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ORIGINAL ARTICLE

Cancer in working-age is not associated with childhood adversities

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Abstract

Background. Early life events are studied as potential causes of cancer. The objective here was to study childhood adversities in the etiology of cancer. **Methods.** The material comprised a population based random sample of 25 898 individuals among the Finnish working-aged population. In 1998 they were requested through six questions in a postal questionnaire to recall their childhood adversities. The cases consisted of people with cancer diagnosed 2000–2006 and registered in the Finnish Cancer Registry (n = 384). The rest of the sample consisted of cancer-free controls. **Results.** The most common adversities were prolonged financial difficulties, serious conflicts in the family and someone in the family having been seriously or chronically ill. The cancer patients reported more prolonged financial difficulties and someone seriously or chronically ill in the family. They reported less parental divorce than the controls. The associations were not statistically significant after adjusting for age, sex, education, and health behaviour. Nor was there a significant difference in the total number of childhood adversities between the study group and the controls. **Conclusion.** On the whole, these cancer patients had not experienced more childhood adversities than the controls. According to our findings, there is no cause to attribute development of cancer in working age to childhood adversities. This information may also give relief to other family members.

The time-scale for developing a cancer varies. Moreover, it is usually impossible to establish what factors, when, and in what sequence, cause the underlying cell transformation. The long period of time often elapsing between the possible first event and the irreversible state has given rise to the conception that not only physiological, but also psychosocial factors may be implicated in cancer development [1]. Biological elements, behavioural, neuroendocrine and immunological abnormalities together and separately are thought to be the mediating factors [2–5]. Adverse exposures occurring during the maturation of the neurodevelopmental system may therefore have a potential to cast a “biological shadow” across the lifespan influencing brain function and altering behaviour. Childhood adversities have time to do harm. Episodes in childhood precede cancer chronologically, whereas adversities in adulthood may come after disease progression.

An association between exposure to adverse childhood events and disease in adulthood has been

reported in both psychopathological health outcomes, e.g. depression and psychosomatic disorders, and in physical diseases, e.g. coronary heart disease, asthma, migraine and also cancer [6–11]. Cancer patients and psychosocial stress in adulthood have been studied with varying methods and results [12–15]. In prospective studies using administrative registers as data sources the evidence failed to support the hypothesis that life events are a risk factor for subsequent cancer [16,17].

Adverse experiences during childhood have been found to be interrelated rather than to occur independently [9,18]. The cumulative dose-response relationship due to several experiences should thus be studied. People with many adversities in their backgrounds are likely to have health risk factors and poor self-rated health later in life [9]. It has also been shown that the more adverse the circumstances in childhood the more total negative life events in adulthood, the more difficulties and slower adaptation to their adverse effects. These all seem

to be associated with poorer physical functional health [19].

After a cancer diagnosis the causes of the disease are sought in earlier life. The aim here was to ascertain whether childhood adversities increase the risk of cancer.

Methods

The Health and Social Support Study (HeSSup) is a prospective follow-up study of the psychosocial health of the Finnish working-aged population [20]. The subjects belonged to a random sample drawn from the Finnish Population Register in four age-groups: 20–24, 30–34, 40–44, and 50–54. The survey was carried out by postal questionnaire during 1998. Completed questionnaires were returned by 25 898 individuals, giving a response rate of 40.0%.

The compatibility of the HeSSup sample with the Finnish general population was tested using official statistics, and the conclusion was that the differences in physical health between participants and general population were small [20].

The subjects were asked to recall their childhood adversities in terms of the following questions: “Did your parents divorce?”, “Did your family have prolonged financial difficulties?”, “Did serious conflicts arise in your family?”, “Were you often afraid of some member of your family?”, “Was someone in the family seriously or chronically ill?”, “Had someone in the family problems with alcohol?” The alternatives were “yes”, “no” or “I do not know”. Only the first two options were included in the statistical analyses. The overall impact of these variables was estimated by the number of affirmative answers.

The Finnish Cancer Registry maintains a nationwide database on all cancer cases in Finland since 1953 [21]. There were 1 083 people within the HeSSup sample with cancer; of these cancers 725 were malignant. The diagnoses of these cancers were made between the years 1955 and 2006. To be able to use the information about these people, only the patients having a cancer diagnosed in 2000 or later were included ($N = 384$). This limitation was made so that recently diagnosed cancer would not have an effect on reports of childhood adversities in 1998. The rest of the sample consisted of cancer-free controls.

The statistical significance of differences between the cancer group and the controls was tested by χ^2 test. Odds ratios (OR) with 95% confidence interval (CI) for cancer in the multivariate logistic regression analysis were calculated for every childhood adversity, for the total sum of adversities and for parental relationship (Model 1). The same analyses were carried out with adjustment for age and sex (Model 2),

for age, sex and education (Model 3) and for age, sex, education, and health behaviour (Model 4). Health behaviour included smoking (never, given up or habitual), alcohol consumption (none or minimal, moderate, heavy) and obesity ($BMI \geq 30$ as the limit value).

A follow-up questionnaire in the HeSSup study was sent during 2003 to all those who responded to the first questionnaire in 1998. Altogether 19 626 individuals returned the follow-up questionnaire, giving a response rate of 75.8%. To confirm the reliability of responses regarding childhood adversities, the kappa coefficient was used to assess associations between the 1998 and 2003 questionnaires. The coefficient varied between 0.52 and 0.86 among cancer patients and from 0.55 and 0.88 among controls (Table I).

Analyses were made using SAS system for Windows, release 9.1.3. The Turku University Central Hospital Ethics Committee approved the study. Respondents' permission was also requested to collate the information with official registers.

Results

The number of registered cancers during the follow-up period was 384. Women (63%) outnumbered men. Over half of the new cancer patients (62%) belonged to the oldest age group analysed, 50–54 years in 1998.

The sociodemographic characteristics age and education showed a statistically significant difference ($p < 0.001$); the incidence of cancer was higher among older and less educated respondents (Table II). There were no differences in incidence by cancer risk factors (smoking and alcohol consumption). Obese respondents seemed to have a statistically significantly increased risk of cancer compared with non-obese respondents ($p = 0.014$).

Table I. Kappa coefficients (95% CI) of responses on childhood adversities between questionnaires in 1998 and 2003 among cancer patients ($n = 276$ –291) and controls (17 159–17 491).

	Cancer patients	Controls
Parents divorced	0.86 (0.76–0.95)	0.88 (0.87–0.89)
Prolonged financial difficulties in the family	0.57 (0.48–0.65)	0.57 (0.56–0.58)
Serious conflicts in the family	0.62 (0.54–0.71)	0.55 (0.54–0.56)
Often afraid of some member of the family	0.52 (0.41–0.64)	0.59 (0.57–0.61)
Someone in the family seriously or chronically ill	0.60 (0.50–0.69)	0.58 (0.57–0.60)
Someone in the family had problems with alcohol	0.74 (0.66–0.83)	0.75 (0.74–0.76)

Table II. Distribution of gender, age groups, education, obesity, also those reporting smoking and alcohol consumption among cancer patients and controls. P-values from χ^2 test.

	Cancer patients (n = 360–384)*		Controls (n = 21 078–22 974)*		p value
	n	%	n	%	
Sex					0.065
women	243	63.3	13 462	58.6	
men	141	36.7	9 512	41.4	
Age-group (years)					<0.001
20–24	18	4.7	6 444	28.1	
30–34	28	7.3	5 534	24.1	
40–44	102	26.6	5 421	23.6	
50–54	236	61.5	5 575	24.3	
Education**					<0.001
lower	260	67.9	12 951	56.5	
higher	123	32.1	9 986	43.5	
Obesity					0.014
BMI <30	333	86.7	20 658	90.5	
BMI ≥30	51	13.3	2 181	9.6	
Smoker					0.245
never smoked	146	40.6	9 483	45.0	
given up smoking	108	30.0	5 817	27.6	
habitual	106	29.4	5 776	27.4	
Alcohol consumption					0.833
none or minimal	122	31.8	6 967	30.4	
moderate	240	62.5	14 586	63.6	
heavy	22	5.7	1 381	6.0	

*The variance is caused by the number of missing answers in different questions.

**Matriculation examination.

The most common childhood adversities were prolonged financial difficulties in the family, serious family conflicts and someone in the family seriously or chronically ill. Those reporting a single childhood adversity did not have higher incidence of cancer than those not reporting such events. Only women reporting prolonged financial difficulties or someone seriously or chronically ill in the family showed an increase in the incidence (Table III). Those reporting parental divorce showed a decreased incidence. In the multivariate logistic regression analysis those reporting more prolonged financial difficulties and someone seriously or chronically ill in the family and less parental divorce still had an increased risk, but this did not reach statistical significance (Table IV).

Those reporting several childhood adversities had higher risk of cancer than those reporting no childhood adversities. Of those with cancer 35% reported no adversities, 27% only one and 38% at least two adversities, whereas among other subjects 40% reported none, 26% one and 34% at least two adversities. There were no statistically significant differences after the adjustment, however.

Discussion

The most important finding in this study was that working-aged cancer patients did not report

significantly more childhood adversities than cancer-free controls. Some differences were nonetheless found. Those reporting parental divorce had decreased risk of cancer and those reporting conflicts increased risk.

The time sequence between adversities and cancer is not an issue here, since the sample survey preceded the diagnosis of cancer. The information about cancer cases could be considered objective because Finland has a nationwide population based cancer register, the completeness of which has been shown to be over 99% [22]. The Finnish Cancer Registry pays great attention to the quality of its data, both in terms of completeness and accuracy. There is no doubt about the correct diagnoses in our data.

However, the recollection of childhood adversities is subjective. After receiving a diagnosis people tend to look for reasons and examine elements in their backgrounds. In this data the diagnosis of cancer cannot have affected recollection, since we used the responses to the 1998 survey, which was carried out prior to any diagnosis. Cancer patients may respond to a questionnaire on early life more actively than other people because after having been confronted with a serious disease they may have thought more about their lives. Patients may seek to ignore their disease and not respond at all. The same objective event may impact quite differently on

Table III. Proportion (%) of cancer patients and controls reporting childhood adversities. P-values from χ^2 test.

	Women			Men		
	Patients (n = 215–234)	Controls (n = 12 370–13 715)	p-value	Patients (n = 119–134)	Controls (n = 8 655–9 451)	p-value
Parents divorced	9.6	18.2	0.001	12.7	16.3	0.267
Prolonged financial difficulties in the family	37.2	28.6	0.006	31.1	25.8	0.190
Serious conflicts in the family	34.6	30.0	0.142	23.5	23.9	0.933
Often afraid of some member of the family	18.2	15.7	0.318	10.1	9.9	0.947
Someone in the family seriously or chronically ill	33.3	26.5	0.019	30.1	24.6	0.145
Someone in the family had problems with alcohol	24.4	26.9	0.384	21.8	20.9	0.805

Statistically significant differences presented in bold face.

individuals and we cannot estimate how the individuals perceived those events. The request for permission to use information from the official registers may also have contributed to the low response rate.

Recall bias in cancer patients may be part of the explanation for some of the relatively low kappa coefficients. The validity of adult retrospective reports of adverse childhood experiences was rated sufficient in spite of significant under-reporting and some bias [23]. Events rated as negative may be more frequently under-reported [24]. In one German study family situation, physical abuse, sexual abuse, and protective factors were assessed, and more sensitive issues such as sexual abuse seemed to be associated with a greater likelihood of error [25]. Here no such adversities were specifically elicited.

There are so far few childhood studies of similar design against which to compare our present investigation. In one US study the negative events investigated may be considered more serious, for example physical abuse and criminal behaviour in the household, than in the HeSSup study [9]. There

the only similarly formulated question related to drinking problems and drug abuse was equally common. In another US study maternal death during childhood increased the risk for breast cancer hospitalisation [26]. Here parental death was not specifically elicited.

Most new cancer diagnoses were of women over 50 years old. According to the Finnish Cancer Registry, the total incidence of cancers is greater among women and breast cancer occurs to a remarkable degree [27]. Considering breast cancer, probably the predominant cancer type here, no adjustment for reproductive factors was made. Cancer in men is usually diagnosed at an older age than our working-aged sample.

After adjusting for confounding factors, age and sex, all the significance of the findings disappeared. Since cancer is an age-related disease, an analytic approach which allows age stratification, e.g. Cox regression, would have been preferable. Unfortunately we could not use this because of missing information about the exact dates of the completion of the questionnaires.

Table IV. ORs (95% CI) of childhood adversities reported among respondents in the multivariate logistic regression analysis for cancer without and with adjustment for age, sex, education and health behaviour. Statistically significant differences are presented in bold face.

	Model 1	Model 2	Model 3	Model 4
Parents divorced	0.57 (0.41–0.80)	0.84 (0.60–1.17)	0.84 (0.60–1.18)	0.87 (0.62–1.22)
Prolonged financial difficulties in the family	1.43 (1.14–1.79)	1.10 (0.88–1.39)	1.10 (0.87–1.39)	1.11 (0.87–1.40)
Serious conflicts in the family	1.17 (0.92–1.48)	1.24 (0.98–1.57)	1.23 (0.97–1.56)	1.26 (0.98–1.60)
Often afraid of some member of the family	1.16 (0.87–1.56)	1.05 (0.78–1.42)	1.06 (0.79–1.43)	1.10 (0.81–1.49)
Someone in the family seriously or chronically ill	1.37 (1.01–1.71)	0.96 (0.77–1.21)	0.97 (0.78–1.22)	0.99 (0.79–1.25)
Someone in the family had problems with alcohol	0.91 (0.71–1.16)	0.97 (0.76–1.24)	0.98 (0.76–1.25)	0.98 (0.76–1.26)

Model 1: Not adjusted.

Model 2: Adjusted for age- and sex.

Model 3: Adjusted for age-, sex- and education.

Model 4: Adjusted for age-, sex-, education-, health behaviour (smoking, alcohol consumption and obesity).

In psycho-oncology the psychosocial and physical determinants of cancer are integrated. To integrate the mental, social, and biological dimensions of the disease itself there is a need to bring research and practice together [28]. Here we investigated the relationship between diagnosed cancer reported to the Finnish Cancer Registry and the recollection of adverse childhood experiences. According to the present findings, there is no conclusive evidence that childhood adversities affect risk of cancer in working age. This information may also be a source of relief to other family members.

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The authors declare that they have no competing interests.

Declaration of interest: The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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