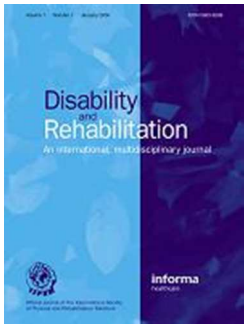

Impact of low back pain on physical, sociodemographic and lifestyle factors across a general population sample within Greece

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Implications for rehabilitation

For the manuscript titled: "Impact of low back pain on physical, sociodemographic and lifestyle factors across a general population sample within Greece"

- ★ Low back pain (LBP) is a highly prevalent musculoskeletal problem amongst the Greek general population
- ★ Mild disability, high intensity LBP with functional limitations, reported sciatica and recurrence were amongst the highly prevalent symptoms whereas, gender differences were evident across physical, sociodemographic and lifestyle factors
- ★ Two physical factors; pain location and intensity appeared to be of importance as they yielded stronger associations.

Title page

Impact of low back pain on physical, sociodemographic and lifestyle factors across a general population sample within Greece.

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ABSTRACT

Purpose: To estimate LBP prevalence in the Greek general population and explore its association with sociodemographic, physical and lifestyle factors.

Method. A sample of 3125 people of the Greek adult population was randomly selected by stratified sampling encompassing rural and urban representation within the Greek mainland. An extended survey form was developed entailing three sections; personal information, questions on symptomatology-physical factors and 3 self-administered questionnaires; the Roland-Morris for disability, the Hospital Anxiety and Depression (HAD) scale for anxiety and depression, and the SF-12 for quality of life (QoL).

Results. A total of 471 (15,1%) people reported LBP (210 males, mean age: 47,04±15,03). Amongst them 59,7% reported sciatica, 75,6% suffered recurrent LBP and 70,1% received specialist care. Low disability levels, moderate to high pain intensity, and good self-reported QoL and psychosocial status were reported. Sociodemographic characteristics (income, smoking, marital status etc.) were not associated with LBP physical factors, whereas, perceived disability and self-reported QoL correlated with age, pain intensity and below knee pain. Psychosocial factors and mental health were not associated with sociodemographic or physical factors. Gender differences were reported across several sociodemographic and physical factors.

Conclusions. Amongst the Greek sample, mild disability, high intensity LBP with functional limitations, reported sciatica and recurrence were amongst the highly prevalent symptoms. Although gender differences were evident across sociodemographic and lifestyle factors, stronger associations were evident only amongst two physical factors, pain location and intensity.

Main text

Low back pain is one of the commonest musculoskeletal entities, notorious in causing physical, economic, functional, psychosocial, behavioural and life-style problems. It is suggested to affect up to 60-80% of the general adult population at some point in their lifetime [1-4]. Despite the variability in prevalence rates internationally [3, 5-7], high prevalence rates are internationally widespread, from the most developed countries including US [8-9], North America [5], Australia [2], Great Britain [10-11] and other European countries [11-16], to developing ones [17-18], such as Pakistan [19], Turkey [20] and Nigeria [21-22].

LBP appears to be a highly prevalent problem within Greece. It is considered ninth in the list of the most common reasons requiring hospital admission [23], first in the list of orthopaedic conditions being encountered in an emergency department [24] and it also seems to be the most common musculoskeletal problem amongst the Greek population. In an extensive cross-sectional study across Greece, a group of rheumatologists investigated the prevalence of rheumatic diseases, and found that the most common disease group was the LBP one with a point prevalence of 11% [25]. Stranjalis et al. [15] in a cross-sectional study encompassing mainly urban population, found a one-month prevalence rate of 31,7%. A more recent smaller-scale study investigated the annual prevalence patterns of musculoskeletal diseases in rural primary care settings in Crete, the largest Greek island [26]. LBP presented with the highest prevalence rate of approximately 57% amongst the various musculoskeletal conditions studied. A more recent study within an urban setting reported 39,5% LBP and 24,6% sciatica [27]. Some other epidemiological studies have also investigated occupational LBP in Greece, in nursing staff [28], shipyard employees [29], dentists [30], public office workers [31], all of which reported high prevalence rates.

In terms of reported disability, chronicity, quality of life, psychosocial impact, work absence and care-seeking, there is scarcity of relevant research within the Greek setting. Spyropoulos et al. [31] reported an 11% of his affected population (public office workers) suffering from severe LBP, 43% were suffering from recurrent episodes. Within the occupational studies, work absence ranged between 10% and 30% [28-30] whereas, Stranjalis et al. [15] reported a sick leave rate of 19.1% amongst the general population with a mean duration of 5 days off work. In terms of healthcare utilisation, approximately 30% of the affected LBP samples consulted a physician doctor or a general practitioner for their symptoms [15, 26].

From the above, it is evident that in Greece, LBP is a debilitating problem, however, there is not a lot of available research on its impact on physical and lifestyle factors, such as ov quality of life (QoL), disability and psychosocial impact. Furthermore, as LBP is acknowledged as a health problem with not only biomedical, but also social, psychological, economic and functional consequences, it is important to explore how several sociodemographic and lifestyle factors within the Greek setting are influenced by LBP.

Given the above, the aims of the present study were to estimate LBP prevalence in a Greek general population sample and explore its association with several physical, sociodemographic and lifestyle factors.

Methods

Sample

The sample included Greek citizens over the age of 16, which were selected by multistage sampling with definition of the sample quotas based on sex, and geographical type of residence (urban, semi-urban, rural), according to the results of the 2011 National Census. The geographical area covered included central and western Greece, and according to the 2011 National Census, urban representation corresponded to cities with more than 10.000 inhabitants, semi-urban to towns with population between 2000 and 10000 people, and rural areas corresponded to villages with less than 2000 inhabitants. In order to obtain a representative sample of Greek citizens, the sample was stratified according to geographical location, in order to obtain as greatest representation as possible. For the geographical location, central and western Greek mainland was divided into 5 urban areas, encompassing 2 large (Athens, Patras), 2 medium sized (Ioannina, Trikala) and one smaller city (Korinthos). In addition, 20 rural areas (10 towns and 10 villages) surrounding each selected city except for Athens were picked up for the study.

The survey was conducted and administered by 8 physiotherapists, well trained in this questionnaire administration procedure attended a full-day training by the principal investigator (EB) on interview administration utilising the presenting assessment form.

The study was approved by the Scientific Committee of the Technological Educational Institute (TEI) of Western Greece (former TEI of Patras).

Survey development

An extended survey form based on current literature was developed. The survey form which was developed was self-reported including personal information (age,

education, marital status, annual income, smoking history etc.) and 18 questions on physical symptoms, functionality and LBP-associated history (recurrence, treatment, other musculoskeletal etc.), which according to the literature have been found to be strongly associated with LBP [3-4, 15, 32]. The majority of the questions were taken from an assessment sheet, which has previously been tested for its reliability and has already been utilised among Greek LBP samples [33, 34]. Questions on symptoms included pain areas by numbered areas on a body chart), pain intensity on a visual analogue scale (VAS) being reported on three levels (average pain, pain at its worst and pain at its best), reported sciatica, frequency, etc. LBP was reported if the subject suffered for the last 7 days (including the day of the survey) [35] and pain was located in the lumbar (low back) region.

In addition, three self-administered questionnaires were delivered; the Roland-Morris for disability, the Hospital Anxiety and Depression (HAD) scale for anxiety and depression, and the SF-12 for quality of life (QoL). All questionnaires have previously been cross-culturally validated within the Greek setting and have been utilised across similar populations [34, 36-38].

Prior to being administered, the survey form was piloted in a LBP sample of 30 people, for clarity and comprehensiveness. Following this, some minor corrections based on the pilot sample feedback were undertaken.

Procedure Undertaken

For each of the 25 testing sites in total, the ‘starting point zero’, corresponded to the biggest (and most popular) square of the town, city or village; which usually constitutes the buzziest location in the Greek settings. From this zero point, each tester was directed towards an eastern and northern direction and included in the study every third household/building situated on the right side of the central road (number 3 was a randomly selected number). Testers were instructed to ask each

subject a standardised question in order to identify if they suffered LBP. Age and sex of people who did not suffer from LBP were reported whereas, people who suffered LBP were provided a full informed consent prior to their participation in the study. In cases where there was no answer from a given household (i.e. people were absent), interviewers would visit for a second time (evening time). When each tester would reach the end of road or the border of the given city, town or village, he was instructed to return to the central square again following a parallel road or avenue and start again surveying by using a 5-point star-type clockwise route. The study was carried out between October and November 2012.

Data analysis

The association of LBP physical factors with several sociodemographic and lifestyle parameters was tested using descriptive statistics, χ^2, independent sample *t* tests and Pearson's correlation coefficient. Regression analysis was carried out using two linear regression analysis models, to predict associations on pain intensity (based on the worst pain intensity) and disability (based on the Roland-Morris Disability Questionnaire). Analysis was performed utilising SPSS (Version 20.0).

Results

Out of 3125 people being questioned, a total of 471 (15,1%) reported LBP (210 males, 261 females, mean age: 47,04±15,03) at the time of the survey. Table 1 summarises the sample's distribution according to geographical area. Amongst them 75,6% were suffering from recurrent LBP, 59,7% reported associated leg pain (sciatica), and 70,1% received specialist care and were already under some form of conservative treatment. Their average and worst pain intensity on a VAS score was 5,26±1,8 and 7,99 ±1,8, respectively. 61,4% reported that their LBP was limiting their activities and function. Table 2 summarises the sample's sociodemographic & physical characteristics and Table 3 illustrates the sample's scores on the self-reported outcome measures.

Table 4 presents the results of linear regression analysis using two different dependent variables; pain intensity (VAS at worst) and disability (Roland-Morris). Significant regression equations were found for pain intensity and disability models [$F(22,448) = 41,245$, $p<0,001$, with an R^2 of 0,669] and [$F(4,466)=19,441$, $p<0,001$, with an R^2 of 0,143], respectively. Pain intensity is considered predictive of gender, age, bed rest, activity limitation due to LBP, specialist visit, anxiety and mental health (on SF-12 mental subscale). Disability is predictive of age, bed rest, pain intensity, activity limitation due to sciatica, physical health (on SF-12 physical subscale) and pain status and frequency.

Table 5 presents associations between sociodemographic, physical & lifestyle factors across the sample. In particular, significant associations (*r* ranging between 0,401 and 0,543 at a statistical level with $p<0,001$) were yielded between pain intensity and below knee pain with disability and QoL (SF-12 physical subscale only). Psychosocial factors had only weak associations (*r* ranging between 0,301 and

0,342, p<0,001) with age (depression only), education and pain intensity (anxiety and depression). Whereas, specialist visit had weak associations (*r* between 0,327 and 0,379, p<0,001) with high disability and QoL. Sex, annual income and smoking were not correlated with any LBP physical or lifestyle factors. Below knee pain was associated only with activity limitation (*r*=0,453).

In terms of gender, although men and women had comparable ages (men-mean age 45,29±14,9, women-mean age: 48,45±15,0), significant differences amongst them were reported on several sociodemographic (education, marital status, smoking, annul income), and physical factors (sciatica and its functionality, pain frequency & intensity, specialist visit, other musculoskeletal problems, anxiety and depression and metal health). LBP recurrence, disability, bed rest, treatment, LBP functionality and physical health did not reveal statistically significant gender differences. Table 6 summarises gender adjusted prevalence distributions of sociodemographic and physical measures.

Discussion

The present study aimed to explore the impact of sociodemographic, physical and life-style factors on LBP in a general population sample of central and western Greece. It was within the scope of the study to attempt to use a representative sample of the general population, encompassing a combination of rural and urban representations. The combination of the 5 cities with variable sizes across central and western mainland and the selection of two towns and villages surrounding each city was thought to be an objective way of capturing a general population sample.

Prevalence

Out of 3125 people being randomly approached and questioned, 15,1%(471) reported LBP (210 males, 261 females, mean age: 47,04±15,03) at the time of the survey. This prevalence estimate is in agreement with an older systematic review by Walker [6] on LBP point prevalence (ranging between 12-33%), as well as a more recent systematic review by Hoy et al. [7] on the global prevalence of LBP, which showed the point prevalence of activity-limiting LBP was estimated to be 11,9±2%, and the 1-month prevalence was estimated to be 23.2 ± 2.9%. However, a number of epidemiological studies in developing and developed countries have yielded higher prevalence rates. Bener et al. [39] reported a 56.5% prevalence of LBP in primary healthcare in Qatar, Louw et al. [18] in their systematic review in Africa reported a 32% mean point prevalence, whereas Hoy et al. [40] reported a point prevalence of 34,1% in Tibet. Within developed countries point prevalence rates range between 19% in the UK [41] and 15-22% [11] with a trend of an increased prevalence over time [42], 25.6% in Australia [2], 26,9% in the Netherlands [14], 28.7% in Canada [43], and between 32% and 42% amongst men and 40% and 48% amongst women, in two German studies [11, 35].

Similar to international studies, previous Greek studies have yielded considerable variability in prevalence rates. Point prevalence range between 11% in a large scale study encompassing rural and urban representation from 8547 people [25] to 56,9% from a smaller scale study in primary care conducted in a rural part of Greece [26]. Two urban based studies reported 1-month and 6-month prevalence rates of 31% [15] and 39,5% [27], respectively. Whereas, occupational LBP prevalence rates are somewhat higher, too, ranging from 37-38% in public office workers [31] and shipyards [30] to 46% in dentists [29] and 75% in Greek nursing personnel [28]. What is interesting in the presenting study is the variability in prevalence rates across the 5 urban testing sites (ranging from 6,54% to 25,45%). The reason for this low prevalence in the area of Athens is not known, although within-country fluctuations have been reported in previous studies [11, 20]. Future studies should further explore LBP point prevalence around Athens.

This variability across the present study and previous ones apart from differences in the methodological design, such as differences in the sample size, application of randomization (in some studies) as opposed to convenience sampling methods in a number of other studies, utilization of rural versus urban versus mixed populations etc. could also be attributed to differences in the definition of LBP. Whereas, a number of studies have either not clearly defined how they were reporting LBP in their study [13, 25]or used the one day limit for LBP and utilized a location of pain between the last ribs and the gluteal folds [2, 7, 44], the presenting study utilized a 7-day limit for LBP and location of pain was restricted to the lumbar (low back) region only. Defining duration for point prevalence and location of pain in LBP epidemiological studies has been a subject of great debate in the past [44-46]. In this study, the presenting pain location was selected in order to distinguish true back pain from other referred pain (i.e. back-associated leg pain, gluteal pain etc.).

Anatomical referral pain patterns were already recorded in the survey. The 7-day duration has been used in previous epidemiological studies [35, 47] and was also thought to be more 'realistic' in terms of true 'bothersomeness'; it was felt that a longer day duration would better distinguish LBP from any incidental ache experienced. Thus, this definition of duration and location in the present study could partly explain the differences in the lower point prevalence rates between this and other epidemiological reports. However, further work should take place in this area in order to confirm this.

Physical factors

Regarding self-reported leg-associated back pain, 59,7% of the population sample reported sciatica and 39,9% reported having below knee pain. Although these numbers are comparable with previous studies, both internationally [41 48]and in Greece [15], like LBP, there is large variability in self-reported sciatica [27, 49]. Again, this could be attributed to the lack of a gold standard method of defining and reporting sciatica [50]. Pain below the knee in this study has also been associated with activity limitation, indicating restricted functionality with below knee pain, thus, justifying Hider et al.'s [48] recent distinction between below and above knee sciatica.

Over two thirds of the sample (75,6%) were suffering from recurrent LBP episodes and over half of the sample (53,9%) had LBP most days. 70,1% received specialist care and were already under some form of conservative treatment whereas, nearly a third of them (27%) underwent bed rest for up to a week. Although most of these rates are comparable with several other studies regarding pain frequency, recurrence and bed rest [15, 51], it is interesting to note the high percentage of the sample receiving specialist care (secondary care). This number is much higher than most studies investigating healthcare seeking (primary or secondary) patterns [48, 51-53].

This percentage is however comparable with the Greek study by Korovessis et al. (2012) and is in agreement with previous report regarding healthcare utilisation within Greece [54-56]. It could therefore be suggested that within Greece there is an overwhelming percentage of healthcare utilisation amongst LBP patients. It would be interesting to follow through this sample and perhaps further explore their natural course and the medical options offered to them.

Despite the high percentage of people seeking medical care, the sample presented with mild to moderate disability, as indicated by the Roland-Morris. Significant associations were yielded between below knee pain with disability and QoL (SF-12 physical subscale only), indicating more severe disability deficits with radiating pain. However, their 'worst pain' intensity was high and 61,4% reported that their LBP was limiting their activities and function. This moderate intensity-low disability amongst the LBP sample is quite common in several studies [2, 11, 41, 43]. Furthermore, disability has yielded moderate to strong associations with pain intensity and age (the older the people the higher the reported disability). Such associations are also familiar in other studies [57]. Disability was also found on the regression model to be predictive of age, bed rest, pain intensity, sciatica limited activity, physical health (on SF-12 physical subscale) and pain status and frequency.

More severe functional limitations and more extensive pain were noted amongst women, especially for those with reported sciatica and its functionality. Amongst other physical factors, women reported higher pain frequency & intensity, more visits to specialists, other musculoskeletal problems (i.e. neck pain), more anxiety and depression and lesser self-reported mental health. Such findings are in line with previous research indicating a more 'severe' physical and lifestyle impact of LBP amongst women, for which causal relationship is unclear [3, 4, 27, 35]. Significant

differences amongst men and women were also reported amongst several sociodemographic factors, such as education, marital status, smoking, annual income; findings, which again resemble previous reports [3, 4, 32, 35]. However, in view of the differences in methodologies across studies, conclusions or generalisations cannot be made. Interestingly, LBP recurrence, self-reported disability, bed rest, treatment, and self-reported physical health did not reveal statistically significant gender differences.

Sociodemographic factors

As regards to the sociodemographic factors, the regression analysis model did not reveal any associations of inhabitancy area, marital status, education, income or smoking history with either disability or pain intensity. Correlations across these sociodemographic factors with disability, physical health and QoL, psychosocial history, pain intensity and location were also weak, thus, contrasting previous research supporting stronger associations with similar sociodemographic parameters [3, 20, 58, 59]. Nevertheless, age has been the only factor associated with pain intensity and disability on the linear regression models and was also correlated with self-reported physical health and QoL, which has been found to be the case in most LBP epidemiological studies [4].

Pain intensity was one of the factors which, in the present study was found to be predictive of gender, age, bed rest, activity limitation due to LBP, specialist visit, anxiety and self-reported mental health (on SF-12 mental subscale). Significant correlations were also yielded between pain intensity with disability and QoL (SF-12 physical subscale), indicating strong associations between them. In this study and as opposed to previous studies, three levels of pain intensity were measured; average pain, pain at its worst and pain at its best. This three-level pain measure was chosen

in order to better 'capture' the impact of pain in demographic, physical and lifestyle factors. Indeed, it was noted that pain at its worst and to a lesser extent average pain intensity was the most indicative pain factor. Pain intensity is probably one of the most useful and commonly utilised LBP outcome measures [60-62] without always consistent findings [63]. Perhaps distinction and utilisation of a multi-level pain intensity measure (as ours) could lead to more accurate and consistent predictive findings. It is therefore, suggested that future studies should encompass, along with current pain, worst pain intensity as an independent self-reported measure.

Lifestyle factors

Regarding the psychosocial profile of the sample, anxiety and depression on the HAD scale were low to moderate, with a statistical significance difference amongst men and women (women scoring higher in both scales). Weak associations were yielded between psyschosocial factors with education and pain intensity and between depression and age. An association was also found between anxiety and pain intensity. Although psychosocial factors have been suggested as risk factors for LBP in several studies [64-67], strong associations was not found in this study. It could be argued that the low disability-low severity profile of the sample could explain such findings. Further work is recommended in this area.

QoL as measured by the SF-12 Health Survey also demonstrated a mildly affected profile with a more significant overlay amongst women in self-reported mental health. Stronger associations were yielded between SF-12 physical subscale with age and pain intensity. Disability and pain intensity were both predictive of physical and mental health, respectively. This relatively good QoL picture of the sample has also been reported amongst musculoskeletal conditions (including LBP) within Greece and abroad [26, 38, 68] as well as amongst general asymptomatic population

samples [69]. This could partly be explained by our low severity sample profile. It could also partly be the result of a culturally-driven issue as indicated in Antonopoulou et al' s study [26]; they believe that, LBP is perceived as a low severity symptom (especially amongst rural population samples), and thus do not feel that lifestyle is strongly affected by it.

One of the major strengths of the current study is the sampling method; which was of a random nature, addressing a general population sample with both urban and rural representation in the Greek mainland, thus enhancing the study's external validity. We also tried to report a variety of sociodemographic, physical and lifestyle factors, which in previous LBP literature were deemed important. Unfortunately, the cross-sectional nature of the study limited further exploration of causal relationships between the factors investigated. This must be implemented in future studies as there is a scarcity of longitudinal ones within Greece. Another shortcoming is the lack of information on the sample's occupation, which was not reported in the present work.

Conclusion

LBP point prevalence was found 15,1% in a sample of 3127 of the general population across western and central Greece. In this sample functional limitations, moderately high intensity pain, associated leg pain and recurrence were amongst the highly prevalent symptoms. However, unlike previous literature, several sociodemographic characteristics (annual income, smoking, marital status etc.) were not correlated with any LBP physical factors or psychosocial factors, thus possibly indicating a different socioeconomic background and aetiology domain to that of the usual non-specific LBP spectrum. Further investigation into this is required. Despite the sample's mild disability level, perceived disability and self-reported quality of life were correlated with age, pain intensity and below knee pain (sciatica). However, in line with previous reports, significant gender differences were reported across the sample amongst several sociodemographic (education, marital status, smoking, annul income), and physical factors (sciatica and its functionality, pain frequency & intensity, specialist visit, other musculoskeletal problems, anxiety and depression and metal health).

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Declaration of Interest statement.

The authors report no declarations of interest.

References

[1] Andersson GB. Epidemiology of low back pain. Acta Orthop Scand Suppl 1998; 281:28-31.

[2] Walker BF, Muller R, Grant WD. Low back pain in Australian adults: prevalence and associated disability. J.Manipulative Physiol Ther. 2004; 27: 238-244.

[3] McBeth J, Jones K. Epidemiology of chronic musculoskeletal pain. Best Pract Res Clin Rheumatol. 2007; 21:403-425.

[4] Manchikanti L, Singh V, Flaco FJE, Benyamin RM, Hirsch JA. Epidemiology of low back pain in adults. Neuromodulation 2014; 17: 3-10.

[5] Loney PL, Stratford PW. The prevalence of low back pain in adults: a methodological review of the literature. Phys.Ther. 1999; 79: 384-396.

[6] Walker BF. The prevalence of low back pain: a systematic review of the literature from 1966 to 1998. J.Spinal Disord. 2000; 13: 205-217.

[7] Hoy D, Williams G, March L, Brooks P, Blyth F, Woolf A, Vos T, Buchbinder R. A systematic review of the global prevalence of low back pain. Arthritis Rheum 2012; 64(6): 2028-2037.

[8] Deyo RA, Tsui-Wu Y. Descriptive epidemiology of low-back pain and its related medical care in the United States. Spine 1987; 12: 264-268.

[9] Lawrence RC, Felson DT, Helmick CG, Arnold LM, Choi H, Deyo RA, Gabriel S, Hirsch R, Hochberg MC, Hunder GG, Jordan JM, Katz JN, Kremers HM, Wolfe F; National Arthritis Data Workgroup. Estimates of the prevalence of arthritis and other rheumatic conditions in the United States. Part II. Arthritis Rheum. 2008; 58(1):26-35.

[10] Palmer KT, Walsh K, Bendall H, Cooper C, Coggon D. Back pain in Britain: comparison of two prevalence surveys at an interval of 10 years. BMJ 2000; 320: 1577-1578.

[11] Raspe H, Matthis C, Croft P, O'Neill T. Variation in back pain between countries: the example of Britain and Germany. Spine 2004; 29: 1017-1021.

[12] Walsh K, Cruddas M, Coggon D. Low back pain in eight areas of Britain. J.Epidemiol.Community Health 1992; 46: 227-230.

[13] Skovron ML, Szpalski M, Nordin M, Melot C, Cukier D. Sociocultural factors and back pain. A population-based study in Belgian adults. Spine 1994; 19: 129-137.

[14] Picavet HS, Schouten JS. Musculoskeletal pain in the Netherlands: prevalences, consequences and risk groups, the DMC(3)-study. Pain 2003; 102: 167-178.

[15] Stranjalis G, Tsamandouraki K, Sakas DE, Alamanos Y. Low back pain in a representative sample of Greek population: analysis according to personal and socioeconomic characteristics. Spine 2004; 29: 1355-1360.

[16] Palacios-Ceña D, Alonso-Blanco C, Hernández-Barrera V, Carrasco-Garrido P, Jiménez-García R, Fernández-de-las-Peñas C. Prevalence of neck and low back pain in community-dwelling adults in Spain: an updated population-based national study (2009/10-2011/12). Eur Spine J. 2015;24(3):482-92

[17] Volinn E. The epidemiology of low back pain in the rest of the world. A review of surveys in low- and middle-income countries. Spine 1997; 22: 1747-1754.

[18] Louw QA, Morris LD, Grimmer-Somers K. The prevalence of low back pain in Africa: a systematic review. BMC.Musculoskelet.Disord.2007; 8: 105.

[19] Farooqi A, Gibson T. Prevalence of the major rheumatic disorders in the adult population of north Pakistan. Br.J.Rheumatol. 1998; 37: 491-495.

[20] Gilgil E, Kacar C, Butun B, Tuncer T, Urhan S, Yildirim C, Sunbuloglu G, Arikan V, Tekeoglu I, Oksuz MC, Dundar U. Prevalence of low back pain in a developing urban setting. Spine 2005; 30: 1093-1098.

[21] Adedoyin RA, Idowu BO, Adagunodo RE, Owoyomi AA, Idowu PA. Musculoskeletal pain associated with the use of computer systems in Nigeria. Technol Health Care. 2005; 13(2):125-30.

[22] Fabunmi AA, Aba SO, Odunaiya NA. Prevalence of low back pain among peasant farmers in a rural community in South West Nigeria. Afr J Med Med Sci. 2005; 34(3):259-62.

[23] Polyzos NM. Striving towards efficiency in the Greek hospitals by reviewing case mix classifications. Health Policy 2002; 61: 305-328.

[24] Marinos G, Giannopoulos A, Vlasis K, Michail O, Katsargyris A, Gerasimos S, Elias G, Klonaris C, Griniatsos J, Stefanos P, Vasileiou I. Primary care in the management of common orthopaedic problems. Qual.Prim.Care 2008; 16: 345-349.

[25] Andrianakos A, Trontzas P, Christoyannis F, Dantis P, Voudouris C, Georgountzos A, Kaziolas G, Vafiadou E, Pantelidou K, Karamitsos D, Kontelis L, Krachtis P, Nikolia Z, Kaskani E, Tavaniotou E, Antoniades C, Karanikolas G, Kontoyanni A. Prevalence of rheumatic diseases in Greece: a cross-sectional population based epidemiological study. The ESORDIG Study. J.Rheumatol. 2003; 30: 1589-1601.

[26] Antonopoulou MD, Alegakis AK, Hadjipavlou AG, Lionis CD. Studying the association between musculoskeletal disorders, quality of life and mental health. A primary care pilot study in rural Crete, Greece. BMC Musculoskelet Disord. 2009;10:143.

[27] Korovessis P, Repantis T, Zacharatos S, Baikousis A. Low back pain and sciatica prevalence and intensity reported in a Mediterranean country: ordinal logistic regression analysis. Orthopedics. 2012; 35(12):e1775-84.

[28] Alexopoulos EC, Burdorf A, Kalokerinou A. A comparative analysis on musculoskeletal disorders between Greek and Dutch nursing personnel. Int Arch Occup Environ Health 2006; 79: 82-88.

[29] Alexopoulos EC, Tanagra D, Konstantinou E, Burdorf A. Musculoskeletal disorders in shipyard industry: prevalence, health care use, and absenteeism. BMC Musculoskelet Disord. 2006; 7: 88.

[30] Alexopoulos EC, Stathi IC, Charizani F. Prevalence of musculoskeletal disorders in dentists. BMC Musculoskelet Disord. 2004; 5: 16.

[31]Spyropoulos P, Papathanasiou G, Georgoudis G, Chronopoulos E, Koutis H, Koumoutsou F. Prevalence of low back pain in greek public office workers. Pain Physician 2007; 10: 651-659.

[32] Henn L, Schier K, Brian T, Hardt J. Back pain in Poland and Germany: a survey of prevalence and association with demographic characters. Biomed Res Int. 2014;2014:901341.

[33] Billis E, McCarthy CJ, Gliatis J, Gittins M, Papandreou M, Oldham JA. Inter-tester reliability of discriminatory examination items for sub-classifying non-specific low back pain. J Rehabil Med. 2012; 44(10):851-7.

[34] Billis E, McCarthy CJ, Roberts C, Gliatis J, Papandreou M, Gioftsos G, Oldham JA. Sub-grouping patients with non-specific low back pain based on cluster analysis of discriminatory clinical items. J Rehabil Med. 2013; 45(2):177-85

[35] Schneider S, Randoll D, Buchner M. Why do women have back pain more than men? A representative prevalence study in the federal republic of Germany. Clin.J.Pain 2006; 22: 738-747.

[36] Georgoudis G, Oldham JA. Anxiety and depression as confounding factors in cross-cultural pain research studies: Validity and reliability of a Greek version of the Hospital Anxiety and Depression Scale. 2001; 87: 92-93.

[37] Boscainos PJ, Sapkas G, Stilianessi E, Prouskas K, Papadakis SA. Greek versions of the Oswestry and Roland-Morris Disability Questionnaires. Clin Orthop Relat Res 2003; 40-53.

[38] Kontodimopoulos N, Moschovakis G, Aletras VH, Niakas D. The effect of environmental factors on technical and scale efficiency of primary health care providers in Greece. Cost Eff Resour Alloc. 2007; 5: 14.

[39] Bener A, Dafeeah EE, Alnaqbi K. Prevalence and correlates of low back pain in primary care: what are the contributing factors in a rapidly developing country. Asian Spine J. 2014; 8(3):227-36.

[40] Hoy D, Toole MJ, Morgan D, Morgan C. Low back pain in rural Tibet. Functioning and disability in persons with low back pain. Lancet. 2003; 361(9353): 225-6.

[41] Hillman M, Wright A, Rajaratnam G, Tennant A, Chamberlain MA. Prevalence of low back pain in the community: implications for service provision in Bradford, UK. J Epidemiol Community Health 1996; 50: 347-352.

[42] Harkness EF, Macfarlane GJ, Silman AJ, McBeth J. Is musculoskeletal pain more common now than 40 years ago?: Two population-based cross-sectional studies. Rheumatology (Oxford). 2005; 44(7):890-5.

[43] Cassidy JD, Carroll LJ, Cote P. The Saskatchewan health and back pain survey. The prevalence of low back pain and related disability in Saskatchewan adults. Spine 1998; 23: 1860-1866.

[44] Garcia JB, Hernandez-Castro JJ, Nunez RG, Pazos MA, Aguirre JO, Jreige A, Delgado W, Serpentegui M, Berenguel M, Cantemir C. Prevalence of low back pain in Latin America: a systematic literature review. Pain Physician. 2014;17(5):379-91

[45] Dionne CE, Dunn KM, Croft PR, Nachemson AL, Buchbinder R, Walker BF, Wyatt M, Cassidy JD, Rossignol M, Leboeuf-Yde C, Hartvigsen J, Leino-Arjas P, Latza U, Reis S, Gil Del Real MT, Kovacs FM, Oberg B, Cedraschi C, Bouter LM, Koes BW, Picavet HS, van Tulder MW, Burton K, Foster NE, Macfarlane GJ, Thomas E, Underwood M, Waddell G, Shekelle P, Volinn E, Von KM. A consensus approach

toward the standardization of back pain definitions for use in prevalence studies. Spine 2008; 33: 95-103.

[46] Hestbaek L, Leboeuf-Yde C, Engberg M, Lauritzen T, Bruun NH, Manniche C. The course of low back pain in a general population. Results from a 5-year prospective study. J.Manipulative Physiol Ther. 2003; 26: 213-219.

[47] Cherkin DC. Primary care research on low back pain. The state of the science. Spine. 1998; 23(18):1997-2002.

[48] Hider SL, Whitehurst DG, Thomas E, Foster NE. Pain location matters: the impact of leg pain on health care use, work disability and quality of life in patients with low back pain. Eur Spine J. 2015; 24(3):444-51.

[49] Konstantinou K, Dunn KM. Sciatica: review of epidemiological studies and prevalence estimates. Spine 2008; 33(22):2464-72

[50] Konstantinou K, Lewis M, Dunn KM. Agreement of self-reported items and clinically assessed nerve root involvement (or sciatica) in a primary care setting. Eur Spine J. 2012; 21(11): 2306-15.

[51] Enthoven P, Skargren E, Carstensen J, Oberg B. Predictive factors for 1-year and 5-year outcome for disability in a working population of patients with low back pain treated in primary care. Pain 2006; 122: 137-144.

[52]Kent PM, Keating JL. The epidemiology of low back pain in primary care. Chiropr.Osteopat. 2005; 13: 13.

[53] Leboeuf-Yde C, Fejer R, Nielsen J, Kyvik KO, Hartvigsen J. Consequences of spinal pain: do age and gender matter? A Danish cross-sectional population-based study of 34,902 individuals 20-71 years of age. BMC Musculoskelet Disord. 2011; 12: 39.

[54] Athanassopoulos AC, Gounarisb C, Sissouras A. A descriptive assessment of the production and cost efficiency of general hospitals in Greece. Health Care Management Science 1999; 2: 97–106.

[55] Exadaktylos NM. Organisation and financing of the health care systems of Bulgaria and Greece -- what are the parallels? BMC Health Serv Res. 2005; 5: 41.

[56] Billis EV, McCarthy CJ, Stathopoulos I, Kapreli E, Pantzou P, Oldham JA. The clinical and cultural factors in classifying low back pain patients within Greece: a qualitative exploration of Greek health professionals. J Eval Clin Pract. 2007; 13: 337-345.

[57] Kovacs FM, Abraira V, Zamora J, Teresa Gil del Real M, Llobera J, Fernández C, Bauza JR, Bauza K, Coll J, Cuadri M, Duro E, Gili J, Gestoso M, Gómez M, González J, Ibañez P, Jover A, Lázaro P, Llinás M, Mateu C, Mufraggi N, Muriel A, Nicolau C, Olivera MA, Pascual P, Perelló L, Pozo F, Revuelta T, Reyes V, Ribot S, Ripoll J, Ripoll J, Rodríguez E; Kovacs-Atención Primaria Group. Correlation between pain, disability, and quality of life in patients with common low back pain. Spine 2004; 29(2): 206-210.

[58] Leboeuf-Yde C, Kyvik KO, Bruun NH. Low back pain and lifestyle. Part I: Smoking. Information from a population-based sample of 29,424 twins. Spine (Phila Pa 1976). 1998; 23(20):2207-13.

[59] Fujii T, Matsudaira K. Prevalence of low back pain and factors associated with chronic disabling back pain in Japan. Eur Spine J. 2013; 22(2):432-8.

[60] Gurcay E, Bal A, Eksioglu E, Hasturk AE, Gurcay AG, Cakci A. Acute low back pain: clinical course and prognostic factors. Disabil Rehabil. 2009; 31(10):840-5.

[61] Williams CM, Hancock MJ, Maher CG, McAuley JH, Lin CW, Latimer J. Predicting rapid recovery from acute low back pain based on the intensity, duration and history of pain: a validation study. Eur J Pain. 2014;18(8):1182-9.

[62] Kim HJ, Park JH, Kim JW, Kang KT, Chang BS, Lee CK, Yeom JS. Prediction of postoperative pain intensity after lumbar spinal surgery using pain sensitivity and preoperative back pain severity. Pain Med. 2014;15(12):2037-45.

[63] Axén I, Bergström G, Bodin L. Using few and scattered time points for analysis of a variable course of pain can be misleading: an example using weekly text message data. Spine J. 2014; 14(8):1454-9.

[64] Croft PR, Rigby AS. Socioeconomic influences on back problems in the community in Britain. J.Epidemiol.Community Health 1994; 48: 166-170.

[65] Linton SJ. A review of psychological risk factors in back and neck pain. Spine 200; 25: 1148-1156.

[66] Truchon M, Côté D, Fillion L, Arsenault B, Dionne C. Low-back-pain related disability: an integration of psychological risk factors into the stress process model. Pain. 2008; 137(3):564-73.

[67] Falavigna A, de Braga GL, Monteiro GM, Marcon G, de Castilhos I, Bossardi JB, Conzatti LP. The epidemiological profile of a middle-aged population with low back pain in southern Brazil. Spine 2015; 40(6):E359-65.

[68] Luo X, George ML, Kakouras I, Edwards CL, Pietrobon R, Richardson W, Hey L. Reliability, validity, and responsiveness of the short form 12-item survey (SF-12) in patients with back pain. Spine 2003; 28(15):1739-45

[69] Gandek B, Ware JE, Aaronson NK, Apolone G, Bjorner JB, Brazier JE, Bullinger M, Kaasa S, Leplege A, Prieto L, Sullivan M. Cross-validation of item selection and scoring for the SF-12 Health Survey in nine countries: results from the IQOLA Project. International Quality of Life Assessment. J Clin Epidemiol. 1998; 51(11): 1171-8.

Tables.

Table 1. Distribution of the sample across central and western Greece.

Urban area	**Reported inhabitants ***	**People being asked** *(number)*	**People with LBP** *number (percentage)*	**Men** *number (percentage)*
Athens (central)	3089698	1167	74 (6,34%)	33 (44,6%)
Patras (west)	213984	837	129 (15,4%)	74 (57,3%)
Ioannina (north west)	89061	389	99 (25,45%)	42 (42,4%)
Trikala (centre-north)	61653	407	83 (20,34%)	29 (34,9%)
Korinthos (central-west)	58192	325	86 (24,46%)	32 (37,2%)
Total	**3512588**	**3125**	**471 (15,07%)**	**210 (44,6%)**

* based on 2011 National census

Table 2. Sociodemographic & physical characteristics of the sample (n=471).

Sociodemographic		***Percent (nu)***
Residence	Rural	17,2% (81)
	Urban	43,7% (206)
	Semi-urban	39,1% (184)
Education	Primary	21,7% (102)
	High school	47,6% (224)
	Higher education	30,8% (145)
Smoking	Non-smokers	60,5% (285)
	Heavy smokers (>2 p/day)	21,1% (99)
Marriage	Not married	25,3% (119)
	Married	63,7% (300)
	Divorsed/ widowed	10,8% (51)
Income (annual)	<7200€	29,7% (140)
	7200-24000€	59,6% (281)
	>24000€	6,8% (32)
Physical		
Pain location	LBP during last month	97,7% (460)
	Sciatica during last month	59,7% (281)
	Pain below the knee	39,9% (188)
Frequency	Every day	18,0% (85)
	Most days	53,9% (254)
Recurrence	LBP recurrent episodes	75,6% (356)

Activity limitation	LBP - limiting activities	61,4% (289)
	Sciatica - limiting activities	36,3% (11)
Investigations	Xray	33,6% (158)
	MRI	11,8% (56)
Bed rest	Bed rest (2-3 days)	17,0% (80)
	Bed rest (<1 week)	11,0% (52)
	Bed rest (2 weeks)	6,6% (31)
	>1 month bed rest	8,1% (38)
Recovery status	Improvement	47,5% (224)
	No improvement	33,3% (157)
	Exacerbation	14,6% (69)
Other problems	Other musculoskeletal problems	34,6% (163)
Sick leave		31,2% (147)
Specialist visit		70,1% (330)
Treatment undertaken		69,9% (329)

Table 3. Self-reported outcome scores (n=471).

	Mean (SD)	**95% CI ***
VAS -average pain intensity	5,26 (1,857)	5,10-5,43
VAS -pain at worst	7,99 (1,87)	7,82-8,16
Roland-Morris Disability Questionnaire	10,01 (6,14)	9,46-10,57
HAD (anxiety subscale)	11,24 (6,22)	10,68-11,81
HAD (depession subscale)	9,16 (6,44)	8,57-9,74
SF-12 Physical subscore	41,06 (9,67)	40,19-41,94
SF-12 Mental subscore	46,02 (10,86)	45,04-47

*95% confidence intervals

Table 4. Linear regression analysis with dependent variables pain intensity (VAS at worst) & disability (Roland-Morris).

	Worst pain intensity	Roland-Morris
VAS -pain at worst	-	,007 *
Roland-Morris	,003 *	-
sex	,914	,006 *
age	,000 **	,013 *
area	,744	,354
education	,278	,545
maritalstatus	,353	,083
Annual income	,074	,492
LBP during last month	,000 **	,711
LBP which is limiting activities	,017 *	,079
Sciatica during last month	,122	,876
Sciatica which is limiting activities	,137	,026 *
Pain below the knee	,270	,658
VAS -average pain intensity	,000 **	,095
VAS -pain at best	,952	,003 *
HAD-Anxiety subscale	,031 *	,684
HAD-Depession subscale	,375	,424
SF-12 Physical subscore	,234	,000 **
SF-12 Mental subscore	,007 *	,652
LBP recurrent episodes	,358	,057
Other musculoskeletal problems	,122	,466
Specialist visit	,000 **	,521
Pain frequency	,504	,000 **
Smoking	,709	,660
Pain status	,838	,028 *
Bed rest	,021 *	,014 *

* p < 0,05

** p <0,001

Table 5. Associations between sociodemographic, physical & life-style factors (n=471).

	LBP which is limiting activities	Sciatica which is limiting activities	Roland-Morris	HAD (Anxiety)	HAD (Depession)	SF-12 Physical subscore	SF-12 Mental subscore
Sex	-,040	-,018	,078	,094*	,064	-,206**	-,176**
Age	-,128**	-,168**	,446**	,261**	,342**	-,405**	-,199**
Area	,001	-,191**	-,082	,055	,033	,107*	,076

Education	,098*	,105*	-,339**	-,308**	-,332**	,350**	,202**
Marital status	-,073	-,086	,304**	,163**	,216**	-,254**	-,237**
Annual income	,029	,007	-,030	-,099*	-,059	,075	,174**
Smoking	-,025	-,035	-,033	,071	,005	,058	-,003
LBP (last month)	-,140**	,021	-,098*	-,057	-,071	,082	-,030
Sciatica (last month)	,230**	-,066	-,395**	-,003	-,039	,361**	,201**
Pain below the knee	-,072	,453**	-,077	-,210**	-,196**	-,020	,055
Pain frequency	-,174**	,012	,363**	,075	,113*	-,334**	-,184**
VAS - average pain	-,226**	-,048	,456**	,315**	,301**	-,396**	-,161**
VAS -pain at best	-,176**	-,028	,294**	,117*	,144**	-,370**	-,221**
VAS -pain at worst	-,273**	-,071	,543**	,302**	,302**	-,453**	-,121**
Recurrent episodes	,081	,043	-,226**	,140**	,095*	,182**	,166**
Other musculoskeletal problems	,012	,003	-,119**	,043	,052	,208**	,094*
Specialist visit	,192**	-,027	-,363**	-,046	-,039	,327**	,086
Days of bed rest	-,135**	-,021	,394**	,082	,117*	-,286**	-,086
Investigations	,073	,102*	,000	,171**	,181**	-,024	-,055

* Pearson's correlation is significant at the 0.05 level (2-tailed)

** Pearson's correlation is significant at the 0.01 level (2-tailed)

Table 6. Sex-adjusted prevalence and means of self-reported measures (men=210, women=261).

	Male	**Female**	**p values**
	Mean (SD)		
Average pain intensity	5,05 (1,9)	5,44 (1,7)	0,03 *
Worst pain intensity	7,75 (2,1)	8,19 (1,7)	0,002 *
Roland-Morris	9,48 (6,4)	10,44 (5,9)	0,32 *
HAD (anxiety)	10,60 (6,6)	11,77 (5,8)	0,003 *
HAD (depression)	8,70 (6,9)	9,52 (5,9)	0,04 *
SF-12 Physical	39,28 (9,5)	43,28 (9,4)	0,85 *
SF-12 Mental	48,15 (9,7)	44,31 (11,4)	0,01 *
	Numbers (Percentages)		
Education			
Primary	33 (15,7%)	66 (25,3%)	0,002 **
High school	92 (43,8%)	132 (50,6%)	
Higher	82 (39%)	63 (24,1%)	
Marital status			
Unmarried	66 (31,4%)	53 (20,3%)	<0,001 **
Married	134 (63,8%)	166 (63,6%)	
Divorsed/widowed	9 (4,3%)	42 (16,1%)	

Annual Income			
<7200 euro	50 (23,8%)	90 (34,5%)	0,004 **
7200-14400 euro	80 (38,1%)	94 (36,0%)	
14400-24000 euro	53 (25,2%)	54 (20,7%)	
>24000 euro	22 (10,5%)	10 (3,8%)	
Smoking			
Non-smoker	114 (54,3%)	171 (65,5%)	0,01 **
Light smoker (1-2 p/week)	38 (18,1%)	49 (18,8%)	
Heavy smoker (>1-2 p/day)	58 (27,6%)	41 (15,7%)	
LBP limiting activities	126 (60%)	163 (62,5%)	0,63 **
Sciatica (last month)	105 (50%)	176 (67,4%)	<0,001 **
Sciatica limiting activities	58 (27,6%)	113 (43,3%)	0,002 **
Pain below the knee	64 (30,5%)	124 (47,5%)	0,001 **
Pain frequency			
Most days	49 (23,3%)	81 (31,0%)	0,083 **
Every day	33 (15,7%)	52 (19,9%)	
Specialist visit	133 (63,3%)	197 (75,5%)	0,024 **
Under treatment	137 (67,2%)	192 (73,6%)	0,147 **
Bed rest	83 (39,5%)	114 (43,7%)	0,331 **
LBP recurrence	152 (72,4%)	204 (78,2%)	0,317 **
Other musculoskeletal problems	48 (22,8%)	115 (44,1%)	<0,001 **

*For independent sample's t test, **For χ^2 *test*