

# KRONİK BEL AĞRISININ EKONOMİK MALİYETİ

## The Economic Cost of Chronic Low Back Pain

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### ÖZET

**Amaç:** Kronik bel ağrısı sık karşılaşılan önemli bir halk sağlığı sorunudur. Kronik bel ağrısının ekonomik yükünün oldukça yüksek olduğu bildirilmekle birlikte Türkiye için ne olduğu net olarak bilinmemektedir. Bu çalışmanın amacı kronik bel ağrılı hastaların toplam ekonomik yükünü araştırmaktır

**Materyal ve Metod:** Çalışmaya kronik bel ağrısı olan 18 yaş üzeri 211 hasta dahil edildi. Hastaların sosyo demografik özellikleri, son 6 ay içindeki sağlık sistemi kaynakları kullanımı, son 3 ay içerisindeki çalışmama durumları anketlerle sorgulandı. Tüm direkt ve indirekt harcamalar hesaplandı. Direkt harcamaların içine doktor muayeneleri, tetkikler, ilaçlar, hastane yatışları, ortopedik yardımcı cihaz kullanımları, fizik tedavi ve son 6 aydaki bel ağrısına bağlı sakatlık nedeniyle hasta bakım ödemeleri dahil edildi. Çalışmamızda indirekt harcamalar son 3 ay içindeki üretim kaybı hesaplanarak tahmin edilmeye çalışıldı

**Bulgular:** Kronik bel ağrısı için yıllık direkt ekonomik yük 2011 değerlerine göre 823.91 TL (346.14 Euro, 443.39 USD), indirekt ekonomik yük ise 5501 TL (2311.34 Euro, 2960.71 USD) olarak hesaplandı.

**Sonuç:** Kronik bel ağrısına bağlı indirekt harcamaların direkt harcamalara göre çok daha fazla olduğu görülmektedir. Bel ağrısının etkili tedavisiyle hasta rapor kullanımına bağlı üretim kaybının ve harcamaların azaltılacağı sonucuna varılmıştır.

**Anahtar Sözcükler:** Kronik bel ağrısı; Hastalık yükü; Ekonomi; Harcama

### ABSTRACT

**Background:** Chronic low back pain (LBP) is a common and important health problem. The economic cost of LBP is very high and its burden in Turkey is not exactly known. The aim of this study is to research the total economic burden of the LBP among the chronic LBP patients.

**Material and Methods:** 211 patients over 18 years of age having chronic LBP were included. Patients socio-demographics, healthcare resource use in last 6 months, inability to work in last 3 months were collected by using questionnaires. We calculated all direct and indirect costs. Direct costs include medical visits, investigations, medications, hospitalizations, orthopedical aids, physical therapy and home payments during the last 6 months. Indirect costs in our study were evaluated mostly with productivity losts for the last 3 months.

**Results:** The annual direct costs for chronic LBP per patient were estimated at 823.91 TL (346.14 Euros or 443.39 USD) and the indirect costs were estimated at 5501 TL (2311.34 Euros or 2960.71 USD) in 2011 prices.

**Conclusion:** The indirect costs for chronic LBP seems to be higher than the direct costs. The productivity losses due to sick leave could be reduced with effective treatments and could help cost savings.

**Keywords:** Chronic low back pain; Burden of disease; Economics; Cost

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## INTRODUCTION

Low back pain has been a serious health problem since the beginning of human history which currently affects 50-80% of people in the industrial western countries at some point in their lives and stands as one of the major health issues causing workday loss, medical cost, and injury (1).

A low back pain of moderate severity and duration has an annual incidence of 10-15% and a point prevalence of 15-30% in the adult population. In 70% of the patients, three or more recurrences were observed. Generally, 90% of the patients completely recover within 3 months. However, for the patients who fail to recover within this period, recovery process slows down and induces high medical costs to the healthcare system. Furthermore, such patients are the principal cause of major disability and workday loss (2,3).

Low back pain does not only affect individuals via functional loss and reduced quality of life, but also has a significant impact over the entire population by causing workday loss (4). In many countries, low back pain accounts for a majority of the disability and costs and it is considered as the most important factor underlying reduced productivity (5,6). Low back pain is responsible for the workday or time loss in 2-5% of the population (7). Although prevalence studies are not adequate in our country, it is known that annual economic loss associated with this disease is 700 million dollars in Australia, while in the US, 5.4 million suffer from low back pain, with a total medical cost of 16 million dollars per year (5,6). In Turkey, although we do not know the exact nature of loss of work capacity, it is a well known fact that mechanical low back pain is a widespread and significant health issue (8).

Chronic low back pain stemming from recurrences or persistency of the pain constitutes 5-8% of the entire cases, however, it has a considerably significant role in increasing the total cost. Social, occupational, and psychologic factors are frequently mentioned to be involved in the pathogenesis of chronic low back pain. Particularly psychologic factors have a major role in chronic low back pain and the associated disabilities (9,10).

In this study, we aimed to investigate the use of healthcare resources, work/productivity loss, and total economic burden in patients with chronic low back pain who presented to our physical therapy and rehabilitation outpatient clinics.

## MATERIAL AND METHODS

Our study consisted of 211 patients, aged  $\geq 18$  years and diagnosed with mechanical chronic lumbar discopathy, lumbar spondylosis, facet syndrome, spondylolisthesis, chronic lumbar strain, or lumbar spinal stenosis, who have been suffering pain at least half the day for the past 3 months. The patients in whom chronic low back pain was associated with acute fracture, neoplasia, infection, abdominal or pelvic organs, or pregnancy, were excluded from the study. Written informed consent was obtained from all the participants.

In the outpatient clinic, a questionnaire concerning sociodemographic data, use of healthcare resources within the past 6 months, and capability to work within the past 3 months, was completed. The questionnaire, completed by a physiatrist interviewing the patients, included data concerning the following items: demographic characteristics (age, height, weight, gender, educational status, occupation, income status, marital status, and smoking status), exercise habits, number of physician office visits due to low back pain, visited physicians, presence of a companion during a patient's hospital stay, work status of the companion including permissions from his/her work and travelling expenses, number of diagnostic methods applied within the past 6 months, drugs used for low back pain within the past 6 months, treatment history, use of assistive devices (corset, wheelchair, orthopedic bed), workday loss within the past 3 months (sick leave, inability to perform housework, reception of help for housework, early retirement due to low back pain, disability benefit, and reduced work capacity), and history of hospital stay.

### Direct and Indirect Costs

Since the study was performed with a social viewpoint, all the expenses made by the patient, his/her employer, and the healthcare system were calculated. Both direct and indirect costs were included in the calculation.

Direct costs consisted of hospital care, outpatient clinic visits, diagnostic tests, medical therapies, orthopedic assistive devices, physical therapy, and housing benefit. The unit prices of medical care were obtained from the 2011 SUT (Medical Practice Report) payment list and the vademecum. However, the reported examination fees in this study are package examination fees. In other words, all the radiologic, biochemical, and bacteriologic tests were included in this fee with the exception of advanced methods such as MRI, CT, and Doppler. Selected major unit prices are shown in Table 1.

**Table 1:** Unit costs used in the study (2011)

Resource Item	Unit Cost
<b>Medical visits</b>	
Emergency	15.5 TL
PRM	55 TL
Orthopedist	49 TL
Neurology	51 TL
Neuro Surgery	55 TL
General Practitioner	44 TL
Rheumatology	55 TL
<b>Diagnostic Tests</b>	
X-ray Imaging	12 TL
Magnetic Resonance Imaging	65 TL
Computerised Tomography	55 TL
Bone Mineral Density	24 TL
Complete Blood Count	3 TL
Sedimentation	1.7 TL
C-Reactive Protein	9 TL
<b>Pharmaceuticals</b>	Vademecum
<b>Day In Hospital</b>	
Surgical ward	21 TL/day
PMR ward	21 TL/day
<b>Orthopaedic aids</b>	
Wheel chair	1500 TL
Corset	55 TL
Girdle	20 TL
Orthopaedic beds	1000 TL
<b>Other, per hour</b>	
Loss of production	3.94 TL
Loss of household work	3.94 TL

The indirect costs in our study were mostly evaluated by losses in productivity (reduced productivity due to changes in health status or failure to go to work, loss of manpower, early retirement, non-professional patient attendants, failure to go to work). Indirect expenses were estimated by multiplying the workday

loss (hours) due to chronic low back pain with average wage per hour in Turkey (based on official minimum wage, 796.50TL in 2011). Reduced performance at work was calculated by the decrease in work capacity (%) reported by the patient himself/herself with normal work hours (8 hours for full-time job). Inability to perform housework and reception of assistance for housework were again calculated based on the official minimum wage.

Annual expenses were calculated by multiplying direct costs by 2 (2 × 6 months) and indirect costs by 4 (4 × 3 months).

### Statistical Analysis

Statistical analyses were carried out with SPSS 16.0 package program.

## RESULTS

### Patients

Patient characteristics are shown in Table 2. The mean age of the patients was 45 years. Most of them were housewives and primary school graduates.

**Table 2:** Demographic data of patients

Patient characteristics	n
<b>Number of patients</b>	
Women	151
Men	60
<b>Working Status</b>	
Working	72
Retired	29
Other	110
<b>Smoking Status</b>	
Smoker	59
Quitted	43
Never smoked	109
<b>Body Mass Index</b>	
Underweight	4
Normal	53
Overweight	87
Obese	67

### Direct Costs

Most commonly prescribed drugs for low back pain (table 3) were analgesics, NSAIDs, muscle relaxants, antidepressants, and proton pump inhibitors (PPIs).

The mean number of drugs used by a single patient within the past 6 months was 2: one for low back pain and one for gastroprotection. Drug cost per patient per year was estimated as 345 TL (144.96€ or 186.49 \$).

**Table3:** Drugs prescribed for LBP

Drugs	n	%
Analgesics	59	%28
NSAIDs	175	%82.9
Muscle Relaxants	156	%73.9
Antidepressants	10	%4.7
Other(cox-2 selective inhibitors, gels)	121	%57.3
PPIs	87	%41.2
Antacids	6	%2.8

Within the past 6 months, 14.7% (n=31) of the patients had visited a primary care physician (88 visits in total).The number of visits to a physical therapy and rehabilitation outpatient clinic 520 visits in total. 17.1% (n=36) of the patients had visited orthopedic outpatient clinics (55 visits in total). 33.2% (n=70) of the patients had visited neurosurgery clinics for low back pain (116 visits in total). 15.2% (n=32) of the patients had visited an emergency unit for low back pain; among those, the number of visits to an emergency unit was (65 visits in total). 7.6% (n=16) of the patients had visited other outpatient clinics (neurology, general surgery, rheumatology, pain outpatient clinics) for low back pain (28 visits in total). In total, 702 outpatient clinic visits were observed, cost of outpatient clinic visits was 329.33 TL (138.38 € or 178 \$) per patient per year.

In addition to drugs and physician office visits, diagnostic tests were also included in the direct costs for low back pain. 30.3% of the patients had received direct radiography, 52.1% MRI, 2.8% CT, 9.0% bone mineral density (BMD), 10.4% laboratory tests including CBC, ESR, and CRP. However, as mentioned before, examination fees at an outpatient clinic included radiologic, biochemical, and bacteriologic tests, we calculated only specific modalities such as MRI, CT, and BMD. The cost of diagnostic tests per patient per year was 75.22 TL (31.6€ or 40.66 \$).

Orthopedic assistive devices counted as a direct cost were corset in 20 (9.5%), girdle in 31 (14.7%), and

orthopedic bed in 1 (0.5%). There was no patient using wheelchair for low back pain. The cost of orthopedic assistive device per person per year was 26 TL (10.92 € or 14.05 \$).

Among our study population, physical therapy was prescribed in the form of ultrasound in 28.4% (totally 640 sessions), transcutaneous electrical nevre stimulation (TENS) in 13.7% (totally 330 sessions), interferential therapy in 16.1% (a total of 340 sessions), infrared in 19% (a total of 440 sessions), and superficial heat therapy in 3.8% (a total of 80 sessions). The average amount spent per person per year on physical therapy was 47.1 TL (19.79 € or 25.46 \$).

Among our 211 patients, 1 reported staying at a physical therapy and rehabilitation clinic for 21 days, whereas none of the patients had stayed in a surgical clinic. The amount spent for the hospitalized patient was 132.5 TL (55.67 € or 71.62 \$).

None of the patients had received a benefit for low back pain.

Annual direct cost per patient was 823.91 TL (346.14 € or 443.39 \$).

#### Indirect Costs

Patients characteristics according to workday and productivity losses are shown in table 4. There was no individual in our patient group who was retired due to low back pain. 34.1% (n = 72) of the patients were working, and among them, 8.5% had not attended work at least 1 day within the past 3 months. In other words, of the 4320 (72 × 60) workdays, 144.5days were not fulfilled due to sick leave. In total, the average amount of expenditure associated with inability to attend work was 23019 TL (9671.85€ or 12442.70 \$), with an annual amount of 109 TL (45.80 € or 58.92 \$) per patient.

Tablo 4: Work day and productivity losses

	n
Early retirement	0
Employed patients who have been on sick leave (%)	18
Duration of sick leave (days)	113,5
Patients with inability to perform household work	110
Patients receiving support for household works (%)	4

Most of the patients were housewives (52.1%). Among them, 27% reported inability to do housework and 1.4% noted receiving help for housework. The cost associated with the inability to do housework for an average time of 10 days was 657 TL (276.05€ or 355.14 \$) per patient per year.

In addition, 52.1% of our patients reported an average loss of 55% in the work capacity in nearly half the work days within the past 3 months. The cost associated with reduced work capacity was calculated as 2741 TL (1151.68€ or 1481.62 \$) per patient per year.

The average amount of travelling expenses to and from the hospital was 5.37 TL (2.26 € or 2.90 \$) per patient. In view of the entire outpatient clinic visits, it amounted to 36 TL (15.13 € or 19.46 \$) per patient per year.

Furthermore, 26.1% (n=59) of our patients were observed to come to the hospital with at least one non-professional patient attendant, among whom, 5.2% had working status. These people were on leave for outpatient clinic visits for 13.3 days per patient per year, which amounts to 530 TL (222.69 € or 286.49 \$) per patient per year. The annual indirect cost was 5501 TL (2311.34€ or 2960.71 \$) per patient.

#### Total Cost

The total expenditure for chronic low back pain was 6324.91 TL (2657.53 € or 3418.87 \$) per patient per year, which was comprised of 823.91 TL (346.18 € or 445.36 \$) direct cost (13%) and 5501 TL (2311.34 € or 2960.71 \$) indirect cost (87%).

## DISCUSSION

Low back pain affects 50-80% of people at some point in their lives. While it has individual effects such as functional losses and reduced quality of life, it also has a social impact via leading to workday loss and decreased productivity (4). Loss of work capacity is one of the leading causes of medical expenses and disability. 80% of the patients suffer recurrent episodes. 90% of patients recover completely within 3 months. However, 5-15% develop chronic low back pain and become more expensive to treat. Spine and low back disorders are the most common health problems in people under 45 years of age. Furthermore, these patients are the reason of major disability and workday loss (7,11).

Many studies propose that low back pain starts during adolescence and displays a growing incidence parallel to aging, while it is known to reach the peak prevalence between 40-60 years (2, 5, 12). In this study, the mean age of the patients was 45.30 years (SD = 12.91), which was a value consistent with the literature.

Although there are studies reporting higher low back pain incidence among men (13), there are also studies indicating that it is higher in women. The higher low back pain in females was attributed to higher sensitivity of women to bodily symptoms and higher tendency to define their symptoms (14). Ketenci et al. studied 1120 patients with chronic mechanic low back pain and found that 72.3% were female, among whom 70% were housewives; they reported women as a significant risk group (15). In consistent with their study, 71.6% of our patients were women, in whom 52.1% were housewives.

Despite the presence of contradictory data in the literature, there are studies showing an association of low back pain to height, body type, and obesity. The metabolic impact of obesity and the effect of increasing weight are held responsible for making obese patients a high-risk group for low back pain. Lebouf et al. performed a review study including 65 epidemiologic studies on the relationship between low back pain and body weight, wherein they confirmed the link between them (16). In the present study,

among our 211 patients, 41.2% were overweight and 31.8% were obese. The patients with a normal BMI value constituted only a quarter of the study group.

Among our patients, 28% were smokers, 20.4% were quitters, and 51.7% were never-smokers. Studies have shown a link between smoking and low back pain. Cigarette smoking has been noted to cause progressive disc degeneration via impairing disc nutrition, leading to hyalinization and necrosis of nucleus pulposus (17,18).

Exercising is believed to increase the functionality and reduce the fear and avoidance beliefs associated with chronic low back pain. In a study focusing on the therapeutic effects of exercise over chronic low back pain, no increase was observed with regard to risk of low back injury or workday loss, and exercising was highlighted as a reliable method in patients with chronic low back pain (19). Cakmak et al. found that there was no proper education and exercise habit concerning the techniques aiming for preservation of low back health, while they observed that many patients ignored low back pain at the beginning and visited a health center only after the occurrence of severe symptoms associated with low back pathology (20). In the present study, among our patient group, 7.6% reported exercising daily, 3.8% reported exercising nearly daily, whereas 76.3% were found to be doing no exercise at all.

Effective treatment of low back pain is a contentious issue (21). With the exception of surgical intervention and psychological services, first, a conservative approach including analgesics, anti-inflammatory agents, muscle relaxants, manual therapy, or exercise is recommended (22,23). In the present study, most of the patients were observed to use drugs for low back pain. High rate of using pharmacological agents for low back pain increases the annual expenditure per patient. According to our calculation based on the Vademecum 2011, annual drug cost was 345 TL (145€) per patient. In the study of Ekman et al., annual pharmaceutical cost was found to be 183€ per patient and the distribution of drug use was as follows: analgesics in 59%, NSAIDs in 51%, muscle relaxants in 11%, and gastroprotective

agent in 12% (24). Depont et al. reported a 6-month pharmaceutical cost of 139 € per patient (25).

In Europe, primary health centers have a principal role and patients need referral from a primary care physician in order to go to a specialist (24). However, in Turkey, patients can visit all hospitals and physicians without any referrals. In the present study, we found that a total of 211 patients had visited physicians 702 times for low back pain. In total, annual cost of outpatient clinic visit was 329.33 TL (138 €) per patient. In the study of Depont et al. the annual cost of visiting a primary care physician was 76.6€ and the annual cost of visiting a specialist was 13.2 € (25). Maniadakis et al. found that 12-16% of the adults visited a primary care physician for low back pain per year and the distribution of visited specialties was as follows: orthopedics in 53%, rheumatology in 18%, pain outpatient clinic in 7%, internal medicine in 7%, urology/gynecology in 9%, and neurosurgery in 6% (26). Ekman et al. reported a visit rate of 83% to primary care physicians (24).

In addition to the drugs and physician visits, diagnostic tests were also included in the direct costs for low back pain. In this study, 30.3% of the patients had received direct radiography, 52.1% had received MRI, 2.8% had received CT, 9.0% had received BMD, and 10.4% had received laboratory tests including CBC, ESR, and CRP. Maniadakis reported that in their study 10% of the patients had underwent MRI, leading to a cost of 71.2 million \$, whereas the cost of MRI and CT studies were noted to be up to 13.2 million \$ (26). Here, we have to say that these numbers indicate the economic burden of low back pain clearly, while also being much higher than the values in our study. For instance, in 1998, the fees of X-ray, MRI, and CT were reported to be 40 \$, 185.4\$, and 91.1 \$ (26). In a study in Sweden, the most common diagnostic test was observed to be X-ray (71.1%) and annual cost was calculated to be 121 € (114 \$) per patient (24). In another study, the cost of imaging modalities per patient per year was estimated as 138 € (26). In the present study, cost of diagnostic tests was 75.22 TL (31.6 €) per patient per year.

Annual cost of using prescribed orthopedic assistive devices was 26 TL (11 €) per patient. Ekman noted the

same value as 139 € (24). In a study in France, annual cost of orthopedic assistive devices was 201 € per patient (25).

In the present study, annual cost of physical therapy was 47.1 TL (19.8 €) per patient. In the study of Maniadakis et al., 9% of the patients reported visiting a physiotherapist and the average number of sessions per patient was found to be 6-11; the total cost of physiotherapy sessions was 150.7 million \$ (26). Furthermore, in one study, 53.3% of the patients were found to visit a physiotherapist and physiotherapist visits were associated with much higher costs due to their higher frequency (number of visits to a primary care physician or a specialist was 3 within the past 6 months, whereas number of visits to a physiotherapist was 8.2 for the same time period) (24).

Of the 211 patients, only 1 reported staying in a physical therapy and rehabilitation clinic for 21 days, while none of the patients reported staying in a surgical clinic. The cost of hospitalization for this 1 patient was 132.5 TL (55.7 €). Annual cost per patient was 1.26 TL (0.5 €). In the literature, there are studies reporting an annual cost of 250 € per hospitalized patient (25). Ekman notes that patients above the age of retirement (>65years) exhibit considerably lower indirect costs due to absence of contribution to the work force, however, he also underscores significant increases in direct costs due to increased hospitalization, adding that despite having elevated direct costs, patients aged  $\geq 65$  years show significantly lower total costs than those of younger patients (24). Since only a few of the patients in our study (13.7%) were aged  $\geq 65$  years, we could not comment in this regard.

In the present study, 8.5% of the patients had taken a sick leave (mean = 8 days) at least once due to low back pain within the past 3 months, which was a rate lower than our expectation. Ekman et al. conducted a comprehensive study in Sweden wherein the major share of medical cost for low back pain was absence at work; among 73% of the working patients, 60% were found to be absent at work with a sick leave due to low back pain in 33 of the past 60 workdays, leading to an annual cost of 9563 € per patient (24). In our study,

we calculated the annual cost of sick leave as 109 TL (45.8 €) per patient, based on the gross minimum wage (796.50 TL). We believe that the significant difference between these two studies may be associated with lower number of sick leave days and the gross domestic product. Furthermore, 52.1% of our patients reported a 55% reduction in work capacity in nearly half the days within the past 3 months. Annual cost of reduced work capacity per patient was 2741 TL (1152 €). In the study of Ekman, 55% of the patients exhibited a 29% reduction in work capacity in 43 of the past 60 days, leading to an annual cost of 3212 € per patient (24). Hestbaek L. et al. conducted a multicenter cohort study and one-fourth of patients were determined to be on sick leave due to low back pain (27). In our study, there was no patient who had retired early or had been put on disability pension. In the study of Ekman et al. 8% of the patients had retired early and 3 patients had been put on disability pension due to low back pain (24).

Most of our patient group consisted of housewives (52.1%). Among them, 27% reported being unable to perform housework, whereas 1.4% noted receiving help for housework. The annual cost of being unable to perform housework for an average time of 10 days within the past 3 months was calculated as 657 TL (276 €). Ekman reported that 61% of his patients received 2.5 hours/day housework assistance in 58 of the past 90 days, revealing the economic burden of inability to do housework as 2027 € per patient per year (24). In the present study, since there was no standard for average cost of daily housework, we based our calculation on gross minimum wage, whereas Ekman calculated it as 35% of the income.

Our indirect costs included travelling expenses of the patients as well as the money, time, and workday allocated by the non-professional patient attendants. The travelling expenses of the patients to and from the hospital was 5.37 TL (2.26 €) per patient. In view of all outpatient visits, annual travel expenditure was 36 TL (15.13 €) per patient. Furthermore, 26.1% of our patients had at least 1 non-professional patient attendant among whom 5.2% were working people. The average duration of annual sick leave was 13.3

days for a single non-professional patient attendant which was amounting to an additional cost of 530 TL (222.69 €) per patient per year. We did not find any data about such expenses in the literature.

In our study, the total cost of chronic low back pain per patient per year was 6324.91 TL (2657.52 €), including a direct cost of 823.91 TL (346.14 €) (13%) and an indirect cost of 5501 TL (2311.34 €) (87%). One study in Germany calculated the total cost as 1790 €, consisted of 854 € (47%) direct cost and 936 € (53%) indirect cost (28). Depont et al. estimated a direct cost of 1430 €, however, gave no information about the indirect cost (25).

### CONCLUSION AND RECOMMENDATIONS

Although chronic low back pain is not a life-threatening disease, it is a growing important epidemiologic and economic problem despite advances in diagnostic and therapeutic methods. Indirect expenses associated with reduced work capacity and workday loss appear to be higher than direct expenses including drugs, physician office visits, physiotherapy, and hospital stay. We believe that by applying more effective treatments that decreases indirect expenses, the total cost can be reduced.

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