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Perinatal and Neonatal Outcomes of Twin Pregnancies in Turkey

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This study was conducted for the purpose of assessing, in the light of results of other research carried out in the present researchers' clinic and in Turkey, the status of twin pregnancies in Turkey, the incidence of twin births, perinatal and mortality rates associated with twin pregnancies, and the problems experienced in Turkey in cases of multiple and twin pregnancies. *Materials and Methodology:* The outcomes of twin births that occurred at the researchers' clinic during the period 2001–2009 were studied retrospectively. Seventeen studies conducted in Turkey on multiple and twin pregnancies during the years 1991–2010 were included in the study. *Findings:* It was observed that the mean multiple pregnancy rate in Turkey is 1.9% and the mean twin birth rate is 1.7%. It was also observed that a large majority (80–97.3%) of multiple pregnancies in Turkey are twin pregnancies. It was noted from Turkish literature that the mean gestational age of twins at birth varies between 33–36.2 weeks and that mean birthweights are 2065–2327 grams for the first-born twin and 1887–2262 grams for the second-born. These findings were observed to be lower than what is indicated in the literature. Perinatal and neonatal mortality, at 58–156/1000 and 40–98/1000 respectively, were seen to be higher than in the literature. *Conclusion:* It can be seen that preterm birth rates for twin pregnancies in Turkey are higher than what is indicated in the literature and that prenatal and neonatal mortality rates are also similarly higher.

■ **Keywords:** twin pregnancy, multiple pregnancy, perinatal mortality, neonatal mortality

Multiple pregnancies are in the group of high-risk pregnancies due to increased neonatal and maternal morbidity. Perinatal mortality rate mainly due to preterm delivery is six times higher in twins when compared with singletons (Rao, 2004). Premature infants incur higher medical costs for the treatment of their conditions and consequently place a significant burden on the economy (Rao, 2004; Taylor, 2006).

The more widespread use of Assisted Reproductive Technology (ART) over the course of approximately the last 20 years has come to be accepted as a reason behind the increase in multiple births throughout the world (Centers for Disease Control and Prevention, 2002; The ESHRE Capri Workshop Group, 2000; Hofmeyr et al., 2007; Sunderam et al., 2009; Taylor, 2006). Although the incidence of multiple births has varied across countries, the approximate rate today has reached a level of 3% (Sunderam et al., 2009). More than 97% of multiple births derive from twin pregnancies (Hofmeyr et al., 2007). While 41% of infants born with ART are preterm, this rate is 13% in the rest of the population. It is for this reason that ART-related multiple pregnancies pose a steadily increasing public health issue (Sunderam et al., 2009).

The present study was undertaken to assess the status of twin pregnancies and related problems in Turkey, according to the clinical outcomes attained by the researchers and through a review of the results of other studies.

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Materials and Methodology

The study retrospectively evaluated cases of twin pregnancies admitted for delivery at the researchers' clinic, reviewing the outcomes together with the findings of other research conducted in Turkey.

The Turkish Academic Network and Information Center (ULAKBİM) was searched for data published by other medical institutions in Turkey, based on the keywords 'twin pregnancy', 'multiple pregnancy', 'perinatal mortality rate', and 'neonatal mortality rate'. The results published on multiple- and twin-pregnancy were collected for review. Publications cited as references in the articles under review were also included in the assessment. In addition, the clinical studies in Pubmed originating from Turkey were also examined. Studies that did not specify perinatal and neonatal mortality rates, those that considered only ART multiple and twin pregnancies or compared ART with spontaneous multiple and twin pregnancies were excluded.

The present study is a retrospective review of the hospital records for a total of 87 twin pregnancies that resulted in the birth of infants of over 22 gestational weeks or of a birthweight of more than 500 grams at the Obstetrics and Gynecology Clinic of the Adnan Menderes University Hospital during the 8-year period of October 2001–October 2009. The data included maternal age at childbirth, gestational age, birthweight, Apgar scores at the 1st and 5th minutes, type of fetus presentation, mode of delivery, cesarean section indications, ART pregnancy frequencies, discordance, perinatal mortality and neonatal mortality rates, Neonatal Intensive Care Unit (NICU) admission rates as well as information regarding the existence of any maternal complications such as preterm labor, premature rupture of membranes (PROM), hypertensive disorders of pregnancy (pregnancy-induced hypertension, pre-eclampsia, eclampsia and HELLP syndrome) or gestational diabetus mellitus (GDM). Additionally, a review was made of the incidence of neonatal problems which included data on preterm birth, low birthweight, intrauterine growth restriction (IUGR), intrauterine fetal death and the incidence of congenital anomalies.

Preterm birth was considered to be birth at < 37 gestational weeks and *very preterm birth* at < 32 gestational weeks. *Low birthweight* was classified as; < 2500 grams and *very low birthweight as* < 1500 grams. A difference between co-twin weights was accepted as *discordance* if it amounted to > 20%.

According to World Health Organization (WHO) classification, the perinatal period refers to the period between the 22nd completed gestational week (154 days) and the 7 full days after delivery. The neonatal period has been defined as the period beginning with childbirth up until the 28th day postnatal. Early neonatal mortality refers to deaths that occur within the first seven (days 0–6) days after birth and late neonatal mortality to deaths occurring after the seventh day but before the 28th day (World Health Organization, 2006).

All still and live births over 22 gestational weeks or 500 grams were included in the present study. A stillbirth or fetal death was defined as fetal death of the fetus before complete expulsion from the mother which was recognized by the failure of the product of conception to produce any vital signs (World Health Organization, 2006).

Statistical analysis was carried out by using the Statistical Package for Social Sciences (SPSS Inc., Chicago, Illinois, USA), Version 11.5. Data was presented as mean ± standard deviation (*SD*) Parametric continuous variables were analyzed with the *t* test, and nonparametric data was analyzed by using the Mann-Whitney U test. Differences between categorical variables were analyzed using the chi-square test and Fisher's exact test. $P < .05$ was considered statistically significant.

Results

A total of 18 studies consisting of 17 studies published in Turkey in the period 1991–2010 on the evaluation of multiple and twin pregnancies as well as data from the researchers' own clinic were included in the research. The number of multiple and twin pregnancies presenting at the researchers' clinic and at other medical centers, their rates, the mean age of the cases, the mean gestational week at birth, the gestational week accepted as the threshold of viability, ART pregnancy rates and cesarean section rates are shown in Table 1.

The nine studies evaluated multiple pregnancies (Aköz et al., 2003; Deveer et al., 2002; Erdemoğlu et al., 2005; Gökçen et al., 2003; Gül et al., 1998; Kamacı et al., 2004; Karlık et al., 1996; Üstün et al., 2002; Yücel et al., 1997) and nine evaluated only twin pregnancies (Bayhan et al., 1998; Buyru et al., 1996; Demircan Sezer et al., 2010; Demirkıran et al., 1991; Kayıkçıoğlu et al., 2001; Şendağ et al., 2001 Nas et al., 2000; Sancı et al., 1999; Yayla & Baytur, 2009). The studies, including that of the present researchers, were retrospective investigations. One concerned the implementation of an epidemiological questionnaire on both multiple and twin pregnancies at multiple medical centers (Yayla & Baytur, 2008, 2009). A look into the medical centers where the studies took place showed that 11 were university hospitals (Bayhan et al., 1998; Buyru et al., 1996; Demircan Sezer et al., 2010; Demirkıran et al., 1991; Erdemoğlu et al., 2005; Gül et al., 1998; Kamacı et al., 2004; Nas et al., 2000; Şendağ et al., 2001; Üstün et al., 2002; Yücel et al., 1997), six were training and research hospitals (Aköz et al., 2003; Deveer et al., 2002; Gökçen et al., 2003; Karlık et al., 1996; Kayıkçıoğlu et al., 2001; Sancı et al., 1999) and one was a multi-center endeavor (that is, 10 centers out of the group of 15 university and training hospitals where detailed outcomes of twin pregnancies and births could be accessed) (Yayla & Baytur, 2008, 2009). The minimum number of births recorded

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TABLE 1

Demographic Characteristics of Multiple and Twin Pregnancies According to the Data of Different Medical Centers in Turkey

Researcher	No. of cases	Mean age ± *SD* (interval)	Gestational week	Limit of viability gestational week (w)/weight (g)	Twin birth rate	No of births from Twin/ multiple pregnancies	ART[a] pregnancy rate	Cesarean section rate
Demirkıran et al., 1991	149	16–38	36.2 (24–42)	24 w, >500 g				29.5%
Karlık et al., 1996*	107 (1.1%)	25.6 (16–40)*			104/10207 (1%)	97.2%		44 (41.1%)*
Buyru et al., 1996	122	26.8 ± 5 (16–38)	33.9 ± 4.8	28 w	141/8672 (1.6%)[b]			37.3%
Yücel et al., 1997*	42 (0.9%)	25.8 ± 3.8 (20–34)			40/4717 (0.9%)	95.2%		18 (45%)
Gül et al., 1998*	73 (2.7%)	29 ± 5.7 (19–48)*		20 w/ >500 g	71/2738 (2.6%)	97.3%		31 (42.6%)*
Bayhan et al., 1998	109	27.6 ± 5.7 (18–48)	35.6 ± 3.6 (21–40)	21 w/ >500 g				55 (50.5%)
Sancı et al., 1999	953	26.6 ± 4.8	36.1 ± 3.2	≥20 w	953/43709 (2.2%)			715 (75%)
Nas et al., 2000	108	24.2 ± 5.7		≥500 g				66.7%
Kayıkçıoğlu et al., 2001[c]	268	26.8 ± 4.6	35.9 ± 3.2		268/42.635 (0.6%)			89 (33.2%)
Şendağ et al., 2001	70	28.1 ± 4.3	33.5 ± 4.9	20 w				52 (76%)
Üstün et al., 2002*	85	29.7 (18–44)*	34.5			80%	25.7%*	79.7%*
Deveer et al., 2002*	301 (1.3%)	27.1 ± 5.3 (17–41)*	34.8 ± 3.3 (21–41)*	21 w	288/23410 (1.2%)	95.3%	63 (20.9%)*	180 (59.8%)
Gökçen et al., 2003*	141 (0.8%)	27.3*		26 w*	136/18288 (0.7%)	96.5%	33 (23.5%)*	64 (45.3%)*
Aköz et al., 2003*	857 (2.6%)	30.4 (17–42)*			834/33571 (2.5%)	97.3%	68 (7.9%)*	52.5%*
Kamacı et al., 2004*	96 (1.7%)	28.2 ± 5.7 (20–40)*	35.2 ± 5.4*	20 w/ >500 g	94/5632 (1.7%)	97.9%		42 (43.8%)*
Erdemoğlu et al., 2005*	283 (3.7%)	28.54 (16–47)*	33 ± 0.2		261/7674 (3.4%)	92.2%	10.25%*	62.1%
Yayla & Baytur, 2008*–2009	1365 (2%)	27.9 ± 5.4	34.4 ± 3.3	20 w / >400 g	1310/70.091 (1.9%)	96%	201 (75.85%)	819 (62.5%)
Demircan Sezer et al., 2010	87	28.2 ± 6.2 (18–48)	34.2 ± 3.8 (22–40)	22 w/ >500 g	87/3043 (2.9%)		22 (25.29%)	74 (85.1%)

Note: *Multiple pregnancy

[a] ART = Assisted Reproductive Technology

[b] 19 out of 141 twin pregnancies were excluded from the study because they were between 20–27 gestational weeks

[c] Only diamniotic-dichorionic twins were included in the study

that derived from twin pregnancies was 40 (Yücel et al., 1997); the maximum was 953 (Sancı et al., 1999).

When other medical centers in Turkey were examined, it was seen that the rate of births from multiple pregnancies varied between 0.8–3.7% and that the twin pregnancy birth rate varied between 0.6–3.4%. The rate of twin pregnancy births at the researchers' clinic was 2.9%. The multiple pregnancy birth rate in Turkey was calculated to be a mean of 1.9% while the rate for twin pregnancy births was 1.7%. It was noted that twin births in Turkey constituted an important portion, 80–97.3%, of births from multiple pregnancies.

The mean gestational week at birth in the present researchers' study was found to be 34.2 weeks. In studies conducted in Turkey, it was observed that twin births occurred at a mean gestational age of 33–36.2 weeks. The rate of ART pregnancies in the present study was established as 25.3%. Six other institutions reported a percentage for ART pregnancies, which varied between 7.9–75.9% (Aköz et al., 2003; Deveer et al., 2002; Erdemoğlu et al., 2005; Gökçen et al., 2003; Üstün et al., 2002; Yayla & Baytur, 2008, 2009). In the present study, 85.1% of the births were by cesarean section; it was observed that the cesarean section rate in this study was higher than at other medical centers. Overall, the rate of cesarean births in cases of twin pregnancies in Turkey ranges between 37.3%–79.7%.

Table 2 displays birthweight, 1st- and 5th-minute Apgar scores, discordance, NICU admisison, perinatal and neonatal mortality rates as well as fetal death rates. Mean birthweight varied between for the first-born twin was 2065–2327 grams and 1887–2262 grams for the second-born. It was established in the study that the perinatal mortality rate was 58/1000, neonatal mortality rate 62.5/1000 and that early neonatal and late neonatal mortality rates were 49/1000 and 13.5/1000, respectively; the rate of fetal deaths was 33/1000. On the other hand, it was found that in all births of 24 weeks or below, mortality was 100%; congenital abnormalities that were incompatible with survival (conjoined twins and rudimentary colon) were included in the statistics. At other institutions, perinatal mortality rates were seen to be 88–156/1000 while neonatal mortality rates were 40/1000 at their lowest and 98/1000 at their highest. In the present study, the NICU admission rate was 27.4%. The NICU admission rate was reported in only two other studies, where these percentages were 21.8% (Sancı et al., 1999) and 67% (Deveer et al., 2002).

The review revealed that there were discrepancies reported in previous research that examined modes of birth and perinatal mortality in twin pregnancies in terms of seeking a relationship between mode of childbirth and birthweight. One study found the perinatal morbidity rate higher in twin pregnancies resulting in vaginal delivery. In particular, mortality was found the highest in pregnancies of a term of less than 30 gestational weeks (Sancı et al., 1999). Another study found prenatal mortality higher in vaginal births of nonvertex presentations and lower mortality in the case of second co-twin infants delivered by cesarean section (Bayhan et al., 1998). Yet another research reported higher perinatal mortality in vaginal deliveries of infants under 1500 grams, lower Apgar scores and higher perinatal mortality in overall vaginal deliveries (Nas et al., 2000). Buyru et al. (1996) reported higher perinatal mortality in second-born breech infants of under 1500 grams delivered vaginally (714/1000). Also perinatal mortality rates in twins delivered vaginally were set down as 312/1000 and as 33/1000 in cesarean births. On the other hand, there is one study that reports that there is no significant relationship between perinatal mortality and modes of delivery and presentation in vaginal deliveries but that there is a significant correlation between perinatal mortality and low birthweight (Kamacı et al., 2004). Still another research stresses that mode of delivery in diamniotic–dichorionic pregnancies does not affect perinatal mortality but that perinatal mortality increases in nonvertex presentation (Kayıkçıoğlu et al., 2001). While in three studies, no significant correlation could be established between mode of delivery and low Apgar scores (Gül et al., 1998; Karlık et al., 1996; Yücel et al., 1997), two other studies report a significant relationship between low birthweight and low Apgar scores (Kamacı et al., 2004; Karlık et al., 1996). In the present researchers' study, more of a significant relationship was found between vaginal births and 5-minute Apgar score of below 7 ($P < .05$) but the cases delivering vaginally were seen to be at earlier gestational weeks.

Again in the present study, vertex–vertex presentation was most frequently seen (34.5%). Of the 16 pieces of research that reported type of presentation, the first-born was most frequently in vertex presentation (Aköz et al., 2003; Bayhan et al., 1998; Buyru et al., 1996; Demirkıran et al., 1991; Deveer et al., 2002; Erdemoğlu et al., 2005; Gökçen et al., 2003; Gül et al., 1998; Kamacı et al., 2004; Karlık et al., 1996; Kayıkçıoğlu et al., 2001; Nas et al., 2000; Sancı et al., 1999; Üstün et al., 2002; Yücel et al., 1997). A look into the data of other medical institutions revealed that the most frequently encountered presentation in seven studies was vertex–vertex (Aköz et al., 2003; Demirkıran et al., 1991; Erdemoğlu et al., 2005; Gökçen et al., 2003; Gül et al., 1998; Kayıkçıoğlu et al., 2001; Üstün et al., 2002); four studies pointed to a more frequent incidence of vertex–nonvertex presentation (Bayhan et al., 1998; Kamacı et al., 2004; Nas et al., 2000; Yücel et al., 1997); and one study indicated an equal frequency of vertex–vertex and vertex–nonvertex presentation (Deveer et al., 2002).

Seven of the eight studies that reported cesarean section indications, including that of the present researchers, stated that the most frequently encountered cesarean section

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TABLE 2

Neonatal Outcomes in Twin Pregnancies

Study	Birthweight Twin A	Birthweight Twin B	Discordance	1st minute Apgar Twin A	1st minute Apgar Twin B	5th minute Apgar Twin A	5th minute Apgar Twin B	Neonatal Intensive Care Unit (NICU) admission	Perinatal mortality rate	Neonatal mortality rate	Fetal death rate
Demirkıran et al., 1991	2388									45.6/1000	
Karlık et al., 1996*									119/1000	40/1000	78.3/1000
Buyru et al., 1996	2158 ± 656	2113 ± 706				8.96 ± 1.7	9.05 ± 1.7		172/1000 (156/1000)[a]	135/1000	25/1000
Yücel et al., 1997*									127/1000		58.1/1000
Gül et al., 1998*									135/1000		27/1000
Bayhan et al., 1998	2082 ± 633	1887 ± 423	12.4%								
Sancı et al., 1999	2289 ± 620	2262 ± 653		7.8 ± 1.3[b]	7.7 ± 1.4[b]			52 (21.8%)	42/1000		
Nas et al., 2000									89/1000	70/1000	
Kayıkçıoğlu et al., 2001°	2327 ± 612	2252 ± 624							78/1000		
Şendağ et al., 2001	2240 ± 847	2047 ± 913		6.7 ± 2.9	7.8 ± 3.2	7.1 ± 2.9	8.0 ± 3				
Üstün et al., 2002*	2163	2194	22 (36 %)[c]								
Deveer et al., 2002*	2284 ± 595	2189 ± 633						416 (67.2%)	61/1000*		
Gökçen et al., 2003*											
Aköz et al., 2003*											
Kamacı et al, 2004*	2296 ± 888	2245 ± 875							88/1000	98/1000*	
Erdemoğlu et al., 2005*	2065 ± 0.2	1972 ± 64	25%[c]						92/1000		
Yayla & Baytur , 2008*–2009			116 (21.3%)[d]						106.9/1000		
Demircan Sezer et al., 2010	2154 ± 669	2115 ± 681	14 (16.1%)	8.3 ± 1.7	8.3 ± 1.8	9.4 ± 1.6	9.4 ± 1.6	43 (27.4%)	58/1000	62.5/1000	33/1000

Note: *Multiple pregnancy

[a] Adjusted perinatal mortality rate (4 newborns were lost due to anomalies)

[b] Recorded as mean Apgar scores, not as 1st or 5th minute.

[c] Discordance was accepted as a difference of > 15% between weight of each twin

[d] Considered as discordance in surviving twins; discordance in the case of perinatal death is 51.64% (47/91).

° Only diamniotic-dichorionic twins were included in the study

indication was the nonvertex presentation of the first fetus (Aköz et al., 2003; Bayhan et al., 1998; Demirkıran et al., 1991; Deveer et al., 2002; Erdemoğlu et al., 2005; Kayıkçıoğlu et al., 2001). The other study reported preterm delivery as the most frequent indication (Üstün et al., 2002).

Table 3 displays the obstetrical problems and maternal complications that are witnessed in the case of multiple and twin pregnancies. In the findings of the present research, 44.8% of the cases were preterm and 20.7% exhibited PROM. It was seen that the most frequently encountered obstetrical problem in twin pregnancies in 10 studies was preterm delivery (18.7–57.5%) and preeclampsia in two studies. Overall frequencies were recorded as ranging between 2.9–67.2% in the case of preterm delivery, followed by 1.3–26.2% in PROM, 6.9–28.3% in preeclampsia, 3.9–8.7% in GDM, 2.9–5.6% in anemia, 0.8–4.3% in urinary tract infections (UTI), 1.6–5.8% in polyhydramnios, 0.8–4.7% in ablatio placentae and placenta previa and 0.9–4.8% in cases of plasenta previa.

Neonatal problems are shown in Table 4. In the present research, the frequency of preterm births was observed to be 64.4% while very preterm births had a frequency of 16.1%, followed by low birthweight at a frequency of 67.8% and very low birthweight at 18.9%. A study of the data of other medical centers showed frequencies of 42–86% in preterm births, 20.5% in very preterm births, a range of 3.4–59% in very low birthweights and of 39.4–74.6% in low birthweights. The frequency of intrauterine fetal deaths ranged between 1.2–16.7% and 1.4–8.8% in congenital anomalies while the frequency of IUGR was seen to range between 1.4–29%. Congenital anomalies (one spina bifida, one gastroschisis and one rudimentary colon) were seen in three of the cases in the present study (1.7%), intrauterine fetal death in two (1.2%), IUGR in two (1.2%) and conjoined twins in one case.

Discussion and Conclusion

In this study the researchers tried to assess the incidence of twin pregnancy births in Turkey in general and at the researchers' clinic, the ART pregnancy ratio within twin pregnancies, the perinatal and neonatal morbidity and mortality rates associated with twin pregnancies, the need for NICU admissions, cesarean section rates as well as twin pregnancy-related problems.

Although there are differences by years and according to the particular institution, the average rate of births from multiple pregnancies in Turkey is 1.9%, and a large majority of these multiple births constitute births from twin pregnancies. The incidence of twin pregnancies varies in different countries (Hofmeyr et al., 2007). One-third of twins born in Great Britain have been reported as monozygotic and 2/3 as dizygotic (Rao et al., 2004). The monozygotic twin rate is almost consistent around the world (0.3–0.5%) (Rao et al., 2004; Ayres & Johnson, 2005), whereas dizygotic twinning frequency varies with maternal age, parity and ethnic group and ART was found to increase both dizygotic and monozygotic twinning (Rao et al., 2004). Research findings in Turkey reveal that the multiple birth rate is 0.8–3.7% and that the incidence of twin births is in the range of 0.6–3.4%.

More multiple pregnancies are seen in ART patients compared to women who do not receive this treatment (Taylor, 2006; Sunderam et al., 2009). Ever since ART first began to be used for the treatment of infertility in 1978, and over the course of time after the birth of the first ART baby in 1981, there has been a steady increase in the practice of ART in the United States (Sunderam et al., 2009). According to 2006 data of the Center for Disease Control and Prevention (CDC), while 49% of infants born with ART are the products of multiple pregnancies, the rate of multiple pregnancy in the general population is 3%. The Center also reports a 44% twin pregnancy rate but a 3% rate in the overall population (CDC, 2008). The frequency of triplets or other higher order multiple pregnancies, it is indicated, is 25 times the rate that has been recorded for the general population (0.2% versus 5%) (CDC, 2008; Sunderam et al., 2009). In European countries, the total rate of births from multiple pregnancies associated with IVF (in vitro fertilization) and ICSI (intra cytoplasmic sperm injection) was 21.8% in 2005; the rate was reported to be 21.7% for twin pregnancies and 1% for triplet pregnancies (Andersen et al., 2008). Turkey's 2004 figures point to a 36.3% rate for twin pregnancies associated with IVF and ICSI and a rate of 3% for triplet births (Andersen et al., 2008).

With the adoption of embryo transfer guidelines and multifetal pregnancy reduction techniques, triplet pregnancies have diminished by 37.5%. Although there are significant differences across European countries, the triplet pregnancy birth rate has shown a decline from its level of 3.6% in 1997 to 0.8% in 2005 (Nyboe et al., 2004, 2009). Twin pregnancies have increased however and it appears that the multiple pregnancy epidemic now continues in the form of twin pregnancies (Reynolds et al., 2003; Taylor, 2006; The ESHRE Capri Workshop Group, 2000; Nyboe et al., 2004, 2009).

The multiple pregnancies rate associated with ART in Turkey was reported in seven studies conducted after 1997 that evaluated multiple and twin pregnancies. While the lowest ART pregnancy rate, 7.9%, was reported by Aköz and colleagues (2003) in their study of the outcomes of multiple pregnancy births occurring over the period 2000–2003, the highest ART pregnancy rate (76%) was recorded by Yayla & Baytur (2008, 2009). This latter group of researchers, however, reported that they were able to establish the nature of pregnancy (whether ART was used or not) about in only 37% of the patients and also suggest in their study that the discrepancies in the outcomes may be due to deficient querying techniques and the constructs used (retrospective records, questionnaire, etc.). The

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TABLE 3

Obstetrical Problems and Maternal Complications in Twin Pregnancies

Study	Preterm delivery	Premature rupture of membranes	Hypertensive disorders of pregnancy[a]	Gestational diabetes mellitus	Ablatio placentae	Placenta previa	Polyhydramnios	UTI[b]+Hydronephrosis	Anemia	Other
Demirkıran et al., 1991	63 (42%)									
Karlık et al., 1996*	20 (18.7%)	9 (8.4%)	16 (15%)		5 (4.7%)	3 (2.8%)			6 (5.6%)	
Buyru et al., 1996		32 (26.2%)			1 (0.8%)		2 (1.6%)			
Yücel et al., 1997*	23 (54.8%)	6 (14.3%)	7 (16.7%)		1 (2.4%)	2 (4.8%)			5 (11.9%)	1 (2.4%)[c]
Gül et al., 1998*	45 (61.6%)	6 (8.2%)	12 (16.4%)			1 (1.4%)	2 (2.7%)	17 (23.3%)	22 (30.1%)	4 (5.5%)[d]
Bayhan et al., 1998	12.8%	10.1%	18.3%							
Sancı et al., 1999	7 (2.9%)	3 (1.3%)	23 (9.6%)					2 (0.8%)	7 (2.9%)	
Nas et al., 2000	26 (24.1%)[e]	3 (2.7%)	7 (6.4%)		2 (1.8%)				4 (3.7%)	
Kayıkçıoğlu et al., 2001°	180 (67.2%)									
Şendağ et al., 2001	34 (50%)	5 (7.4%)	8 (11.6%)	6 (8.7%)			4 (5.8%)			
Üstün et al., 2002*	11 (27.5%)	8 (20%)	5 (12.5%)	1 (2.5%)	1 (2.5%)	1 (2.5%)		3 (7.5%)		
Deveer et al., 2002*	173 (57.5%)	49 (16.3%)	85 (28.3%)	12 (3.9%)			12 (3.9%)	13 (4.3%)		
Gökçen et al., 2003*			17 (12%)							
Aköz et al., 2003*	307 (35.8%)	176 (20.5%)	128 (15%)	34 (4%)	11 (1.3%)	8 (0.9%)		105 (12.3%)	178 (20.8%)	26 (3%)[f]
Kamacı et al, 2004*	22 (22.9%)	12 (12.5%)	17 (17.7%)				6 (6.3%)	2 (2.1%)		
Erdemoğlu et al., 2005*	23%	8.8%	18.4%				3.4%			0.8%[g]
Yayla & Baytur, 2008*–2009	29 (13.8%)	23 (11%)	47 (22.4%)	8 (3.9%)						
Demircan Sezer et al., 2010	39 (44.8%)	18 (20.7%)	6 (6.9%)	5 (5.7%)		2 (2.7%)				

Note: *Multiple pregnancy

[a] Hypertensive disorders of pregnancy = Pregnancy-induced hypertension, pre-eclampsia, eclampsia and HELLP syndrome

[b] UTI = Urinary Tract Infection

[c] Cord prolapse 1 (2.4%)

[d] Cord prolapse 2 (2.74%), uterine rupture 1 (1.36%), hand prolapse 1 (1.36%)

[e] Preterm birth was accepted as < 36 gestational weeks

[f] Chorioamnionitis 22 (2.56%), hyperthyroidism during pregnancy 4 (0.46%)

[g] Cardiac disease

° Only diamniotic-dichorionic twins were included in the study

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TABLE 4

Neonatal Problems in Twin Pregnancies

Study	Preterm birth (week) < 32	Preterm birth (week) < 37	Low birthweight (grams) < 1500	Low birthweight (grams) < 2500	Intrauterine fetal death	Congenital anomaly	Intrauterine growth retardation	Twin-to-twin transfusion syndrome	Apgar < 7	Apgar < 7 Vaginal	Apgar < 7 Cesarean
Demirkıran et al., 1991		63 (42%)	10/298 (3.4%)				29%			45/211 (21.3%)	8/89 (9%)
Karlık et al., 1996*		61 (57%)*		55 (52.9%)[a]					35/200 (17.5%)	19/114 (16.7%)*	16/86 (18.6%)*
Buyru et al., 1996		70 (57.4%)	144 (59%)	163 (66.8%)	7 (2.87%)	9 (3.7%)	41 (16.4%)				
Yücel et al., 1997*		27 (64.3%)*			5/86 (5.8%)*	1 (2.4%)*	2 (4.8%)*			12/41 (29.27%)	9/40 (22.5%)*
Gül et al., 1998*				83 (56.1%)*	4 (5.5%)*	1 (1.4%)*	1 (1.4%)*		61 (41.2%)*	31/38 (81.6%)*	29/31 (93.6%)*
Bayhan et al., 1998		39.5%	9.6%	111 (50.9%)			12.4%				
Sancı et al., 1999											
Nas et al., 2000			20 (9.3%)	125 (57.9%)						12 (16.6%)	11 (9.7%)
Kayıkçıoğlu et al., 2001°		180 (67.2%)	56 (10.6%)	301 (57.2%)							
Şendağ et al., 2001		47 (69%)	31/132 (23.5%)		11/70 (15.7%)						
Üstün et al., 2002*		49 (72.0%)	9 (6.7%)	81 (60%)	6/85 (7.1%)*	6/68 (8.8%)	4/85 (4.7%)*				
Deveer et al., 2002*		328 (53.2%)	71 (11.3%)*	400 (74.6%)							
Gökçen et al., 2003*	29 (20.5%)*		48/272 (17%)	146/272 (53.7%)							
Aköz et al., 2003*		661/834 (79.3%)			11 (1.3%)*	31 (3.6%)*	42 (4.9%)*	11 (1.3%)			
Kamacı et al, 2004*				118/194 (60.8%)*	16 (16.7%)*	7/194 (3.6%)*			56 (28.9%)*		
Erdemoğlu et al., 2005*		85.9%			2.3%	3.6%*	17 (6.0%)*	6 (2.3%)			
Yayla & Baytur, 2008*–2009		86%		39.40%							
Demircan Sezer et al., 2010	14 (16.1%)	56 (64.4%)	33 (18.9%)	118 (67.8%)	2 (1.2%)	3 (1.7%)	2 (1.2%)		15 (8.9%)	8 (66.7%)[b]	7 (5%)

Note: *Multiple pregnancy

[a] Based on the arithmetical mean of each newborn's weight

[b] $p < .05$

° Only diamniotic-dichorionic twins were included in the study

researchers furthermore emphasized that Turkish families tended to hide or be discreet about their ART pregnancies. A look at the data over time shows that in fact, although the rates of multiple or twin pregnancies associated with ART have differed over the years, there has not been a significant increase. In 2010, the Ministry of Health limited the number of embryos transferred using ART.

The incidence of cesarean section in twin pregnancies rose from 28% in 1980–1985 to 59% in the 2000s (Taylor, 2006). Traditional practice calls for the planning of vaginal birth in the event of the vertex presentation of the first twin, provided there is no other accompanying complication (Ayres & Johnson, 2005). The recommended mode of delivery is by cesarean section when the first twin is nonvertex. The potential for locked twins exists when the first twin is breech and the second twin is cephalic. This phenomenon is rare, but cesarean delivery is recommended if the potential for locking exist (American Collage of Obstetricians and Gynecologists [ACOG], 2004). However, there are no prospective control studies on this subject. On the other hand, it has been reported that planning a cesarean birth reduces perinatal mortality by 75%. The biggest risk in vaginal delivery is death of the second twin due to anoxia (Taylor, 2006).

The mode of delivery in the event of a vertex–nonvertex presentation is controversial. The nonvertex second twin weighing >1500 g can be delivered vaginally by primary breech extraction (Crowther, 2000; Gocke et al., 1989).

Although there are those who defend the premise that there is no difference in terms of prenatal mortality between vaginal delivery and cesarean section, cesarean section tends to be preferred due to the possibility that the second twin may need a cesarean delivery following a vaginal birth and because of possible complications of external cephalic version or internal podolic version. Cesarean section was preferred at the researchers' clinic as well in the case of vertex–nonvertex presentations.

In Turkey, studies point to a rate of cesarean birth that ranges between 33.2–79.7% in cases of multiple or twin pregnancies. In recent years it has been seen that the twin pregnancy cesarean section rate has increased in Turkey, a trend that is similar to what is witnessed in the rest of the world. In the present study, the cesarean section rate was higher than at other institutions. It is believed that the reasons for this may be the tendency to prefer cesarean section in ART pregnancies, in pregnancies of older mothers, and in vertex–nonvertex presentations, perhaps also because more cases with complications had been referred to the tertiary hospital, or that obstetricians had had limited experience with vaginal delivery of twin pregnancies and thus feared associated legal implications.

Perinatal mortality incidence for twin pregnancies in Turkey is between 62/1000–172/1000, a level that seems higher that the rates indicated in the literature. A look into the literature shows that the perinatal mortality rate has been reported to be 37/1000 in twins and 52/1000 in triplets (Taylor, 2006). In the past, the perinatal mortality rate had been reported as 28% in monochorionic and 16% in dichorionic twins. Although outcomes have subsequently improved significantly, perinatal mortality risk is still 1.5% and 3% respectively, compared with 0.5% for singletons (Siddiqui & McEwan, 2007). In twin pregnancies, as compared to singleton pregnancies, preterm birth, fetal death of one of the twins, intrapartum complications, congenital anomalies and twin-to-twin transfusion syndrome have exhibited increases as secondary conditions. Perinatal and neonatal mortality rates were seen to be lower in the present study than at other medical centers. The reason for this is believed to stem from the high cesarean section rate at the researchers' hospital and also because of the fact that fully equipped NICUs are available. Happily, improvements in the availability of well-equipped NICUs have been responsible for lowering the high rate of perinatal mortality over the years.

Varying results in the studies were observed in the examination of the correlation between mode of delivery in twin pregnancies and perinatal mortality and low Apgar scores. In general, there is a higher incidence of perinatal mortality and low Apgar scores in cases of nonvertex presentation, in second-born breech twins of under 1500 grams delivered vaginally, in second twins, in low birthweights and in very preterm births.

Studies conducted in Turkey indicate that the mean gestational week at birth in the case of twin pregnancies varies between 33–36.2 weeks. In the United States, gestational age at delivery was reported in 2002 as 35.3 weeks for twins, 32.2 weeks for triplets, and 29.9 weeks for quadruplets, while this figure was 38.8 weeks for singletons (Martin, 1999). While only 1.6% of single babies are born before the 32nd week of pregnancy, this percentage is 11.9% for twins (Gabbe et al., 2007). Preterm delivery which is frequently encountered in twins compared with singletons (The ESHRE Capri Workshop Group, 2000) is responsible for 10–12% of all preterm births (Rao et al., 2004). In Turkey, the rate of preterm delivery in the case of twin pregnancies is 39.5–86%. This rate varies between 42–67% in Europe (Nyboe et al., 2009).

Prematurity in particular continues to be a problem in Turkey due to the insufficient number of NICUs in the country. Ministry of Health data for 2009 revealed that there were 524 NICUs, 1956 neonatal ventilator and 4595 neonatal intensive care beds (3679 incubators and 916 open beds) in Turkey (http//www.saglik.gov.tr). This deficiency contributes to the difficulties encountered in the monitoring, referral and deliveries of multiple pregnancies. The Ministry of Health's efforts to increase the number of NICUs in the country is ongoing.

An examination of the literature shows that mean birthweight for singletons is 3332 grams but 2347 grams for twins (Martin, 1999). The study data indicates lower

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mean birthweight especially for the second twin compared with the developed countries. The rate of very low birthweight for twins in Turkey ranges between 3.4–59% and between 39.4–74.6% in cases of low birthweight.

One of the weaknesses of the present study was that definitions of preterm birth, very preterm birth, low birthweight and very low birthweight have not been standardized in research reports in Turkey. Additionally, a sizeable portion of the studies have not referred to a need for more NICUs.

It is of the utmost importance to determine chorionicity in ultrasonography (USG) scan performed in the first trimester of multiple pregnancies (Rao et al., 2004; Taylor, 2006). Fetal/perinatal loss is 5 times more in monochorionic twins as opposed to dichorionic twins; the incidence of antenatal cerebral lesions is 10 times than what is observed in dichorionic twins, and IUGR cases are twice as much (Taylor, 2006). In the present research, however, reliable data could not be collected on this due to the fact that some patients were late in receiving referrals and thus late in the follow-up or a USG scan of chorionicity had not been carried out in the first trimester, among other reasons. Chorionicity could only be determined on the basis of findings during delivery and the pathological examination of the placenta. Looking at the results of other medical centers, it was indeed seen that chorionicity was determined not by USG but by examination of the placenta during delivery or by means of the gender differences between twins.

Research reports on rates of perinatal mortality in twin pregnancies are varied in Turkey. In many studies, the gestational week accepted as a threshold of viability in terms of the rate of perinatal mortality in twin pregnancies is 20, 22, 24, 26 or 28 weeks. Moreover, the use or non-use in the statistics of anomalies that are inconsistent with survival is also a factor that may change calculated rates of perinatal mortality. As of June 2009, the Turkish Ministry of Health has accepted the childbirth threshold of viability as 22 gestational weeks or 500 grams. In the WHO definition of perinatal mortality, the limit is set at 22 weeks and above. More recent approaches consider 24 weeks the limit but this has not been adopted as a guideline as yet. The twin births included in the present study were at 22 gestational weeks or with a birthweight of more than 500 grams. It is significant that both the present study and the research of Yayla & Baytur (2008, 2009) point to a 100% mortality rate in all births occurring before the 24th week. For this reason, a more accurate approach, it is believed, would be to consider twin pregnancies in a different category and adopt a viability limit of 24 gestational weeks or a weight of over 500 grams for each twin.

Another controversial issue is the time of delivery of twins. The prospective risk of stillbirth after 37 weeks is 6–9 per thousand births in twins with a greater risk of unexpected late death in monochorionic pregnancies. The widespread practice in selecting the time for inducing labor or for elective cesarean birth is the 37th week in dichordionic twin pregnancies and the 36th week in monochorionic twins (Taylor, 2006). As a result, the incidence of iatrogenic prematurity tends to increase in twin pregnancies due to the planning of cesarean deliveries after the 36th week. Therefore, it is our opinion that a better approach in the case of twins would be to accept a preterm delivery threshold of not the 37th gestational week but the 36th gestational week.

In Turkey, as a developing country, contrary to the low perinatal mortality rates that have been attained in singleton pregnancies, perinatal mortality rates in multiple and twin pregnancies appear to be higher than those in developed countries. The reasons for this may be the high rate of preterm birth and the inadequate number of NICUs.

To conclude, twin pregnancies represent a risk and must be followed up very carefully in the face of increasing maternal and neonatal morbidity and mortality. It is particularly important to determine chorionicity with USG scan at an early date. We believe that compliance with ART guidelines and transfers of single embryos will reduce the incidence of multiple pregnancies in the future and prevent pre-term-related prematurity in infants. We also posit that the cesarean section as a mode of delivery in twin pregnancies, especially for the vertex–nonvertex presentation, will reduce perinatal mortality and maternal complications if there is no appropriate conditions for vaginal delivery. Moreover, we also believe that increasing the number of NICU's available to each newborn will effectively contribute to lowering perinatal and neonatal mortality rates.

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