

A SURVEY OF CONGENITAL MALFORMATION AND PREGNENCY ABNORMALITIES AMONG TOXIC CHEMICALS/DIOXIN VICTIMS

Quang Le B, Hau Doan H, Luong Hoang V,
Vietnam Military Medical University

Abstract

Investigating the proportion and distribution of congenital malformation and pregnancy abnormalities among children and grand children of 47,893 veterans living in 8 provinces in Vietnam between 1994 and 2004; of which 28,817 had prehistoric exposure with toxic chemicals/Dioxin. The results showed that:

- Proportion of congenital malformations among toxic chemicals/Dioxin exposed veterans' children was 2.95%, higher than that among exposed veterans' brothers and sisters, and of non-exposed veterans. Among chemistry/Dioxin exposed veterans' congenital malformation children and grandchildren, the proportion musculature malformation was 27.45%, higher than other malformation types; the proportion of nervous system malformation was 11.08%.
- Proportion of pregnancy abnormalities out of sum of pregnancies among female veterans and male veterans' wives was 41.27%, statistically higher than that of unexposed group (27.92%). Pregnancy abnormality proportion out of sum of pregnancies among toxic chemicals/Dioxin exposed history veterans' daughters and daughter-in-laws was 37.82%, statistically higher than that of unexposed group (28.30%). As well, pregnancy abnormalities such as abortion, mortal premature delivery, womb death, were higher in exposed group than those in unexposed group.

Introduction

The use of toxic chemicals/Dioxin of American military Southern Vietnam has caused people's serious health consequences. Many studies in the world and in Vietnam have shown that toxic chemicals/Dioxin is relevant to congenital malformations and pregnancy abnormalities^{1,2,3,4,5}. To reveal harmful effects of toxic chemicals/Dioxin to Vietnamese veterans' children and grandchildren, we carried out this study with the following objectives:

- Identify the congenital malformation proportion and distribution features among toxic chemicals/Dioxin exposed veterans' progenies.
- Identify the pregnancy abnormality proportion and distribution features among toxic chemicals/Dioxin exposed veterans' wives, daughters and daughter-in-laws.

Materials and Methods

Participants: Investigating 47,893 veterans aging from 47 to 65 living in 8 provinces/cities of Vietnam (Hoa Binh, Thai Nguyen, Thai Binh, Quang Tri, Binh Dinh, Dac Lac, Binh Duong and Can Tho) who ever fought in Southern region from 1962 to April, 1975, of those, 28,817 were anamnesticly exposure with toxic chemicals/Dioxin and 19,076 were unexposed.

Methodology: Cross-sectional study with analysis: Interviewing directly veterans and their family's members/family trees using structured questionnaires. Case-control study based on data stored at local study health facilities (commune health station, hospital, etc). Continuously supervising exposed veterans' households from 1994-2004 to identify congenital malformation and pregnancy abnormality frequency, age of congenital malformation-born-mothers and congenital malformation proportion by order of child.

Results and Discussion

1. Congenital malformation proportion among children and grandchildren of toxic chemicals/Dioxin exposed veterans.

We carried out on 28,817 exposed veterans' households and 19,076 unexposed veterans' households, 1,640 exposed congenital malformation households and 356 unexposed congenital malformation households. Moreover, the number

of alive children of the exposed veterans' households is 77,816 in which the number of congenital malformation children was 2,296 and there were 452 congenital malformation children in 61,043 alive children of the unexposed veterans' household. The results show that the congenital malformation proportion of toxic chemical exposed veterans' children was 2.95%, statistically higher than that of non-exposed veterans' children (0.74%) ($p < 0.01$). Whether the malformation proportion is high or low depends on observing level and recording of each author in different areas. In this study, we merely compared between exposed and non-exposed group under the same conditions. There were approximately 2% congenital malformation newborns⁸. Congenital malformations such as genital, spinal and heart malformations detected later in childhood and teenager caused congenital malformation proportion higher in children. Our study however was not able to completely collect data of later and ignorable congenital malformations.

We also compared the congenital malformation of toxic chemical/Dioxin exposed and non-exposed veterans' grandchildren, this study was carried out on 53,910 exposed reproductive F1 households, 2,537 of which had congenital malformation children and 46,604 unexposed reproductive F1 household, 738 of which had congenital malformation children. Among 113,211 F2 alive children of exposed veterans' households and 99,038 unexposed veterans' households were 3,045 congenital malformation and 812 ones, respectively. The results show that congenital malformation proportion of toxic chemical/Dioxin exposed veterans' grandchildren was 2.69%, statistically higher than that of non-exposed veterans' one ($p < 0.01$). F1 generation's congenital malformation proportion (veterans' sons and daughters) was higher than F2 generation's statistically. This result agreed with the study of Nguyen Van Nguyen et al. (1998) at several hot places of Bien Hoa, Da Nang, and Phu Cat airports. The comparative results of congenital malformation between toxic chemical/Dioxin exposed veterans' children and exposed veterans' siblings' children and non-exposed veterans' children show that congenital malformation proportion of veterans' siblings' and non-exposed veterans' children was 0.76%, statistically lower than that of toxic chemical/Dioxin exposed veterans' children (2.95%). Hence, congenital malformation of those veterans' children was not hereditary.

In order to compare the congenital malformation proportion by birth order of F1, we surveyed 2,296 children among 77,816 alive children. The results show that the number of congenital malformation in the first children accounted for 36.72%, of such in the second children was 34.58%, in the third children was lower at 16.33%. Congenital malformation proportion by birth order indicated that the emergency of congenital malformation concentrating on the first and the second children was statistically higher than that of the third children and the following ones ($p < 0.01$). Consequently, some families, due to last congenital malformation children (alive or died), tried to bear the third, the fourth and the fifth child with the hope that they might have some healthy one.

We also carried out classifying of congenital malformation of exposed veterans' progenies by ICD-10⁹, nervous system (Q00-Q07) and musculature system (Q65-Q79), the results indicated that among 5,314 congenital malformation progenies (2,296 children-F1 and 3,045 grandchildren-F2) of toxic chemical/Dioxin exposed veterans, musculature malformation occupied the highest proportion (27.45% compared with sum of observed congenital malformation cases). Harelip-cleft palate and eye-ear-face-neck malformations, meanwhile, occupied lower proportion from 2.90% to 3.71%. The number of multi-malformations was remarkable high: 1,387 cases, accounting for 25.97%. Connor Ferguson-Smith (1993)⁶ showed that severe congenital malformation ratio was 10/1000 of nervous system, such ratio of circulatory system was 8/10000, of urogenital system was 4/1000, of musculature system was 2/1000, and of other malformation was 6/1000. Beside that among nervous system congenital malformations, cerebral palsy's and incompetence's proportions were the highest (31.42% and 40.02%). Our findings were similar to findings of local authors studying from 1996 to 1999 in Bien Hoa, Da Nang. Also, they agreed with study of Nguyen Van Nguyen et al. from 1996 to 1999 in Bien Hoa, Da Nang. According to several foreign authors, cerebral palsy proportion out of 1000 alive children was 1.9-2.5 (Igram, 1995); 1.4⁷; 2.6 (Glentinh, 1976); 2.49 (Hagberg and Iolow, 1986). And the limb malformation occupied the highest proportion among musculature system congenital malformations. The proportion of malformation cases of both upper limb and lower

limb were 25.51%; the upper limb's malformation proportion was 22.31% separately and the lower limb's malformation proportion was 18.10% separately. Other types of limb malformations such as polydactyly and syndactyly had low proportion (1.92% and 3.41%). Thorax malformation was 8.59% and undetermined musculature multi-malformation was 10.16%.

Through the study, we found that the number of congenital malformation children of lower than 35-year-old mothers occupied 75.79%; the proportion of congenital malformation children of higher than 45-year-old mothers was lowest (5.30%). The age of non-exposed mothers giving congenital malformation births tended to be higher; it was however not statistically significant ($p > 0.05$). It is revealed that under 17-year-old mothers easily gave congenital malformation births due to hormone unbalance. Meanwhile, aged women gave congenital malformation births as well.

2. Pregnant abnormality proportions of toxic chemical/Dioxin exposed veterans' wives, daughters and daughter-in-law.

Table 1: Pregnant abnormality proportion of toxic chemical/Dioxin exposed/ non-exposed female veterans and male veterans' wives.

Indicators	Exposed group (n=28,817)	Non-exposed group (n=19,076)
Number of pregnancies	132,114	84,115
Number of alive birth-giving	77,586	60,378
Number of pregnant abnormalities	54,528	23,485
Pregnant abnormalities/ number of pregnancies	41,27	27,92

Pregnant abnormality out of number of pregnancy of exposed group was higher than that of non-exposed ($p < 0.05$). In Giong Trom, Ben Tre, the random aborting proportion before scattering was 6% (129 abortions/1,562 pregnant cases). After scattering, that proportion was 14% (217 abortions/1,562 pregnant cases).

Pregnant abnormalities were observed on toxic chemical/Dioxin anamnestic exposed female veterans and male veterans' wives. There were statistically significant difference of pregnant abnormality proportions between exposed and non-exposed group ($p < 0.05$).

Table 2: Pregnant abnormality proportions of toxic chemical/Dioxin anamnestic exposed veterans' daughters and daughter-in-laws.

Indicators	Exposed veterans' offspring (n=53,910)	Non-exposed veterans' offspring (n=46,064)
Number of pregnancies	177,180	136,602
Number of alive birth-giving	110,162	97,944
Number of pregnant abnormalities	67,018	38,658
Pregnant abnormalities/ number of pregnancies	37,82	28,30

The indicator of veterans' F1's proportion of pregnant abnormalities out of number of pregnancies (daughters and daughter-in-law) were lower than those of female veterans and male veterans' wives correlatively. The indicator of proportion of pregnant abnormality out of F1's number of pregnancy were higher among toxic chemical/Dioxin exposed veterans than non-exposed group ($p < 0.01$). This proportion was significantly higher than data Japan and Asian countries.

Most of pregnant abnormality cases were observed on daughters and daughter-in-laws of toxic chemical/Dioxin anamnestic exposed veterans'. The difference of particular pregnant abnormalities between exposed group and non-exposed group was similar to that difference of female veterans and male veterans' wives.

Conclusions

1. Congenital malformation proportions and features of toxic chemicals/Dioxin anamnestic exposed veterans' children and grandchildren.
 - Congenital malformation proportion of toxic chemicals/Dioxin exposed veterans' children was 2.95%, higher than that of non-exposed veterans' children and exposed veterans' siblings ($p < 0.01$). Congenital malformation proportion of toxic chemicals/Dioxin exposed veterans' grandchildren was 2.70%, higher than that of non-exposed veterans' grandchildren ($p < 0.05$).
 - Congenital malformation proportions of the first child and the second child were higher than later ones; F1 generation congenital malformation was 27.45% that of nervous system was 11.08%.
 - Female veterans, male veterans' wives, veterans' daughters and daughter-in-law gave births of congenital malformation at age 25-35, occupying 75.79%.
2. Pregnant abnormality proportions and features of toxic chemical/Dioxin anamnestic exposed male veterans and veterans' daughters and daughter-in-laws.
 - Proportion of pregnant abnormality out of number of pregnancy of toxic chemical/Dioxin anamnestic exposed male veterans and male veterans' wives was 41.27%, statistically significant ($p < 0.01$) higher than that of non-exposed group (27.92%).
 - Proportion of pregnant abnormality out of number of pregnancy of toxic chemical/Dioxin anamnestic exposed veterans' daughters and daughter-in-laws was 37.82%, statistically significant ($p < 0.01$) higher than that of non-exposed group.
 - Such pregnant abnormalities as abortion, dead premature delivery, dead malformation child, and womb dying fetus were higher in toxic chemical/Dioxin exposed group than those of non-exposed group.

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