Awareness of osteoporotic patients

Yeşim Gökçe Kutsal · Ayçe Atalay · Şule Arslan
Aynur Başaran · Ferhan Cantürk · Abdullah Cindaş
Merih Eryavuz · Jale İrdesel · Kıymet-İkbal Karadavut
Yeşim Kirazlı · Dilşad Sindel · Kazım Şenel
Füsun Güler-Uysal · Kadir Yıldırım

Abstract Osteoporosis has recently been recognized as a major public health problem by some governments and health care providers. Despite significant progress in knowledge about osteoporosis, public awareness is required for effective management if precautions are to be taken. The aim of this study was to evaluate the educational status of osteoporotic individuals, and their awareness about the disease and sources of information. We also aimed to compare the variables between the geographical regions of the country, since significant differences exist in socioeconomic status and lifestyle within the same cultural context. This multicenter study was carried out in eight cities located in six different geographical regions between September 2001 and January 2002. To our knowledge, this is the first multicenter study in Turkey evaluating the relationship between awareness of osteoporotic patients and other variables such as educational level and economic factors. Ten centers took part in this study and consecutive patients with either femoral or lumbar T-scores below -2.5 SD were enrolled into the study group. Bone mineral density was measured using dual energy X-ray absorptiometry (DXA). Patients were interviewed using a questionnaire on past medical history, education, awareness about their disease and risk factors for osteoporosis. A total of 540 women (93.8%) and 36 men (6.3%) were included in the study. Fifty-four percent of patients declared that they were aware of osteoporosis. With regard to sources of information, 56.8% of patients reported physicians as the main source of information. Awareness of the patients was negatively correlated with age ($P=0.025$, $r=-0,94$) but positively correlated with education ($P=0.0001$, $r=0.327$), level of physical activity ($P=0.001$, $r=143$), calcium intake ($P=0.005$, $r=119$)

Y.G. Kutsal · A. Atalay
Department of Physical Medicine and Rehabilitation,
Faculty of Medicine, Hacettepe University,
Ankara, Turkey

Ş Arslan
Department of Physical Medicine and Rehabilitation,
Faculty of Medicine, Gaziosmanpaşa University,
Tokat, Turkey

A. Başaran · K.İ. Karadavut
Clinic of Physical Medicine and Rehabilitation,
SSK Ankara Educational Hospital,
Ankara, Turkey

F. Cantürk
Department of Physical Medicine and Rehabilitation,
Faculty of Medicine, 19 Mayıs University,
Samsun, Turkey

A. Cindaş
Department of Physical Medicine and Rehabilitation,
Faculty of Medicine, Süleyman Demirel University,
Isparta, Turkey

M. Eryavuz
Department of Physical Medicine and Rehabilitation,
Cerrahpaşa Faculty of Medicine, İstanbul University,
İstanbul, Turkey

J. İrdesel
Department of Physical Medicine and Rehabilitation,
Faculty of Medicine, Uludağ University, Bursa, Turkey

Y. Kirazlı
Department of Physical Medicine and Rehabilitation,
Faculty of Medicine, Ege University, İzmir, Turkey

D. Sindel
Department of Physical Medicine and Rehabilitation,
Faculty of Medicine, İstanbul University,
İstanbul, Turkey

K. Şenel · K. Yıldırım
Department of Physical Medicine and Rehabilitation,
Faculty of Medicine, Atatürk University,
Erzurum, Turkey

F. Güler-Uysal
Department of Physical Medicine and Rehabilitation,
Faculty of Medicine, Çukurova University,
Adana, Turkey

A. Atalay (✉)
16. sokak, Banuapt 24/4, Bahçelievler, 06500,
Ankara, Turkey
E-mail: ayce@hacettepe.edu.tr
Tel.: +90-312-3051575
Fax: +90-312-3105769

and modern clothing style ($P = 0.0001$, $r = 309$). Educational status of the patients was negatively correlated with BMI ($P = 0.0001$, $r = -283$) and positively correlated with physical activity ($P = 0.0001$, $r = 268$), modern clothing style ($P = 0.0001$, $r = 600$) and smoking ($P = 0.0001$, $r = 273$). Regional comparison of female patients demonstrated that significant differences exist in terms of educational status, clothing style, smoking, level of physical activity, calcium intake, and knowledge about osteoporosis. As a result, education has profound effects on awareness about osteoporosis and many aspects of human behavior, such as calcium intake, physical activity, clothing style and smoking. Significant disparities may be observed between the geographical regions of the same country.

Keywords Awareness · Education · Geographical regions · Osteoporosis

Introduction

Osteoporosis has recently been recognized as a major public health problem by some governments and health care providers. In the European community, the number of men and women aged 65 years or older will increase steadily and the most dramatic changes will occur in the very elderly, in whom the incidence of osteoporotic fracture is greatest [1]. As the population gets older, morbidity, mortality and financial costs attributed to osteoporosis are expected to rise. The economic costs related to osteoporotic fractures are substantial and will almost certainly increase further unless effective preventive interventions are widely implemented [2]. Despite significant progress in knowledge about osteoporosis, public awareness is required for effective management if precautions are to be taken. Health care providers obviously need to understand the population's knowledge of and attitudes towards osteoporosis [3].

The aim of this study was to evaluate the educational status of osteoporotic individuals, and their awareness about the disease and sources of information. A population of osteoporotic patients was available from different geographical regions of the country, enabling the comparison of various findings between these regions.

Materials and methods

This multicenter study was carried out in eight cities located in six different geographical regions between September 2001 and January 2002. In ten centers, consecutive patients with either femoral or lumbar T-scores below -2.5 SD were evaluated. Bone mineral density was measured using dual energy X-ray absorptiometry (DXA) and osteoporosis was diagnosed in accordance with guidelines of the World Health Organization (WHO) [4,5]. Different DXA machines (Hologic, Lunar or Norland) were used in different centers, so for each measurement, T-score for that specific machine was utilized. Patients were interviewed using a questionnaire that included variables such as age, sex, weight, height, educational status, clothing style (modern, traditional, Islamic), drugs used for osteoporosis, age at menarche, age at menopause, type of menopause, past use of oral contraceptive, presence of chronic disease, smoking history (never smoker, ex-smoker who is not smoking for the last year or current smoker), physical activity (number of 20-min sessions of activity per week) and calcium intake. All subjects were asked if they had knowledge or ideas about osteoporosis and if they had, what were the sources of information. Islamic style clothing means that except for the face and hands, all of the body is covered with a large piece of cloth, which is usually black. In the traditional style, the face, part of the hair, hands and sometimes distal parts of the arms are not covered. Calcium intake was assessed semi-quantitatively on a 3-point scale (never = 0, sometimes = 1, every day = 2) from reported current consumption of each of these foods: milk (more than 250 ml), cheese (more than 50 g) and yoghurt (more than 125 g) [6]. Sources of information commonly utilized by the patients were listed as: physician, family and friends, radio and television, newspapers and magazines. Body mass index (BMI) greater than 25 kg/m^2 was accepted as obese.

Turkish formal education is based on 5 years of primary school, 3 years of secondary school and 3 years of high school. Educational status was noted as not able to read and write, able to read and write, primary school, secondary school, high school, and university (3 years or 4 years) graduates. In addition, years of formal education were stratified as 5 years or less, 6–8 years and more than 9 years [6]. For statistical analysis, SPSS (Statistical Package for Social Sciences) version 8.0 was used. Since data were not normally distributed, non-parametric tests were chosen. In addition to descriptive analysis, we used the Kruskal-Wallis test for continuous variables and the chi-square test for nominal variables. We considered statistical level $P < 0.01$ to be significant.

There are seven geographical regions in Turkey. The first four of the seven regions determined were given the names of the sea which are adjacent to them (the Black Sea region, the Marmara region, the Aegean region and the Mediterranean region) and the other three regions were named in accordance with their location in the whole of Anatolia (Central Anatolia, Eastern Anatolia and Southeastern Anatolia) [7]. We compared patients from six geographical regions because significant differences in terms of socioeconomic status and lifestyle exist between these regions. No center from Southeastern Anatolia took part in the study. Male patients were not included in this regional analysis because of insufficient number of patients. For comparison between geographical regions, we used Kruskal-Wallis and chi-square tests. We redefined some of the variables such as calcium intake, smoking status, educational status and

clothing style for better interpretation of chi-square tests. We defined calcium scores of 4 or less as low calcium intake, and 5 or more as high calcium intake according to median score. We compared never-smokers with ex-smokers and current smokers. We grouped educational status into two groups formal education for 5 years or less and more than 5 years. We compared traditional and Islamic clothing with modern style. A P-value < 0.01 was considered to be statistically significant.

Results

Five hundred and forty women (93.8%) and 36 men (6.3%) were included in the study. The educational status of the study group was as follows: not able to read and write, 25.1%; able to read and write, 10.7%; primary school graduates, 33.0%; secondary school graduates, 9.3%; high school graduates, 11.2%; university graduates (3 years), 5.9%; and university graduates (4 years), 4.8%. Sociodemographic characteristics of the study population are summarized in Table 1.

Fifty-four percent of patients stated that they were aware of osteoporosis. With regard to sources of infor-

Table 1 Sociodemographic characteristics of the patients

Sociodemographic characteristic	Mean ± SD or percentage distribution	Range (minimum-maximum)
Age (years)	60.4 ± 10.8	17–87
Age at menarche (years)[a]	13.7 ± 1.5	9–22
Age at menopause[a]	45.2 ± 5.9	23–63
BMI	27.0 ± 4.7	15.4–48.5
Calcium score	4.1 ± 1.2	0–6
Surgically induced menopause (%)[a]	15.7	–
Chronic disease (%)	61.8	–
Smoking status (%)		
Never smoker	77.3	–
Ex-smoker	9.3	–
Current smoker	13.4	–
Clothing style (%)		
Islamic	6.9	–
Traditional	59.3	–
Modern	33.8	–

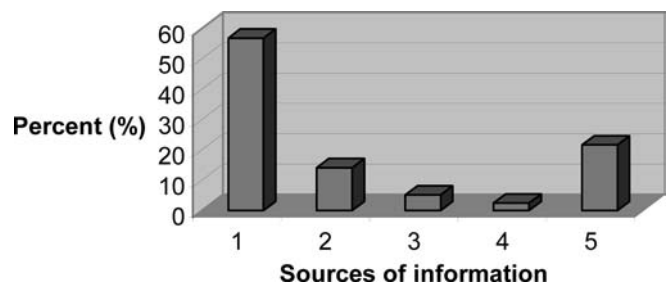[a]Calculated only for women

Fig. 1 Sources of information. *1* Physicians (56.8%), *2* family and friends (14.1%), *3* radio/television (5.1%), *4* newspaper/magazines (2.4%), *5* multiple sources of information (21.6%)

mation, 56.8% of patients reported physicians as the main source of information. Sources of information about osteoporosis are summarized in Fig. 1.

Patients were divided into three groups (5 years or less, 5–8 years and more than 9 years) according to years of formal education. In all, 392 (68.9%) of patients had 5 years or less of formal education, 53 patients (9.3%) between 6–8 years and 124 patients (21.8%) had 9 years or more. Variables were compared between these three groups. Comparison of variables according to years of formal education is summarized in Table 2.

Awareness of the patients was negatively correlated with age ($P=0.025$, $r=-0,94$) but positively correlated with education ($P=0.0001$, $r=0,327$), level of physical activity ($P=0.001$, $r=143$), calcium intake ($P=0.005$, $r=119$) and modern clothing style ($P=0.0001$, $r=309$). Educational status of the patients was negatively correlated with BMI ($P=0.0001$, $r=-283$), and positively correlated with physical activity ($P=0.0001$, $r=268$), modern clothing style ($P=0.0001$, $r=600$) and smoking ($P=0.0001$, $r=273$).

Female patients were divided into six groups according to geographical regions. Since we did not have sufficient numbers of male patients for comparison, they were not included. BMI, obesity, age at menopause, oral contraceptive use, presence of chronic disease and type of menopause were similar between the regions. Comparison of female patients according to geographical regions is summarized in Table 3.

Discussion

In this muticenter study, we aimed to evaluate the educational status of osteoporotic individuals, their

Table 2 Comparison of variables according to years of formal education

Variable	5 years or less	6–8 years	9 years or more	*P*-value
BMI	27.8 ± 4.8	26.0 ± 3.8	24.7 ± 4.1	< 0.001
Presence of obesity	72.2%	58.8%	41.7%	< 0.001
Physical activity for more than 2 h/week	65.7%	84.9%	93.1%	< 0.001
Percent of never-smokers	85.1%	64.2%	58.2%	< 0.001
Awareness of osteoporosis	43.7%	62.3%	83.7%	< 0.001

Table 3 Comparison of female patients according to geographical region. *BMI* body mass index. Percentages are given according to the distribution within the region and numbers within the brackets represent number of cases for each region

	Regions						
	Black Sea 5.6% (30)	Marmara 35.6% (192)	Aegean 4.4% (24)	Central Anatolia 36.3% (196)	Mediterranean 8.7% (47)	Eastern Anatolia 9.4% (51)	P-value
Age of patients (years)	58.7 ± 10.1	61.2 ± 10.8	66.3 ± 8.5	58.5 ± 10.1	61.1 ± 10.8	61.9 ± 8.9	0.0001
Age at menarche (years)	13.6 ± 1.2	13.4 ± 1.6	13.2 ± 1	14 ± 1.6	13.7 ± 1.3	13.7 ± 1	0.0001
Age at menopause (years)	44.6 ± 6	45.6 ± 6.1	44.5 ± 5.2	44.8 ± 6.3	45 ± 5.5	46.7 ± 3.5	0.256
BMI	27.2 ± 4.5	26.9 ± 4.7	26.4 ± 3.5	27 ± 4.7	27.4 ± 3.9	28.9 ± 5.8	0.383
Educational status							
Less than 5 years	73.3% (22)	56.1% (106)	45.8% (11)	81.1% (159)	79.5% (35)	94.1% (48)	0.0001
More than 5 years	26.7% (8)	43.9% (83)[a]	54.2% (13)[a]	18.9% (37)	20.5% (9)	5.9% (3)	–
Dress style							
Islamic + traditional	73.3% (22)	49.7% (95)	66.7% (16)	71.1% (138)	82.6% (38)	90.2% (46)	0.0001
Modern	26.7% (8)	50.3% (96)[a]	33.3% (8)	28.9% (56)	17.4% (8)	9.8% (5)	–
Smoking status							
Never-smoker	82.8% (24)	75.9% (145)	95.8% (23)	75.8% (147)	88.9% (40)	98% (50)[a]	0.001
Ex-smoker + current smoker	17.2% (5)	24.1% (46)	4.2% (1)	24.2% (47)	11.1% (5)	2% (1)	–
Level of physical activity							
Less than 2 h per week	20.7% (6)	22.8% (41)	4.2% (1)	18.8% (33)	28.6% (10)	96% (48)[a]	0.0001
Two hours or more per week	79.3% (23)	77.2% (139)	95.8% (23)	81.3% (143)	71.4% (25)	4% (2)[a]	–
Calcium intake							
Low	70% (21)	47.4% (91)	91.7% (22)	73% (143)	47.7% (21)	80.4% (41)	0.0001
High	30% (9)	52.6% (101)[a]	8.3% (2)	27% (53)	52.3% (23)[a]	19.6% (10)	–
Knowledge about osteoporosis							
Yes	31% (9)	62.1% (118)	70.8% (17)	51.3% (99)	58.7% (27)	25.5% (13)	0.0001
No	69% (20)[a]	37.9% (72)	29.2% (7)	48.7% (94)	41.3% (19)	74.5% (38)[a]	–

[a]Denotes group that is statistically different from others

awareness about the disease and sources of information. We also wished to compare the variables between the geographical regions of the country, since significant socioeconomic status and life style differences exist within the same cultural context. Fifty-four percent of our patients reported that they were aware of osteoporosis, meaning that 46% were not. When sources of information were asked for, 56.8% of patients mentioned physicians as the major source. Patients were compared according to years of formal education (5 years or less, 6–8 years, 9 years or more). We used formal education because it may be regarded as a composite or surrogate variable for overall socioeconomic status [8], and level of education (years of completed education) allows comparison between countries more readily than other socioeconomic indicators [9]. BMI, obesity, smoking status and physical activity was significantly different between the educational groups. In addition, awareness of osteoporosis was significantly different between the educational groups. When patients were compared according to geographical regions, education, clothing style, physical activity, calcium intake and awareness of osteoporosis were significantly different.

Garton et al. examined climacteric symptoms, attitudes towards hormone replacement therapy (HRT) and osteoporosis in 481 women aged 45–49 [10]. They concluded that most women had heard of HRT (96%) and osteoporosis (84%), usually from women's magazines or friends. In this study by Garton et al., family practitioners and hospital doctors were the least important. In our study, only 54.0% of women were aware of osteoporosis, which is quite low when compared with the study by Garton et al. Also, in our study most of the patients (56.8%) reported that physicians were the most important source of knowledge, which is opposite to the findings of Garton et al. Similarly, Juby et al. evaluated 145 seniors attending a senior's clinic and social day program using a self-administered questionnaire [11]. They identified that television, newspapers and friends were the main sources of information; physicians ranked only fifth as a source of information.

Varenna et al. examined 6160 postmenopausal women referred for their first densitometric evaluation and they found age at menarche, past exposure to oral contraceptives, use of HRT, prevalence of chronic diseases, physical activity, overweight and smoking showed significant trends according to years of education [6]. Also, as they had a cohort of postmenopausal women as the study group, they could show differences in the prevalence of osteoporosis among educational classes

and the protective role played by increases in formal education.

Magnus et al. undertook a random sample of 1514 Norwegian women and men aged 16–79 years to investigate knowledge of osteoporosis and attitudes towards methods for preventing this disease [3]. They concluded that in both men and women, increased knowledge of osteoporosis was correlated to a high level of education.

In a study by La Vecchia et al., it was stated that smoking was much more common among more educated women, and a strong positive social class gradient existed among Italian women [12]. Similar to these studies, we observed that percentage of never-smokers was higher among the least educated women and in the Eastern Anatolia region, which is the region with lowest level of education, 98% of our patients were never-smokers.

Unlike previous reports, in our study we were able to evaluate regional differences from many aspects. When patients were compared according to geographical regions, education, clothing style, physical activity, calcium intake and knowledge about osteoporosis was significantly different. Awareness of osteoporosis was significantly lower in Eastern Anatolia and the Black Sea regions. Also, in general, awareness about the topic was significantly different between the educational groups. With regard to education, there are some regional disparities in our country. The rate of illiteracy reaches almost 50% in Eastern and Southeastern provinces [13]. These discrepancies between the regions in terms of education clearly affected awareness about osteoporosis. Varenna et al. demonstrated that physical activity behavior showed the greatest difference among educational classes [6]. Similarly, in the Eastern Anatolia region, only 4% of patients were involved in physical activity twice per week or more. Ford et al. have evaluated physical activity habits of higher and lower socioeconomic status populations [14]. They found that lower socioeconomic status women were the least active group, and that important quantitative and qualitative differences in physical activity among population sub-groups exist. İnanıcı-Ersöz et al. evaluated 1026 women in urban regions of three cities using tibial speed of sound measurement [15]. In this study, they found that calcium consumption and sporting activity scores were significantly greater in the high socioeconomic status group. Similarly, we have observed a statistically significant positive correlation between physical activity and education.

We included consecutive patients presenting at clinics with osteoporosis as confirmed by DXA. The present study was therefore intended to evaluate awareness of patients with established osteoporosis, and thus differed from previous studies. The limitation of the study was that subjects who attend clinics may not be representative of the population of Turkey. Since DXA can be found at specialized centers, we could not evaluate a random sample from the community. We did not rely upon self-reported osteoporosis because self-reported prevalence of osteoporosis significantly underestimates the likely true prevalence [16]. Self-report is a valuable epidemiological tool, but may require additional documentation when the disease is diagnostically complex [17]. The problem in osteoporosis is the requirement for a specific diagnostic approach.

The most common types of chronic diseases, including cardiovascular, gastrointestinal, musculoskeletal, neoplastic, psychiatric, pulmonary, renal and other diseases, are reported substantially more frequently by individuals with fewer than 12 years of formal education than by the general population [8]. In a study by La Vecchia et al., it was shown that education is a strong determinant of several chronic conditions, and the pattern of health care utilisation also varied extensively according to education [18]. In a previous study, it was shown that continuous long-term health promotion strategies, directed toward both physician and the general population, appear to increase awareness about osteoporosis in women in women over 45 years and/or in the medical community [19]. The issue for an aging society is the approach the health professions will take in the next decade to reduce the frequency of late-life fracture incidence [20]. However, most general practitioners report inadequate exposure to teaching on osteoporosis at medical school [21]. Therefore, organized programs directed at both the public and the medical community are required.

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