

Growth and Development of Permanent Teeth Germ of Transplacental Yu-Cheng Babies in Taiwan

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This paper is intended to present a study of transplacental Yu-Cheng babies in Taiwan. The focus of the study is to demonstrate how a contaminated food source can affect the growth and development of permanent teeth germ in children.

A sporadic outbreak of a peculiar skin disease was reported in Japan (Fukuoka Prefecture) in October of 1968. An epidemiological study revealed the outbreak of this disease was caused by contaminated Kanemi rice oil. This episode of rice oil poisoned with polychlorinated biphenyls (PCB) was the first reported outbreak of PCB poisoning in the world. A second episode occurred in central Taiwan eleven years after the Japanese episode. This poisoning was substantiated by epidemiological studies (Ko et al. 1981; Hsu et al. 1984; Hsu et al. 1985). The results of these studies were as follows: (1) The major age group affected by the outbreak was between 11 and 25 years of age. (2) Most victims were students and factory workers. (3) Registered data from the Taiwan Provincial Government Health Department reported 1843 cases in 1980. Of this group, more than 800 women were child-bearing age and most of these women would or soon would be married and pregnant. The offsprings of these women were in danger, because it has been proven that PCB intoxication could affect the fetus (Taki et al. 1969, Allen et al. 1980). The fetus suffers contamination through the placenta. Absent any other route of contamination, these babies, only contaminated through the placenta, are called "PCB transplacental Yusho babies" in Japan (Yoshimura 1974) and "PCB transplacental Yu-Cheng Babies" in Taiwan.

Babies with PCB poisoning could have "Fetal PCB syndrome (FPS)" (Yamashita et al. 1985) and may have retarded eruption of permanent teeth and other anomalies such as reduced numbers of teeth and abnormal shaped roots (Fukuyama et al, 1979). PCB transplacental Yu-Cheng babies will increase due to the special demographic distribution characteristics of PCB poisoned people in Taiwan (for more than 800 women of child-bearing age). The study of transplacental Yu-Cheng babies is an important public health issue for Taiwan. Although there may be other issues, this study

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will focus only on the growth and development of permanent teeth of those babies affected by PCB transplacental contamination.

MATERIALS AND METHODS

Four primary schools were selected from high density areas of PCB intoxication. Data from the Local Health Bureau was combined with basic data from our previous study (Lan, 1982; Lan et al. 1987). Our exposure group was made up of poisoned mothers and transplacental Yu-Cheng babies that were born after 1979.

We also matched a reference group based on the following criteria : (1) same sex (2) age difference within three months (3) same occupation of fathers (4) similar family economic status (5) indigenous residents of the area (6) mothers with no poisoned by PCB.

Each exposed case was matched against four randomly selected reference cases. Participation in the study was optional. The 18 exposed children (9 males and 9 females) had chosen to participate in the study. A reference group of 72 (36 males and 36 females) were chosen by random selection but only 44 children (26 males and 18 females) chose to join the study. Panographs of the 62 participants were taken by the same dentist using the same X-ray machine. A complete oral examination was completed on each participant. Each participant's dental history was recorded with particular attention given to any past history of permanent teeth extraction. The X-ray films were read by three dentists using single blind method. The three dentists did not know which film belong to exposed group participants or to reference group participants.

A skillful and experienced dentist would easily observe any congenital absence of permanent teeth from children of 7 or 8 years old. The third molar is an exception so this tooth was not included in the study.

All three dentists identified the same permanent teeth germ missing in all cases.

RESULTS AND DISCUSSION

The results obtained in this study are given in Table 1. Among 9 transplacental Yu-Cheng girls, 4 were missing permanent teeth germ due to congenital factors (4/9). Among the 18 girls in the reference group, none was missing permanent teeth germ due to congenital factors (0/18). Among 9 transplacental Yu-Cheng boys, one was missing permanent teeth germ due to congenital factors (1/9). Among the 26 boys in the reference group, one was missing permanent teeth germ due to congenital factors (1/26).

The study of Fukuyama et al (1979) reported that : Among 43 (24 males and 19 females) PCB poisoned children there were 37 (22 males and 15 females) non-transplacental Yu-Cheng babies and 6 (2 males and 4 females) transplacental Yu-Cheng babies. One of the

two (1/2) transplacental Yu-Cheng babies girls permanent teeth germ were missing due to congenital factors. None of the four (0/4) transplacental Yu-Cheng baby boys had permanent teeth germ missing due to congenital factors.

The 37 PCB poisoning non-transplacental Yu-Cheng babies poisoned ages ranged from 0 to 8 years old. This group included 22 non-transplacental Yu-Cheng girls. Three of them had permanent teeth germ missing (3/22). No one among the 15 non-transplacental Yu-Cheng boys had permanent teeth germ missing (0/15).

Their conclusion is that PCB poisoning may cause retarded eruption of permanent teeth, anomalies in the number of teeth, and abnormal shaped roots.

Table 1 : Congenital missing of permanent teeth of PCB transplacental Yu-Cheng children and their reference group

Exposed No.	Sex	Congenital missing	Missing site	Congenital missing of control	Missing site
1	F	+	5 5	- -	
2	F	+	54 5	- -	
			5 5		
3	F	+		- - -	
			2		
4	F	+	7542 457	- - -	
			754 457		
5	F	-		- -	
6	F	-		- -	
7	F	-		- -	
8	F	-		-	
9	F	-		-	
10	M	+	4	- + -	3 3
11	M	-		- - -	-
12	M	-		- - -	
13	M	-		- - -	
14	M	-		- - -	
15	M	-		- - -	
16	M	-		- -	
17	M	-		- -	
18	M	-		- -	

'- ' means : no congenital missing of permanent teeth

'+' means : congenital missing of permanent teeth

After these studies, the questions still remain : (1) Why does PCB affect the growth and development of permanent teeth germ in transplacental and non-transplacental Yu-Cheng girls ? (2) How does PCB interfere with the normal development of permanent teeth germ especially on girls ? (3) What mechanisms may cause permanent teeth germ to fail to form ? Thus, the experiments on

diphyodont animals are absolutely needed to further study on these questions.

Reports about the effects of PCB poisoning on the early eruption of deciduous teeth are available (Funatsu et al. 1971, Yamaguchi et al. 1971). But we do not find reports about missing deciduous teeth germ due to PCB poisoning. It will be a very interesting topic for our further study since these transplacental Yu-Cheng female fetuses received their mother's PCB poisoned blood from a fertilized egg but their deciduous teeth germ could keep intact and only permanent teeth germ be affected.

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