Socioeconomic Status and Survival from Soft-Tissue Sarcomas: A Population-Based Study in Northern Italy

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ABSTRACT

Background and *Purpose:* Differential prognosis among cancer patients according to socioeconomic status (SES) has been reported. We analyzed survival from soft tissue sarcomas (STS) according to different SES indicators.

Methods: We followed up all the adult patients with a new diagnosis of STS occurring between 1.1.1981 and 31.12.1983 in an area of Northern Italy (N = 86).

Results: The overall three-year survival rate was 57 percent. After adjustment for confounders, both low education and blue collar jobs were negatively associated with survival.

Conclusions: The results suggest that patients of low SES have a poorer prognosis for STS. (*Am J Public Health.* 1991;81:747–749)

Introduction

The five-year relative survival rates from soft-tissue sarcomas (STS) were about 60 percent in the United States in 1979–84.[1] Several studies have described the clinical and pathological determinants of survival from STS.[2–5]

In recent years, considerable attention has been paid to differential prognosis among cancer patients according to socioeconomic status (SES), particularly for breast and colon cancer.[6–9]

Differences in survival are interpreted as related to earlier access to diagnosis and therapy of higher social class patients.

We are not aware of previous investigations of the role of socioeconomic factors as predictors of survival among STS patients. The present investigation is based on the follow-up of all patients with a new diagnosis of STS among residents of a geographic area of Northwestern Italy.

Methods

A population-based case-control study of STS in the provinces of Novara, Vercelli, and Alessandria in Northwestern Italy was carried out between January 1, 1981 and December 31, 1983 among residents of 20 or more years of age to investigate the role of exposure to phenoxy herbicides in the etiology of STS.[10] Eighty-six subjects were enrolled, after histologic confirmation of the diagnosis by two independent pathologists.[10] The vital status and cause of death of all 86 subjects were ascertained during 1987 through correspondence with the municipalities where they resided at the time of diagnosis. The median follow-up duration was 38 months (mean 34.5; range 0–70).

In 1988 a subset of slides (n = 58) was reviewed by a different group of pathologists to evaluate each case according to a histopathological grading classification proposed by French authors.[3,4]

Within the case-control study, 18 of the 86 original cases could not be interviewed. Details on the questionnaire and the procedures involved are given elsewhere.[10] The following variables were analyzed as potential predictors of survival: age, sex, marital status, education, smoking habits, occupation, exposure to phenoxy herbicides, type of hospital of diagnosis (large public hospital vs small or private hospital), and site of origin, histotype, and histopathological grading of the sarcoma.

The analyses were performed using SAS programs.[11,12] Estimates of survival were obtained using the Kaplan-Meier product-limit method[13]; the statistical significance of the difference between survival curves was evaluated through the log rank test.[14] A multivariate analysis was performed including different SES indicators and other covariates; the Cox proportional hazards model was used.[15] Proportionality of risk over time was assessed for each variable introduced in the models through the plots of the log (−log) of the survival distribution function on the log of time.

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TABLE 1—Proportion of Deceased Patients at the end of Follow-up according to Selected Variables Collected from Municipality Rosters or Hospital Records (whole series of 86 cases) and at Interview (68 cases)

Variables	Deceased n (%)	Total n
Success of interview		
yes	30(44)	68
no	11(61)	18
Age (years)		
<45	8(36)	22
45–54	7(41)	17
55–64	8(50)	16
65+	18(58)	31
Sex		
males	15(37)	41
females	26(58)	45
Hospital of diagnosis		
large, public	25(50)	50
small or private	16(44)	36
Years of school		
<=5	25(51)	49
6+	4(24)	17
missing	1(50)	2
Marital status		
Married	21(47)	45
Unmarried	4(40)	10
Other	6(46)	13
Smoking		
yes	15(47)	32
no	16(46)	35
missing	0 (0)	1
Main Occupation		
Manual worker	14(52)	27
Farmer	14(58)	24
Others	3(18)	17
Exposure to herbicides		
yes	7(58)	12
no	24(43)	56

TABLE 2—Multivariate Analysis (Cox's proportional hazards model): Role of Education and Occupation in Influencing Survival among the 68 Interviewed Cases*

Model and SES indicators		Coefficient	SE
I	years of school <=5	1.33	0.61
II	manual workers	0.90	0.39
	farmers	0.37	0.43
III	years of school <=5	1.06	0.64
	manual workers	0.65	0.42
	farmers	0.15	0.45

*Each model includes also sex, age, and histopathological grading.

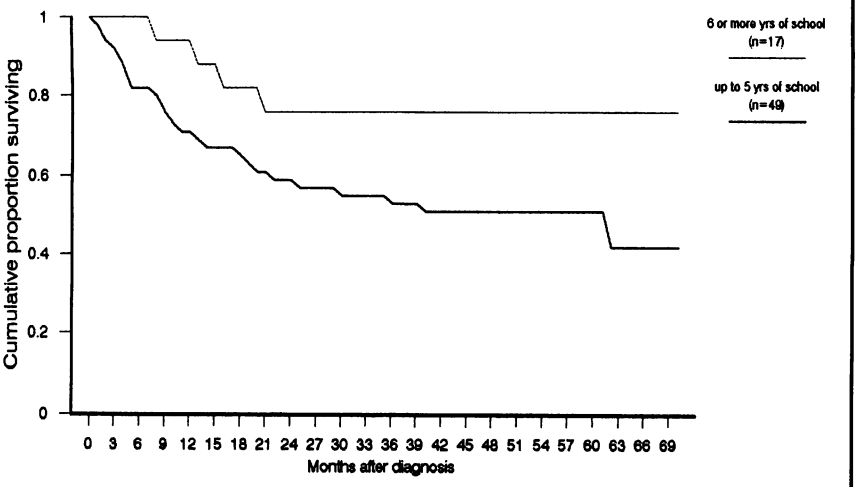

FIGURE 1—Survival from STS by Education

Results

The overall proportion of patients alive three years after a diagnosis of sarcoma of soft tissues was 57 percent.

The Appendix shows the distribution of the patients by site of the tumor, histology, and grading, according to vital status at the end of follow-up. Only two-thirds of cases could be reviewed for histopathologic grading: there is evidence that such classification is likely to be an important prognostic factor for STS.

Table 1 reports the distribution of several characteristics of the patients by vital status at the end of follow-up.

By univariate analysis, the less educated patients and unskilled workers (manual workers or farmers vs others) had poorer prognoses. Figure 1 shows the difference in the proportion surviving according to education. A similar pattern appears comparing survival experiences according to the main occupation.

To take into account the strong association between low education and unskilled jobs and the role played by other covariates in influencing survival, a multivariate analysis was performed, fitting three models. In all models estimates of different SES indicators were adjusted for sex, age, and histopathologic grading. Table 2 shows that low education is negatively related to survival; among blue collar workers, a poorer prognosis is evident for manual workers in industry but not for farmers.

Discussion

Differences in cancer survival according to socioeconomic status of the patient have already been observed for other cancers, both when comparing different categories of workers (i.e. blue vs white collar)[8] and when comparing different ethnic groups.[9] The differences seem to affect particularly breast and colorectal cancers which, at least in theory, could be more influenced by early diagnosis. In a study based on the Swedish Cancer Registry,[8] the following tentative interpretations for the observed social class differences were proposed: earlier detection in higher social class, with improvement of prognosis; earlier detection in higher social class, without improvement of prognosis (lead time bias); host factors, associated with social class, which influence the response to treatment; biological properties of the tumors arising in different social classes.

There is no evidence in favor of host factors or biologic differences in the tumors. Early detection seems to be more reasonable, but it is difficult to disentangle pure "lead time" (i.e. earlier diagnosis without real improvement of survival) and effectiveness of treatment.

Apart from histopathologic grading, only socioeconomic indicators showed an association with survival rates, with patients of low socioeconomic groups showing a worse prognosis. This observation does not rule out a more complex interpretation involving other factors not considered in the present analysis. Although our findings are based on a relatively small number of cases, they cannot be easily explained by bias, since the follow-up was successful for 100 percent of the 86 patients; SES was determined on *a priori* categorization of education and occupation; follow-up procedures were com-

pletely blind as to the predictors used in the analyses; differences in survival between patients of different socioeconomic groups were not confounded by age, sex, or tumor grading.

Unfortunately, we had incomplete information about clinical variables, such as stage of cancer at first symptoms or signs or type of treatment. Separate analysis according to histologic type is of little help because there are too few cases in each group. Although they show different probabilities of survival, ranging from zero through almost 100 percent, there is no obvious grouping of histologic types which could make a comparison between social classes easier. The histopathologic grading, a good prognostic factor, was available for only two-thirds of our cases.

The present report, like those cited earlier, suggests the existence of inequalities in health, associated with patient socioeconomic status. More analytical studies to control from a pure "lead time" effect are in order. □

APPENDIX—Proportion of Decreased Patients at the End of Follow-up by Site, Histotype,[a] and Grading of the Soft-tissue Sarcoma.

	Deceased n	Total n
Site of the tumor		
Head and neck	3	8
Retroperitoneal	5	8
Upper limb	4	13
Lower limb	12	23
Thorax	8	13
Abdomen	0	2
Pelvis	4	6
Trunk, unsp.	1	1
Other and unsp.	4	12
Histotype		
Fibrohistiocytic tumors	7	14
Dermatofibrosarcoma protuberans	0	3
Malignant histiocytoma	7	11
Tumors of adipose tissue	2	10
Liposarcoma	0	3
Myxoid liposarcoma	2	7
Tumors of muscle tissue	6	9
Leiomyosarcoma	4	7
Rhabdomyosarcoma	2	2
Tumors of blood vessels	4	17
Angiosarcoma	1	1
Kaposi sarcoma	1	13
Malignant hemangiopericytoma	2	2
Other vascular malignant tumors	0	1
Tumors of synovial tissue	2	3
Synovial sarcoma	2	3
Tumors of peripheral nerves	5	7
Malignant Schwannoma	4	4
Other mal. tumors of peripheral nerves	1	3
Tumors of paraganglionic structures	1	1
Malignant tumors of nonchromaffin tissue	1	1
Tumors of cartilage and bone forming tissue	2	4
Chondrosarcoma of soft parts	2	4
Tumors of uncertain histogenesis	1	2
Malignant cell tumor of soft parts	0	1
Chordoma	1	1
Unclassified	11	19
Histopathologic grading		
Grade I	6	26
Grade II	11	23
Grade III	7	9
Missing	17	28

[a]For the classification used, see reference 16.

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