Design of Growth Studies in Preterm Infants

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Background and Aims

A previous study indicated that precision was less and sample size requirements were greater with a parallel than a cross-over study design during balance studies in preterm infants (Cooke et al, 1988). The aim of this study was to compare sample size requirements of a parallel with that of cross-over study during growth studies in preterm infants (Cooke et al, 2006).

Methods

- Preterm infants were fed both study formulas, each for one week in a balanced random fashion.
- Weight was measured immediately before the study began, at the end of the first week and at the second week. Weight gain (g/d) was calculated for each week.
- Data were analyzed using the methodology described by Snedecor and Cochran with Fisher’s adjustment for degrees of freedom (Statistical Methods 7th Edition Iowa State University Press, Ames Iowa)

Results

- 16 (8 girls, 8 boys) preterm (≤ 32 w, ≤ 1750 g) AGA infants were studied.
- At birth, mean ($\pm$ SD) weight and gestational age were 1226 ± 204 g, 29 ± 5 w.
- At study entry, weight and age were 1471 ± 225 g and 22 ± 9 d.
- Individual weight gain data are presented in the **Table**.
- Overall, weight gain was greater in boys than girls ($+10$ g/d).
- Weight gain was greater with Formula A than B ($35.9 \pm 9 > 27 \pm 6$ g/d; $p < .005$), an effect that was also greater in boys ($42 \pm 13 > 27 \pm 8$ g/d) than girls ($34 \pm 9 > 29 \pm 9$ g/d).

Variances are also presented in the **Table**

- Paired variance, as is associated with cross-over design, was 165 g/d.
- Pooled variance, as associated with parallel study, was 242 g/d.
- Sample size requirements needed to increase from 16 in the cross-over to 24 pairs to provide the same precision with the parallel study design

Subject	Weight gain g/d		
	Formula A	Formula B	
1	32.5	35	Paired Variance 165 g/d ~ 16 pairs
2	53	26.3	
3	27	30	
4	50	25	
5	45	35	
6	28	25	Pooled Variance 283 g/d ~ 32 infants
7	32.9	33.3	
8	32	25	
9	22	14	
10	20	14	
11	35	24	Sample Size Difference $16 \times 283 / 165 = 27$ pairs
12	61	44	
13	31	48	
14	42.5	8.8	
15	40	26.7	
16	50	30	

Conclusion

Cross-over produced results that were statistically significant with fewer patients than the parallel study design.

Discussion

Balance studies are rarely performed in the modern era. A cross-over growth study might be the preferred method of study design when initially assessing the effects of different feeding strategies on growth during this critical epoch of growth and development. .