

HEALTH STATUS STUDY OF FEMALES HANOI VETERANS EXPOSED TO THE CHEMICALS DURING THE VIETNAM WAR

Le Thi Hong Thom¹, Le Thi Thai Hang¹

10-80 Division, Hanoi Medical College, 35 Nguyen Huy Tuong, Thanh Xuan, Ha noi, Viet nam

Introduction

The chemical war, that lasted for more than 10 years (1961-1971) in South Vietnam had ended 30 years ago, but its severe outcomes on exposed human health still existed. Dioxin, the most ecotoxic agent, that human known to now, have been researched by many scientists over the world. The studies conducted in experimental animals and partly in human tissues, have demonstrated that, dioxin cause the toxicity for many biofunctions^{1,2}...

Many research into human health have been done, most of the studies have concentrated on the health effects of male exposed veterans. This study had done on the Hanoi females, who have served in some military forces during chemical wartime in the South of Vietnam. The purpose is aimed to evaluate the health status and the reproductive health, concerned to exposure.

Materials and Methods

Subjects:

Exposed are the Hanoi females veterans, served in the South during wartime, after war returned to the North, ended the exposure.

Unexposed are the Hanoi females veterans, served in wartime only in the North.

Method: epidemiological cohort study

The data of the study have been processed and analyzed by EPIINFO 6.04, STATA 7.0, the results evaluated and interpreted in correspondence with the epidemiological disciplines, as follow:

- The statistical relation between Agent Orange/Dioxin Exposure and the Health Outcomes, rely on the strength of the evidence: RR/OR; CI; p value.
- Errors removing/or restricting (chance, bias, and confounding)
- Cause-effect relationship verifying, giving the overtop for strength of association (RD, AFe...), temporally correct association, consistency of association, considering the other hypothesis or interpretation

Sample size is 1055 females, includes 314 veterans exposed and 741 unexposed.

Results and discussion:

Health status:

There are significant differences of pathologies, concerning exposure, females veterans who spent military time in the sprayed areas of the South have disease frequency of 1.67 time higher than unexposed, with p value of 0.01, especially in the rates of nervous system, musco-skeletal, skin diseases, and cancer in general. The dose-response relationship between pathology and exposed levels from light to heavy have been observed.

Table 1: Relative disease frequencies by exposure level

Diseases	Unexposed (n=741)	Light Exposed (n=213)	Heavy Exposed (n =101)	χ^2 for trend	p
Nervous	37.2	49.3	75.6	38.3	0.01
Musco-skeletal	32.7	42.1	47.6	13.2	0.05
Skin	0.9	6.2	15.4	29.2	0.002
Cancer	0.7	1.1	4.7	22.3	0.001

Taking into account the strength of the scientific evidence and the appropriateness of the epidemiological method to detect the association, the outcomes have sufficient evidence of to be associated to exposure are: neurasthenia, lung tuberculosis, chloracne, chronic hepatitis, and cancer.

Table 2: The significantly high relative frequency diseases

Diseases	RR (CI.)	p	RD/100	AFe%
Neurasthenia	4.72 (3.65-6.1)	0.001	1.57	37.2
Lung tuberculosis	7.87 (2.18-28.4)	0.001	3.47	51.1
Chloracne	10.3 (3.97-27.1)	0.01	6.85	71.2
Chronic hepatitis	7.91 (2.21-27.4)	0.001	3.26	53.2
Cancer	4.25 (1.43-12.5)	0.007	1.23	36.2

Reproductive Health outcomes:

There is a clear relationship between exposure and the reproductive health, they are spontaneous abortion, stillbirth, and birth defect delivery. The differences are high statistically significant in spontaneous abortion and birth defect, the most birth defects are the mental retardations of different levels, the defects of the musculoskeletal system like deformities of hands, legs, or spina bifida. This data of our study is higher in comparison with the other study on male veterans of Hanoi^{3,4}, but lower than the rate of study on female still living on the sprayed areas of the South⁵.

There is the dose-response relationship between reproductive outcomes and exposed levels also.

Table 3: Reproductive outcomes by exposure

Outcomes	Husband-unexposed		Husband-exposed	
	Wife unexposed	Wife exposed	Wife unexposed	Wife exposed
<i>Abortions spontaneous</i>	4.7	12.2	11.9	20.5
RR (CI.)	2.85(2.18-3.73)		1.92 (1.21-3.04)	
p	0.001		0.01	
<i>Stillbirths</i>	0.54	1.41	1.39	2.16
RR (CI.)	2.51 (1.15-5.51)		1.56 (0.39-6.23)	
p	0.02		0.07	
<i>Birth defects</i>	0.36	3.59	3.63	8.86
RR (CI.)	10.2 (4.38-23.7)		2.58 (1.18-6.14)	
p	0.0001		0.03	

Spontaneous abortions have the relative frequency of total pregnancies is 13.7 among exposed veterans, while is 5.5 of unexposed, made the significant difference with relative risk of 2.51, p value less than 0.01.

Stillbirths have the rate of total pregnancies is 1.5 in exposed veterans, while is 0.7 in unexposed, the difference is statistically significant with relative risk of 2.35, p<0.01.

Birth defects have the rate in total live births of exposed veterans of 4.63, compared to 0.7 of unexposed veterans, difference is statistically significant with relative risk of 6.63, p<0.001.

Logistic regression analysis of the birth defect delivering and risk factors shows the relation between birth defect delivering and the factors of direct exposure, exposure time and exposure level. The rate of birth defect delivering is highest if both wife and husband have been exposed to war chemicals.

Table 4: Multiple logistic analysis of birth defect delivering

Factors	p	Multiple logistic		Pseudo R ₂
		CI.95%	RR	
Direct exposure	0.01	0.19-0.87	3.70	59%
Exposed period of time	0.01	0.23-0.69	2.41	
Exposed level	0.03	0.17-0.57	4.72	
Disease during pregnancy	0.06	0.55-0.72	1.11	
Husband exposure	0.001	0.10-0.46	5.87	
Mother occupation	0.06	0.38-0.98	1.22	
Exposure to other chemicals	0.07	0.38-0.98	1.52	

Heavy exposed veterans have the risk of birth defect delivering of 5.2 folder higher than unexposed. Direct exposure have the risk of birth defect delivering of 3.5 folder higher. Exposure of 5-8 years have the highest risk of birth defect delivering than the other period of exposure time.

Acknowledgements:

We are grateful for the sponsorship of Ministry of Health for funding. We also especially appreciate the cooperation of Vietnam Veteran Association to undertake the studies willingly and performed them diligently. We thank the Organizing Committee of Dioxin 2011 for its assistance in performance the presentation.

References:

1. Hoang Tri Quynh, Le Cao Dai and Le Thi Hong Thom (1989); *Chemosphere* 18: 967-974.
2. Institute of Medicine (IOM) (1994); *Veterans and Agent Orange*: 74-110.
3. Le Cao Dai, Hoang Trong Quynh, Nguyen My Hien, Le Hong Thom, Le Bich Thuy (1993); *2nd International Symposium*, Hanoi: 240-245.
4. Le Cao Dai, Nguyen Thi Ngoc Phuong, Le Hong Thom, Tran thi Thuy, Nguyen thi Tu Van, Le Hong Cam, Huynh thi Kim Chi, Le Bich Thuy (1989); *Dioxin* 89: 1005-1012.
5. Le Hong Thom, Hoang Dinh Cau (2002); *Viet Nam-US Scientific conference*, Ha Noi: 492-506.