



Journal of Medical Sciences

ISSN 1682-4474

science
alert

ANSI*net*
an open access publisher
<http://ansinet.com>

JMS (ISSN 1682-4474) is an International, peer-reviewed scientific journal that publishes original article in experimental & clinical medicine and related disciplines such as molecular biology, biochemistry, genetics, biophysics, bio-and medical technology. JMS is issued eight times per year on paper and in electronic format.

For further information about this article or if you need reprints, please contact:

Ali Cimbiz
Department of Physical Therapy
and Rehabilitation,
Dumlupinar University,
Health Institution of Higher
Education, 43100,
Kutahya Turkey

Tel: +90 274 2652031/2091,
90 535 3938164
Fax: + 90 274 2652191

J. Med. Sci., 7 (4): 620-624
15th May, 2007

Musculoskeletal Pain and Associated Sociodemographic Factors (Linear Probability Model)

¹Nevin Uzgören, ²Ali Cimbiz, ²Cihan Caner Aksoy,
²Sultan Ozturk and ²Emel Elem

The objective of the study was to evaluate the effect of sociodemographic factors on severity of musculo-skeletal pain in Turkey. Two thousand eight hundred fifty two (N = 2852) subjects with or without musculoskeletal pain any regions of the body were included in this study. Data was gathered by means of and anonymous self-reporting questionnaire which participants selected by random sample techniques. The survey instrument was a simple two page anonymous form including questions such as pain (Pain; No:0, Yes:1), age, gender, case and family history, occupation, height, weight and BMI, sleeping time, happiness, stress, smoking history, sportive activity and living region of Turkey. According to analyses, gender, age, height, weight, cigarette smoking, stress, happiness, sitting working and sleeping time were found effective in formation pain ($p < 0.05$). Occupation variable was accepted less efficient in formation pain ($0.05 < p < 0.10$). No significant effectiveness in formation pain were observed in variables case and family history, sportive activity and BMI ($p > 0.05$). The present study shows that even in Turkey today the perception and impact of a health problem (musculoskeletal pain) is related to a person's sociodemographic situation. In examined results, it is showed increasing in formation pain probability to be female, to be struggle farmer, housewife, retired and student, increased age, increased weight, increased stress and to be Mediterranean region. Separately, it is showed decreasing in formation pain probability that increased height (as height as 1, 89), increasing happiness, increased work time (sitting) and increasing sleeping time.

Key words: Musculoskeletal pain, sociodemographic status, regression, linear probability model, dichotomous dependent variable, qualitative variable

INTRODUCTION

The incidence of musculoskeletal pain has increased recently in industrialized nations resulting in musculoskeletal pain representing a leading cause of physical and occupational disability (Wesley *et al.*, 2000). The association between low socio-economic status and poor physical functioning has been well described (Hemingway *et al.*, 1997; Martikainen *et al.*, 1999). Persons with a low level of education, who belong to a low occupational class, or who have a low income develop more disabilities than their better-off counterparts. A less healthy physical environment, less healthy lifestyle and the psychological impact of being poorer than other people, are also possible explanatory factors (Brekke *et al.*, 2004). Some authors have found that geographical variations in self-reported illness persist even after allowing for socio-structural individual characteristics (Gould and Jones, 1996). In the other hand pain treatment especially chronic pain did not get benefit from the treatment approach. The reason for treatment failure is often not obvious, but psychological and socioeconomic factors may play a major role. A number of studies have described the psychosocial and sociodemographic characteristics of patients, who fail to respond to treatment (Herman and Babbiste, 1981; Aronoff and Evans, 1982). Finally, a number of studies have found these sociodemographic factors to be without importance for treatment outcome (Chapman *et al.*, 1981; Aronoff and Evans, 1982; Kleinke and Sprangler, 1988; Solomon and Tunks, 1991).

In literature linear regression analysis about musculoskeletal were performed to identify factors correlated with depression and trait anxiety (White *et al.*, 2002) and the relationship of pain-related negative affect with clinical pain intensity in fibromyalgia patients (Staud *et al.*, 2004). In addition Kuijer *et al.* (2006) were performed to explain work status from the variables of functioning in worked and non-worked back pain patients. In another study Dickey *et al.* (2002) were performed linear regression to investigate the relationship between intervertebral motion, intravertebral deformation and pain in chronic low-back pain patients. Despite of the literature studies, no more studied have been investigated the effect of sociodemographic factors on severity musculoskeletal pain. The objective of the present study was to determine the sociodemographic factors of associated with musculoskeletal pain.

MATERIALS AND METHODS

Two thousand eight hundred fifty two (N = 2852) voluntary adults of both sexes were participated to study from 7 region (randomized samples from Marmara,

Aegean, Mediterranean, Inner Anatolia, Black Sea and South East Anatolia) of the Turkey in first 4 months of 2006 year. Subject with or without musculoskeletal pain any regions of the body were included in this study. Exclusion criteria for participants were neurological diseases, intestinal or cardiopulmonary pain and malignancy. Data was gathered by means of and anonymous self-reporting questionnaire which participants selected by random sample techniques. The survey instrument was a simple two page anonymous form including questions such as pain Pain; No:0, Yes:1), age, gender, case and family history, occupation, height, weight and BMI, sleeping time, happiness, stress, smoking history, sportive activity and living region of Turkey. The study had local research and ethics committee approval and participants gave written consent.

Statistical analyses: SPSS 13.0 version for Windows was used for all statistical analyses. Statistical evaluation of the data was performed by regression analyses (linear probability model). If the $p < 0.05$, that coefficient accepted statistically significant.

RESULTS

Demographic and other baseline data of subjects are given in Table 1. R^2 value is found quite lower than 1 (0.139) (Table 2). However, R^2 values frequently have affinity resulting lower than 1 in linear probability models. Although the R^2 values, F examination was found significant ($F = 8.508$ $p = 0.000$). It shows being a important model that established model to be explained in formation pain. In this study, gender, age, weight, cigarette smoking, stress, happiness, sitting working and sleeping time were found effective in formation pain ($p < 0.05$). Occupation, height and geographic region were found less effective in formation pain (to some level, $p < 0.05$ and $0.05 < p < 0.10$). No significant effectiveness in formation pain were observed in variables case and family

Table 1: Demographic and physical Features (n: 2852)

Age (year)	36.0±15.2 (12-90)
Weight (kg)	69.5±12.7 (19-115)
BMI	24.6±4.3 (18-44)
Height (m)	1.68±0.11 (1.20-1.95)
Sex, F/M (No.%)	1420 (49.8)/1432 (50.2)
Occupation (No.%)	
Unemployed	10 (0.4)
Officer	551 (19.3)
Worker	202 (7.1)
Student	833 (29.2)
Retired	172 (6.0)
Housewife	31 (25.6)
Irregular	293 (10.3)
Farmer	60 (2.1)

Data are shown as Mean±SD

Table 2: Linear probability model analyses results

Independent variable	Coefficients	Standard error	t	Significant p
Constant gender	0.276	0.211	1.311	0.190
Female	...	...	...	...
Male	-0.079	0.026	-3.034	0.002
Occupation				
Unemployed	...	...	...	...
Officer	0.198	0.139	1.421	0.155
Worker	0.220	0.141	1.565	0.118
Student	0.245	0.139	1.762	0.078
Retired	0.261	0.142	1.844	0.065
Housewife	0.264	0.139	1.894	0.058
Irregular	0.214	0.140	1.529	0.126
Farmer	0.288	0.148	1.942	0.052
Age				
≤14	...	...	...	...
15-29	0.206	0.144	1.423	0.155
30-44	0.209	0.146	1.431	0.152
45-59	0.298	0.147	2.027	0.043
60-74	0.362	0.149	2.425	0.015
75+	0.418	0.162	2.577	0.010
Height				
≤1.49	...	...	...	...
1.50-1.59	-0.126	0.097	-1.300	0.194
1.60-1.69	-0.147	0.096	-1.537	0.124
1.70-1.79	-0.180	0.099	-1.819	0.069
1.80-1.89	-0.217	0.103	-2.107	0.035
1.90+	-0.089	0.129	-0.689	0.491
Weight				
24-39	...	...	...	...
40-55	0.180	0.152	1.184	0.237
56-71	0.236	0.154	1.529	0.126
72-87	0.280	0.157	1.787	0.074
88+	0.350	0.162	2.156	0.031
BMI				
14-18.99	...	...	...	...
19-23.99	-0.043	0.038	-1.143	0.253
24-28.99	-0.046	0.046	-1.143	0.320
29-33.99	-0.044	0.058	-0.768	0.443
34-38.99	-0.101	0.038	-1.215	0.224
39+	-0.065	0.146	-0.447	0.655
Case history				
None	...	...	...	...
Only one	0.045	0.022	2.075	0.038
Two risk	0.025	0.039	0.658	0.511
Three risk	-0.012	0.083	-0.145	0.885
Four and more risk	0.132	0.221	0.599	0.549
Family history				
None	...	...	...	...
Only one risk	-0.014	0.019	-0.759	0.448
Two risk	-0.024	0.024	-1.000	0.317
Three risk	-0.094	0.042	-2.209	0.027
Four and more risk	-0.062	0.077	-0.808	0.419
Smoking history				
No	...	...	...	...
Yes	0.041	0.019	2.197	0.028
Stress				
No	...	...	...	...
Low	0.067	0.035	1.894	0.058
Mild	0.135	0.033	4.038	0.000
High	0.203	0.035	5.730	0.000
Happiness				
Unhappy	...	...	...	...
Occasionally happy	-0.046	0.028	-1.624	0.104
Happy	-0.101	0.030	-3.380	0.001

Table 2: Continued

Independent variable	Coefficients	Standard error	t	Significant p
Sitting work time (h)				
0-1.9	...	...	...	...
2-3.9	-0.088	0.026	-3.439	0.001
4-5.9	-0.144	0.026	-5.470	0.000
6-7.9	-0.123	0.030	-4.060	0.000
8+	-0.140	0.027	-5.181	0.000
Sportive activity				
No	...	...	...	...
Yes	0.004	0.019	0.229	0.819
Geographic region of Turkey				
Marmara (Northwestern)	...	...	...	...
Aegean	0.016	0.027	0.582	0.560
Mediterranean	0.083	0.034	2.411	0.016
Inner anatolia	.041	0.032	1.263	0.207
Black sea	-0.012	0.040	-0.299	0.765
East anatolia	0.023	0.039	0.596	0.551
South east anatolia	0.053	0.053	0.999	0.318
Sleeping (h)	-0.013	0.005	-2.484	0.013
N = 2852				
R ² = 0.139				
F = 8.508 (0.000)				

Dependent Variable: Pain (No:0, Yes:1), p<0.05 values were accepted statistically significant. It accepted having important efficient on pain that variables wrote as bold and less efficient that variables wrote as italic (0.05, p<0.10),shows the basic level

history, sportive activity and BMI (generally p>0.05). In addition Mediterranean region of the Turkey effective in formation pain than basic level Marmara (Northwestern) (p<0.05) (Table 2). It is showed the most efficient factors effected the pain that sitting work time, stress, happiness, gender, sleeping time, age, smoking cigarette and weight. In this study was found statistically higher pain in female subjects than male, employed, housewife and student subjects than unemployed subjects, age higher than 45 years than younger, over 72 kg weight than fatless subjects, subjects in stress and unhappy than subject without stress and happy and smoker subjects than non-smoker (p<0.05).

DISCUSSION

The principal finding of the present study is that the musculoskeletal pain effected from sociodemographic factors as gender (female subjects), occupation (farmer, housewife, retired and student), over 45 ages, 1.70-1.89 m and ±72 kg, cigarette smoking, stress, happiness, sitting working time and sleeping hour. In addition, BMI, sportive activity, case and family history sociodemographic factors were found not effective on formation musculoskeletal pain.

Findings of previous authors have revealed a higher prevalence of disability among women, as well as sex differences in physical-medical and psychosocial variables influencing pain and disability (Gatchel *et al.*, 1995). Jensen and Bodin (1998) suggest that women are more likely to respond positively to multidisciplinary interventions for chronic pain than men. Jensen *et al.*

(2001) examined the efficacy of a cognitive-behavioral treatment program for individuals with chronic spinal pain and found that 74% of the female participants experienced significant improvements in pain intensity, depression and disability, as well as Short Form (SF)-36 scores, whereas male participants showed no significant improvements.

Soetanto *et al.* (2006) determined the gender differences in pain threshold and tolerance among Chinese adults in Hong Kong. Pain was assessed by using the Pain Intensity Verbal Rating Scale-Chinese version. Compared to men, women had a lower threshold and tolerance for pressure pain and women reported more pain at the pain tolerance level.

In other multiple logistic regression study reported that increasing age, no regular exercise, heavy lifting, repetitive work and monotonous work as risk factors on low back pain (Ghaffari *et al.*, 2006). In cohorts of newly employed workers, certain work related psychosocial factors and individual psychological distress are associated with the subsequent reporting of musculoskeletal pain and generally this effect is common across anatomical sites (Nahit *et al.*, 2003).

Significant associations were found between various psychosocial factors and musculoskeletal pain in different body regions after adjusting for potential confounding factors. Occupational stressors, in particular stress from safety, physical environment and ergonomics, were important predictors of musculoskeletal pain, as was coping by eating behaviour (Chen *et al.*, 2005). In this study results are concordance with literature studies. However, BMI and working sitting time results are found disagreeable with literature studies. Because of most our subjects' students or young and psychological thinking that sitting relieve the pain effective for appearing these results in the study. Some levels of case and family history variables are also significant. But, if the levels belonging to case and family history are examined, it is seen decreasing in formation pain probability in contrast to increased risk factors. This isn't a sufficient invention. This situation were welded with a great probability that Turkey wasn't sufficient health services and so, persons weren't have certain information about their health.

In the regression analyses of cross-section data models are frequently observed where the dependent variable is a qualitative variable having only two classes or alternatives. This type of qualitative variable is generally referred to as a dichotomous dependent variable and usually is assigned the value of 0 or 1 for the purpose of the estimation (Huang, 1970). In this study, to find out the effect of sociodemographic factors on musculoskeletal

Table 3: An example estimate with linear probability model

Characteristics of person	Coefficient values
Constant	0.276
Gender coefficient for women	0
Officer coefficient	0.198
Age coefficient	0.209
Height coefficient	-0.147
Weight coefficient	0.236
BMI coefficient	-0.043
Case History coefficient	0.045
Family History coefficient	0
Smoking history coefficient	0.041
High stress coefficient	0.203
Unhappy coefficient	0
Sitting working time coefficient	-0.140
Sportive activity coefficient	0
Region of Turkey coefficient	0.041
Sleeping time (7 hour) coefficient	-0.013 (7) = -0.091
Total score	0.828
Probability of formation pain $P(\bar{Y}|X_i)$	82.8%

pain, we performed linear probability model. Furthermore, in that type studies are also used logistic regression model instead of linear probability model.

Each coefficients of the linear probability model shows changes in the conditional probability that the dependent variable (i.e., a person has pain) will occur, whereas one unit changes in the independent variable (Gujarati, 1999). In this study, since most of independent variable were categorical type, interpretation of each coefficient were made due to basic level.

For example -0.079 coefficients of the gender variable shows male subjects have lower pain (7.9%) than women subjects when other variables stable. In addition, probability of formation pain in farmers' 28% is higher observed than unemployed subjects (coefficients: 0.288, Table 2). Sleeping time is only the quantitative independent variable in our model. Increasing 1 h in sleeping time is decreased 1.3% in probability of formation pain (coefficients -0.013, Table 2).

However, if we substitute values of explanatory (independent) variables on the right-hand side of model linear probability, we will get the actual estimate of the probability of formation pain a person.

For example; ages 35 year cigarette smoker, officer women, height 1.62 m, weight 60 kg, BMI: 23, Hypertension in case history, no risk in family history, unhappy and have high stress, working 8 hour in sitting position, daily sleeping 7 h, have not any sportive activity and living in Inner Anatolia (Table 2). In other words, probability of formation pain in women with those properties is 82.8% (Table 3).

CONCLUSIONS

The present study shows that even in Turkey today the perception and impact of a health problem (musculoskeletal pain) is related to a person's sociodemographic

situation. Self-reported health status is known to correlate with mortality and it is a person's perceived health problems which influence the demand for health care. Increasing in weight, to be a female, increasing in age, cigarette smoking, stress, happiness, sitting working and sleeping time are implied increase risk of severe symptoms.

REFERENCES

- Aronoff, G.M. and W.O. Evans, 1982. The prediction of treatment outcome at a multidisciplinary pain center. *Pain*, 14: 67-73.
- Brekke, M. and P. Hjortdahl, 2004. Musculo-skeletal pain among 40- and 45-year olds in Oslo: Differences between two socioeconomically contrasting areas and their possible explanations. *Intl. J. Equity Health*, 19: 3-10.
- Chapman, S., S. Brena and A. Bradford, 1981. Treatment outcome in a chronic pain rehabilitation program. *Pain*, 11: 25-268.
- Chen, W.Q., I.T-S. Yu and T.W Wong, 2005. Impact of occupational stress and other psychosocial factors on musculoskeletal pain among Chinese offshore oil installation workers. *Occup. Environ. Medicine*, 62: 251-256.
- Dickey, J.P., M.R. Pierrynowski, D.A. Bednar and S.X. Yang, 2002. Relationship between pain and vertebral motion in chronic low-back pain subjects. *Clin. Biomech. (Bristol, Avon)*, 17: 345-352.
- Gatchel, R., P. Polatin and T. Mayer, 1995. The dominant role of psychosocial risk factors in the development of chronic low back pain/disability. *Spine*, 20: 2702-2709.
- Ghaffari, M., A. Alipour, I. Jensen, A.A. Farshad and E. Vingard, 2006. Low back pain among Iranian industrial workers. *Occup. Med. (Lond)*, Jul 12; (Epub ahead of print).
- Gould, M.I. and K. Jones, 1996. Analyzing perceived limiting long-term illness using U.K. Census Microdata. *Soc. Sci. Med.*, 42: 857-869.
- Gujarati, D.N., 1999. *Temel Ekonometri, Literatür Yayıncılık*, pp: 548-551.
- Hemingway, H., A. Nicholson, M. Stafford, R. Roberts and M. Marmot, 1997. The impact of socioeconomic status on health functioning as assessed by the SF-36 questionnaire: The Whitehall II Study. *Am. J. Public Health*, Sep; 87: 1484-1490.
- Herman, E. and S. Babbiste, 1981. Pain control: Mastery through group experience. *Pain*, 10: 79-86.
- Huang, D.S., 1970. *Regression and econometric method*. Wiley, New York.
- Jensen, I.B. and L. Bodin, 1998. Multimodal cognitive-behavioral treatment for workers with chronic spinal pain: A matched cohort study with an 18 month follow-up. *Pain*, 76: 35-44.
- Jensen, I.B., G. Bergström, T. Ljungquist, L. Bodin and Nygren, 2001. A randomized controlled component analysis of a behavioral medicine rehabilitation program for chronic spinal pain: Are the effects dependent on gender. *Pain*, 91: 65-78.
- Kleinke, C.L. and Jr. A.S. Sprangler, 1988. Predicting treatment outcome of chronic back pain patients in a multidisciplinary pain clinic: Methodological issues and treatment implications. *Pain*, 33: 41-48.
- Kuijjer, W., S. Brouwer, H.R. Preuper, J.W. Groothoff, J.H. Geertzen and P.U. Dijkstra, 2006. Work status and chronic low back pain: Exploring the International Classification of Functioning, Disability and Health. *Disabil Rehabil*, 30: 28: 379-388.
- Martikainen, P., S. Stansfeld, H. Hemingway and M. Marmot, 1999. Determinants of socioeconomic differences in change in physical and mental functioning. *Soc. Sci. Med.*, 49: 499-507.
- Nahit, E.S., I.M. Hunt, M. Lunt, G. Dunn, A.J. Silman and G.J. Macfarlane, 2003. Effects of psychosocial and individual psychological factors on the onset of musculoskeletal pain: Common and site-specific effects. *Ann. Rheum Dis.*, 62: 755-760.
- Soetanto, A.L., J.W. Chung and T.K. Wong, 2006. Are there gender differences in pain perception. *J. Neurosci. Nurs.*, 38: 172-176.
- Solomon, P. and E. Tunks, 1991. The role of litigation in predicting disability outcome in chronic pain patients. *Clin. J. Pain*, 7: 300-304.
- Staud, R., D.D. Price, M.E. Robinson and Jr. C.J. Vierck, 2004. Body pain area and pain-related negative affect predict clinical pain intensity in patients with fibromyalgia. *J. Pain*, 5: 338-343.
- Wesley, A., P. Polatin and R. Gatchel, 2000. Psychosocial, psychiatric and socioeconomic factors in chronic occupational musculoskeletal disorders. In: *Occupational Musculoskeletal Disorders*. Mayer, T., R. Gatchel and P. Polatin, (Eds.), Lippincott, Williams and Wilkins, Philadelphia.
- White, K.P., W.R. Nielson, M. Harth, T. Ostbye and M. Speechley, 2002. Chronic widespread musculoskeletal pain with or without fibromyalgia: Psychological distress in a representative community adult sample. *J. Rheumatol.*, 29: 588-594.