AN EPIDEMIOLOGICAL STUDY ON HEALTH EFFECTS BY DIOXIN IN VIETNAM; COMPARISON OF VISUAL ACUITY OF JUNIOR HIGH SCHOOL STUDENTS BETWEEN HERBICIDE SPRAYED AND NON-SPRAYED AREAS

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Abstract

To clarify the adverse health effects induced by dioxins involved in herbicide sprayed during Vietnamese War, we have conducted epidemiological studies in herbicide-sprayed areas since 2002. The purpose of this study is to compare the eyesight in two areas. The subjects are men and women, who were about 300 junior high school students in each area. We measured 5m eyesight using the Landolt's ring eyesight test chart. We interviewed existence of poor eyesight persons in a family, watching time of TV, possession of TV and TV game and learning hours at home by original questionnaire. The mean of eyesight was significantly lower in sprayed area than non-sprayed area divided by sex and grade ($p<0.001$). As a result of multiple regression analysis, an area and TV watching distance were significantly associated with both eyes.

These results show that eyesights of junior high school students are influenced by the area more than habits such as watching time of TV and learning hours at home.

Introduction

To clarify the adverse health effects induced by dioxins involved in herbicide sprayed during Vietnamese War, epidemiological studies have been conducted in herbicide-sprayed and control non-sprayed areas since 2002. We have already shown significantly higher dioxins levels of serum, breast milk and adipose tissues in inhabitants of sprayed area than those in non-sprayed area, while no significant difference was found on early indicators of adverse health effects such as liver or thyroid function and immunological activities. [1,2] As for the result of contrast eyesight in 2005, eyesight was significantly lower in sprayed area than non-sprayed area.[3] To confirm the results above, the number of subjects was increased. In addition, we chose junior high school students to exclude the influence of habit related to eyesight as much as possible. The purpose of this study is to compare the eyesight in two areas.

Subjects and Methods

The subjects are men and women, who were junior high school students in August, 2006. The number of subjects was 301 in sprayed area, and 328 in non-sprayed area. In distinction of sex and grade, there was almost no difference in the number of subjects in each area.

We measured 5m eyesight with the Landolt's ring eyesight test chart. We measured their height and weight and then calculated BMI. We interviewed about existence of poor eyesight persons in a family, distance to the TV, watching time of TV, possession of TV and TV game, playing time of TV game and learning hours at home by original

questionnaire.

We compared with mean eyesight in two areas, divided by sex and grades using *t*-test. We also analyzed correlation of eyesight with habit and BMI in each area and all data. We made a multiple regression analysis using eyesight as objective variance and area, TV watching distance, BMI and family history as explanatory variables.

Results and Discussion

The results of the mean of eyesight are shown in Table 1. As for the mean of eyesight, the mean of eyesight was significantly lower in sprayed area than non-sprayed area divided by sex and grade ($p<0.001$). The results of their habits examined by questionnaire are shown in Table 2. The weight ($p<0.01$) and BMI ($p<0.001$) in non-sprayed area were significantly lower than sprayed area, and learning hours at home in sprayed area was significantly longer than non-sprayed area ($p<0.001$). However, learning hours and eyesight did not have the significantly correlation in both area ($r=-0.14$). There was no significant difference in height, the rate of possession of TV and a TV game and the presence of family history in each area. Multiple regression analysis eyesight was significantly associated with the area ($p<0.001$) and TV watching distance ($p<0.01$) in both right and left eyes. (Table 3) It was possible that eyesights of junior high school students are influenced by the area more than habits such as watching time of TV and learning hours at home since standardized partial regression coefficient of area is larger than other ones.

For next issue, we should investigate effects of nutritional status, especially Vitamin A to eyesight as an other confounding factor.

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Table 1 Mean of eyesight divided by sex and grade

	Sprayed area			Non-sprayed area			p-value
	N	Right eye Mean±SD	Left eye Mean±SD	N	Right eye Mean±SD	Left eye Mean±SD	
Total	289	1.49±0.34	1.50±0.35	272	1.81±0.29	1.80±0.30	***
Men	134	1.53±0.33	1.55±0.33	142	1.83±0.29	1.80±0.32	***
Women	155	1.45±0.34	1.46±0.37	130	1.79±0.29	1.80±0.28	***
6^{th} grade	119	1.49±0.36	1.46±0.36	92	1.84±0.27	1.83±0.31	***
7^{th} grade	97	1.53±0.35	1.57±0.34	99	1.78±0.30	1.77±0.31	***
8^{th} grade	73	1.40±0.29	1.49±0.35	81	1.82±0.30	1.81±0.29	***

*** $p<0.001$: significant difference between sprayed and non-sprayed area.

Table 2 Results of questionnaire

	Sprayed area (N=289)	Non-sprayed area (N=272)	p-value
Height (cm)	142.6±7.5	141.9±7.6	
Weight (kg)	33.1±6.0	31.5±5.9	**
BMI	16.1±1.8	15.5±1.7	***
Study hours at home (hour)	3.5±1.3	2.8±1.0	***
Possession of TV (%)	270 (93.4)	245 (89.4)	
TV watching distance			
1m (%)	8 (2.8)	16 (6.0)	
2m (%)	134 (46.7)	114 (42.9)	
3m more (%)	145 (50.5)	136 (51.1)	
Possession of TV game (%)	39 (13.5)	25 (9.1)	
Family history (%)	57 (19.7)	39 (14.2)	

Family history: existence of poor eyesight person in a family.

** $p<0.01$, *** $p<0.001$

Table 3 Association of eyesight with areas, TV watching distance and family history using multiple regression analysis

	Right Eye (N=561)		Left Eye (N=561)	
Explanatory variable	β	p-value	β	p-value
Area (Sprayed: 1, Non-sprayed: 0)	-0.469	***	-0.391	***
TV watching distance	0.124	**	0.141	**
Family history			-0.093	*
R	0.234		0.181	

Family history: existence of poor eyesight person in a family.

β: standardized partial regression coefficient

R: multiple correlation coefficient

* $p<0.05$, ** $p<0.01$, *** $p<0.001$