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Original scientific paper

Obesity and Low Back Pain

Abdulbari Bener[1], Rafie Alwash[2], Tariq Gaber[3] and Gyorgy Lovasz[4]

[1] Department of Community Medicine, Faculty of Medicine, UAE University, UAE
[2] Department of Preventive Medicine, Ministry of Health, UAE
[3] Primary Health Care Clinics, Ministry of Health, UAE
[4] Department of Orthopedic Surgery, Tawam Hospital, Ministry of Health, UAE

A B S T R A C T

Obesity and low back pain (LBP) are common health problems among patients attending Primary Health Care (PHC) in general practice at the United Arab Emirates (UAE). The objective of this study was to determine whether obesity is associated with low back pain. A cross-sectional face-to-face interview questionnaire survey was conducted. The questionnaire was a modified version of the Roland-Morris Scale for evaluating back disability. The interviews were conducted in Arabic by qualified nurses. A multi-stage stratified sample 1,103 UAE national aged 25–65 years, who attended PHC clinics for any reason, were invited to participate but only 802 subjects were eligible to be included for the statistical analysis. The data were analyzed using univariate and multivariate statistical methods. Of the 802 subjects, 428 (53.4%) were males and 374 (46.6%) were females. The mean age of the males was 40.5 ± 11.5 years and females was 38.2 ± 10.5 years (p=0.004). The mean BMI of the males was 26.4 ± 7.4 and females was 27.8 ± 5.6 (p=0.002). The overall prevalence of LBP in the present study was 64.9% (95% confidence interval, 61.0–68.8) and respectively, 56.1% in males and 73.8% in females. The results revealed that there was association between BMI and some socio-demographic variables with the respect of with low back pain. Back pain had more influence on the life style habits on females than in males. Stepwise multiple regression analysis showed that only age (p<0.0001), educational level (p=0.001), gender (p=0.002), place of living (p=0.019), BMI (p<0.0001), and housing condition (p=0.02) had significant effect on the presence of LBP in patients. The present study showed that obesity is moderately associated with low back pain.

Key words: *obesity, body mass index, risk factors, quality of life, UAE*

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Introduction

Low back pain (LBP) is an important clinical and public health problem[1]. It is the most common cause of disability among younger adults[2,3] that affects an estimated 70% to 80% of adults at some point during their lifetime[4]. In the United Kingdom, as in many other countries, back pain is known to be a major cause of suffering and disability[5–7]. Obesity is one of several lifestyle factors that has been suspected of causing LBP[8]. From a public health perspective, it would be important to know if lifestyle factors, such as body weight, play an important role in its genesis[9]. However, more recently epidemiological studies revealed some confusion concerning association between obesity and LBP. Some studies have reported an association between obesity and non-specific LBP[8–11], while others failed to confirm this correlation[12–14].

The aim of this study was to determine whether obesity is associated with LBP in a general practice at the Primary Health Care Clinics (PHC) among patients in the United Arab Emirates (UAE).

Material and Methods

Study design

This is a cross-sectional PHC clinics based study conducted in the City of Al Ain with a population over 300,000. The survey was carried out during the period from 15 June 2001 to 20 January 2002. UAE citizens resident in Al Ain City were recruited for this study.

Questionnaire and interview

The questionnaire and criteria for the back related disability-specific quality of life defined and proposed by Patrick et al.[3], and by Dionne et al.[15] were used. This is a modified 24-item version of the Roland-Morris Scale for evaluating back disability[16]. The questionnaire was modified by removing seven items and replacing them by other four items from within the original sickness impact profile. This modification was done to avoid overlap of meanings on translation to Arabic. Therefore, the scores of our version ranged from 0 to 21, reflecting the simple sum of items indicated as positive by the respondent i.e. a higher score correspond to more disability. A translated Arabic version of the questionnaire was revised by the Consultant (bilingual) and back translated by a bilingual GP, unacquainted with the original English version. Both translators have met and made the necessary corrections, modifications and rewording after considering the minor differences and discrepancies, which had occurred. The questionnaire was validated. LBP was defined on the basis of the following question: »Thinking back within the six months, have you had any ache or pain in the lower back that lasted one day or longer?«.

Subjects and procedure

Study subjects were UAE nationals, aged between 25 and 65 years, attending the PHC centers, irrespective of the type of their complaints, except for the very ill and those who apologize from participation. Due to high level of illiteracy qualified nurses using their Arabic mother language based the questionnaire on structured face-to-face interviews. A multi-stage stratified sampling design was performed using an administrative division of the Al-Ain City. In order to secure a representative sample of the study population, the sampling plan was stratified with proportional allocation according to PHC clinic patient visits and medical district location size[17]. The sampling from the clinics was proportional to 25–75% of semi-urban to urban distribution of population. The survey was carried out in 8 urban PHC clinics and 2 semi-urban PHC clinics. Then, subjects were selected systematically 1-in-2 using multi-stage sam-

pling technique. The subjects were selected among patients registered and attending PHC clinics for whatever reason. The PHC clinics were instructed to structurally interview and complete a questionnaire for a consecutive series of UAE national aged 25–65 years old attending their clinics and at the beginning of survey 1,103 subjects agreed to interview for a period of seven months.

Height and weight were measured using standardized methods; all the participants wore light clothes without shoes. The body mass index (BMI), calculated as the weight (kg) with 1 kg subtracted to allow for clothing divided by height in meter squared, was used as a measure of obesity. Body Mass Index (BMI = weight/height^2) was used as an overall measure of obesity. Subjects were classified into three categories: acceptable weight <25; overweight (BMI 25–29.9); and obese (BMI >30).

Data analysis

The Statistical Package for Social Sciences (SPSS)[18], was used for statistical analysis. Student-t test was used to ascertain the significance of differences between mean values of two continuous variables and Mann Whitney test were used for nonparametric distribution. Chi-square analysis was performed to test for differences in proportions of categorical variables between two or more groups. In 2×2 tables, the Fisher exact test (two-tailed) was used instead of chi-square, in particular, when sample size was small. The stepwise logistic regression analysis was used to adjust for potential cofounders and to rank the risk factors (determinants) for LBP (1 = low back pain, 2 = without low back pain) and independent variables were a mixture of continuous and categorical variables. The level $p<0.05$ was considered as a cut-off value for significance.

Results

1,103 subjects agreed to participate and interviewed in the present study, but only 802 subjects aged 25–65 years, were eligible to be included for the statistical analysis. Of the 802 subjects, 428 (53.4%)

TABLE 1
AGE AND BMI CHARACTERISTICS OF BACK-RELATED DISABILITY ACCORDING TO THE GENDER

Variables	Males (N= 428) Low back pain		Females (N= 374) Low back pain	
	Yes (N=240) %	No (N=188) %	Yes (N=276) %	No (N=98) %
Age groups (in years)*				
25–34	38.3	33.0	40.2	45.9
35–44	27.1	31.9	29.3	36.7
45–54	15.8	26.1	20.3	11.2
>54	18.8	9.0	10.1	6.1
BMI				
< 25	37.9	40.4	28.3	39.8
25–30	37.5	42.0	30.4	30.6
> 30	24.6	17.6	41.3	29.6

* $p<0.05$ (Difference between males and females concerning low back pain)

were males and 374 (46.6%) were females. The mean age of the males was 40.5 ± 11.5 years and females were 38.2 ± 10.5 years (p=0.004). The mean BMI of the males was 26.4 ± 7.4 and females were 27.8 ± 5.6 (p=0.002). The overall prevalence of LBP in the present study was 64.9% (95% confidence interval, 61.0–68.8) and respectively, 56.1% among males and 73.8% in females (Table 1). It will be observed that as an age increases LBP decreases (p<0.05). The prevalence of LBP among those who are labeled as obese was high among females (41.3%) than in males (24.6%).

Tables 2 and 3 gives the socio-demographic characteristics of subjects with regard to age, educational level, occupation, place of living, type of housing condition and smoking habits in the population surveyed according to the BMI conditions in males and females (BMI<30 and BMI >30). As can be seen from Table 3 in females, there were statistically significant differences between BMI < 30 and BMI > 30 with the respect of LBP for the age

TABLE 2
PREVALENCE OF LBP ACCORDING TO THE BMI AND SOCIO-DEMOGRAPHIC CHARACTERISTICS IN MALES

Variables	BMI <30 (N= 336) Low back pain		BMI > 30 (N= 92) Low back pain	
	Yes (N=181) %	No (N=155) %	Yes (N=59) %	No (N=33) %
Age groups (in years)				
25–34	39.8	34.2	33.9	27.3
35–44	28.7	29.7	22.0	42.4
45–54	14.4	27.1	20.3	21.2
>54	17.1	31.1	23.7	9.1
Educational level				
Illiterate	32.0	34.8	32.2	36.4
Primary	29.3	31.0	32.2	30.3
Intermediate/secondary	24.9	10.3	22.0	18.2
College/university	13.8	23.9	13.6	15.2
Occupational status				
Sedentary	54.1	45.2	54.2	60.6
Manual	24.9	36.8	27.1	33.3
Mainly sitting	21.0	18.0	18.7	6.1
Place of living				
Urban	71.8	65.2	71.2	72.7
Rural	28.2	34.8	28.8	27.3
Housing conditions				
Villa	29.6	28.4	28.6	35.0
Flat	56.0	56.5	59.1	51.3
Mud/traditional house	14.4	15.1	12.3	13.7
Smoking habits				
Yes	38.1	26.5	40.7	24.2
No	61.9	73.5	59.3	75.8

TABLE 3
PREVALENCE OF LBP ACCORDING TO THE BMI AND SOCIO-DEMOGRAPHIC CHARACTERISTICS IN FEMALES

Variables	BMI <30 (N=231) Low back pain		BMI > 30 (N=143) Low back pain	
	Yes (N=162) %	No (N=69) %	Yes (N=114) %	No (N=29) %
Age groups (in years)*				
25–34	46.9	49.3	30.7	37.9
35–44	28.4	39.1	30.7	31.0
45–54	13.0	8.7	30.7	17.2
>54	11.7	2.9	7.9	13.8
Educational level*				
Illiterate	40.1	37.7	56.1	58.6
Primary	24.7	27.5	20.2	20.0
Intermediate/Secondary	19.8	21.7	7.0	14.5
College/University	15.4	13.0	16.7	6.9
Occupational status**				
Sedentary	21.6	15.9	10.5	24.1
Manual	13.0	7.2	9.6	3.4
Housewife	65.5	76.9	79.9	72.5
Place of living				
Urban	78.4	78.3	75.4	58.6
Rural	21.6	21.7	24.6	41.4
Housing conditions				
Villa	34.0	36.2	28.9	34.6
Flat	49.4	43.6	57.9	58.6
Mud/traditional house	16.6	20.2	13.2	6.8
Smoking habits				
Yes	2.5	2.7	3.4	4.9
No	97.5	97.3	96.6	95.1

* p=0.001; ** p<0.04 (Difference between BMI<30 and BMI>30 concerning low back pain)

group (p=0.001), educational level (p= 0.008), and occupational status (p=0.037).

Table 4 shows functional disability in patients with LBP according to the BMI. As can be seen from Table 4, gives the frequency and percentage of back-related disability, quality-of-life questionnaire responded. The most frequent disability was »I change position frequently to get back on leg comfortable« among BMI < 30 (76%) and BMI > 30 (85%) (p=0.02). The least reported disability was »I stay at home most of the time« among subjects BMI < 30 (25.3%) and BMI > 30 (30.8%).

Table 5 shows stepwise logistic regression analysis results that significantly affect LBP. It was found that only age (p< 0.0001), educational level (p=0.001), gender (p=0.002), place of living (p=0.019) BMI (p<0.0001), and housing condition (p=0.02) had significant effect on the presence of LBP in patients.

TABLE 4
FUNCTIONAL DISABILITY IN PATIENTS WITH LBP ACCORDING TO THE BODY MASS INDEX CLASSIFICATION

Functional disability	BMI < 30 LBP (N=338)		BMI>30 LBP (N=70)		p
	Yes (N)	%	Yes (N)	%	
1. I stay at home most of the time	84	25.3	52	30.8	ns
2. I change position frequently to get back or leg comfortable	253	76.0	144	85.2	0.02
3. I walk more slowly than usual because of back or leg pain	170	50.0	101	59.4	0.048
4. I am not doing any of the jobs that I usually do	138	40.7	83	48.8	ns
5. Because of my back problem, I use handrail to get upstairs	138	40.7	81	47.9	ns
6. I have to hold on to something to get out of an easy chair	160	47.5	105	61.8	0.003
7. I get dressed more slowly than usual	101	29.8	68	40.2	0.022
8. I only stand for short periods of time	182	53.8	107	62.9	ns
9. I try not to bend or kneel down	207	60.9	113	66.5	ns
10. I find it difficult to turn over in bed	146	43.1	77	45.3	ns
11. My back or leg is painful almost all of the time	112	33.2	77	45.3	ns
12. I only walk short distance	146	43.2	86	50.9	ns
13. I sleep less well	176	51.9	79	46.7	ns
14. I avoid heavy jobs around the house or work	195	57.9	112	65.9	ns
15. I am more irritable and bad tempered with people	114	33.7	47	27.6	ns
16. I go upstairs more slowly than usual	96	28.4	68	40.0	0.009
17. I stay in bed most of the time	142	42.0	93	54.7	0.008
18. My sexual activity is decreased	95	28.8	57	34.8	ns
19. Rubbing or holding areas of hurt or any uncomfortable	186	55.0	114	67.5	0.007
20. Doing less of daily work than I would usually do	161	47.6	92	54.4	ns
21. Often express concern to other people about my health	127	37.5	77	45.3	ns

TABLE 5
MULTIPLE STEPWISE REGRESSION ANALYSIS FOR LBP ASSOCIATED WITH SOME INDEPENDENT FACTORS

Independent variables	Relative risk	95% confidence interval	p
Age	2.84	(2.41–3.35)	0.0001
Educational level	2.65	(1.53–4.78)	0.001
Gender	2.30	(1.38–3.83)	0.002
Place of living	1.94	(1.12–3.36)	0.019
BMI	1.91	(1.57–2.35)	0.0001
Housing condition	1.59	(1.19–2.14)	0.02

Discussion

The prevalence rate of LBP in the present study was 64.9% (95% confidence interval, 61.0–68.8) and respectively, 56.1% among males and 73.8% in females. The figure is similar to the prevalence of LBP pilot survey reported[19] in the UAE population (59%). The inquiry about LBP in present study was similar to one of the questionnaires used in earlier surveys[1,6–10].

Table 6 shows prevalence rate of LBP surveys reported in different countries. The prevalence rate of LBP in the present study is similar and consistent to prevalence of LBP reported by other community and primary health care based surveys, in Australia[20] (57%), in Canada[21,22] (54.9%–84.1%), in China[23] (77.9%), in Denmark[24] 51%), in Hong Kong[25] (39%), in Japan[26] (60.5%), in Russia[27] (48%) in Saudi Arabia[28] (30%), in Switzerland[29] (69%), in UK[1,30] (59%–59%) and in USA[31] (67.7%). This indicates the geographical differences in the prevalence of low back pain. The lack of sufficient studies about

TABLE 6
PREVALENCE RATE OF LBP STUDIES REPORTED IN DIFFERENT COUNTRIES

Country	Author	Year	Sample size	Age	Prevalence (%)
Australia	Ebrall et al.[20]	1994	601	adult	57
Canada	Brown et al.[21]	1998	14,897	adult	54.9
	Cassidy et al.[22]	1998	2,184	adult	84.1
China	Chiou et al.[23]	1994	3,159	adult	77.9
Denmark	Suadicani et al.[24]	1994	469	adult	51
Hong Kong	Lau et al.[25]	1995	652	adult	39
Japan	Matsui et al.[26]	1997	3,042	adult	60.5
Russia	Tortosova et al.[27]	1994	701	adult	48
Saudi Arabia	Al-Shammari et al.[28]	1994	2,460	adult	30
Switzerland	Rohrer et al.[29]	1994	1,398	adult	69
UK	Waxman et al.[30]	2000	1,455	adult	59
	Papageorgiou et al.[1]	1995	4,501	adult	59
USA	Shekelle et al.[31]	1995	3,105	adult	71
UAE	Present study	2002	802	adult	64.5

this subject in this part of the world make it difficult for us to compare our results more effectively with other reported results. However, these LBP prevalence rates will vary based on the exact wording of the questions asked to the patients. In fact, the present study yielded some clues regarding possible mechanisms for the association between the obesity and LBP.

In the present study, the prevalence of LBP was found to be higher among females (73.8%) than in males (56.1%), this is consistent with reports of the most recent studies[5,7,20,24]. Females and housewives tend to do most of the work around the house. This may demand them to sit, stand, or bend for long periods of time, or to lift heavy weights. The amount of work may be doubled if they were obliged to work at some professional job type or serve the guest. This may explain the high prevalence among housewives, and partly explain the high prevalence among females in general population.

Obesity was proved to be a risk factor for LBP in some studies[8–11]. The prevalence of obesity is higher in females with LBP than in males with LBP according to the present study. This is consistent with previous reported studies that the overweight is more likely to have back pain than those of normal weight, also obesity is found more common among females[8,10,28]. To conclude whether there is a causal association between obesity and back pain, it is necessary to consider the weight evidence, both for and against. However, overall, there is some evidence in favor of a causal explanation. In many epidemiological studies there is a positive association between obesity and back pain[8,10,28]. In general, obesity might be positively associated with LBP either because excessive body weight could have mechanical ill effects on the back caused by excessive weight-bearing[8,10,11,28] or that there could be a biochemical explanation for such a link[11]. Furthermore, we attempted to gauge the severity of symptoms by asking about disability for everyday activity and limitation of function produced by the back pain. Of the individual activities examined, standing for long periods, bending and kneeling, and doing heavy jobs most often gave rise to difficulty, but there was a tendency for the entire disabilities correlate.

In general, low socio-economic status is associated with LBP[32]. In fact, education is the best indicator of socio-economic status since it is unlikely to be affected by chronic diseases that beginning adult life, as might occupation and income. 19 major studies examined the association between education and LBP, whereas 16 studies showed that low educational status was significantly associated with increased prevalence of back pain[32]. In the present study majority of males and females with LBP were illiterate. Finally, obesity in itself might have some influence on LBP due to poor lifestyle habit[8], and poor educational level[32]. In an Arabian population, the lack of exercise or lack of lifestyle habits in female population may be additional factors contributing to the high prevalence rate of low back pain among them.

Furthermore, in fact, trunk and lower extremity loss of muscle mass and central obesity progress with aging, but the effect of muscle loss on chronic low back pain has not been precisely investigated and assessed. Toda et al. reported a decline in trunk and lower extremity lean body mass per body weight is characteristics of women with low back pain[33].

Finally, the present study yielded some clues regarding possible mechanisms for the association between the obesity and LBP. There are a number of methodological issues, which limit the conclusiveness of the studies on association between obesity and LBP. Firstly, nearly all samples have been selected from PHC Clinics and treatment settings. Secondly, little information has been provided on the specific-

ity of the measures or criteria use. Thirdly, It is worth to note that it may be difficult to actually compare international prevalence rates, which our survey data are broadly consistent with other international studies published.

Conclusion

The present study showed that obesity is moderately positively associated with low back pain.

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REFERENCES

1. PAPAGEORGIOU, A. C., P. R. CROFT, S. FERRY, M. I. V. JAYSON, A. J. SILMAN, Spine, 20 (1995) 1889. — 2. KELSEY, J. L., A. L. GOLDEN, Occup. Med. State of the Art Review, 3 (1988) 7. — 3. PATRICK, D. L., R. A. DEYO, S. J. ATLAS, D. E. SINGER, A. CHAPIN, R. B. KELLER, Spine, 20 (1995) 1899. — 4. FRYMOYER, J. W., W. L. CATS -BARIL, Orthop. Clin. North. Am., 22 (1991) 263. — 5. PALMER, K. T., K. WALSH, H. BENDALL, C. COOPEN, D. COGGON, BMJ, 320 (2000) 1577. — 6. WALSH, K., D. COGGON, Spine, 16 (1991) 1075. — 7. WALSH, K., J. Epidemiol. Community Health, 46 (1992) 227. — 8. LEBOEUF-YDE, C., K. O. KYVIK, N. H. BRUUN, Spine, 24 (1999) 779. — 9. LEBOEUF-YDE, C., Spine, 25 (2000) 226. — 10. DEYO, R. A., J. E. BASS, Spine, 14 (1989) 501. — 11. ARO, S., P. LEINO, Int. J. Obesity, 9 (1985) 267. — 12. BIERING -SORENSEN, F., Spine, 9 (1984) 106. — 13. BOVENZI, M., A. ZADINI, Spine, 17 (1992) 1048. — 14. SMEDLEY, J., P. H. EGGER, C. COOPER, D. COGGON, BMJ, 314 (1997) 1225. — 15. DIONNE, C., T. KOEPSELL, M. V. KROFF, R. A,. DEYO, W. E. BARLOW, H. CHECKOWAY, Spine, 20 (1995) 2721. — 16. ROLAND, M., R. MORRIS, Spine, 8 (1983) 141. — 17. COCHRAN, W. G.: Sampling techniques. (John Wiley & Sons, New York, Chichester, 1977). — 18. NORUSIS, M. J.: SPSS/PC+ for Windows, Base System and Advanced Statistics User's Guide, Release Version # 11. (SPSS Inc, Chicago, Illinois, 1998). — 19. BIN YAKOUB, M.: Estimating the prevalence of low back pain and associated risk factors in Al-Ain. (Community Medicine Senior Clerkship Project, UAE, 1996). — 20. EBRALL, P. S., J. Manipulative & Physiological Therapeutics, 17 (1994) 447. — 21. BROWN, J. J., G. A. WELLS, J. TROTTIER, J. BONNEAU, B. FERRIS, Spine, 23 (1998) 821. — 22. CASSIDY, J. D., L. J. CARROL COTE, Spine, 23 (1998) 1860. — 23. CHIOU, W. K., M. K. WONG, Z. H. LEE, Int. J. Nurs. Stud., 23 (1994) 361. — 24. SUADICANI, P., K. HANSEN, A. M. FENGER, F. GYNTOLBRG, Occup. Med., 44 (1994) 217. — 25. LAU, E. M., P. EGGER, D. COGGON, C. COOPER, L. VALENTI, D. O'CONNELL, J. Epidermiol Community Health, 49 (1995) 492. — 26. MATSUI, H., A. MAEDA, H. TSUJI, Y. NARUSE, Spine, 22 (1997) 1242. — 27. TORPOPTSOVA, N. V., Spine, 20 (1995) 328. — 28. AL-SHAMMARI, S. A., T. A. KHOJA, M. KREMLI, S. R. AL-BALLA, Saudi. Med. J., 15 (1994) 223. — 29. ROHRER, M. H., B. SANTOS EGGIMANN, F. PACCAUD, E. HALLER-MASLOV, Eur. Spine, 3 (1994) 2. — 30. WAXMAN, R., A. TENNANT, P. HELLIWELL, Spine, 25 (2000) 2085. — 31. SHEKELLE, P. G., M. MARKOVICH, R. LOUIE, Spine, 20 (1995) 1668. — 32. DIONNE, C. E., M. VON KORFF, T. D. KOEPSELL, R. A. DEYO, W. E. BARLOW, H. CHECKOWAY, J. Epidemiol. Community Health, 55 (2001) 455. — 33. TODA, Y., N. SEGAL, T. TODA, T. MORIOTO, R. OGAWA, Arch. Intern. Med., 160 (2000) 3265.

A. Bener

Department of Medical Statistics and Epidemiology, Hamad Medical Corporation, P. O. Box 3050, Doha, Qatar, United Arab Emirates

PRETILOST I BOL U DONJEM DIJELU LEĐA

S A Ž E T A K

Pretilost i bol u donjem dijelu leđa česti su zdravstveni problemi bolesnika koji dolaze u primarnu zdravstvenu zaštitu u Ujedinjenim Arapskim Emiratima (UAE). Cilj ove studije bio je utvrditi povezanost pretilosti i boli u donjem dijelu leđa. Transverzalno istraživanje je provedeno razgovorom uz upotrebu upitnika. Upitnik je modificirana verzija Roland-Morrisove skale za procjenu zdravstvenog stanja leđa, a intervju tipa »licem u lice« provodile su kvalificirane medicinske sestre, na afrapskom jeziku. Upitnik je popunilo 1103 državljana UAE, dobi od 25 do 65 godina, koji su iz bilo kojeg razloga došli u ambulantu primarne zdravstvene zaštite, no među njima su samo 802 osobe dale pristanak da njihovi podaci budu korišteni u statističkoj analizi ove studije. Podaci su analizirani univarijatnim i multivarijatnim statističkim metodama. Od 802 osobe, 428 (53.4%) bili su muškarci, a 374 (46.6%) žene. Srednja dob muškaraca bila je 40.5 ± 11.5, a žena 38.2 ± 10.5 godine ($p=0.004$). Srednja vrijednost BMI muškaraca iznosila je 26.4 ± 7.4, a žena 27.8 ± 5.6 ($p=0.002$). Ukupna prevalencija boli u donjem dijelu leđa bila je 64.9% (95% CI, 61.0–68.8), odnosno, 56.1% u muškaraca i 73.8% u žena. Rezultati su pokazali povezanost BMI i nekih socio-demografskih varijabli s boli u donjem dijelu leđa. Bol u leđima imala je veći utjecaj na navike i stil života kod žena nego kod muškaraca. Višestruka regresijska analiza (»stepwise«) pokazala je da samo dob ($p<0.0001$), razina obrazovanja ($p=0.001$) spol ($p=0.002$), mjesto življenja ($p=0.019$), BMI ($p<0.0001$), i uvjeti stanovanja ($p=0.02$) imaju značajan učinak na prisutnost boli u donjem dijelu leđa u bolesnika. Ova studija pokazala je umjerenu povezanost debljine s boli u donjem dijelu leđa.