194

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Title: Do relaxin and progesterone serum levels affect pelvic organ mobility?

Aims of Study:

Relaxin, an insulin- like hormone, and progesterone, a common measure of luteal and placental function, have both been implicated in the pathogenesis of pelvic organ descent. Relaxin has been shown to induce marked changes in connective tissue: there is inhibition of collagen biosynthesis by dermal fibroblasts in vitro (1), dissociation of large collagen fibrils into smaller disorganized fibrils (2) and an increase in collagenolytic activity (3) in target tissues such as the cervix and the symphysis pubis. The effect of progesterone on connective tissue is much less well defined. The aim of this pilot study was to correlate relaxin and progesterone serum levels (obtained during the first and early second trimester) with hypermobility of the anterior vaginal wall as determined by translabial ultrasound.

Methods:

In a prospective pilot study serum samples were obtained from 50 nulliparous women seen between 9 and 16 weeks' gestation, the time at which relaxin serum levels are expected to peak (4). Samples were processed on the same day and stored at -20^{o} or below until analysed. Of 50 samples, 49 were available for analysis. Progesterone serum levels were determined on an automated analysis system (Vitros ECI, Johnson& Johnson Immunodiagnostics), utilizing a competitive immunoassay technique. Relaxin was analysed manually using an enzyme- linked immunosorbent assay (hRLX Elisa, Immundiagnostik Bensheim, Germany). For the progesterone assay, the manufacturer quotes a precision of between 4.4 and 8.2 % (CV). The %CV for the hRLX Elisa was determined at between 5.9 and 13.6 for the working range of the test. Hypermobility data was obtained by translabial ultrasound as previously described (5), with descent of the bladder neck on Valsalva (BND) determined against the inferoposterior margin of the symphysis pubis. Interobserver variability for this test is under 20% (own unpublished data). Joint hypermobility was also documented for elbow and fifth finger hyperextension and thumb/ wrist flexion (6). Ethics Committee approval had been obtained from the institutional ethics committee. Pearson's Correlation statistics were performed, with a $p< 0.05$ taken as statistically significant.

Results:

Figure 1 shows scatterplots of progesterone and relaxin serum levels against BND. There were no significant or near significant correlations with clinical (joint hypermobility) and ultrasound (BND, proximal urethral rotation, cystocele descent, retrovesical angle on valsalva) indices of hypermobility. The only significant correlation detected was between gestational age and serum progesterone ($R= 0.488$, $p< 0.001$).

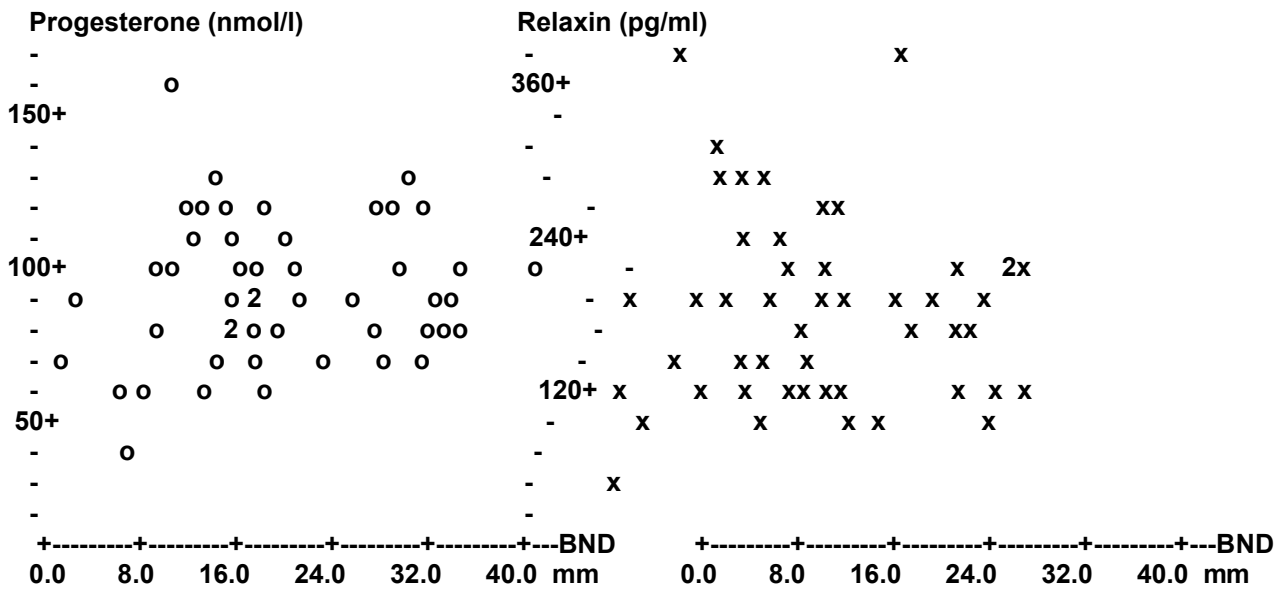

Figure 1: Progesterone and relaxin serum levels plotted against bladder neck descent (n= 49)

Conclusions:

Pregnancy seems to result in increased pelvic girdle mobility, and it has been suspected for a long time that this is an early rather than a late phenomenon (7). This also appears true for pelvic organ mobility. In this group of 50 nulliparous women seen at 9-16 weeks' gestation, bladder neck descent (as determined by translabial ultrasound) varied between 1 and 42 mm. A hormonal influence on pelvic fascia and ligaments could potentially explain this marked variation. The authors therefore attempted to correlate serum levels of relaxin and progesterone, the two hormones most likely to influence pelvic connective tissue, with clinical and ultrasound indices of ligamentous relaxation. No significant or near significant correlations were detected.

These negative findings may be due to methodological limitations, e.g., lack of longitudinal hormone determinations, or the timing of blood sampling. Another explanation could be that the variations in pelvic organ mobility seen early in a first pregnancy may be largely genetic in origin, reflecting intrinsic connective tissue quality rather than pregnancy- related changes

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