

ABSTRACT

Title: Changes in the mechanical parameters of women's hair during pregnancy

Matters: We can look from different angles on the hair – as on a nanocomposite fiber and as on biomaterial changing with the origin and age. The hair doesn't differ only by length, structure and color but also by diameter and shape. It reflects the overall health of the individual and all the processes in the organism of the individual and thus also the pregnancy. During pregnancy, hormonal changes take place which have an effect on the hair. Many women experience faster hair growth, extension and increased volume of the hair during pregnancy. This status is only temporary and lasts only to the childbirth.

Aim: The aim of this work was to show the influence of pregnancy on mechanical parameters of hair and what direction this influence takes. Next, using questionnaires, to better solve the effect of particular pregnancy parameters on the hair, i.e. pregnancy order, sex of the child. Then, evaluate the whole problem using statistical tests and so make better sense of it.

Methods: We'd selected a group of 64 pregnant women; hair samples were cut from them in the nape area each month throughout pregnancy. Each measurement started with evaluation of hair diameter with the use of optical microscope. Next, the hair had been measured by the tensile machine Deform type 2; there the shape of the deformation curve has been examined. Also we examined some hair samples using a torsional pendulum. All measurements have been processed and put into tables and graphs.

Results: For the whole group of women observed, i.e. for 1755 hair samples, we have found hair diameter of $84,48 \pm 15,15 \mu\text{m}$ and the true modulus of elasticity $2,5 \pm 0,71 \text{ GPa}$. Changes during pregnancy are best described by the trends, i.e. by the mean time changes of quantity values in this period. Significant differences appear in resilience and relaxation force. For these variables the order of pregnancy is a significant factor. The significant factor for trends F_0 is sex of the child. Another conclusion can be for the measured values. The three parameters, i.e. pregnancy order, sex of the child and place where the women live positively correlate with the diameter of hair, the linearity limit, the proof stress, the true relative elongation to fracture and the tensile toughness and F_0, F_1, F_3, τ_2 .

Conclusion: We managed to demonstrate changes in the diameter of hair and resilience during pregnancy common to the whole population observed. In contrast with documented dependence of several mechanical quantities on the pregnancy order, the demonstrated strong correlation between the sex of the child and some mechanical parameters was not expected.

Key words: gravidity, mechanical parameters of hair, viscoelastic parameters of hair, ceratin, viscoelastic model of hair