ABSTRACT

The maternal diet during pregnancy is an important factor involved in the epigenetic programming of the offspring. In addition to the nutritional aspect, the epigenome is also influenced by possible contaminating substances that may occur in the diet of pregnant women. An important group of these potential contaminants are persistent organic pollutants, which are compounds of mostly anthropogenic origin that persist in the environment for a long time, become part of food chains, and some of them accumulate in living organisms. These substances are being monitored for their adverse effects on organisms, and the use of some of them has already been banned or at least significantly restricted.

The aim of this work was to find out whether the quality of the diet of pregnant women in the Czech Republic differs in terms of nutrition and contamination with persistent organic pollutants so much that these differences can be reflected in the methylome of newborns.

The diet quality of 49 pregnant women from the Karviná and České Budějovice regions was analyzed. During the last month of pregnancy, these women recorded in detail all the food they ate for one week and at the same time collected a quarter of this food in boxes (one box for one day). Information on the quantity and quality of the diet was obtained from the diet records, and the concentrations of 67 different persistent organic pollutants belonging to five different groups - polychlorinated biphenyls, organochlorine pesticides, brominated flame retardants, perfluorinated compounds and polyaromatic hydrocarbons - were analyzed in the collected food samples. Subsequently, possible associations were evaluated between the nutritional quality of the maternal diet and the maternal alimentary intake of POPs on the one hand and the methylome status of newborns in umbilical cord blood cells on the other.

The nutritional quality of the diet of the pregnant women in the studied group did not reach the recommended values in some monitored parameters, especially the protein and fiber intake was insufficient. Alimentary intake of persistent organic pollutants was at a very low level and in the vast majority of cases it was an order of magnitude lower than the established limits. Differences in the diet of individual women were not significant enough to be reflected in the methylome of newborns.