EXPOSURE TO PCBS AND OTHER POPS AND REPRODUCTIVE OUTCOME IN THE NORWEGIAN HUMIS STUDY.

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Introduction

Although PCB has been forbidden for more than 20 years now, and its levels in human milk is declining, it remains among the chemicals in human milk causing concern with regard to its possible detrimental effects on the fetus and the breastfed child. However, our knowledge is limited and with regard to most outcomes inconsistent results are being reported.[1] Some of the reason for the inconsistency could be due to differences in the total exposure pattern to different POPS between populations, and lack of control for this. In hope of increasing our knowledge of the effect of PCBs and other POPS on child health a prospective birth cohort that will allow for control of a variety of coexisting POPs has been established. The aim of the present presentation is to present the HUMIS cohort and to present some preliminary results.

Materials and Methods

In a population-based birth-cohort, mother and child pairs are consecutively recruited after birth by health visitors or by a medical doctor (Østfold county). Participating mothers are then sent containers for milk and a questionnaire usually within 2 weeks after their consent has been registered at The Norwegian Institute of Public Health, except for Østfold county were the containers and questionnaires are handed out to the mothers at the hospital after birth The preferred sample method is to collect 25 ml every morning on eight separate days, totaling 200ml, before the child is 2 months of age and to do the milking by hand avoiding any electrical or other types of pumping equipment. However, the mothers are free to decide how and when to sample and we also accept pumped milk from other times of the day and milk collected in a longer or shorter period of time. All details on how and when the milk was sampled are however registered by a sampling scheme. The containers have been thoroughly washed and the absence of toxicants in its empty and washed state checked. When the container is filled it is posted by the mothers, and stored at –20 degrees in a Biobank of the Norwegian Institute of Public Health upon arrival.

Information on health outcomes is obtained by questionnaires sent to the families when the child is 1, 6, 12 and 24 months and 7 and 12 years of age. The recruitment started in 2003 and provided sufficient funding, we plan to include a total of 6000 mother/child pairs enabling future nested case-control studies on different health outcomes. 1700 mother/child pairs have been recruited so far. A Microsoft Access database keeps track of all participating mother and incoming as well as outgoing material and questionnaires. The recruitment up to now has taken place in six counties in Norway, which represent northern, southern, western, and eastern parts of Norway including both coastal and inland areas (Rogaland, Telemark, Troms, Østfold, Oppland and Akershus).

350 samples were randomly selected within the 5 counties. 30 samples were selected randomly from SGA children and 20 samples selected within children that were prematurely born. All together 400 milk samples have been analyzed. The results reported here are based on 124 children in whom the quality check of the data file has been completed.

Information used in this paper has been obtained primarily from the questionnaire sent or handed out to the mothers and asked to be filled in when the child was approximately one month old. This questionnaire provides information about birth weight, gestational age, pregnancy complications, maternal educational level in 5 categories, maternal height and weight at the start of the last pregnancy as well as weight at the start of milk sampling, smoking habits, parity, nationality and duration of breastfeeding of previous children. Information on the duration of exclusive and partial breastfeeding of the present child is obtained from the first questionnaires, as well as at 6, 12 and 24 months of age. Child health is also mapped in subsequent questionnaires with special focus on the number and types of infections and allergic diseases, as well as unspecific disorders.

Information on the general population of birth-giving mothers during the period of 2000-2003 was obtained through the Norwegian Medical Birth Registry,[2] which is a national registry containing information on all children born in Norway since 1967.

Concentrations of the sum of 6 indicator PCBs, IUPAC # 28, 52, 101, 153, 138 and 180 were measured at the Norwegian School of Veterinary Science. The extraction and lipid clean-up were done according to methods described earlier.[3] The lipid concentration of the milk was determined gravimetrically. Details for determination of PCBs on a GC-ECD were described earlier.[4]

Statistical analysis was performed using SPSS 12 software. In bivariate analysis, medians are given and non-parametric tests (Kruskal Wallis) were used to test for significance. Linear regression analysis was used to study the association between birth weight and sum6pcb, adjusted for potential confounders.

Results and discussion

First we studied the characteristics of study sample and the sampling details. Compared to the general population the characteristics of the randomly selected sample of 350 mothers were similar for age (29, 29y), gestational length (278, 279 days), child's birth weight (3675 to 3570g), but with a lower percentage of smokers (8.6, 17.4%) and a lower percentage of firstborn children (37, 44%). Most mothers started the milk sampling when the child was approximately one month old (mean 35, median 37, min 2 max 157 days) and they had collected on eight separate occasions (mean 6.5 median 8, range 1 to 8 times) over a period of eight days (mean 13, median 8, range 1 to 111 days), most of them had sampled the milk by hand (69%). Only one third of the mothers had used pump equipment (31%).

Preliminary results on the levels of sum 6PCBs in 123 human milk samples are reported. The mean and median concentration of the sum of 6 PCBs was estimated to 87 and 81 µg/kg milk fat, respectively with a minimum value of 20 and a maximum value of 331.

In order to map potential confounders, we first studied factors associated with sum6PCB. Factors significantly associated with sum6PCB in the bivariate analysis were: maternal age, county and maternal education. In a model adjusting for all variables mentioned here the following additional factors were significantly associated with sum6PCB: duration of previous breastfeeding, maternal weight at pregnancy start, weight before milk sampling, maternal education level, and number of years between mothers first and last (current) child. Maternal smoking, height, nationality and parity were not significantly associated with sum6PCB. In the model 35% of the variance in the PCB levels was accounted for.

The mean and median birth weight was 3660g and 3705g, respectively, with a minimums value of 1613 and maximum of 4910. There was no association between birth weight and sum6PCB levels in the bivariate analysis ($p=0.4$). Nor were there any association between sum6PCB and birth weight in a model adjusting for maternal age, duration of previous breastfeeding, maternal weight at pregnancy start, weight difference to the time of milk sampling, maternal education level, and number of years between mothers first and last (current) child, smoking, parity, height, gestational length and child sex. Due to small sample size there is a risk of Type 2 error. These analysis will be repeated for altogether 400 samples. Furthermore separate analysis on each congener as well as for additional POPs will be performed and presented.

References

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