

Evaluation of Occupational Risk Factors in Non-Hodgkin Lymphoma and Hodgkin's Disease in Iranian Men

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Abstract

Background: Lymphoma is a malignancy, arises from lymphoid tissue. Nowadays, it is the ninth most common cancer in Iran. The risk factors of malignant lymphomas have not well determined, but since 20 years ago till now, too many epidemiological researches have been concerning either Non-Hodgkin Lymphoma (NHL) or Hodgkin's Disease (HD). It is a common usual hypothesis that idiosyncratic reaction to common physical, chemical, and viral agents could lead to lymphoma without obvious immune deficiency. Some occupations has reported to cause increasing "NHL" risks, such as rubber industry, veterinaries, uranium mining, metal working, asbestos exposing, farming, textile industry, and benzene exposing. The roles of ionizing radiation, benzene and other environmental agents have not been clear, because of the lack of confirmed evidences for relation between the occupational and environmental agents with "HD".

Methods: A case-control study with 150 cases of malignant lymphoma and 150 controls have performed in Tehran. Data have selected through face-to-face interviews about the medical and occupational histories.

Results: In this study, there was a significantly increased risk for Non-Hodgkin Lymphoma in these occupations; welders, metal workers, founders, aluminium workers OR=4.6 [Confidence Interval (CI): 1.47-14.35] and increased risk for Hodgkin's Disease in drivers OR=2.34 [(CI):0.86-6.35]. We have found out decreased NHL risk in office workers OR=0.54 [(CI):0.29-1.02] and also found out a non-significant increased NHL risk in farmers OR=1.58 [(CI):0.82-3.03]. In this study, we have found no relation between smoking and HD, or NHL.

Conclusion: The results of this study suggest that several occupations could alter the risk of Non-Hodgkin Lymphoma and Hodgkin's Disease.

Keywords: Hodgkin's Disease; Non-Hodgkin Lymphoma; Occupational exposure

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Introduction

Remarkable changes in mortality and incidence of various cancers have occurred in recent decades. Lymphoma is a malignancy that arises from lymphoid tissue.

Nowadays, it is the ninth most common cancer in Iran [1]. The risk factors of malignant lymphomas have not well determined, but since 20 years ago till now, too many epidemiological researches have been concerning either Non-Hodgkin Lymphoma (NHL) or Hodgkin's Disease (HD). The known risk factors explain only a small proportion of malignant lymphoma.

Non occupational risk factors that might predispose NHL Include: age, gender, race, primary or

hereditary immune deficiency syndrome, autoimmune disease such as Sjogren's, Celiac disease, Rheumatoid Arthritis, Systematic Lupus Erythematosus, certain infections (such as EBV, HCV), genetic factors and family history of lymphoma in first-degree relatives [2, 3].

There are some occupational and environmental risk factors which might cause lymphoma such as exposure to chemicals (phenytoin, dioxin, phenoxy herbicide), radiotherapy, radiation and chemotherapy. Some occupations increase risk of NHL including: rubber industry, veterinarians, uranium miners, exposure to asbestos, wood industry, metal working, female textile workers, farmers, chemists, exposure to benzene [3-5].

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Non occupational risk factors that have impressed Hodgkin's Lymphoma including: sex, race, immune deficiency. It seems that genetic susceptibility has no role for Hodgkin's Lymphoma, but one exception: homozygote twins [3, 4].

Some occupations might have a role to cause Hodgkin's Lymphoma but there is a controversy about their role. Only, there is a concurrence on role of wood industry, to cause Hodgkin's Lymphoma [5]. Exposure to pesticide and solvents might also have a role in Hodgkin's Lymphoma development [4]. Trichloroethylene, tetrachloroethylen, 1, 3 butadiene are in 2A group International Agency for Research on Cancer (IARC) and tetrachlorodibenzo-p-dioxin, phenoxy acetic acid, chlorophenol are in 2B group IARC [6].

"Boffetta and Devocht study" has suggested homogeneous elevated risk of NHL in wood and printing industry, but there was heterogeneous elevated risk, has found in farmers especially in animal husbandry and teachers. But it doesn't seem that these occupations represent major risk factors for NHL in most populations [7].

"Fristchi- L. study" has shown: NHL risk has increased by solvents exposure, like benzene, and possibly by wood dust exposure [8].

Mannetje has confirmed that crop farmers and meat workers are high risk occupations for NHL in New Zealand [9].

Master et al. has suggested there is no strong relation between aromatic hydrocarbons (benzene, toluene, xylene, or styrene) and developing malignant lymphoma [10].

Regarding the cancer incidence growth, prevention of this disease is one of the most essential health programs in each country. So identification of high risk jobs helps us to prevent cancers. This has not been studied so far in Iran.

Materials and Methods

This study was a case-control study. Cases were patients with Non- Hodgkin Lymphoma or Hodgkin's Disease with pathological diagnosis, whose have admitted in two reference university hospitals (Imam Khomeini Hospital and Shariati Hospital) in Tehran. "Controls" were cases brothers. If patient had no brother, a close relative has chosen. The patients and controls were not specifically age-matched but they were approximately the same age range.

Inclusion Criteria

1-NHL or HD with pathological diagnosis

2- Male

3- Age ≥ 18 years

Exclusion Criteria

1- Any history of hereditary immune deficiency, primary immune deficiency, autoimmune disease, immunosuppressive drugs consumption, organ transplantation before cause of disease

2- Unwillingness of patients to cooperate in this study

Data Collection

Data has gathered through patient interview in hospital sections. Necessary data about cases have asked from Non- Hodgkin's and Hodgkin's Lymphoma patients then have recorded on a questionnaire, which have specially designed for this study.

Questionnaire has included demographic data, history of medicine consumption and diseases, occupational history topics such as current job title and former ones, duration of each job, exposure to chemicals, cancer in colleagues, etc.

Patients with less than one year occupation have not included.

Statistical Analysis

Data have analyzed with utilization of SPSS 11.5. Relationship between disease and other variable criteria have analyzed with Pearson Chi- square.

Results

Out of 150 cases, there were 95 Non- Hodgkin's Lymphoma and 55 Hodgkin's Lymphoma.

Statistical analysis has shown that mean age of Hodgkin's Lymphoma cases and controls were 42.7 and 41.3 years respectively. There was no statistically significant difference between case and control groups (p -value=0.528).

Mean age of Non Hodgkin's Lymphoma cases and controls were 47.5 and 46.1 years respectively.

There was no statistically significant mean age difference between case and control groups (p =0.525).

There were 16 (29%) smokers among Hodgkin's Lymphoma cases and 19 (34.5%) smokers in control group and no significant cigarette smoking difference between Hodgkin's Lymphoma case and control groups.

Smoking frequency in Non Hodgkin's Lymphoma case and control groups were 25 (26.3%) and 29 (30.5%) respectively. There was no significant cigarette smoking difference between Non Hodgkin's Lymphoma case and control groups.

Table 1. Distribution of different occupations in Non- Hodgkin's Lymphoma and odds ratio of Non-Hodgkin's Lymphoma development in different occupational groups

Occupational group	Job	Case	Control	OR (95% CI)	P value
1	Farming *	30	21	1.58 (0.82-3.03)	0.165
2	Driving **	12	13	0.91(0.39-2.11)	0.83
3	Forging*, Turning*, Casting, Welding*, Aluminum working, Metal working*	16	4	4.6 (1.47-14.35)	0.005
4	Office working	23	35	0.54 (0.29-1.02)	0.059
5	Solicitor ship	24	27	0.851(0.448-1.61)	0.623
6	Painting*	0	1	0.98 (0.96-1.01)	0.31
7	Construction working*	4	3	1.34 (0.29-6.19)	0.70
8	Textile*, Spinning, Carpet weaving	3	6	0.48 (0.11-1.9)	0.30
9	Shoe making*, Glass making, Piping, Smoother, Hose making	3	6	0.48 (0.11-1.9)	0.30
10	Electrician, Electrical equipment repair work	3	1	3.06 (0.31-30)	0.31

*: High risk jobs in causing NHL

Table 2. Frequency distribution of different occupations in Hodgkin's Lymphoma and odds ratio of Hodgkin's Lymphoma development in different occupational groups

Occupational group	Job	Case	Control	OR(95% CI)	P value
1	Farming*	6	3	2.12 (0.50-8.95)	0.297
2	Driving	14	7	2.34 (0.86-6.35)	0.08
3	Forging*, Turning*, Casting, Welding*, Aluminum working, Metal working*, Mechanic*	14	8	2 (0.76-5.26)	0.15
4	Office working	18	17	1.08 (0.48-2.42)	0.83
5	Solicitor ship	13	17	0.69 (0.29-1.61)	0.39
6	Painting, Dye manufacture*, Printing*, laundry*, Photography*, Carpentry*, Cabinet work	6	2	3.2 (0.62-16.8)	0.14
7	Construction working	1	3	0.32 (0.03-3.18)	0.30
8	Textile, Spinning, Hosiery, Sewing	2	4	0.48 (0.08-2.74)	0.40
9	Shoe making, Glass making, Piping, Smoother, Hose making	1	6	0.15 (0.01-1.30)	0.05
10	Electrician, Electrical equipment repair work	2	1	2.03 (0.17-23.15)	0.55

*: High risk jobs in causing NHL

Table 1 shows distribution of different occupations in Non- Hodgkin's Lymphoma case and control group and odds ratio of Non-Hodgkin's Lymphoma development in different occupational groups. Table 2 shows distribution of different occupations in Hodgkin's Lymphoma case and control groups and odds ratio of Hodgkin's Lymphoma development in different occupational groups.

Discussion

Some studies have shown: there is no relationship between cigarette smoking and Non-Hodgkin Lymphoma [11-15].

In the third occupational group (working with metals) NHL was significantly higher in patients rather than control group [OR= 4.6 (1.47-14.35) p-value=0.005]. This is corresponding with "Fabbroperay, Zheng and Richardson" studies [11, 16, 17]

Table 3. Distribution of high and low risk occupations in NHL case and control groups

Occupations	High risk	Low risk	total
Case (%)	63(66.3%)	32(33.7%)	95 (100%)
Control (%)	53(55.8%)	42 (44.2%)	95 (100%)

Table 4. Distribution of high and low risk occupations in HL case and control groups

Occupations	High risk	Low risk	total
Case (%)	40(72.7%)	15(27.3%)	55(100%)
Control (%)	24(43.6%)	31(56.4%)	55(100%)

and some studies which have found increased risk of developing NHL in welders [11, 18-20].

In this study we could not identify, which occupation had the greatest role to cause this difference, because the frequency of each single occupation was low and we had to combine different occupations, regard to common exposures.

In first occupational group (agriculture), there was no statistically significant difference between NHL and control group [OR=1.58 (0.82-3.03)].

Some studies have suggested that farming has related with NHL [7, 9, 11, 16, 17, 21] whereas some other studies have not found any relationship between farming and NHL [18].

In fourth occupational group (office work), our findings could not confirm a reverse relationship with NHL development OR=0.54 (0.29-1.02) which has suggested by Persson and Mannetje studies [9]. This could be due to our small sample size.

In the eighth occupational group (textile, spinning), there was no relationship between the jobs and NHL. This might also be due to low frequency workers in this occupational group.

In Hodgkin's Disease, smoking data analysis has shown no statistically significant difference between case and control group.

In second occupational group (driving), Hodgkin's Lymphoma was not higher in patients rather than control group [OR= 2.34 (0.86-6.35) p-value=0.08] but Mannetje [9] has suggested such a relationship.

Although it is suggested that relatives of lymphoma patients have higher risk for developing [21], but the patients in our study have not reported any family history of lymphoma [22-25].

Some occupations have suggested as high risk for NHL which includes agriculture, exposure to pesticide, mechanic, welding, metal working, painting, printing, construction working, photography, textile, driving, laundry, teaching, carpentry and turning. Our findings have shown NHL patients were significantly more likely to these occupations than control group [OR=2.48 (1.38-4.47) p-value=0.0002] (Table 3).

Also Hodgkin's Lymphoma patients were significantly closer to high risk jobs than control group [OR=3.44 (1.55-7.64) p-value=0.002] (Table 4).

Conclusion

Thus we could conclude that working in these "high risk" jobs might be related with lymphoma, however we could not confirm it for every particular job category because of low sample size. Except for the relation between working with metals and Non-Hodgkin Lymphoma. We suggest conducting research with more subjects in this regard.

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Conflict of Interest

The authors declared no potential conflict of interest with respect to the authorship and/or publication of this article.

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Authors' Contribution

Omid Aminian and Ali Abedi designed the study, collected and analyzed the data. Farzaneh Chavoshi wrote the paper. Fatemeh Rahmati Najarkolaei was the editor of the manuscript. All authors read and approved the final revision of the manuscript.

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