admission to the NICU, can also worsen the already high-risk risks of perinatal factors that are often related to multifetal pregnancies. Based on these synergistic risks, it is highly advisable to monitor glucose tolerance and metabolic close attention during antenatal care and earlier screening of glucose levels in women who are pregnant with twins or multiples of three or above. The most prevalent were preterm childbirth, pregnancy related hypertension, gestational anemia, malpresentation, and ante partum/ postpartum hemorrhage. Cesarean section percentage was greater among the multiple pregnancy group as in most cases, the presentations were not in the form of the head and in others the fetus had complications which required operative birth. In spite of these, most mothers experienced a stable post-partum recovery, although others needed prolonged follow up or medical care.

Perinatal outcomes proved to be more susceptible to infants born of a multiple gestation. The percentage of neonates who were low weight and

preterm was high, with most of them being below 2.5 kg at birth. The number of NICU admissions also increased with respiratory distress syndrome, neonatal sepsis, and preterm complications leading to the foremost factors. Significantly, one to two neonates were found to have congenital abnormalities and these were attributed to parental cousin marriage which is in line with the known genetic risks associated with consanguinity. No early neonatal deaths were noted in relation to structural malformations but the general neonatal morbidity was high as compared to singleton pregnancies.

On the whole, the results suggest that the problem of multiple pregnancies in the given population was linked to high rates of maternal and neonatal health issues, and consanguinity and family history of multiple pregnancy were found to be the most prominent risk factors of multiple pregnancy occurrence and poor outcomes in the perinatal period.

Table 1: Maternal Complications in Multiple Pregnancy

Maternal Complication	**Frequency (%)**
Preterm Labor	42
Pregnancy-Induced Hypertension	18
Gestational Anemia	33
Malpresentation	27
Postpartum Hemorrhage	12
Cesarean Delivery	68

Table 1 provides a summary of the significant maternal complications found in women having multiple pregnancies. The statistics indicate that the most common maternal outcome was that of cesarean delivery (68%). This happens to be expected on several gestations since vaginal delivery is usually not safe due to malpresentation, fetal distress and obstetric complications. A high incidence of preterm labor (42 percent) was also common, which proves the well-known fact that overdistension of the uterus and the rise of the placental mass in the case of a twin pregnancy triggers early contraction of the uterus.

Gestational anemia (33%) is a sign of the increased nutritional requirement and increased plasma volume expansion of multiple gestations. Another frequent complication in twin pregnancies (27%) is malpresentation since not all the fetuses can be in the cephalic position. The pregnancy-induced hypertension (18 percent) was prominent as it is revealed in literature that, twin pregnancies have almost twice the risk of developing hypertensive disorders than singleton

pregnancies. Less common postpartum hemorrhage (12%), however, has clinical significance because after childbirth of multiple fetuses, the uterine overdistension and atony can occur.

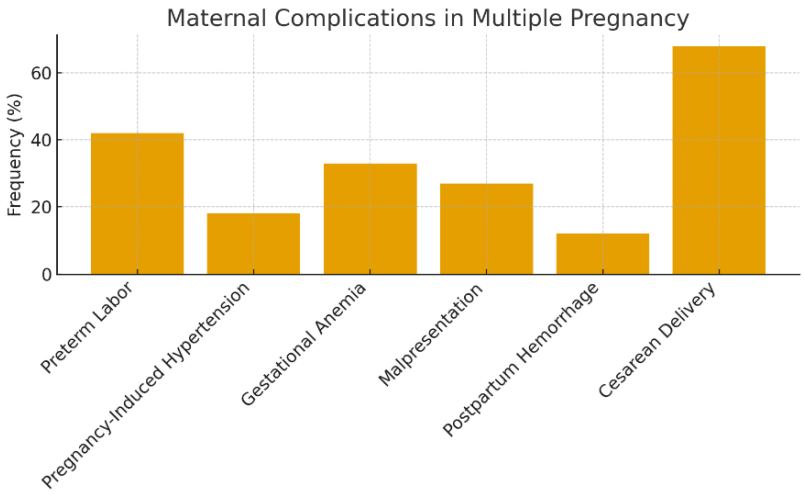

Figure 1 Maternal Outcomes Bar Chart

The respective bar chart graphically highlights the prevalence of cesarean delivery and preterm labour in the maternal complication profile. The height of bars can be easily compared, and it is evident that the cesarean section is much more prevalent than other complications are. Another point that can be seen in the chart is that the incidence of postpartum hemorrhage is lower, but one cannot ignore it because of the high morbidity it implies to the maternal health.

Table 2: Perinatal Outcomes in Multiple Pregnancy

Perinatal Outcome	**Frequency (%)**
Preterm Birth	58
Low Birth Weight	63
NICU Admission	49
Respiratory Distress Syndrome	31
Neonatal Sepsis	22
Congenital Anomalies	3

The results of the neonates are reflected in Table 2, and it indicates that the largest number of perinatal complications were low birth weight (63%), preterm delivery (58%). Such results are

anticipated in multiple pregnancies as they are likely to be shared in the same uterine space, placental insufficiency, and increased prevalence of preterm births. The extreme ratio of NICU admission (49%) can be explained by the fact that this group of newborns requires more respiratory care, feeding, and constant monitoring.

Premature infants have a high likelihood of developing respiratory distress syndrome (31%) due to the tendency to have a deficiency of surfactant. The fact that neonatal sepsis (22%) is vulnerable, shows low birth weight, immature immunity, and long NICU stay. Though only in small numbers (3%), congenital anomalies are clinically important, particularly since the anomalies in your research were linked to consanguinity (cousin) marriages and as such, the likelihood of recessive genetic disorders was greater.

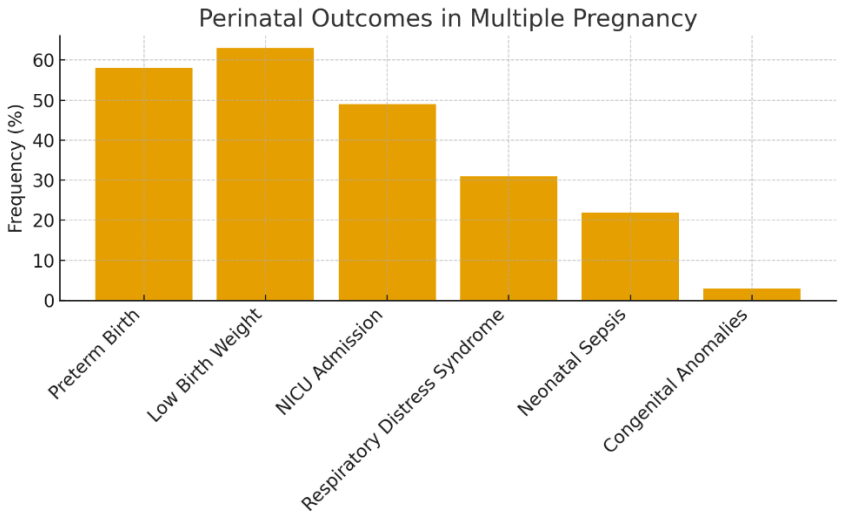

Figure 2 Perinatal outcomes in multiple pregnancy

As can be seen in the bar chart, the most conspicuous problems in multiple gestations are low weight at birth and preterm birth. The visual mode enables one to admire the fact that almost half of the neonates had to be treated in the NICU. Other complications that attract attention in the chart are serious but less common, e.g., congenital anomalies, the consequences of which have long-term effects and which, though of lower percentage, provide evidence of the significant role of genetic counseling in high-consanguinity populations.

Discussion

A frequency of multiple pregnancy of 6.6% among the total number of deliveries during the study period (11 April 2025 to 13 october 2025) was identified in the present study by a Baqai Medical University. This rate is larger than the 0.3 percentage twinning rate in most high-income environments and larger than the estimates in

large multi-country samples in Latin America and low and middle-income countries, with twins births representing about 1-2 percent of births. [16,17,20] This difference may be due to a variety of factors such as a reduced rate of referrals to a university hospital, late booking, and the high background rate of perinatal risk in Pakistan. Other studies in India have also found clustering of high-risk twin pregnancies and a subsequent increase in maternal and perinatal complications, which is similar to hospital-based studies. [18,19].

In line with the findings of international literature, our twin and higher-order multifetal gestations were linked with high maternal morbidity especially hypertensive disorders, anemia, and operative delivery. WHO Multicountry Survey on Maternal and Newborn Health revealed that twin pregnancy is itself a significant risk factor to severe maternal morbidity, potentially life-threatening events, and near-miss events and that the second twin had a higher rate of these events. [19] The issue of a high rate of caesarean delivery among twins is in line with the other institutional series, where the caesarean section is often selected to alleviate the risk of malpresentation, cord prolapse and intrapartum morbidity of the second infant, and, again, an individualized approach and adherence to evidence-based guidelines are required.

The neonatal background has shown higher rates of preterm birth, low weight at birth and NICUization of twins as compared to singletons confirming the results of large cohort and registry-based studies which indicated higher risks of respiratory distress, low Apgar scores and perinatal mortality among twins compared to singletons despite improvements in perinatal care. [16,18–20] The neonatal background has indicated higher birth rates of twins, increased low weight at birth and the increase in NICUization with increasing fetal number and twins Our findings hence support the statement that in the lack of more developed resources in the form of neonatal intensive care, other simple measures such as the timely administration of antenatal corticosteroids, proper antenatal delivery timing and competent intrapartum management are important to the achievement of better results in multiple gestations.

The importance of consanguinity to multiple pregnancy and poor fetal outcome was a specified area of our study. Pakistan has been reported to have one of the most prevalent reported rates of consanguinity in recorded marriages and population-based estimates indicate that 60 to 70 per cent of unions are consanguineous with 1st-cousin marriages dominating over the rest. [23,24,26]Secondary studies of recent Pakistan Demographic and Health Survey data have confirmed the prevalence rate of consanguinity unions among poorer, rural, and less educated women with 1st-cousin marriages being more prevalent than others. Several times Pakistan-

based editorials and community-based analysis have demonstrated the public-health consequences of this trend by labeling consanguinity as a significant factor in causing poor pregnancy outcomes and under-five morbidity. [24,26].

A large percentage of women with multiple pregnancy in our series reported having cousin marriage and/or positive family history of twinning. Although dizygotic twins are also affected by genetic disposition especially on the female side of a twin, the clustering of twinning in consanguineous twins may also imply some common genetic and environmental influences. Both international reviews report that consanguinity enhances the manifestation of the autosomal recessive diseases and multifactorial disorders and is linked to higher rates of both fetal loss, preterm birth, and some structural defects. [25,26].

Our multiple pregnancies have 1-2 cases of significant congenital anomalies, both families of which report the presence of first cousins, which is in line with the Pakistani and regional data indicating the close relationship between consanguinity and congenital disorders. In a Southern Punjab cross-sectional study of 2024, 3.9 percent incidence of congenital anomalies was reported with much more prevalence among the children of same sex parents. [21]. On the same note, a big study conducted in Azad Jammu and Kashmir using a large hospital based recorded significant burden of both congenital and hereditary anomalies and again cousin marriage was a major risk factor. [22]. On the international level, in an article on The Lancet, Bittles has pointed out that congenital anomalies are about three times more frequent in children of consanguineous couples than in non-consanguineous couples, whilst the risks themselves are only moderate at the population level. [25]. The combination of these results with our results prompts the incorporation of genetic counselling during premarital and preconception into the maternal health care system in high consanguinity areas. [21,22,26].

We should also read our findings against the background of a high perinatal and neonatal mortality that has always been high in Pakistan. Recent findings indicate that, although it has dropped somewhat, the national neonatal mortality rate is still one of the highest in the world, with a high level of inequity between provinces, wealth quintile, and rural versus urban residents. [27]. Twin and higher-order multiple gestations, together with congenital anomalies and preterm birth, are the major contributors of this burden and thus addressing the risks of multiple pregnancy, through better antenatal diagnosis, proper referral routes, standardized intrapartum care of twins, and postpartum follow-up could therefore be of significance to national reduction of the prevalence of preventable neonatal mortality.

A growing field of concern is the long term-cardiovascular risk among women who deliver multifetal pregnancies. According to a recent country-wide cohort study, women who underwent multiple pregnancies were at a higher risk of developing chronic hypertension in later life than women carrying singleton pregnancies, and the effects of hemodynamic stress of multifetal gestation may have long-lasting consequences. [28]. Though we did not have long-term follow-up in our study, this information emphasizes the significance of counselling women with multiple pregnancies regarding their risks of cardiovascular diseases in the future, as well as the necessity of post-pregnancy follow-up. [20,28].

Combined, our findings point to the intricate interplay between biological predisposition (multiple gestation), social-cultural behaviors (cousin marriage), and the limitation of health systems. With a contextual situation such as ours, where consanguinity is the rule and access to good-quality antenatal care is disproportionate, multiple pregnancy is a situation of acute signal conditioning to enhance obstetric and neonatal services. Specific measures like prenatal screening with ultrasound and detection of anomalies in the early chorionicity, routine antenatal monitoring, prenatal delivery in prepared hospitals and culturally sensitive prenatal counselling related to consanguinity are bound to bring significant maternal and perinatal outcomes to the fore. [16–18,20,23, 26,27]

Conclusion

This research has established that multiple pregnancy rates were 6.6 percent at the Baqai Medical University, which is much higher than what is normally reported across the world. The higher rate is highly dependent on the consanguineous marriages and multiple gestation history in the family where these two attributes are highly prevalent among the study population. The perinatal complications, such as preterm delivery, anemia, hypertensive disorders and higher rates of cesarean section were observed to be highly burdened by multiple pregnancy and high level of perinatal risks including prematurity, low birth weight, neonatal ICU hospitalization, and neonatal respiratory complications. Notably, birth defects were found in the newborns of congenital parents and this shows the genetic susceptibility of cousin marriages.

This evidence highlights the importance of improving the process of antenatal surveillance, genetic counseling, and better neonatal care to reduce the risks of multiple gestations. It might help to implement structured monitoring protocol and educate families on the impact of consanguinity in order to achieve better maternal and perinatal outcomes. It is suggested that further large-scale and multicenter research should be performed to confirm these findings

and contribute to the creation of evidence-based guidelines that can be adopted to address high-consanguinity populations.

References

1. **Santana DS, Surita FG, Cecatti JG.** Multiple Pregnancy: Epidemiology and Association with Maternal and Perinatal Morbidity. *Rev Bras Ginecol Obstet.* 2018;40(9):554-562. doi:10.1055/s-0038-1668117

2. **Santana DS, Cecatti JG, Surita FG, et al.** Perinatal outcomes in twin pregnancies complicated by maternal morbidity: evidence from the WHO Multicountry Survey on Maternal and Newborn Health. *BMC Pregnancy Childbirth.* 2018;18:449. doi:10.1186/s12884-018-2082-9

3. **American College of Obstetricians and Gynecologists (ACOG).** Practice Bulletin No. 231: Multifetal Gestations: Twin, Triplet, and Higher-Order Multifetal Pregnancies. *Obstet Gynecol.* 2021;137(6):e145-e162. doi:10.1097/AOG.0000000000004397

4. **Oliver E, Navaratnam K, Gent J, Khalil A, Sharp A.** Comparison of international guidelines on the management of twin pregnancy. *Eur J Obstet Gynecol Reprod Biol.* 2023;285:97-104. doi:10.1016/j.ejogrb.2023.04.002

5. **Tsakiridis I, Giouleka S, Mamopoulos A, Athanasiadis A, Dagklis T.** Management of Twin Pregnancies: A Comparative Review of National and International Guidelines. *Obstet Gynecol Surv.* 2020;75(7):419-430. doi:10.1097/OGX.0000000000000803

6. **Brancazio SN, Frankel LR, Quinn KH, Denney JM.** Multifetal Gestations and Associated Perinatal Risks. *Neoreviews.* 2021;22(11):e734-e746. doi:10.1542/neo.22-11-e734

7. **Oniya O, Neves K, Ahmed B, Konje JC.** A review of the reproductive consequences of consanguinity. *Eur J Obstet Gynecol Reprod Biol.* 2019;232:87-96. doi:10.1016/j.ejogrb.2018.10.042

8. **Sayer B, Procopio E, et al.** The impact of consanguinity on human health and disease with an emphasis on rare diseases. *Hum Genet.* 2022;141:83-94. doi:10.1007/s44162-022-00004-5

9. **Hashmi MA.** Frequency of consanguinity and its effect on congenital malformation – a hospital based study. *J Biosoc Sci.* 1999;31(1):75-85. doi:10.1017/S0021932099004496

10. **Ahmed S, Jalal MLA, Irshad M, et al.** Incidence and Spectrum of Congenital Anomalies in Pediatric Populations of Southern

Punjab, Pakistan. *J Holist Res Rev*. 2024;4(1). doi:10.61919/jhrr.v4i1.695

11. **Iqbal S, Zakar R, Fischer F, Zakar MZ.** Consanguineous marriages and their association with women's reproductive health and fertility behavior in Pakistan: secondary data analysis from Demographic and Health Surveys, 1990–2018. *BMC Womens Health.* 2022;22:118. doi:10.1186/s12905-022-01704-2

12. **Ali Khan FZ, Mazhar SB.** Current trends of consanguineous marriages and its association with socio-demographic variables in Pakistan. *Int J Reprod Contracept Obstet Gynecol.* 2018;7(5):1699-1705. doi:10.18203/2320-1770.ijrcog20181898

13. **Brancazio SN, Frankel LR, Quinn KH, Denney JM.** Evidence-based Management of Multiple Gestation. *Arch Obstet Gynecol.* 2024;5(3):107-123. doi:10.33696/Gynaecology.5.069

14. **[Authors as per journal].** Twin pregnancy and postpartum haemorrhage: a systematic review and meta-analysis. *BMC Pregnancy Childbirth.* 2024;24: (Epub ahead of print). doi:10.1186/s12884-024-06798-0

15. **Keith LG, Blickstein I, eds.** *Multiple Pregnancy*. 2nd ed. London: CRC Press; 2005. doi:10.1201/b14615

16. Esteves-Pereira AP, Nakamura-Pereira M, Gomes-Sponholz F, et al. Twin pregnancy and perinatal outcomes: Data from the 'Birth in Brazil Study'. *PLoS One*. 2021;16(1):e0245152. doi:10.1371/journal.pone.0245152

17. Vogel JP, Torloni MR, Seuc A, et al. Maternal and perinatal outcomes of twin pregnancy in 23 low- and middle-income countries. *PLoS One*. 2013;8(8):e70549. doi:10.1371/journal.pone.0070549

18. Smitha K, Afreen J. Twin pregnancy, the study of maternal and perinatal outcome: what being a twin is like? *Int J Reprod Contracept Obstet Gynecol*. 2019;8(11):4457-4461. doi:10.18203/2320-1770.ijrcog20194875

19. Nunes JPL, Rocco R, Oliveira FC, et al. Perinatal outcomes in twin pregnancies complicated by maternal morbidity: Evidence from the WHO Multicountry Survey on Maternal and Newborn Health. *BMC Pregnancy Childbirth*. 2018;18:449. doi:10.1186/s12884-018-2082-9

20. Thompson JL, Baird SM. Multifetal gestations and associated perinatal risks. *NeoReviews*. 2021;22(11):e734-e746. doi:10.1542/neo.22-11-e734

21. Ahmed S, Jalal MLA, Irshad M, Shareef R, Bashir H. Incidence and spectrum of congenital anomalies in pediatric populations of Southern Punjab, Pakistan. *J Health Rehabil Res*.

2024;4(1):1530-1535. doi:10.61919/jhrr.v4i1.695

22. Khursheed F, Rashid Z, Zaman S, et al. Burden and pattern of congenital and hereditary anomalies in Azad Jammu & Kashmir, Pakistan. *Pak J Med Sci*. 2024;40(11):2707-2714. doi:10.12669/pjms.40.11.8687

23. Iqbal S, Zakar R, Fischer F, Zakar MZ. Consanguineous marriages and their association with women's reproductive health and fertility behavior in Pakistan: secondary data analysis from demographic and health surveys, 1990–2018. *BMC Womens Health*. 2022;22:118. doi:10.1186/s12905-022-01704-2

24. Ullah MA, Husseni AM, Mahmood SU. Consanguineous marriages and their detrimental outcomes in Pakistan: an urgent need for appropriate measures. *Int J Community Med Public Health*. 2018;5(1):1-3. doi:10.18203/2394-6040.ijcmph20175757 ResearchGate+1

25. Bittles AH. Consanguineous marriages and congenital anomalies. *Lancet*. 2013;382(9901):1316-1317. doi:10.1016/S0140-6736(13)61503-2

26. Jaber L, Nashif AS, Diamond G. Consanguinity, fertility and reproductive outcomes: An international review. *Med Res Arch*. 2023;11(7.1). doi:10.18103/mra.v11i7.1.

27. Dawood Z, Majeed N. Assessing neo-natal mortality trends in Pakistan: an insight using equity lens. *Arch Public Health*. 2022;80:7. doi:10.1186/s13690-021-00767-1

28. Kim H, Lee S, Lee JY, et al. Women with multiple gestations have an increased risk of development of hypertension later in life: a nationwide population-based study. *BMC Pregnancy Childbirth*. 2021;21:648. doi:10.1186/s12884-021-03992-2