Life events and chronic duodenal ulcer: a case control study

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SUMMARY The frequency of life events during the two years before an exacerbation of ulcer in a duodenal ulcer population was compared with the frequency of these events over the same time period in an age-sex matched probability sample of the community population. The mean number of events and the associated distress and life change scores were similar for both groups. When events were categorised into areas of activity, such as health, bereavement, family and social life, change of residence, etc. and were further classified on the basis of desirability, separation from persons, and problem chronicity, only one significant difference was found between patients and controls—more patients changed residence ($P=0.0005$). Frequency distributions of the number of events and the distress and life change scores were similar for both groups. Concerning individual events, the only significant differences in frequency were that more patients changed residence in Sydney ($P=0.006$) and more controls had a child leave home for reasons other than marriage ($P=0.03$). Patients and controls experienced the same four most frequent events. Among patients, no correlation existed between age and either the number of events experienced or distress and life change scores. Among controls, age was negatively correlated with the number of events experienced ($P=0.0004$) and the life change scores ($P<0.003$). It is concluded, therefore, that an excess of stress, as measured by the number of life events experienced and by distress and life change scores associated with these events, does not appear to be a risk factor for the exacerbation of chronic duodenal ulcer.

Previous studies have failed to show an association between the frequency or nature of life events and chronic gastric ulcer.^{1,2} However, if an association were to exist between peptic ulcer and life events, one might expect this association to be more likely to occur in chronic duodenal ulcer than chronic gastric ulcer, as duodenal ulcer is a disease known to be associated with a physiological abnormality—hypersecretion of acid—and because in other circumstances emotional stress has been shown to precipitate changes in function.³⁻⁷ The aim of the present study was to determine whether duodenal ulcer patients experienced an excess of life events during the two years preceding an exacerbation of their disease, in comparison with the life event experience of a community control population.

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Methods

PATIENT SELECTION

The study sample included 74 inpatients and outpatients who had a duodenal ulcer crater diagnosed endoscopically at the Royal North Shore Hospital of Sydney between September 1978 and March 1979. Patients were excluded if they did not reside in Sydney, if they had previously undergone gastric surgery, if other overwhelming physical or mental disease were present, or if they did not understand English. They were otherwise unselected. No patients refused to participate in the study and all were interviewed within one month after diagnosis.

CONTROL POPULATION

Persons were selected at random from the Sydney electoral rolls† and telephoned regarding participation in the study. This was done until the 74 patients

†Registration is compulsory in Australia for all persons over 18 years of age.

had been individually matched with 74 controls for sex, age within 10 years, and social grade as represented by suburb of residence within metropolitan Sydney.⁸ All controls stated that they had no history of peptic ulcer or dyspepsia. Over 85% of those approached who were eligible for the study agreed to participate. The exclusion clauses for the patients also applied for the selection of controls. Although all controls possessed a telephone, this was also the case with over 90% of the patients. Forty-four of these controls answered the questionnaire during a personal interview and the remaining 30 answered it by post, the latter having also been sent a standardised letter of instruction.

ASSESSMENT OF LIFE EVENT STRESS

Sixty-two life events were measured using a modified self-report inventory⁹ resembling that used by Tennant and Andrews⁹ and Paykel *et al.*¹⁰ The 62 life events have been scaled for the distress and life change they cause, according to the responses of an Australian urban population as described by Tennant and Andrews.⁹ In the patient group, the events noted were those experienced during the two years preceding the diagnosis, omitting illnesses due to chronic duodenal ulcer. Only one occurrence of each event was counted. Life events experienced by each control pertained to the same period as for the matching patient. The time period chosen was two years in order to correspond with the study of a gastric ulcer population² and also to more than cover the time period in which the present duodenal ulcer (which was not necessarily the initial ulcer) would have developed.

STATISTICAL ANALYSIS

To test the associations between each of the study variables and the risk of chronic duodenal ulcer, the paired *t* test,¹¹ χ^2 test of independence,¹² McNemar's test of significance,^{13 14} Fisher's exact probability test,¹⁵ and the exact probability test for a binomial distribution¹⁶ were employed as applicable. Spearman's rank correlation coefficient¹⁶ and the Mann-Whitney test¹⁶ were used to assess the effect of age on the study variables, and the effect of sex was tested using paired and independent *t* tests.¹¹ As expected, all data were skewed to the right as they were counts of rare events, and therefore square root transformation¹⁷ was performed before the assessment of sample means and the use of *t* tests. Normality of distribution was assessed using Shapiro-Wilkes coefficients.¹⁸

Results

In order to assess the possible effect of the mode of data collection on the findings, the 44 community controls who were interviewed personally were first analysed separately from the 30 who had answered the questionnaire by post. As these two groups were found to be similar, the data were pooled and all the results presented below compare the patient group with the pooled sample of 74 community controls.

NUMBER OF EVENTS AND DISTRESS AND LIFE CHANGE SCORES

Duodenal ulcer patients reported a total of 288 events, while the controls reported 253 events over the two-year study period. The mean numbers of events were similar for patients and controls ($P=0.57$), as were also the mean distress and life change scores ($P=0.33$ and 0.53 respectively). Paired *t* tests were used to assess the differences.

The patients and controls reported significantly fewer events during the second year than during the first year before interview ($P<0.001$ for both groups), possibly because of greater difficulty in recall for the second year. The patient and control groups did not significantly differ from each other regarding the number of events reported either during the first or second year ($P=0.17$). The spread of events over each of the two years was also similar for patients and controls.

DISTRIBUTION OF NUMBER OF EVENTS PER PERSON AND DISTRESS AND LIFE CHANGE SCORES

Concerning distribution of the number of events per person, a χ^2 test of independence revealed no significant difference between patients and controls ($P=0.29$) (Table 1). Four patients and four controls experienced 10 or more events and the highest numbers of events reported were 15 and 11 respectively for patients and controls; the majority of subjects—58 patients and 62 controls—experienced between one and six events, and six patients and three controls reported no events.

Table 1 Distribution of number of events: duodenal ulcer patients and controls

Number of events	Patients	Controls
Nil	6	3
1-3	34	45
4-6	24	17
>6	10	9
Total	74	74

χ^2 (3df) = 3.78, $P=0.29$.

*See addendum.

While the raw distress and life change scores were not distributed normally (Figure), the form of the distribution was similar for both life change and distress scores and for patients and controls. The number of subjects in each score range, 0-25, 26-50, etc, tended to decrease with increasing scores and only five patients and three controls scored above 125 for distress and only five patients and five controls scored above 125 for life change.

(The highest possible score for life change or distress was 1120).

INDIVIDUAL EVENTS

Table 2 presents a matched pairs analysis of the 11 most common events, which were those reported by at least 10 patients or 10 controls before discarding tied pairs for analysis.

Patients and controls reported the same four

Table 2 Matched pairs analysis of 11 most frequent events (74 patients and 74 controls)

Event	Unit scaling for		Frequency with which events were reported by				Matched pairs RR	P
	Distress	Change	Patient only	Control only	Patient and matched control	Neither patient nor matched control		
1 Minor personal illness - self	2	2	21	20	10	23	1.05	1.0
2 Serious personal illness - self	16	16	13	9	7	45	1.44	0.52
3 Serious illness - close relative	16	9	20	10	4	40	2.0	0.10
12 Death - close relative	57	24	8	9	3	54	0.89	1.0
13 Death - close friend, relative	30	12	14	18	4	40	0.88	0.86
26 Child left home - not for marriage	11	14	1	9	1	63	0.11	0.03
35 Problems with friends, neighbours	10	8	8	3	3	60	2.67	0.23
49 Change in work hours	5	16	12	6	1	55	2.0	0.24
53 Moved house in Sydney	4	11	12	1	0	61	12.0	0.006
54 Moderate financial difficulties	9	10	5	10	2	57	0.50	0.30
56 Improved finances	1	23	11	10	4	49	1.10	1.0

most frequent events. These four events account for 32% of the total number of events in both the patient and control groups.

Seven of the 11 events were more frequently reported by patients and four more frequently by controls. McNemar's test¹⁴ for matched pairs showed that the only significant differences were that more controls had a child leave home for reasons other than marriage ($P=0.03$) and more patients moved house in Sydney ($P=0.006$).

CATEGORISATION OF EVENTS (TABLES 3 AND 4)

Assessments were made by either the χ^2 test¹² or Fisher's exact probability test,¹⁵ or the exact probability test for a binomial distribution.¹⁶

Areas of activity (Table 3)

In only one of the seven areas did patients differ significantly from controls—more patients moved house ($P=0.0005$).

Desirable and undesirable events (Table 4)

All events were classified as desirable (13 events)

or undesirable (35 events) or else ambiguous—that is, unable to be so classified (14 events). In these three areas, patients and controls were similar as regards the number of subjects experiencing the events and the frequency distribution of events—that is, statistically similar numbers of patients and controls had one event, two events, etc.

Separation events (Table 4)

These events, of which there are 23, are those entailing separation from familiar people. No significant differences were found between patients and controls regarding the number of subjects experiencing events and the frequency distribution of events.

Chronic difficulties (Table 4)

These are events that cannot be dated as actual incidents but are situations which persist over a period of time. Twelve such items have been included in the life events inventory and here no significant differences emerged between patients and controls.

Table 3 *Analysis of categorised events* (1)

Event category	Number of subjects experiencing		
	One event	Two events	≥ Three events
Health (nine events):			
Patients (49)	27	14	8
Controls (45)	27	17	1
Distribution of one and ≥ two events: χ^2 (1 df) 0.23, $P=0.63$			
Bereavement (four events):			
Patients (29)	26	3	0
Controls (30)	27	3	0
Distribution of one and two events: Fisher's exact $P=1.0$			
Family and social (22 events):			
Patients (37)	23	7	7
Controls (42)	20	14	8
Distribution of one, two and ≥ three events: χ^2 (2 df) 2.30, $P=0.32$			
Education (six events):			
Patients (3)	1	2	0
Controls (8)	6	2	0
Distribution of one and two events: Fisher's exact $P=0.56$			
Work (nine events):			
Patients (23)	13	7	3
Controls (23)	17	5	1
Distribution of one and ≥ two events: χ^2 (1 df) 1.53, $P=0.22$			
Moving house (three events):			
Patients (14)	14	0	0
Controls (1)	1	0	0
Binomial distribution: $P=0.0005$			
Financial and legal (nine events):			
Patients (32)	24	5	3
Controls (30)	24	3	3
Distribution of one and ≥ two events: χ^2 (1 df) 0.22, $P=0.64$			

AGE

The patients' median age was 53 years and the controls' median age was 57 years. Using Spearman's rank correlation technique,¹⁶ no correlation was found in the patient group between age and the number of events ($P=0.11$) or between age and life change and distress scores ($P=0.08$ and 0.70 respectively). A negative correlation was found in the control group between age and number of events ($r_s=-0.41$, $P=0.0004$) and between age and life change scores ($r_s=-0.36$, $P=0.003$). As the correlation coefficients are less than 0.5, however, their importance may be open to question. No correlation was found between age and distress scores ($P=0.99$). When patients and controls were divided into three age groups—under 40 years, 40–59 years, 60 years and over—group comparisons by Mann-Whitney test¹⁶ revealed that the youngest patients (under 40 years) scored significantly higher for distress than did controls in their age group ($P=0.04$). No other significant differences were found.

SEX

When male and female patients were compared with controls by paired t test,¹¹ and male patients were compared with female patients by independent t test,¹¹ no significant association was found between sex and the number of events and the distress and life change scores.

Table 4 Analysis of categorised events (2)

Event category	Number of subjects experiencing				
	One event	Two events	Three events	Four events	≥ Five events
Desirable (13 events):					
Patients (33)	25	4	4	0	0
Controls (30)	21	6	2	1	0
Distribution of one and ≥ two events: χ^2 (1 df) = 0.26, P = 0.61					
Undesirable (35 events):					
Patients (67)	23	7	15	11	11
Controls (62)	20	15	14	8	5
Distribution of one, two, three, four and ≥ five events: χ^2 (4 df) = 5.69, P = 0.22					
Ambiguous (14 events):					
Patients (32)	19	9	3	1	0
Controls (38)	28	5	5	0	0
Distribution of one and ≥ two events: χ^2 (1 df) = 1.61, P = 0.20					
Separation (23 events):					
Patients (52)	30	15	3	3	1
Controls (50)	27	17	4	2	0
Distribution of one, two and ≥ three events: χ^2 (2 df) = 0.32, P = 0.85					
Chronic difficulties (12 events):					
Patients (33)	14	15	1	2	1
Controls (31)	19	8	4	0	0
Distribution of one and ≥ two events: χ^2 (1 df) = 2.28, P = 0.13					

Discussion

The problems of studies relating stress to duodenal ulcer include misclassification of disease status and non-quantitative methods used to assess stress. In the present study, diagnosis has been based on duodenoscopy and stress has been quantified in terms of the number of events experienced and their associated change and distress scores.^{9 10}

Despite the negative results found in this and other controlled studies relating life events to peptic ulcer,^{1 2} certain methodological problems deserve emphasis. Selye has defined stress as a reaction within the organism in response to an evocative agent¹⁹ and this response may be influenced by such factors as personality, social support, past experience, education, and occupation.²⁰ It cannot be denied that duodenal ulcer patients may react abnormally to some or all life events and duodenal ulcer may be the result of this aberrant response. Supporting the negative findings reported in this study are the observations that chronic peptic ulcer is not more common in stressed groups such as air traffic controllers^{21 22} and populations exposed to death in times of war,²³ and the fact that other studies have not shown that life events play a role in the aetiology of any chronic disease.²⁴

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Addendum

LIST OF LIFE EVENTS WITH SCALE TO MEASURE THEIR STRESSFULNESS*

Event	Distress	Change
Health		
1 You had a minor illness or injury like one needing a visit to a doctor or a couple of days off work	2	2
2 You had a serious illness, injury or operation needing hospitalisation or a month or more off work	16	16
3 A close relative had a serious illness (from which they did not die) (Women only)	16	9
4 You found out that you were pregnant (with a wanted pregnancy)	2	26
5 You found out that you were pregnant (with an unwanted pregnancy)	33	29
6 You had a stillbirth	40	22
7 You had an abortion or miscarriage	26	13
8 You had a baby	5	47
9 Your change of life (menopause) began	14	18
Bereavement		
10 Your wife/husband died	83	79
11 A child of yours died	80	57
12 A close family member died (eg, parent, brother, fiancé, etc.)	57	27
13 A close family friend or relative died (eg, aunt, uncle, grandmother, cousin, etc.)	30	12

*Tennant C, Andrews G. A scale to measure the stress of life events. *Aust NZ J Psychiat* 1976; **10**:27–32.

Event	Distress	Change
Family and social		
(if you are or were married)		
14 You married	5	59
15 You adopted a child (women only)	4	47
16 Your wife had a child or you adopted a child (men only)	4	41
17 There have been increasing serious arguments with your wife/husband	26	25
18 There has been a marked improvement in the way you and your wife/husband are getting on	2	18
19 You have been separated from your husband/wife for more than a month because of marital difficulties	31	29
20 You have been separated from your wife/husband for more than a month for reasons other than marital difficulties, (eg, hospitalisation, business, etc.)	12	15
21 You have got back together again after a separation due to marital difficulties	5	25
22 You have been divorced (If you have or had children)	54	62
23 A child of yours became engaged	2	6
24 A child of yours married with your approval	2	10
25 A child of yours married without your approval	22	16
26 A child of yours left home for reasons other than marriage (If you are single)	11	14
27 You became engaged or began a 'steady' relationship	2	17
28 You broke off your engagement	25	21
29 You broke off a 'steady' relationship	18	18
30 You had increasing arguments or difficulties with your fiancé or steady friend	15	13
Friends and relatives		
31 A new person came to live in your household (apart from a new baby)	8	20
32 There has been a marked improvement in the way you get on with someone close to you (excluding husband or wife)	1	10
33 You have been separated from someone important to you (other than close family member)	13	13
34 There has been serious increase in arguments or problems with someone who lives at home (excluding husband or wife)	16	16
35 There have been serious problems with a close friend, neighbour, or relative not living at home	10	8
Education		
36 You started a course (ie, university, technical college, apprenticeship, or other occupational training course)	3	16
37 You changed to a different course	5	11
38 You completed your training programme	2	27
39 You dropped out of your training programme	14	22
40 You studied for, or did, important exams	10	13
41 You failed an important exam	20	18
Work		
42 You have been unemployed and seeking work for a month or more	20	22
43 Your own business failed	38	44
44 You were sacked	32	34
45 You retired	15	53
46 You were downgraded or demoted at work	20	18
47 You were promoted	2	18
48 You began to have trouble or disagreements with your boss, supervisor or fellow workers	10	9
49 You had a big change in the hours you worked	5	16
50 You started in a completely different type of job	8	24

<i>Event</i>	<i>Distress</i>	<i>Change</i>
<i>Moving house</i>		
51 You moved to Sydney from overseas	19	48
52 You moved to Sydney from elsewhere in Australia	8	26
53 You moved house in Sydney	4	11
<i>Financial and legal</i>		
54 You had moderate financial difficulties	9	10
55 You had a major financial crisis	34	37
56 You are much better off financially	1	23
57 You were involved in a traffic accident that carried serious risk to health or life of yourself or others	31	22

<i>Event</i>	<i>Distress</i>	<i>Change</i>
58 You had minor difficulties with the police or authorities (which have not required a court appearance)	4	2
59 You had more important problems with the police or authorities (which have not required a court appearance)	21	15
60 You had a jail sentence or were in prison	59	72
61 You were involved in a civil law suit (eg, divorce, debt, custody, etc.)	25	21
62 Something you valued or cared for greatly was stolen or lost	9	5