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The pattern of physical comorbidity and the psychosocial determinants of depression: a prospective cohort study on a representative sample of family practice attendees in Slovenia

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ABSTRACT

Objectives This study aims to present the patterns of physical comorbidity in depressed patients and factors strongly associated with depression in a representative sample of Slovenian family practice attendees.

Methods Medical data was obtained for 911 general practice attendees. Of them, 221 (24.3%) were diagnosed as depressed. The depressive states of the subjects were evaluated using the Composite International Diagnostic Interview (CIDI). Physical comorbidity was assessed with a questionnaire covering the most common health problems in the Slovenian adult population. Several psychosocial factors were also analysed.

Results Those variables significantly related to ICD depression were included in multivariate binary logistic regression analysis, adjusted by age, gender and education. The calculation included the chi-square, odds ratio (OR) with confidence

interval (95% CI) and *P*-value. A *P*-value < 0.05 was marked as statistically significant.

Conclusions There was no significant difference in the number of concurrent chronic diseases in depressed and non-depressed subjects. The risk of depression was increased by the presence of several concomitant factors. The burden of somatic comorbidity was shown to be smaller than the impact of psychosocial determinants, which also acted as protective factors: the feeling of safety at home and the absence of problems in intimate relationships. The abuse of alcohol and drugs by a family member and current poor financial situation were strongly associated with depression. The impact of concurrent incontinence and chronic bowel disease was also important, though somewhat weaker.

Keywords: depression, physical comorbidity, psychosocial determinants

Introduction

Depression is a complex disorder with significant physical and mental changes in many bodily functions. The symptoms are numerous and are expressed in different intensities and in various combinations. They include emotional, motivational, cognitive and physical signs.¹ Depression is a major global public health problem, second only to cardiovascular disease.²

Depression is often associated with chronic somatic diseases, which are of increasing importance due to the ageing of the population and the consequent growth in the number of multi-morbid patients,^{3,4} i.e. people with two or more chronic diseases at the same time.⁵ The prevalence of multimorbidity in the general population is estimated to be 25.5–29.05% in primary care patients;⁴ both the prevalence and complexity of multimorbidity increases with age,^{6,7} e.g. in the age group 0–19 years it is estimated at 10%, whereas in subjects aged 80 years and over it has risen to 78%.⁸

The association between depression and chronic somatic diseases is due to depression increasing the risk of some chronic somatic diseases, while at the same time chronic somatic diseases are also risk factors for depression.⁹ Mental illnesses (e.g. depression and other common mental disorders, alcohol abuse and substance abuse disorders, and psychoses) increase the risk of both contagious and non-transmissible diseases, and contribute to the enhanced incidence of both intentional and accidental injuries.¹⁰ In depressed patients, other somatic problems also occur frequently, such as cardiovascular and cerebrovascular disease, diabetes mellitus, irritable bowel syndrome and certain types of malignancy.¹¹ Depression may be considered an independent prognostic factor for coronary heart disease,¹² and it is associated with an increased incidence of ischaemic stroke and increased mortality after stroke.^{13–15} Prospective population cohort studies have shown that depression predicts colorectal cancer,¹⁶ irritable bowel syndrome,¹¹ chronic inflammatory bowel disease¹⁷ and lower back pain.^{18–20} By contrast, the prevalence of depression has been shown to be significantly higher in patients with chronic somatic disease than in healthy subjects; in the former group, the probability of the occurrence of depression was almost three times higher.¹

Somatic diseases are a proven risk factor for the onset of depression, with the risk being similar for various somatic diseases, i.e. arterial hypertension, asthma, arthritis, rheumatoid disease, lower back pain, diabetes mellitus, cardiovascular disease and chronic bronchitis.²¹ Comorbidity, e.g. migraine, respiratory and abdominal diseases, together with

certain psychosocial characteristics, significantly predicted the development of depression after a year of follow-up.²²

Improved prevention and early identification are made feasible by knowledge of the variety of risk factors. These also include the female gender,²³ lower socio-economic status,^{24–26} a family history of depression²⁷ and personality.²⁸

The aim of this study was to analyse the associations between depression and most common chronic diseases, together with the impact of psychosocial characteristics (risk factors) on the onset of depression, in a representative sample of family practice attendees in a prospective cohort study, using multivariate logistic regression modelling.

Methods

Participants

In 2003, consecutive family medicine practice attendees aged 18–75 years were recruited from 60 general practitioner (GP) clinics in Slovenia, and reviewed after 6, 12 and 24 months. The participating family medicine practices were selected from both urban and rural settings, and served a population with diverse socio-economic and ethnic characteristics. Each practice recruited 10–20 participants.²⁹ In 2009, the cohort was again reviewed, and additional data on somatic diseases were gathered from the patient records, so that multimorbidity and its patterns in these patients could be assessed and analysed. It was possible to locate the physicians of 925 of the original 1100 subjects; 15 patients were already deceased. After excluding questionnaires with missing data, 911 questionnaires were included in the statistical analysis (82.8% response rate). The family physicians were asked to review the medical records for the subjects who were included in the original prospective cohort study on depression,^{29,31} and note the presence of any of the somatic diseases included in the multimorbidity questionnaire. Patient consent has been obtained and all steps have been taken to maintain patient confidentiality.

Measures

Information on the sociodemographic characteristics of the participants, i.e. gender, age, education, employment status, household income, ethnicity, living status and occupation type was collected using a standardised questionnaire.²⁹ Depression was evaluated using the Composite International

Diagnostic Interview (CIDI), which provides psychiatric diagnoses based on symptoms experienced in the last six months, according to the ICD-10 criteria. Several risk factors, intrinsic either to the individual or to the social context, were included.^{29,30} The multimorbidity questionnaire covered most common chronic diseases³² and health problems in the Slovenian adult population, i.e. ischaemic stroke, dementia, Parkinson's disease, epilepsy, coronary heart disease, malignant disease, chronic pulmonary disease, hypertension, arthritis, poor vision or hearing, chronic pain, chronic bowel disease, ulcers, gastritis, GERD, dysphagia, injury, incontinence or prostate problems, hypo- or hyperthyroidism, hypo- or hyperparathyroidism, hypo- or hyperadrenalism, porphyry and uraemia. Both the first recruitment period (1 July 2003 to 31 December 2005) and the time of the current study (January–May 2009) were covered in the data collection. Depression diagnosed at any time during the study period was defined as a dependant variable.

Data analyses

Sample data were presented by frequency and percentage distribution for categorical variables and by a mean value and standard deviation for continuous variables. The chi-square test, Fisher's exact test for 2 × 2 tables and the independent sample's *t*-test were used for univariate comparison of somatic states and psychosocial characteristics between the depressed (D) patients and the control group (ND). In the

second phase, significant somatic states were included in the multivariate binary logistic regression analysis to calculate independent predictors for depression. In the third phase, logistic regression model included both somatic states and psychosocial characteristics as possible independent predictors of depression. The results were adjusted by age, gender and education. Owing to a large number of predictors, the Forward Wald method was used to eliminate insignificant variables. The calculation included the chi-square (χ^2), odds ratio (OR), 95% confidence interval (95% CI) and *P*-value. Statistical analysis was performed with SPSS 15.0 software; *P* < 0.05 was considered statistically significant.

Results

Gender, education, marital status and age of participants

Of 911 patients, with an average age of 53 years ($M = 53.1 \pm 14.3$ years; $DM = 52.2 \pm 13.6$ years and $ND M = 53.4 \pm 14.5$ years, $P = 0.266$), 221 were considered as depressed (D) and 690 as non-depressed (ND – control group). The sample consisted of 38.0% men (27.6% of D and 41.3% of ND) and 62.0% women (72.4% of D and 58.7% of ND). The difference in gender regarding the occurrence of depression was statistically significant ($P < 0.00$). Detailed background information is presented in Table 1.

Table 1 Sample grouped by gender, education, marital status and age

Characteristic	All participants (<i>n</i> = 911)	ICD-10 depression		<i>P</i>
		No (<i>n</i> = 690)	Yes (<i>n</i> = 221)	
Gender (%)				< 0.00
Male	346 (38.0%)	285 (41.3%)	61 (27.6%)	
Female	565 (62.0%)	405 (58.7%)	160 (72.4%)	
Education (%)				0.01
Primary school or lower	201 (22.1%)	149 (21.6%)	52 (23.5%)	
Vocational school	215 (23.6%)	158 (22.9%)	57 (25.8%)	
High school and higher	409 (45.0%)	305 (44.2%)	104 (47.3%)	
University and higher	86 (9.4%)	78 (11.3%)	8 (3.6%)	
Marital status (%)				0.44
Married or living with partner	645 (70.8%)	491 (71.5%)	152 (68.8%)	
Separated or divorced	45 (5.0%)	32 (4.7%)	13 (5.9%)	
Widowed	93 (10.2%)	65 (9.5%)	28 (12.7%)	
Single and never married	128 (14.0%)	99 (14.4%)	28 (12.7%)	
Age (M ± SD)	53.1 ± 14.3	53.4 ± 14.5	52.2 ± 13.6	0.27

Co-occurring diseases in depressed and non-depressed subjects: the multivariate logistic regression modelling

The results in Table 2 show that in both groups (D and ND), there was the highest prevalence of hypertension and chronic pain. First, logistic regression modelling, adjusted by age, proved no differences between groups, when considering hypertension, but chronic pain significantly affected the onset of depression (27.1% vs. 17.8%, $P = 0.01$). In subjects with malignant disease, the occurrence of depression differed in D compared with ND subjects (2.3% D vs. 4.2% ND, $P = 0.090$) but was not statistically significant, because the number of subjects ($n = 34$) might not have been sufficient to achieve a level of significance. Co-occurring diseases in the regression model described only 4% of the original variance (Nagelkerke $R^2 = 0.040$). In a separate calculation, all reported co-occurring diseases were summed for each participant and there was no statistically significant difference in the number of reported co-occurring chronic diseases.

In the second regression model (Table 2), co-occurring diseases and an additional 30 psychosocial factors, adjusted by gender and education, were included as predictors. Owing to a large number of variables, insignificant factors from the first regression model calculation were excluded. The risk of depression was increased by incontinence (8.1% D vs. 5.1% ND, $P = 0.02$), chronic bowel disease (3.6% D vs. 1.6% ND, $P = 0.03$), death of a family member (18.1% D vs. 9.6% ND, $P = 0.001$), psychological or emotional problems of a father (19.5% D vs. 9.6% ND, $P = 0.00$), discrimination on grounds of appearance (8.1% D vs. 1.4% ND, $P = 0.01$), physical abuse in childhood (25.3% D vs. 13.3% ND, $P = 0.01$), poor present financial situation (38.0% D vs. 17.8% ND, $P < 0.00$), and problems with alcohol or drugs in a significant other, mainly parent (24.0% D vs. 8.6% ND, $P < 0.00$).

Protective factors, identified by multivariate logistic regression analysis, were feelings of safety at home (46.6% D vs. 58.8% ND, $P = 0.03$) and absence of problems establishing intimate relationships (53.4% D vs. 71.9% ND, $P = 0.00$).

Summarising the calculated results, the strongest predictors of depression, derived from the multivariate regression model (Table 2), were the abuse of alcohol or drugs by a family member and current poor financial situation. The impact of concurrent incontinence and chronic bowel disease was also important, although somewhat weaker.

Discussion

In our findings (Table 1), the incidence of depression (24.3%) was somewhat higher than in other similar studies. In Slovenia, Klemenc Ketiš *et al*³¹ reported a prevalence of 15.2% patients with depression in the adult population, aged between 18 and 64 years, and at least one chronic disease present in 40.7% of the patients. Significantly higher rates of depression and anxiety were found among patients with chronic pain. This was also present in significantly more patients with a particular chronic disease in comparison with the patients without it; this was probably due to sampling and inclusion criteria.

Nevertheless, the two studies are concordant regarding chronic pain. We believe that depression can intensify the feeling of chronic pain, while living with chronic pain can contribute to depression – knowing that symptoms of chronic pain, depression and anxiety often overlap in patients.^{33–35} The concurrence of depression and chronic pain is reported to vary from 30 to 60%;^{36,37} in our sample it was 27.1%. Patients with chronic pain have symptoms of depression or anxiety more frequently than those without,³⁸ with depression intensifying other symptoms. We may conclude from our results that chronic pain significantly affects the onset of depression in adults in Slovenia when only somatic problems are taken into account (Table 2); it follows that special emphasis should be given to the assessment of onset of depression in patients with chronic pain and to chronic pain treatment, because treatment of chronic pain is less successful in depressed subjects.^{39,40}

Based on logistic regression modelling results, including psychosocial characteristics, somatic determinants of depression were urinary incontinence and chronic bowel disease (Table 2). The prevalence of urinary incontinence increases with age.⁴¹ In the adult population, problems with urinary incontinence are estimated to be present in approximately 11.8% of men and 26.2% of women;⁴² in our sample they are present in 5.1% of ND and 8.1% of D subjects. Several studies have confirmed an association between depression and a higher prevalence of urinary incontinence.^{41,42} Given that, our findings are not unexpected, because middle-aged women represent a majority of the sample (Table 1), and female gender has been proven to be a significant risk factor for depression.²³

In our analysis, patients with inflammatory bowel disease (IBD) were assessed as a homogeneous group (Table 2), since Graff *et al*⁴³ found no differences in the psychological profiles of people with ulcerative colitis compared with those with Crohn's disease. The recovery rate of patients with Crohn's disease and depression was only 17%, while a significantly

Table 2 Co-occurring diseases in depressed and non-depressed subjects (model 1), factors associated with depression (model 2); multivariate logistic regression

Characteristic	ICD-10 depression		Model 1 ($\chi^2 = 25.050$, df = 12, $P = 0.015$)			Model 2 ($\chi^2 = 153.462$, df = 14, $P < 0.001$)		
	no (n = 690)	yes (n = 221)	χ^2	OR (95% CI)	P	χ^2	OR (95% CI)	P
Diabetes mellitus	51 (7.4%)	19 (8.6%)	1.31	1.44 (0.77–2.68)	0.25			
Coronary heart disease	41 (5.9%)	15 (6.8%)	0.41	1.24 (0.64–2.39)	0.52			
Malignant disease	29 (4.2%)	5 (2.3%)	2.87	0.41 (0.15–1.15)	0.09			
Chronic pulmonary disease	30 (4.3%)	14 (6.3%)	0.94	1.40 (0.71–2.78)	0.33			
Hypertension	202 (29.3%)	57 (25.8%)	1.49	0.77 (0.51–1.17)	0.22			
Arthritis	43 (6.2%)	13 (5.9%)	0.02	0.96 (0.50–1.85)	0.90			
Chronic pain	123 (17.8%)	60 (27.1%)	7.84	1.69 (1.17–2.45)	0.01			
Incontinence	35 (5.1%)	18 (8.1%)	3.62	1.89 (0.98–3.63)	0.06	5.50	2.26 (1.14–4.37)	0.02
Poor vision or hearing	44 (6.4%)	16 (7.2%)	0.03	1.06 (0.56–1.99)	0.86			
Chronic bowel disease	11 (1.6%)	8 (3.6%)	2.75	2.24 (0.86–5.80)	0.10	4.56	3.12 (1.10–8.95)	0.032
Ulcers, gastritis, GERD, dysphagia	54 (7.8%)	27 (12.2%)	1.64	1.40 (0.84–2.34)	0.20			
Poor present financial situation	123 (17.8%)	84 (38.0%)				17.84	2.29 (1.54–3.24)	<0.00
Death of a family member	66 (9.6%)	40 (18.1%)				7.99	2.05 (1.23–3.16)	0.01
Feelings of safety (at home)	284 (58.8%)	118 (46.6%)				4.67	0.73 (0.49–0.97)	0.03
Psychological or emotional problems of father	66 (9.6%)	43 (19.5%)				8.20	2.07 (1.24–3.19)	0.00
Physical abuse in childhood	92 (13.3%)	56 (25.3%)				6.70	1.83 (1.15–2.71)	0.01
Absence of problems in establishing intimate relationships	496 (71.9%)	118 (53.4%)				10.00	0.61 (0.40–0.81)	0.00
Problems with alcohol or drugs in significant other	59 (8.6%)	53 (24.0%)				17.27	2.73 (1.674–4.20)	<0.00
Discrimination on grounds of appearance	10 (1.4%)	18 (8.1%)				6.90	3.63 (1.381–9.25)	0.010

higher recovery rate (53%) was reported in patients with Crohn's disease without depression.⁴⁴ In patients with IBD, concurrent depression is associated with a significantly lower quality of life, regardless of the current severity of the primary disease.⁴⁵ Research findings suggest depression and anxiety to be the most common states which co-occur in patients with IBD,⁴⁶ and the proportion of depressed patients is reported to be significantly higher in those with IBD in comparison with ND controls.⁴⁶ Our findings were expected, and concordant with those of others, although there are limitations to interpretation due to the number of patients included.

With regard to psychosocial determinants, our findings are in accordance with existing evidence that all forms of abuse and poverty are associated with depression. Various types of childhood trauma, most often occurring in underprivileged families, such as parental loss, poor parenting, parental drinking, mental illness and family violence, contribute to the onset of depression in adulthood. The factors identified in our study (Table 2) are concordant with the body of research available. The emotional problems of the patient's father (Table 2) may be interpreted as emotional abuse, which is relatively difficult to define and has only recently been recognised as a distinct entity.⁴⁷ This abuse, which can occur on a daily basis and often reflects a poor family environment, may have more dire and long-lasting consequences than other types of abuse.⁴⁸ In patients with chronic pain, emotional abuse was reported more commonly (38%) and to be of greater severity (12% with 'severe to extreme' abuse) than other types of abuse, such as physical or sexual.⁴⁷ Children who witness domestic violence can experience a broad range of harmful responses, including behavioural, emotional, or cognitive issues that may follow them into adulthood.⁴⁸⁻⁵⁰

A family history of alcoholism in first-degree relatives carries an increased risk of depression.⁵¹ Because Slovenia is known for its alcohol dependence rate,⁵² we may assume that, in association with substance abuse, which was identified as the most significant factor associated with depression in our study (Table 2), an abusive family environment plays a very important role in the onset of depression in adulthood. Children exposed to parental violence are frequently victims of concurrent maltreatment; estimates of such co-occurrence range from 47 to 80%.⁵³ Poverty (Table 2, i.e. poor financial situation) is linked to violence and abuse,⁵⁴ while a present poor financial situation may strengthen the impact of other risk factors.²⁴⁻²⁶

The loss of a significant other, and discrimination based on appearance, were identified as other risk factors for the adult onset of depression. The death of a significant other can result in a depressive

reaction in any individual, regardless of age, who finds such stressors overwhelming. These stressors are most commonly seen, however, in the elderly. The presence of multiple stressors or the inability to cope can result in an episode of depression.⁵⁵ Practitioners need to be aware of the fact that the loss of a loved one may generate a bereavement response that portrays a pathological appearance. The stress of losing a spouse outranks all others, although grieving over the loss of any significant person can, in itself, precipitate depression. Depressive symptoms associated with bereavement are too often overlooked by healthcare personnel as 'normal' for the grieving subject. Zisook and Schucater showed that widows often display depressive symptoms even two years after their loss.⁵⁵ Increased substance abuse in the bereaved can also indirectly contribute to depression.

Discrimination, acting as a chronic stressor, remains poorly researched. Apart from the impact of research into racial discrimination, there is a lack of informative data explaining how the experience of discrimination based on appearance operates. The effects of ethnicity and perceived discrimination on the diastolic pressure response were analysed by Thomas *et al.*⁵⁶ Individuals who perceived more ethnic discrimination had greater blood pressure responses to phenylephrine. We can assume that the experience of discrimination based on appearance may contribute to some of the physiological underpinnings of chronic diseases and depression.

Contrary to our expectations, the burden of somatic comorbidity was shown to be smaller than the impact of psychosocial determinants, which also acted as protective factors. Clearly, the protective factors which were identified (Table 2) are expected, and logically counteract the risk factors. Feelings of safety and the capacity for building fulfilling relationships are present in those without the emotional and attachment problems which commonly derive from childhood maltreatment experience.⁵⁷ The possibility for a fulfilling relationship to protect against depression in ND subjects could be, though not necessarily, interpreted in the light of the participants' independence and personal maturity.

An advantage of our findings is that they are based on a representative sample of family practice attendees in Slovenia; therefore the pattern of physical comorbidity identified in depressed patients might serve as a relatively valid guidance for family physicians. In spite of the large sample size, the prevalence of depression was lower than expected, resulting in a low number of D subjects, therefore the inclusion criterion 'depressions diagnosed at any point during the study period' was used, which made predictions impossible. Moreover, in spite of the large sample size, the numerous chronic diseases analysed split both depressed and non-depressed patients into smaller

subgroups, consequently making the number of subjects insufficient to achieve a level of significance. For this reason, separated diagnostic factors in association with depression should be considered for further research. Because the response rate (82.8%) might have affected the representativeness of the original sample, further sampling and analysis would be appropriate to re-establish the pattern of comorbidity presented.

Conclusions

The prevalence of depression in this representative sample of Slovenian family practice attendees was found to be 24.3%. There was no statistically important difference in the number of concurrent chronic diseases between depressed and non-depressed subjects. In both groups, the highest prevalence was of hypertension and chronic pain.

The abuse of alcohol or drugs by a family member and current poor financial situation were strongly associated with depression, while the impact of concurrent incontinence and chronic bowel disease was also important, although somewhat weaker. If only somatic states were taken into account, chronic pain was significantly associated with the onset of depression. Explanations for the pattern of physical multimorbidity in depressed subjects were considered, yet remained unclear.

When treating IBD and urinary incontinence, family doctors should be encouraged to actively seek out and treat depression in the adult population. A history of parental abuse and financial problems should be also considered as a powerful factors associated with depression.

We researched and described depression as a bio-psycho-social entity, considering not only its psychological, but also its social and somatic dimensions. Given that, depression can be recognised as a complex condition with different dimensions, which is of utmost importance in family medicine, for treating the patients in a holistic manner.

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ETHICAL APPROVAL

The National Medical Ethics Committee of the Republic of Slovenia approved the protocol of the study: The Acceptability of a Multi-factor Rating Scale for Predicting Depression in Family Medicine.

COMPETING INTERESTS

The authors declare that they have no competing interests.

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