Original Article

Socioeconomic Status and Childhood Leukemia

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Abstract

Introduction

Connection of socioeconomic status measures (such as income and education and parental addiction) to childhood leukemia are likely to vary with place and time. The aim of this study was to assess the relation between socioeconomic status and childhood leukemia.

Materials and Methods

a case- control study conducted on 86 case of acute lymphoblastic leukemia age 0-14 years in Shahid Sadoughi Hospital in Yazd and matched on age and sex to 188 healthy controls. Data was collected by interview using a questionnaire.

Data analyzed by chi-square test. Odds ratio (Ors) and 95% confidence intervals were used to measure the risk of childhood A.L.L associated with parental smoking, alcohol drinking & addiction.

Results

There was a significant difference in parental education level (P-value=0, P-value=0.001), income status (P-value =0.001), father's job (0.002) between two groups. The risk of childhood A.L.L was associated with paternal smoking (P-value =0.001, OR=2.6, CI 95%, 1.5-4.5), alcohol drinking (P-value=0.003, OR=3.33, CI 95%, 2.7-3.9), addiction (P-value =0, OR=42.7, CI95%, 5.56-328.34).

Conclusion

The results suggest that socioeconomic factors and paternal smoking and alcohol drinking are related to risk of childhood leukemia. It should be considered for planning support.

Keywords

Precursor Cell Lymphoblastic Leukemia-Lymphoma; social class; Smoking; Alcohol Drinking; Behavior, Addictive

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Introduction

Leukemia is one of the most common potentially fatal illnesses in children (1). It accounts for approximately one third of all malignancies in this age group. Although the etiology of childhood leukemia remains undefined; a causal association with many risk factors has also been described (2).

Over the last years, the interest in assessing social inequalities and health has increased. Socioeconomic characteristic have been associated with morbidity and mortality discrepancies in many developed countries (3-5).

Relationship between social inequalities and cancer has been well studied for adults (6), but less extensively for childhood cancer and childhood leukemia seems to be unique in this aspect (7). A comprehensive review on the association between socioeconomic status (SES) and childhood leukemia was recently published and the authors have pointed out that this association is likely to vary according to time, place and study design there are more positive association in older studies and negative association in newer ones (8). Studies of the relation between parental smoking, alcohol drinking, addiction and childhood leukemia have produced inconsistent results. Cigarette smoke contains many well-established carcinogens, and both active and passive smoking have been implicated in the development of several cancers during adulthood (9).The role of parental smoking in childhood leukemia is less certain, although biologically plausible. Cigarette smoke has been linked to an increased frequency of chromosomal abnormalities (10), oxidative damage (11), and aneuploidy of sperm (12). To date several epidemiologic studies have demonstrated arguments against a strong association or even any association between maternal smoking and childhood leukemia, but others have observed a positive relationship. Reports on the effect of paternal smoking on subsequent risk of leukemia in offspring are inconclusive. Alcohol drinking is a behavior that often accompanies cigarette smoking, and has been linked to fetal growth retardation and miscarriage during pregnancy. However, the relationship between parental alcohol consumption and childhood leukemia also remain unclear. Early studies generally found no effect of maternal alcohol consumption on development of leukemia in offspring while more recent reports have observed an increased risk for both the acute lymphocytic and myeloid leukemia subtypes (9).

The authors concluded that more studies with several types of SES measures are necessary to evaluate the strength of this association. The aim of this study was to evaluate the association between socioeconomic status and childhood acute lymphoblastic leukemia.

Materials and Methods

A case- control study was conducted on 86 patients with acute lymphoblastic leukemia ages 0-14 years in Shahid Sadoughi hospital, Yazd (2008-2009). The subjects were matched on age and sex to 188 healthy controls. Controls were selected using randomized sampling among schools. The schools of control group were selected from case group. The control group included classmates and playmates of case group who were randomly selected and were the same in age and sex.

Data were collected by on interview with parents using a self-designed questionnaire, including demographic data (sex, age) and socioeconomic criteria (parental education, parental Jobs, family income and parental addiction). The levels of income were defined as: low, intermediate and high on the basis of individual record by parents. Questions were also asked about maternal and paternal smoking history, and alcohol consumption, and addiction history (prior, during pregnancy and current).

Statistical Analysis

Data were analyzed using SPSS version 15. Chi-square test was used to verify the association between acute lymphoblastic leukemia and each criteria of socioeconomic status. Odds ratio

(Ors) and 95% confidence intervals were used to measure the risk of childhood A.L.L associated with parental smoking, alcohol drinking & addiction.

Results:

62.8% (n=54) of cases and 60.1% (n=43) of controls were male. Mean age in case and control group was 7.13±3.39 and 6.85±3.58. There was a significant difference in parental education level, income status, Fathers job between two groups. Of 86 patients with All, 15.1% (n=13) had illiterate fathers and 31.2% (n=26) had high school degree (diploma) or above (Academic education), While of 188 children in controls, 1.6% (n=3) had illiterate fathers and 53.8% (n=101) had high school degree or above. The difference in father's education level between two groups was significant by chi-square test (P-value <0.001) (table 1).

Illiteracy rate in patients mothers was 12.8% (n=11) in case and 3.2% (n=6) in control group 36% (n=31) of mothers in cases group had diploma or above, while it was 53.2% (n=100) in control group, which was significantly different (P-value =0.001) (table 1).

There was significant difference between fathers job in two groups (P-value =0.002) and 48.8% (n=42) of patients fathers were workers and farmers (table 2). Most of mothers in two groups were house wife. So there was no significant difference between two groups on mother's job.

Family income state in two groups was significantly different by chi-square test (P-value =0.001) (table 3). 32.6% (n=28) of cases were on low incomes while only 15.4% (n=29) of control group had such state. 7% (n=6) of cases and 13.8% (n=26) of control were placed in high income state.

Among case fathers, 43% reported having smoked, compared with 22.3% of control fathers. There was a significantly association with paternal smoking and A.L.L in children. (P-value =0.001, OR=2.625, CI 95%, 1.518-4.539) (Table 4).

Among case fathers, 5.8% reported alcohol drinking, compared with 0% of control fathers. There was a significantly association with paternal alcohol drinking and childhood all. (P-value =0.003, OR=3.33, CI=95%, 2.77-3.98) (Table 4).

Among case fathers, 18.6% reported addiction history (past and current), compared with 8% of control fathers. There was a statistically significant association between childhood A.L.L and paternal addiction (P-value <0.001 OR=42.7, CI=95%, 5.5-328.34)) (Table4).

None of mothers in two group reported alcohol drinking, addiction history and only one person in two group reported smoking. So, there was no significant association between childhood A.L.L and maternal risk factors.

Table 1: frequency distribution of mother's and father's education level

Groups / Education level		Case		Control		total	
		n	%	n	%	n	%
Uneducated	mother's	11	12.8	6	3.2	17	**6.2**
	father's	13	15.1	3	1.6	16	**5.8**
Primary school	mother's	23	26.7	44	23.4	67	**24.5**
	father's	18	20.9	37	19.7	55	**20.1**
Secondary school	mother's	21	24.4	38	20.2	59	**21.5**
	father's	29	33.7	47	25	76	**27.7**
High school diploma	mother's	24	27.9	63	33.5	87	**31.8**
	father's	19	22.1	58	30.9	77	**28.1**
+above	mother's	7	8.1	37	19.7	44	**16.1**
	father's	7	8.1	43	22.9	50	**18.2**
Total	mother's	86	100	188	100	274	**100**
	father's	86	100	188	100	274	**274**
P-value	mother's	**0.001**					
	father's	**0.000**					

Table 2: frequency distribution of father's job

Groups / Job	Case		Control		Total	
	n	%	n	%	n	%
Plain worker and farmer	42	48.8	53	28.2	95	**34.7**
State employee	12	14	53	28.2	65	**23.7**
Self employed	31	36	73	38.8	104	**38**
Non-employed	1	1.2	9	4.8	10	**3.6**
Total	**86**	**100**	**188**	**100**	**274**	**100**

P-value =0.002

Table 3: frequency distribution of family income state

Groups / Income state	Case		Control		Total	
	N	%	n	%	n	%
Low	28	32.6	29	15.4	57	**20.8**
Intermediate	52	60.4	133	70.7	185	**67.5**
High	6	7	26	13.8	32	**11.7**
Total	**86**	**100**	**188**	**100**	**274**	**100**

P-value =0.001

Table4: Frequency distribution of paternal smoking, alcohol consumption and addiction

Parameter	Group	Case		Control		Sum		P-value	OR
		Yes	No	Yes	No	Yes	No		
Smoking	n	37	49	42	146	195	79	0.001	**2.625**
	%	43	57	22.3	77.7	71.2	28.8		
Alcohol	n	5	81	0	188	5	269	0.003	**3.33**
	%	5.8	94.2	0	100	1.8	98.2		
Addiction	n	16	70	1	187	17	257	0.000	**42.7**
	%	18.6	81.4	5	99.5	6.2	93.8		

Discussion

In this study there was a negative association between childhood acute lymphoblastic leukemia and family income, parental education level and father's job .Several studies have shown an association between leukemia and high SES (13-18). Over all, studies utilizing area based socioeconomic measures have demonstrated an increased risk of A.L.L. among people with high SES (7, 1, and 19). On the other hand, the results of the studies of SES and childhood leukemia using individual level assessment are controversial (15-17, 20-24). High levels of family income and parental education, reassured individually have been consistently associated with a lower risk of childhood leukemia, while association of parental occupational class with childhood leukemia demonstrates a contrary association; i.e. high rates are correlated with high SES (49-51), Including findings from 2 cohort studies (25-26).A recent case-control study conducted in united kingdom did not show any difference in childhood A.L.L risk according to deprivation levels, whether using area-or. Individual based measure of SES at the time of birth or diagnosis (27).Recently, Pool, et al. pointed out the difficulties in making quantitative comparisons between studies, since many different types of SES measure were utilized and their distinct social implications can vary by place and time (8). In fact, the adequacy of the measure is also related to the study aims and availability of information in each particular country (28). In this study, high percent of fathers in case group were workers or farmers, it can indicates social class of job and probably shows that fathers contact with risk agent at work can increase risk of childhood A.L.L which has been reported in several studies (29) We categorized family income state as low, intermediate, and high based on the parents view, and amount of family income and other factors such as family size, living place, and social class of parental job have not been recorded. It is recommended to conduct cohort studies with more subjects, and more accurate SES measures.

In agreement with our results several studies have found a positive relationship between childhood all and paternal smoking. (30-34) and some others is controversial (37, 38, 9, 35). Certainly, more studies are needed to better understand the effect of parental smoking on childhood A.L.L risk. (30). It is recognized that childhood A.L.L and AML (acute meylocytic leukemia) are two distinct diseases with different histological presentations, age distributions, and prognoses. (39)

Our results were consistent with a few studies that reported relationship between paternal alcohol drinking and childhood leukemia (30).

And several studies reported controversial (9, 31).Alcohol metabolism is known to produce reactive oxygen species (ROs) that could contribute to carcinogenesis (38).

According to the results of this study, paternal addiction had a positive association with acute childhood leukemia. Yet, any studies have done about this relationship. In our study, mothers didn't have history of (%1), alcohol addiction and cigarette smoking was equal (%1) in two groups. Many studies have found a positive relationship between childhood leukemia and maternal alcohol consumption (9, 31) although the evidence is inconclusive (40).
It is unclear whether maternal or paternal cigarette smoking before or during pregnancy is a risk factor for developing childhood leukemia (30, 35).

Conclusion

According to this study findings, child-hood leukemia showed to be related with families low SES. Thus, it is highly recommended to consider supportive plans for these patients to improve treatment outcomes.

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Conflict of Interest

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