Twin birth order, birthweight and discordance birthweight: any relationship?

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ABSTRACT: *Background:* It is widely believed that in twin pairs, at birth, the first-born weigh more than the second-born but this concept has been challenged.
Objective: To assess the truthfulness of this common concept that first-born twins are usually heavier than their second-born siblings at birth.
Methods: In a series of 104 sets of live-born twins, the birth weights of first-born twins were compared with those of their second-born siblings, after controlling for gender. Their intra-pair birthweight differences were determined and twin pairs whose birthweight difference was 15% or more were designated as discordant.
Results: Twin I was heavier than Twin II in 61.5% of cases while Twin II was heavier than Twin I in 28.9% of cases. Twins I and II had equal birthweights in 9.6% of cases. Comparing the mean birthweight of the first-born-male twin with that of second-born- male twin, it was 2515 $\pm$ 427g[95 % Confidence Interval, CI = 2402 - 2628) versus 2432 $\pm$ 435g (95% C I = 2321 - 2543) $p > 0.05$. The mean birthweight of first-born-female twin was 2326 $\pm$ 445g (95% CI = 2214 - 2439) while that of the second-born-female twin was 2325 $\pm$ 501g (95% CI = 2197 - 2453) $p > 0.05$. When the birthweight difference exceeded 750g, the probability that Twin I will be heavier than Twin II was 83.3% (5 of 6).
Conclusion: It is concluded that the first-born twin is usually heavier than the second one, especially when the difference in birth weight is greater than 750 g.

Key Words: Twins, Birth order, Relative birthweights, Birthweight discordance.

INTRODUCTION

The concept that first-born twins are usually heavier than their second-born siblings at birth is widely believed. Various studies aimed at assessing the truthfulness of this concept have produced conflicting conclusions, both in developed and developing countries. For instance, in Nigeria, Ilesanmi et al[1] reported that among 212 twin pairs the first-born twin was heavier in 42.6% of cases while the second-born twin was heavier in 42.2% of cases. In another Nigerian study, Swende and Hwande[2] reported that the first-born was heavier in 48.7% of cases while the second-born twin was heavier in 43.6% of cases. Similarly, a study from Germany reported that mean birthweight was higher in first-born twins than in their second-born siblings[3]. Another German study involving 177 live-born twin pairs reported that the first twin was on the average heavier by 54g[4].

In contrast, a Nigerian study reported that second-born twins had weight advantage more often than the corresponding first-born siblings[5]. Friedman et al[6] in USA, reported that second-born twins were heavier than first-born twins in 55% of cases. Similar finding has been reported in another study in a developed country[7]. Oyawoye and Fakeye[8] reported that in low birthweight twin gestations, the second-born twin was heavier than the first-born twin in 57.3% of cases. However, in these studies, the investigators did not control for gender which is well known to influence birthweight both in singletons[9,10] and in twins[11].

Although the phenomenon of birthweight discordance is common in twin gestations, various stud-

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Table 1. Relative birthweights of Twins I and II.

Relative birthweights	No of babies	Percentage
Twin I greater than Twin II	64	61.5
Twin I less than Twin II	30	28.9
Twin I equal to Twin II	10	9.6
Total	**104**	**100**

ies on birthweight discordance were silent on which one of the discordant pairs is likely to be delivered first[12-14]. This is an issue of practical clinical importance because it has been shown that birthweight-discordance[13-15] as well as second-born twins[16-18] are both at increased risk of adverse perinatal outcome. Some investigators have reported that the threshold for clinically significant birthweight discordance is 15% or more[12].

The present study sought to assess the truthfulness of the concept that first-born twins are usually heavier than their second-born siblings at birth.

MATERIALS AND METHODS

This cross-sectional study involved all twin babies delivered at St Philomena Catholic Hospital (SPCH) between 1st January, 2006 and 31st December, 2009.

All twin babies delivered at SPCH during the 4-year study period were weighed naked by a trained midwife, within the first 30 minutes after birth, using a mechanical Waymaster weighing scale calibrated to the nearest 50 grammes. The scale was periodically standardized with known weights for reliability and daily for zero error to ensure accuracy. The order of delivery of the twins and their sexes were carefully recorded. Excluded from the study were twin babies delivered by Caesarean section and twin pairs where one or both were still-born. Only live-born pairs of twins were studied. In this study, Twin I refers to the first-born while Twin II refers to the second-born twin. The data on birth weight were analysed according to birth order to determine their relative distribution collectively. Also the difference in birth weights (weight of Twin I minus weight of Twin II) were examined to determine the magnitude and direction of such differences.

In this study, a twin pair was designated discordant if one of the pair was smaller by 15% or more. The level of discordance was calculated for each pair as a percentage of the birthweight of the heavier twin:

$$\text{Level of discordance (\%)} = \frac{\text{Birthweight difference} \times 100}{\text{Birthweight of heavier twin}}$$

Intra-pair birthweight percentage differences was stratified into the following categories: 15-24.9%, 25-34.9% and 35% or more, which roughly corresponded to moderate, severe and extreme discordance. A percentage difference in birthweight of 14.9% and below was regarded as mild level of discordance. A twin pair was called discordant-first when the smaller was first-born and discordant-second when the smaller was second-born. One-minute Apgar Score of 3 and below was designated as severe birth asphyxia.

The Student's t test was used in ascertaining the level of significance of two differences, which was set at $p < 0.05$.

RESULTS

During the 4-year study period, a total of 104 (2.3%) sets of live-born twins were delivered (not by caesarean section) in an obstetric population of 4,544. Overall male-to-female ratio was 0.98: 1.

Ratio of male Twin I to female twin I was 1:1. The same ratio was obtained for male Twin II and female twin II. As shown in Table I, Twin I was heavier than Twin II (61.5% versus 28.9%). Overall, the mean birthweight of male Twin I was greater than that of male Twin II by an average difference of 83g (Table 2) $p > 0.05$. Table 3 compared mean birthweight of female Twin I with that of female Twin II. Overall, there was no statistically significant difference in birthweight distribution. As shown in Table 2, when both sexes were combined, Twin I was heavier by an aver-

Table 2. Comparison of mean birthweight of Twin I and Twin II.

sex	Mean (SD) Birthweight in grammes				
	Twin I	Twin II	Difference	t-statistic	p value
Males	2515 ± 427	2432 ± 435	83	1.028	> 0.05
Females	2326 ± 445	2325 ± 501	1	0.011	> 0.05
Both sexes	2416 ± 467	2380 ± 472	36	0.276	> 0.05

Table 3. Birth order in 30 birthweight-discordant twin pairs.

Relative birthweights of Twins I and II	Levels of birthweight discordance in percentage			
	15-24.9 (moderate) No (%)	25-34.9 (severe) No (%)	35 or more (Extreme) No (%)	Total No (%)
Twin I greater than Twin II	11 (36.7)	4 (13.3)	1 (3.3)	16 (53.3)
Twin I less than Twin II	8 (26.7)	4 (13.3)	2 (6.7)	14 (46.7)

Table 4. Distribution of birthweights differences according to relative birth weight in 30 birthweight-discordant twin pairs.

Relative birthweights of Twins I and II	Birthweight difference (g) in twin pairs		
	< 500g No (%)	500-750g No (%)	> 750g No (%)
Twin I greater than Twin II	2 (6.6)	11 (36.7)	5 (16.7)
Twin I less than Twin II	6 (20.0)	5 (16.7)	1 (3.3)
Twins I and II combined	8 (26.6)	16 (53.4)	6 (20.0)

age of 34g. The mean birthweight of male Twin I was greater than that of female Twin I by 189g (t statistic = 0.862; p > 0.05). Similarly, the mean birthweight of male Twin II was greater than that of female Twin II by 107g (t statistic = 0.444; p > 0.05); Table 2.

Among the 30 birthweight discordant twins pairs, the mean birthweight of Twin I was 1973 ± 423g (95% confidence interval CI = 1753 – 2193) while the mean birthweight of Twin II was 2312 ± 480g (95% CI = 2090 – 2534) ± = 2.123 p > 0.05. Of the 30 birthweight discordant twin pairs, 14(46.7%) were discordant-first and 16 (53.3%) were discordant-second. Table 3 showed twin birth order in relation to levels of birth-weight discordance. Each of the three sets of twins in which both foetuses were stillborn exhibited severe levels of birthweight discordance greater than 25% (specifically, their levels of birthweight discordance were 26.7%, 36.6% and 60% in first, second and third twin pairs respectively). As shown in Table 4, Twin I is more likely to be heavier than Twin II when the birthweight difference between the pair is between 500-750g. When the birthweight difference exceeds 750g, the probability that Twin I will be heavier than Twin II is 83.3% (5 of 6). The risk of breech delivery and 1-minute Apgar Score of 3 and below were each 1.8 times higher in Twin II than in Twin I (Table 5).

DISCUSSION

Data from the present study showed that the widely held view that first-born twins were usually heavier

Table 5. Twin birth order and perinatal outcome.

A. Low birth weight n = 119	**No of babies**	**Percentage**
Twin I less than 2500g	55	46.2
Twin II less than 2500g	64	53.8
B. Twin birth order and presentation		
Twin I: n = 104		
Cephalic	76	73.1
Breech	25	24.0
Transverse	3	2.9
Twin II: n = 104		
Cephalic	59	55.7
Breech	44	42.3
Transverse	1	0.1
C. One-minute Apgar Score = or < 3 n = 14		
Twin I	5	35.7
Twin II	9	64.3
D. Perinatal death n = 8		
Twin I	2	25.0
Twin II	6	75.0

than their second-born siblings was incorrect. The differences in mean birthweights between the first-born and the second-born twins were small and statistically not significant, making it less likely to be important clinically. However, this does not imply that significant clinical problem could never occur.

In the present study, excluding twins of equal birthweight, first-born twins had weight advantage more often than their second-born siblings at birth. Other previous studies[1,2,19] in Nigeria have reported similar trend but with differing percentages. In contrast, some other investigators[5-7] have reported that second-born twins were more often heavier than their first-born siblings. There is no readily available explanation for this finding. It is possible that it is an integral part of the discordant phenomenon. This view is reinforced by the finding in this study that the probability that Twin I will be heavier that Twin II was 83.3% when the birthweight difference between the twin pair was greater than 750g.

Overall, comparing the mean birthweight of male twins I and II, the former was heavier than the latter by an average of 83g. However, this difference was not statistically significant. On the other hand, similar comparison between female twins I and II, showed that both had similar birthweight distribution with a difference of only one gramme. Comparison with previous studies[1-3,5,6] was not possible because the authors did not control for gender in their analysis of relative birthweights of Twins I and II. In both singletons[10] and twins[11], it has consistently been shown that males were significantly heavier than females at birth. It is possible that failure to control for gender in relative birthweight data analysis may have partly contributed to the conflicting reports in literature concerning relative birthweights in twins. Consequently, it is suggested that future studies aimed at verifying the truthfulness of the concept that first-born twins were usually heavier than second-born twins should take gender into consideration in their data analysis.

The results of the present study indicated that second-born twins demonstrated a higher tendency toward low birth weight, breech presentation and low Apgar Score compared to their first-born counterparts. Similar finding has been reported by other investigators[3,8,17,20]. These three factors above may

account for the higher perinatal death rate in second-born twins compared to their first-born counterparts.

One limitation of the present study was its failure to assess the effects of monozygosity versus dizygosity on this phenomenon. This represents an area of future study. Despite this limitation, the present study focused on assessment of the truthfulness of the concept that the first-born twin was usually heavier than its second-born sibling and our data have shown that irrespective of birth order any one of the twin pairs could weigh more or less at birth.

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20. Obisesan KA, Arowojolu AO, Ilesanmi AO, Roberts AO, Fawole O. Relative risk associated with the second-born twin at birth. Nig J Clin Pract 1999; 6 (1): 13-14. Table 1: Relative birthweights of Twins I and II.