SALIVARY AND SERUM STEROID HORMONE LEVELS AND BREAST MILK DIOXIN CONCENTRATIONS IN VIETNAMESE LACTATING WOMEN

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Introduction

Dioxin is an toxic chemicals generated from the herbicides production. Dioxins exist sustainably in ecosystem and human body. During war in Vietnam, from 1962- 1971, US Military sprayed a huge amount of Dioxins over Vietnam Southern war area for general defoliation and crop destruction (Stellman et al, 2003). Bien Hoa, Phu Cat and Da Nang are exposed at highest levels (Dwemychuk et al, 2005). Li et al (2005) demonstrated that the biosynthesis of androgens, cortisol, and aldosterone is altered by dioxin-like PCB126 in human adrenocortical H295R cells. Dioxin are mainly concentrated in breast milk due to it ís highly lipophilic. Up to now, there have not been many researches on dioxin levels and steroid hormone in the saliva and serum of people in Vietnam hot-spots. We conducted this research on " Saliva and serum steroid hormone levels and breast milk dioxin concentrations in Vietnamese lactating women in Phu Cat district, Binh Dinh province" with the following objectives:

- To identify dioxin levels in breast milk of lactating women in Phu Cat Dist., Binh Dinh Province, Vietnam.
- To identify steroid hormone levels in the saliva and serum of lactating women in Phu Cat Dist., Binh Dinh Province, Vietnam.

Materials and methods

114 women aged from 20 to 30, breast-feeding their children from 4 to 16 weeks old. They were divided into 2 research groups:

Exposed group: 56 women living at Phu Cat, Binh Dinh (Cases).

Non-exposed group: 58 women living in Kim Bang, Ha Nam (Controls).

- Identifying the steroid hormone levels (including cortisol, cortisone, androstenedione (A-dione), dehydroepiandrosterone (DHEA), estradiol (E2) and estrone) in saliva and serum of lactating women living surrounding Phu Cat military airport, Binh Dinh Province and living in Kim Bang Dist., Ha Nam province as control group

Methods
- Comparative cross- descriptive research method was used
- Sample collection:
Breast milk of women aged from 20 to 30, breast-feeding their children from 4 to 16 weeks old were collected

Case group consist of women living around Agent Orange/Dioxin exposed hot-spots in Phu Cat, Binh Dinh
Control group consist of women living at Kim Bang Dist, Ha Nam province

Specimen obtainment and storage
+ Technique for collecting saliva, serum and milk specimens
All research subjects were fully informed about and consented to participate into the research. The specimen collection was conducted at the morning time (from 8am to 10 am) in the two research locations:
- Saliva was collected by rinsing mouth with water and then transferring the resulting mixture directly into a test tube (15 mL)
- Blood (5 mL) after collected was processed with centrifugal machine to extract the serum.
- Breast milk was collected by the mothers themselves into the clean containers.

All samples were stored with dry ice and analyzed at Lab of Kanazawa University.

Ethics Consideration

- All subjects gave their consents to the research participation. The personal information and related results were kept confidential. The obtained data is for the purposes of the research only, not for any other objective.

Results and discussion

Dioxin in breast milk in research locations

The results showed that TEQ PCDDs, TEQ PCDFs and TEQ PCDDs + PCDFs in milk of women living at Phu Cat were significantly higher than these indicators of women at Kim Bang with $p < 0.001$. TEQ PCDDs in milks of cases was 7.28 (5.04 – 9.34) and of controls 2.02 (1.23 – 3.26), TEQ PCDFs of cases was 4.44 (3.10 – 5.01) and controls 1.43 (1.06 – 1.80), TEQ PCDDs + PCDFs of cases was 11.17 (8.30 – 13.83) and of controls 3.61 (2.28 – 4.99). These results were consistent with research by Nhu et al (2009b) in Agent Orange/Dioxin levels in Cam Lo dist., Quang Tri province comparative to controls at Cam Xuyen, Ha Tinh.

So many years after the war, population and ecosystem have been still suffered heavily from herbicide sprayed during the war. Dioxin concentrations were highest in soil and half-life of Dioxin in human being lasts from 7 to 11 years (Schecter, 2003). Dioxin mean level in breast milks of cased lactating women were 3.2 times higher than that of controlled women.

Hormone level in research locations

The obtained results of cortisol and cortisone levels in serum in Phu Cat, Binh Dinh were significantly higher than in Kim Bang, Ha Nam (p value < 0.01) . Meanwhile, diferrences among DHEA, A-dion, estrone and estradiol levels obtained in Phu Cat and Ha Nam were not significant ($p > 0.05$). Steroid hormone levels possibly changed according to dioxin exposure scale.

Nhu and Teruhiko Kido (2011) showed that steroid hormone level varied depending on the dioxin exposure levels. Research by Nguyen Ngoc Hung (2010) indicated that there was high correlation between levels of cortisol, cortisone in milk and these in saliva of lactating women.

Results of this research showed that cortisol and sortisone in saliva collected in Phu Cat (exposed area) were significantly higher than in Ha Nam (non-exposed area) with $p < 0.01$. Other steroid hormone levels identified in the two research locations were not different to each other with $p > 0.05$. These results were consistent with the research by Nhu et al (2010) conducted in other hot-spot area. By contrast, the estradiol level in this research was not consistant with results by Nhu et al in 2011.

Correlation between hormone in serum and hormone in saliva of lactatin women in the two research locations

+ Correlation between cortisol in serum and in saliva (ng/ml): $y = 0.023x – 0.24$; $R2 = 0.60$; $p < 0.001$;

+ Correlation between cortisone in serum and in saliva (ng/ml): $y = 0.41x – 0.28$; $R2 = 0.44$; $p < 0.001$;

+ Correlation between DHEA in serum and in saliva (pg/ml): $y = 0.02x + 59.34$; $R2 = 0.38$; $y < 0.001$;

+ Correlation between androstenedione in serum and in saliva (pg/ml): $y = 0.038x – 1.93$; $R^2 = 0.81$; $y < 0.001$;

+ Correlation between estrone in serum and in saliva (pg/ml): $y = 0.033x + 0.302$; $R^2 = 0.59$; $y < 0.001$;

+ Correlation between estradiol in serum and in saliva (pg/ml): $y = 0.006x + 0.09$; $R2 = 0.74$; $y < 0.001$;

Up to now, there is still not any proved related factor to the level of steroid hormone in saliva, relation between salivary and serum steroid hormone levels and dioxin exposure levels. This research is necessary to measure the dioxin effects on health of population in dioxin hot-spots in Vietnam. Basing on the results, we would like to give some conclusions as follows:

- Dioxin levels in breast milk in exposed area was significantly higher than in non-exposed area with $p < 0.001$

- Cortisol and cortisone in serum and saliva obtained in exposed area were significantly higher than these in non-exposed one with $p < 0.01$.

- A quite high correlation between salivary hormone and serum hormone ($r > 0.63$, $p < 0.001$)

References

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