

Growth pattern of fetuses with chromosomal anomalies in the first trimester

Martin Hynek, Dagmar Smetanova, Eduard Kulovany, David Stejskal



Center for Fetal Medicine, Prague, Czech Republic

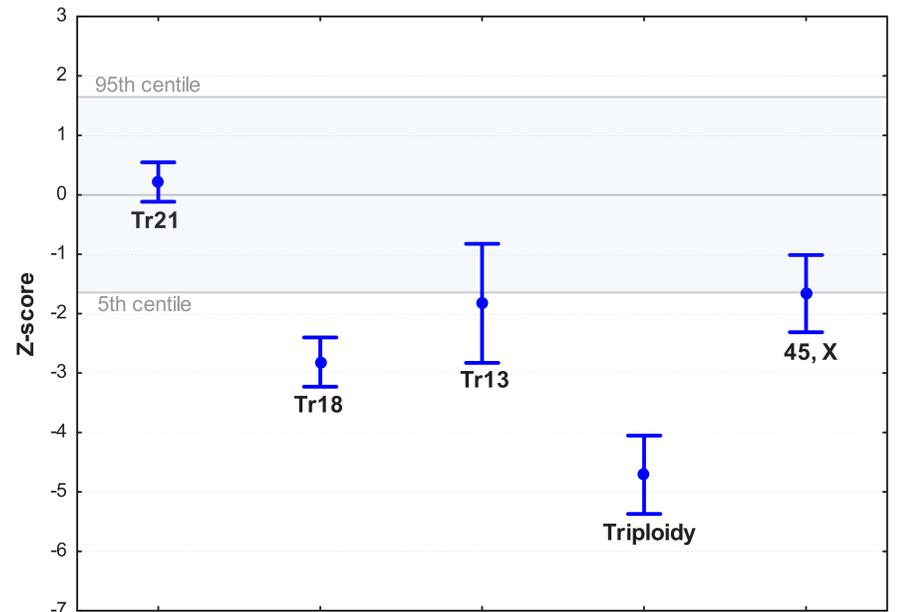
1. Introduction:

Chromosomal anomalies have been reported to be associated with fetal growth restriction (1). The aim of this study is to assess the extent of growth delay in chromosomal anomalies (CHA) based on CRL measurements during the first trimester.

2. Methods:

We conducted a retrospective cross-sectional study of CRL measurements of pregnancies with CHA examined during the first trimester screening in our facility over a 6-year period. Each CHA was assessed separately. For the means of comparison we constructed reference growth curve based on exactly dated singleton and twin pregnancies after in-vitro fertilisation including 572 CRL measurements of fetuses without chromosomal or organ anomaly and without subsequent spontaneous abortion. Reference growth curve together with 5th and 95th centile were constructed using mean and SD model described by Altman (2). The deviation between our observed CRL in CHA pregnancies and expected CRL for a given gestational age according to our reference growth model was expressed as z-score. For the purpose of statistical comparison mean z-score, 95% confidence interval and centile corresponding to the mean were calculated. One-sample t tests were carried out to verify if the z-score distribution is equal to zero. Finally, we compared z-scores of male and female fetuses with Down syndrome by the means of two sample t test.

Mean z-scores with 95% confidence intervals

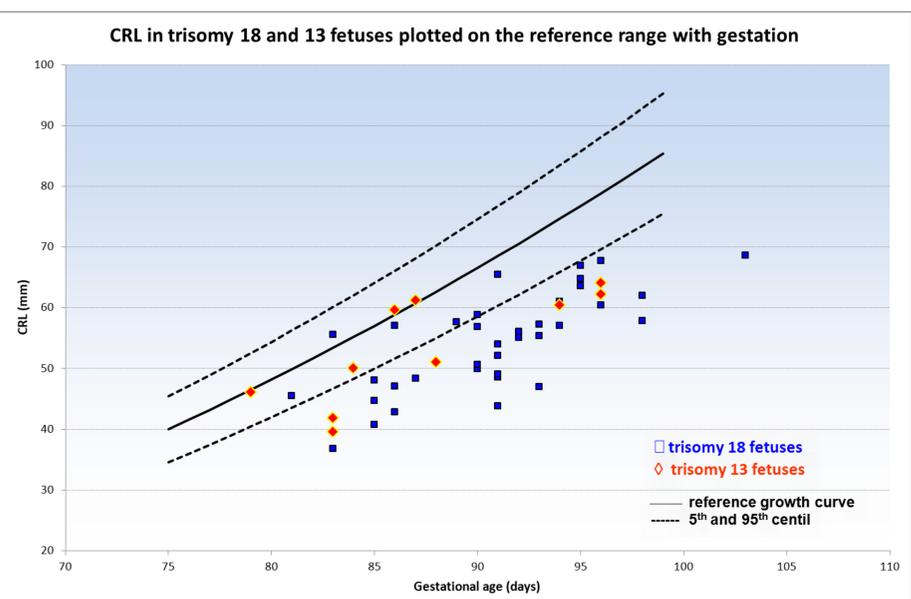
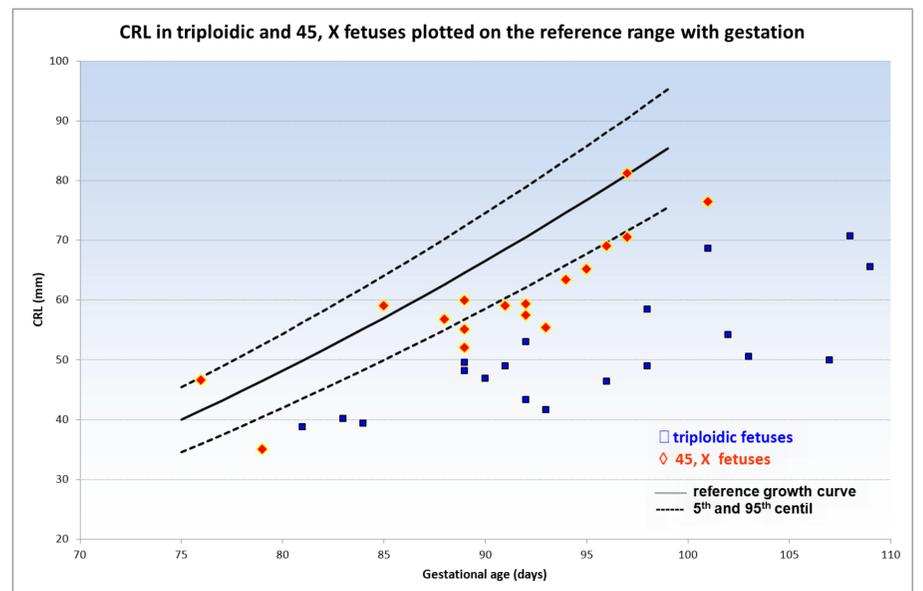
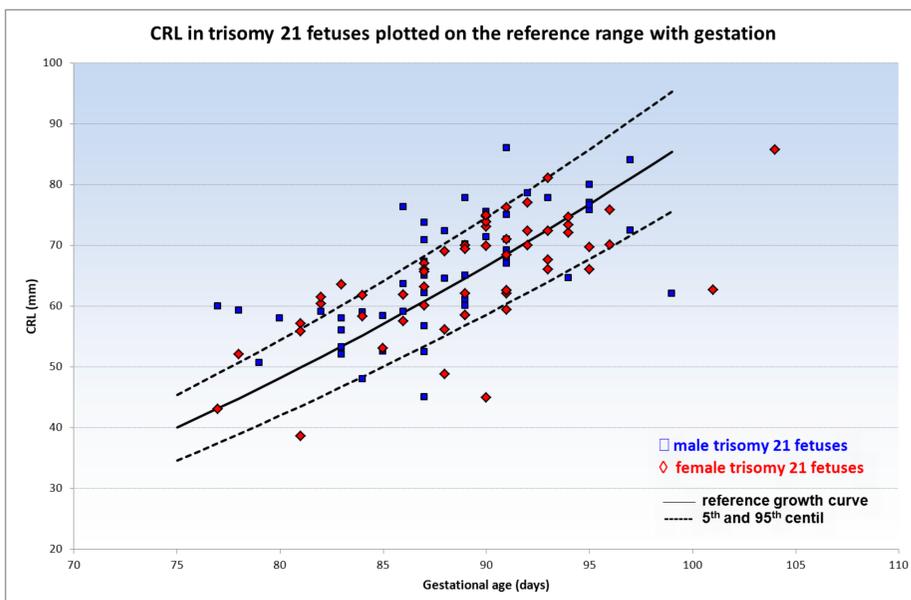


3. Results:

Reference growth model was established with the formula $CRL = 0,01333 GA^2 - 0,42728 GA - 2,9350$ for CRL in mm and GA in days.

A total of 174 CHA pregnancies was eligible for designed analysis. Of this number there was 104 cases with Down syndrome (Tr21), 32 with Edwards syndrome (Tr18), 8 with Patau syndrome (Tr13), 17 with Turner syndrome (45, X) and 13 with triploidy. We proved no difference in growth pattern of fetuses with Tr21 (mean z-score 0,22, 58th centile, $p=0,2$).

The separate comparison of female and male fetuses with Tr21 also revealed no significant difference ($t=1,31$, $p=0,18$). Otherwise, we observed a statistically significant growth restriction – similar in fetuses with 45, X and Tr13 (mean z-score -1,66, 4,9th centile, $p<0,001$, resp. mean z-score -1,83, 3,4th centile, $p<0,05$) and severe in Tr18 fetuses (mean z-score -2,82, 0,2nd centile, $p<0,001$). The most striking restriction was in triploidic fetuses (mean z-score -4,71, 0,0001st centile, $p<0,001$).



Chromosomal anomaly	Tr21	Tr18	Tr13	Triploidy	45,X
Number of cases	104	32	8	13	17
Mean Z-score	0,22	-2,82	-1,83	-4,71	-1,66
Mean centile	58,7	0,24	3,36	< 0,0001	4,85
p value	$p = 0,2$	$p < 0,001$	$p < 0,05$	$p < 0,001$	$p < 0,001$

4. Conclusion:

Statistical analyses showed no significant difference in growth pattern of Tr21 fetuses, regardless of their sex. By contrast, in 45, X, Tr13, Tr18 and triploidy there was a growth restriction of various extent, deepening in mentioned order.

Reference :

- Snijders RJ, Sherod C, Gosden CM, Nicolaides KH. Fetal growth retardation: associated malformationa and chromosomal abnormalities. Am J Obstet Gynecol 1993; 168: 547-555.
- Altman DG. Construction of age-related reference centiles using absolute residuals. Stat Med 1993; 12: 917-924.

Further information:

e-mail: martin.hynek@gennet.cz, www.gennet.cz