



The Uterine Capacity Measured by the Total Twin Birth Weight and Duration of Twin Pregnancy

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Abstract. The objective of this study was to answer the question whether there is the relation between the uterine capacity, estimated by the total birth weight of fetuses, and the duration of twin gestation. The material for researches contains data received from the books of births and case records concerning the pregnant who gave births to twins in the Institute of Obstetrics and Gynecology of the Medical University in Łódź between 1970-1998. The final analysis concerned only gestations lasting more than 29 weeks, without any complications (excluding prematurity and the growth-discordant twins), and when gestational age was exactly known. The selected group was finally composed of 188 pairs of twins. The analyses considered relations between total birth weight of twins, the sex of newborn babies, parity, and the duration of gestation. The duration of the analyzed twin pregnancies was 35,6 weeks, including primiparous with 35,8 weeks, and multiparous – 35,1 weeks. In the group of male-male twin pairs the average duration of pregnancy was 35,7 weeks, in unlike-sexed pairs – 35,6 weeks, and in female-female pairs – 35,5. In the group of the primiparous having male-male twin pairs the average duration of pregnancy was 35,1 weeks, unlike-sexed pairs – 36,4 weeks and female female pairs – 36,6 weeks, while in the group of multiparous relatively: 36,4, 35,4, 35,0 weeks. The total birth weight of the specific pairs of twins was from 2270 g to 6900g (average 4794g), while in 92% <5500g. In the primiparous group it was 4908,1 g. and in the multiparous group – 4663,1 g. Analyzing the total twins' weight according to the fetal gender and parity it was found that in primiparous with male-male twins - 4715,3, unlike-sexed – 5271,6 and female-female – 4967,5, whereas in multiparous relatively: 4961,5, 4692,6, 4414,0. The shortening of twin pregnancies was caused by the following factors: total body mass achieved by fetuses was > 5500 g, presence of male sex in twin pregnancies (only in primiparous), and also the multiparity.

Key words: Twin birth weight, Fetal sex, Parity, Duration of pregnancy

INTRODUCTION

The twin pregnancies are commonly considered as the highest risk gestations. It is caused by the possibilities of occurrence of many dangers complicating their course, which also occur in singleton pregnancy, but much more seldom, and which are specific only for the twin gestations.

The most frequent complication occurring in twin gestations is preterm birth. The incidence of preterm delivery (less than 37th weeks gestations) is approximately 50 per cent [14]. Since, the average length of twin gestation is 35 weeks that is 3-4 weeks shorter than for singleton [3]. However, little is known at present about the mechanisms of preterm birth in twin gestations. Uterine overdistension, caused by larger capacity of uterine cavity, can be at most a contributory factor [13].

The aim of this study was to answer the question whether there is a relationship between the uterine capacity, estimated by the total birth weight of fetuses, and the duration of twin gestation.

MATERIAL AND METHODS

The studies contain data received from the books of births and case records concerning the pregnant who gave births to twins in the Institute of Obstetrics and Gynecology of the Medical University in Łódź between 1970-1998. The final analysis concerned only gestations lasting more than 28 weeks, without any complications (excluding prematurity and the growth-discordant twins) and when gestational age was exactly known. Twin gestations with complications affecting their duration, for example EPH gestosis, premature cervical dilatation and gestations ended by the cesarean delivery indicated by circumstances other than wrong position of fetus were excluded.

The selected group was finally composed of 188 pairs of twins, which were analyzed by estimation of the total birth weight of newborn, the sex of twins, parity and the length of gestation.

The material was analyzed using the χ^2 analysis with Yates correction. Statistical significance was considered at $p < 0,05$, where the appropriate Yule coefficient was calculated.

RESULTS

According to the analysis of the material, 66 pregnant (35,1%) were primiparous, 122 (64,9%) – multiparous (Table 1). In the scope of twins' sex the male-male pairs occurred in 56 cases (29,9%), unlike-sex in 68 cases (36,2%) and female-female in 64 cases (34,0%) (Table 1).

The duration of the analyzed twin pregnancies was 28 to 40 weeks (mean $35,6 \pm 2,2$ weeks), including primiparous $35,8 \pm 2,1$ weeks and multiparous $35,1 \pm 2,8$ weeks (Table 2). In the group of male-male twin pairs the mean duration of pregnancy was $35,7 \pm 2,2$ weeks, unlike-sexed pairs – $35,6 \pm 2,6$ weeks and female-female pairs – $35,5 \pm 2,9$ weeks (Table 2).

Table 1 - General data

Sex	Primiparous		Multiparous		Total	
	Number	%	Number	%	Number	%
Male – male	30	45,45	26	21,31	56	29,78
Female-female	24	36,36	40	32,78	64	34,04
Female-male	12	18,18	56	45,9	68	36,17
Total	66	100	122	100	188	100

Table 2 - Median duration of the twin pregnancy

Sex	Median duration of pregnancy		
	Primiparous	Multiparous	Total
Male-male	35,13 ± 2,53	36,46 ± 1,56	35,75 ± 2,20
Female-female	36,66 ± 2,42	35,05 ± 3,53	35,56 ± 2,93
Unlike-sex	36,41 ± 1,24	35,42 ± 2,68	36,64 ± 2,64
Total	35,82 ± 2,17	35,10 ± 2,82	35,64 ± 2,60

Analyzing the time of duration of pregnancy related to the parity and sex twins, it was determined that in the group of primiparous having male-male pairs the mean duration of pregnancy was 35,1 ± 2,5 weeks, unlike sexed pairs – 36,4 ± 1,2 weeks and female-female pairs – 36,6 ± 2,4 weeks; while in the group of multiparous relatively: 36,4 ± 1,5 weeks, 35,4 ± 2,6 weeks and 35,0 ± 3,5 weeks (Table 2).

Table 3 shows the average total birth weight of twins in the succeeding weeks of gestation. Total birth weight of specific pairs of twins was from 2270,0 g to 6900,0 g (mean 4794,1 ± 1096,7 g), while in 92% of cases was smaller than 5500 g.

Analyzing the sum of twin's birth weight according to the obstetric past of parturient, it was noticed that in primiparous group it was 4908,1 ± 981,3 g, and in multiparous group – 4663,1 ± 1115,2 g (Table 4). The biggest total twins' birth weight was found when both fetuses were male sex (mean 4829,4 ± 972,4 g), then unlike sex (mean 4802,9 ± 1086,1 g) and female sex (mean 4621,5 ± 1226,0 g).

Analyzing the total twins' weight according to the fetal gender and parity (Table 4) it was found that in primiparous the biggest values appeared in the presence of male – female pair (mean 5271,6 ± 1198,5 g), then female – female pair (mean 4967,5 ± 686,4 g) and male – male pair (mean 4715,3 ± 1103,7 g), whereas in multiparous the opposite relation was observed: male – male pair – 4961,5 ± 819,2 g, male – female pair 4692,6 ± 1056,7 g and female – female pair – 4414,0 ± 1434,7 g.

Among twelve cases of growth-discordant twins more than 20%, their total weight was near to the mean calculated for concordant twins at the particular gestational age (Figure 1 and 2). In ten cases the heavier twin has his birth weight bigger than that mean.

Table 3 - Average total birth weight of twins in succeeding weeks of gestation

Duration of pregnancy (weeks)	Average birth weight twins A+B (in grams)
30	2906,6
32	3383,7
33	3415,0
34	4209,0
35	4794,3
36	4980,0
37	5123,3
38	5525,0
39	5450,0
40	5850,0

Table 4 - The average birth weight of twins

Fetal sex	Average total birth weight A+B (in grams)		
	Primiparous	Multiparous	Total
Male-male	4715,3 ± 1103,8	4961,5 ± 819,2	4829,4 ± 972,4
Female-Female	4967,5 ± 686,5	4414,0 ± 1434,8	4621,5 ± 1226,0
Unlike-sex	5271,6 ± 1198,6	4692,6 ± 1056,7	4802,9 ± 1086,1
Total	4908,1 ± 981,3	4663,1 ± 1115,3	4794,1 ± 1096,7

Analyzing the percentage of newborn gender according to the parity we noticed that in primiparous group male-male twin pairs accounted for 46%, female-female pairs – 36%, male-female pairs 18%, whereas in multiparous: male-male pairs – 22%, female-female pairs – 32%, male-female pairs – 46% (Figure 3 and 4).

DISCUSSION

Twins present approximately 1% of all deliveries, but their share in the total perinatal mortality reaches 10-20% [6, 11]. Moreover, as the investigations carried out at the Scottish Twin Center in Glasgow [9] have shown, nearly 2/3 of these neonates require highly specialized management in the Intensive Care Unit during postnatal period. As the main cause of that unfavorable percentage of perinatal mortality and morbidity in twins is prematurity. One of them is probably greater uterine stretch initiating premature labor. On the other hand it can not be excluded that it is a kind of specific defending mechanism

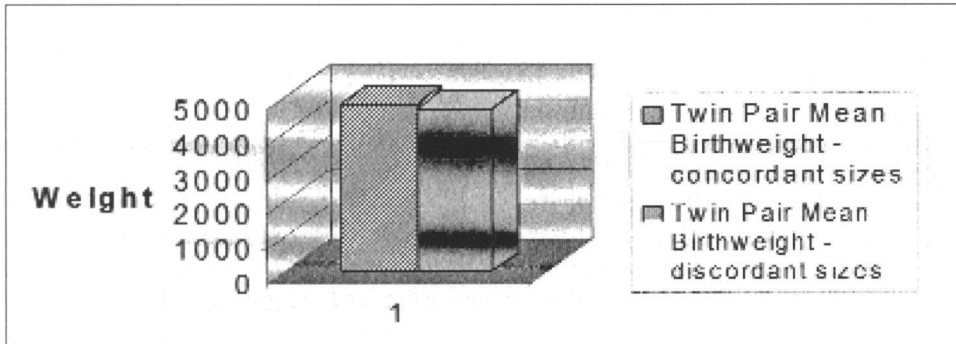


Fig. 1 - The average total birth weight of concordant and discordant twin pairs.

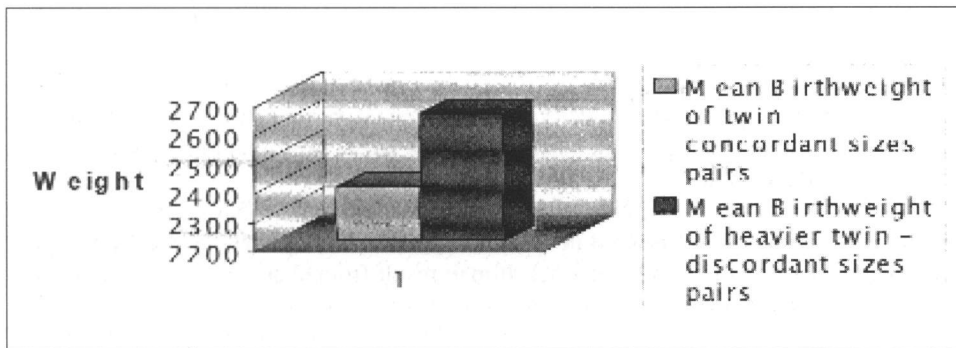


Fig. 2 - The average birth weight of concordant twin pairs and heavier twin in discordant pairs.

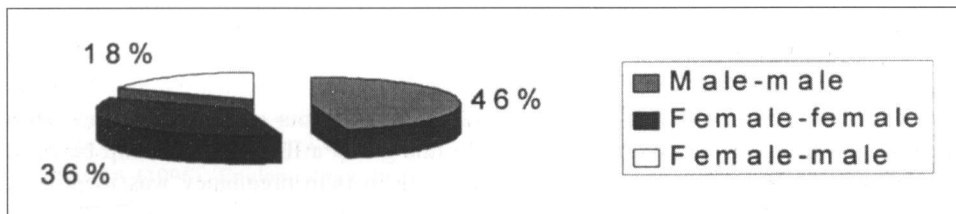


Fig. 3 - Distribution of twins in primiparous by sex.

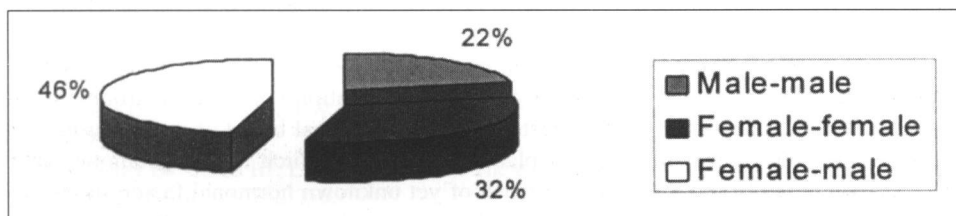


Fig. 4 - Distribution of twins in multiparous by sex.

preventing from excessive enhanced volume of uterine cavity leading to significant reduction of uteroplacental blood flow. It was suggested by the study results indicating a raising percentage of perinatal mortality of twins born after 37th week of gestation [15]. Indeed, the optimal birth weight for twins appears to be between 2,5 and 3,5 kg, whereas for singletons it is between 3,5 and 4,0 kg [2]. In the literature there are some reports suggesting that the uterine ability to “carry” twin pregnancy runs out when the total twins’ weight reaches 5250 g.

As it was showed by Cohen et al [3] studies, from 28 week of pregnancy onwards the rate of growth decreases in comparison to that of a singleton with its maximal intensity especially after 34 weeks. Similar observations were made by the other authors as well [8,17]. In our study the mean twin pregnancy duration was 35,6 weeks and it was longer in primiparous (35,8 weeks) than in multiparous (35,5 weeks) (Table 2). It was almost 4 weeks shorter than in singleton pregnancies. Estimating the rate of total birth weight of newborn twin was found that starting from 34 week of pregnancy it was raising considerably slower (Table 3). In 36 week of pregnancy it was mean 4980 g, so as much as in term singleton and it is in the case of fetal macrosomia.

Over 92% of twins were delivered when the total neonatal weight was < 5500 g. It may suggest that the uterine capacity reaches then its critical level above which the mechanisms responsible for the labor contractions are evoked (analogically to polyhydramnion in singletons).

A little longer duration of twin pregnancy in primigravidas (35,8 weeks) than multiparous (35,1 weeks) was observed in spite of bigger total body mass of neonates (primigravidas 4908,1g; multiparous 4663,1g). It may result from absence of postpartum damage of genital tracts and weakening of function of tissues responsible for internal orifice of cervix occlusion. This is connected with smaller risk of ascending infection of fetuses, which can be the next factor inducing greater uterine stretch. Moreover, it can not be excluded that shorter duration of twin pregnancy in multiparous may be caused by bigger burdening of gravid by work and having less time for relax.

Large studies consistently demonstrate an increased number of male fetuses in singleton preterm births [4, 7, 12]. Some studies [4, 5] showed similar correlation in twin pregnancies. It suggests that fetal gender may be one of the biological factors responsible for initiation of mechanisms leading to preterm birth. In our study similar correlation was only found in primigravidas (Table 2). In this group a linear relationship between number of male fetuses and risk for preterm birth in twin pregnancy was identified. When both fetuses were male, the average time of pregnancy was 35,1 weeks, unlike-sex – 36,4 weeks, females – 36,6 weeks. In multiparous the presence of male sex did not influence shortening of duration of pregnancy. The biological mechanism responsible for male sex influence the initiation of preterm birth is still unknown. It is possible that this is connected with bigger body mass of male neonates.

These exceeding 200 g differences can result in greater uterine stretch. It can not be also excluded the influence of existing hormonal alternations in fetus environment. In one of the studies the higher level of testosterone in umbilical blood of male fetuses was measured. A well-known substrate for placental estrogen, which in turn promotes labor [10, 16]. There is also possible the existence of yet unknown hormonal factor, unique to male fetuses, or associated with both sexes, but stronger in male fetuses. It is also possible the presence of hormonal factor, which plays protective role in female fetuses. Future

investigation should be carried out to answer the questions, how fetal sex influences the duration of pregnancy. The twin pregnancy model seems to be the most competent.

In literature [1] we found only one information suggesting that divergent intrauterine twins' growth is physiological, in some cases, and to support optimal intrauterine environment. The question, whether shortening of duration of twin pregnancy is a defensive mechanism protecting them from excessive increase of uterine capacity is still without an answer. Too small number of our cases makes it also impossible come to any conclusion.

SUMMARY

Our study and the review of literature suggest the presence of different mechanisms responsible for shortening of duration of twin pregnancy. We think that some of these factors are the following:

1. total body mass of fetuses > 5000 g;
2. presence of male sex in twin pregnancy (only in primiparous);
3. multiparity.

REFERENCES

1. Blickstein I, Goldman RD, Smith-Levitin M (1999): The relation between inter-twin birth weight discordance total twin weight. *Obstet Gynecol* 93: 113-116.
2. Butler NR, Alberman ED (1969): Perinatal problems – the second report of the 1968 British Perinatal Mortality Survey 7: 122-147.
3. Cohen SB, Dulitzky M, Lipitz S (1997): New birth weight normograms for twin gestation on the basis of accurate gestational age. *Am J Obstet Gynecol* 177: 1101-1104.
4. Cooperstock MS, Campbell J (1996): Excess males in preterm birth: interactions with gestational age, race, and multiple birth. *Obstet Gynecol* 88:189-193.
5. Cooperstock MS, Bakewell J, Herman A (1998): Effects of fetal sex and race on risk of very preterm birth in twins. *Am J Obstet Gynecol* 179: 762-765.
6. Gall SA (1996): Epidemiology. In: Gall S.A., editor. *Multiple pregnancy and delivery*. St. Louis: Mosby 1-22.
7. Harlow BL, Frigoletto FD, Cramer DW (1996): Determinants of preterm delivery in low-risk pregnancies: the RADIUS study group. *J Clin Epidemiol* 49: 441-448.
8. Luke B, Witter FR, Abbey H (1991): Gestational age-specific birthweights of twins versus singletons. *Acta Genet Med Gemellol* 40:69-76.
9. MacGillivray I (1983): Determinants of birth weight in twins. *Acta Genet Med Gemellol* 23: 151-155.
10. Mayers DA, Nathanielsz PW (1993): Biologic basis of term and preterm labor. *Clin Perinatol* 20: 9-28.
11. McCarthy BJ, Sachs BP, Layde PM (1981): The epidemiology of neonatal death in twins. *Am J Obstet Gynecol* 141: 252-256.
12. McGregor JA, Leff M, Orleans M, Baron A (1992): Fetal gender differences in preterm birth: findings in a North American cohort. *Am J Perinatol* 9: 43-8.

13. Newman RB, Gill PJ, Katz M (1996): Uterine activity during pregnancy in ambulatory patients: comparison of singleton and twin gestations. *Am J Obstet Gynecol* 154: 530-531.
14. Newman RB, Godsey RK, Ellings JM (1991): Quantification of cervical change. Relationship to preterm delivery in the multifetal gestation. *Am J Obstet Gynecol* 165: 264-271.
15. Powers WF, Kieley JL (1994): The risks confronting twins: a national perspective. *Am J Obstet Gynecol* 170: 456-461.
16. Romero R, Scoccia B, Mazor M (1988): Evidence for a local change in the progesterone/estrogen ratio in human parturition at term. *Am J Obstet Gynecol* 159: 657-660.
17. Rydhstrom H (1992): A birthweight-for-gestation standard based on 4737 twins born in Sweden between 1983 and 1985. *Acta Obstet Gynecol Scand* 71: 506-11.

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