



A hospital-based case-control study of acute myeloid leukemia in South Korea : Analysis of occupational data investigated by a general hospital surveillance system

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BACKGROUND

- The occupational acute myeloid leukemia(AML) surveillance system was established at Seoul St. Mary's Hospital in June 2018.
- The surveillance system was conducted through cooperation between the Department of occupational and environmental medicine(OEM) and the Department of Hematology, and the AML patients who were first hospitalized were evaluated for work relatedness.
- The purpose of this study was to identify the association between occupational exposures and AML using data from the occupational cancer surveillance system by a hospital-based case-control study.

METHOD

- Participants (AML cases): 304 incident cases of AML diagnosed at Seoul St. Mary's Hospital from June 2018 to December 2020.
- Controls: 1,170 community-based controls matched by sex and age
- Collected data: Interviewer-administered questionnaires were used including 27 occupational categories and 32 potential occupational risk factors during hospitalization.
- Cumulative exposure level evaluation: 2 industrial hygiene experts
- Statistical analysis: The odds ratios(OR) with 95% confidential intervals (CI) were estimated by using conditional logistic regression models.

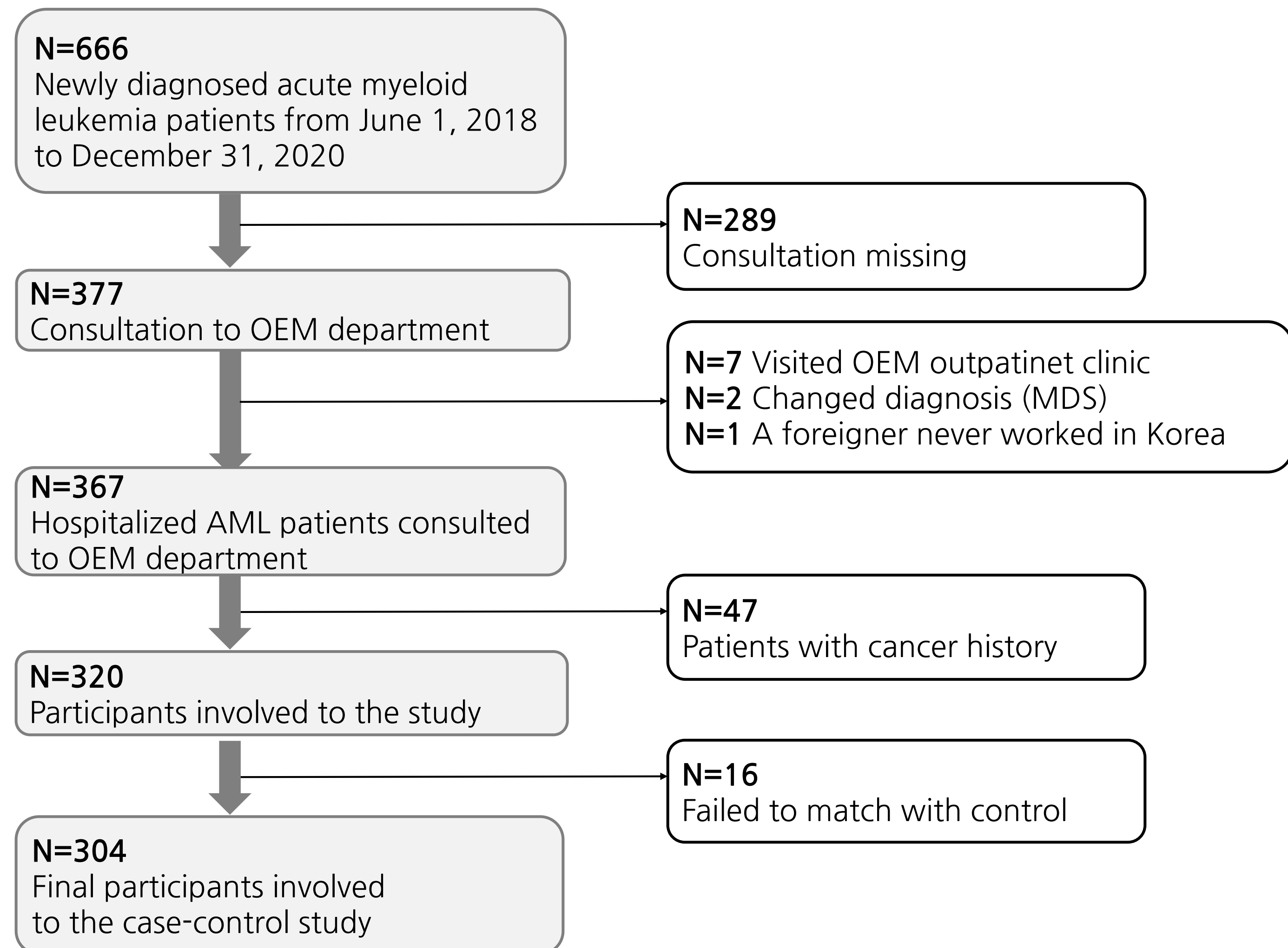


Figure 1. Schematic diagram of the participants

RESULTS

Table 1. Demographic characteristics of acute myeloid leukemia cases and controls.

Characteristic	AML Cases		Controls	
	N	%	N	%
Total	304	100	1170	100
Sex				
Male	172	56.58	662	56.58
Female	132	43.42	508	43.42
Age at index date				
<30	37	12.17	125	10.68
30-39	43	14.14	174	14.87
40-49	53	17.43	167	14.27
50-59	69	22.7	271	23.16
60-69	80	26.32	372	31.79
70-79	18	5.92	55	4.7
≥80	4	1.32	6	0.51
Year of birth				
≤1950	27	8.88	52	4.44
1951-1960	91	29.93	366	31.28
1961-1970	65	21.38	265	22.65
1971-1980	45	14.8	182	15.56
1981-1990	44	14.47	171	14.62
≥1991	32	10.53	134	11.45

Table2. Odds ratio (OR) and 95% confidence intervals (95% CI) of acute myeloid leukemia associated with occupational categories.

Occupational categories	Cases	Controls	OR	95% CI
Petrochemical industry	1	6	0.50	0.057-4.385
Motor vehicle maintenance and repair	5	16	1.20	0.440-3.293
Paper industry	1	10	0.40	0.051-3.125
Chemical, plastics, adhesives manufacturing	6	24	0.95	0.383-2.366
Oil storage, transport, or sale	3	6	2.00	0.500-7.997
Beauty salons, barber shop	2	9	0.89	0.192-4.114
Paint manufacturing or painting	11	21	2.10	1.010-4.346
Foundry industry	1	5	0.76	0.089-6.514
Leather, tire manufacturing	1	7	0.53	0.063-4.520
Cleansing, washing, or degreasing using solvents	4	6	2.67	0.753-9.450
Laboratory	2	28	0.28	0.065-1.164
Shoes manufacturing	1	13	0.26	0.033-2.007
Sterilization of medical devices	5	42	0.46	0.179-1.158
Pesticide industry(including spraying)	7	14	1.97	0.777-4.993
Cokes and steel industry	2	10	0.80	0.175-3.651
Radiation related industry(nondestructive inspection)	1	14	0.27	0.035-2.050
Wood processing, plywood&furniture manufacturing	2	14	0.56	0.127-2.466
Dry cleaning	1	6	0.59	0.070-4.958
Printing industry	3	26	0.44	0.131-1.453
Interior construction	5	17	1.14	0.422-3.103
Military service exposed Agent orange	2	24	0.29	0.067-1.255
Aircrew	3	2	6.00	1.003-35.908
Rubber industry	1	3	1.33	0.139-12.818

Table3. Odds ratio (OR) and 95% confidence intervals (95% CI) of acute myeloid leukemia associated with occupational exposures.

Occupational exposures	Cases	Controls	OR	95% CI
Benzene	9	38	0.89	0.42-1.87
Carbon tetrachloride	1	4	1.00	0.11-8.95
1,3-butadiene	1	3	1.33	0.14-12.82
Pesticides	6	10	2.31	0.84-6.37
Ethylene oxide gas	1	5	0.80	0.09-6.85
Adhesives	7	126	0.19	0.09-0.42
Formaldehyde	7	35	0.78	0.34-1.76
Ethylene glycol ether	1	10	0.28	0.04-2.28
Radiation	5	49	0.38	0.15-0.99
Immunosuppressants	1	3	1.33	0.14-12.82
Gasoline	6	82	0.28	0.12-0.64
Thinner(for paint)	16	102	0.58	0.34-1.01
Dioxin(TCDD)	1	12	0.33	0.04-2.50
Styrene	3	13	0.82	0.23-2.93
DDT(Dichloro-diphenyl-trichloro ethane)	1	9	0.44	0.06-3.51
Methylene chloride	1	8	0.5	0.06-4.00

Table4. Odds ratio (OR) and 95% confidence intervals (95% CI) of acute myeloid leukemia associated with occupational materials by cumulative exposure.

Occupational exposures	Cases	Controls	OR	95% CI
Benzene				
Low	3	9	1.25	0.34-4.64
Medium	0	2		
High	1	0	>1000	<0.01->1000
Adhesives				
Low	1	57	0.06	0.01-0.46
Medium	1	16	0.20	0.03-1.58
High	3	4	2.22	0.47-10.40
Formaldehyde				
Low	2	8	1.00	0.21-4.71
Medium	1	2	1.56	0.14-17.75
High	1	1	4.00	0.25-63.95
Radiation				
Low	2	18	0.50	0.12-2.18
Medium	1	9	0.63	0.22-1.79
High	1	2	1.16	0.52-2.61
Thinner				
Low	4	42	0.41	0.15-1.14
Medium	5	13	1.21	0.72-2.03
High	4	2	1.91	1.08-3.37

DISCUSSION

- In this study, paint-related jobs, aircrew, pesticides, and thinners are associated with an increased risk of AML.
- Although not statistically significant, the effect size of OR was found to increase with increasing cumulative exposure to adhesives, formaldehyde, and radiation.
- Considering these results, it is estimated that more potential risk factors are scattered through workplaces, and management of the working environment for the substances will be necessary.