

Management of Osteoporosis: A Survey of Israeli Physicians' Knowledge and Attitudes

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*See Editorial on page 375
and Consensus Statement on page 397*

Abstract

Background: Osteoporosis is the most common human bone disease. It affects millions of persons throughout the world and its prevalence will increase as the population ages worldwide.

Objective: To assess Israeli physicians' attitudes and knowledge with regard to management of osteoporosis.

Methods: A questionnaire was mailed to 1,900 Israeli physicians concerning their attitudes to the management of osteoporosis, their prescribing habits, and their knowledge on the pharmacological treatment of the disease.

Results: Replies were received from 19% of the physicians. The respondents encouraged physical activity and cessation of smoking for all women, and prescribed estrogen replacement as the main treatment for 50-year-old women. A relatively low level of knowledge was found regarding the adequate dosage of several of the pharmacological treatments.

Conclusions: The findings of the present study stress the need to provide clear guidelines and to extend physicians' knowledge regarding the management of osteoporosis.

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Osteoporosis is the most common human bone disease and affects millions of people around the world. Its prevalence will increase as the population ages worldwide. The most serious clinical consequences associated with osteoporosis are fractures and their complications. The most common fractures are those of the proximal femur, vertebrae, and distal forearm [1,2]. The lifetime risk of a woman sustaining an osteoporotic hip fracture is greater than the total cumulative risk of breast, ovarian and endometrial cancers. It has been estimated that of the 250,000 patients who suffer a hip fracture per year in the United States, mortality is increased by 10-20% and more than one-third become functionally disabled [3,4].

Osteoporosis was recognized for the first time 50 years ago [5]. However, the major advances in the understanding, prevention and treatment of the disease have occurred only in the last decade [6]. These advances are primarily due to the new technologies that enable accurate and reliable measurement of bone mass [2], and to the introduction of effective treatments for reducing the incidence of osteoporotic fractures [7]. Further advances are expected from the integration of genomics and informatics in the treatment of osteoporosis [8].

In an effort to disseminate the knowledge accumulated during the last years, several organizations in different countries have developed guidelines to aid physicians in the diagnosis and treatment of osteoporosis. The National Osteoporosis Foundation of the United States [9] has developed a physician's guide aimed at serving as "...a basic reference on the prevention, diagnosis and treatment of osteoporosis." The Osteoporosis Society of Canada [10], as well as the Council of the National Osteoporosis Foundation in South Africa [11], the National Osteoporosis Society in the UK [12], and the International Committee for Osteoporosis [13] have also published clinical practice guidelines for the diagnosis and management of the disease.

These national-level efforts are accompanied by an increasing interest in examining physicians' views regarding osteoporosis. However, the majority of these studies concentrated on the prevailing knowledge, attitudes and practice regarding hormone replacement therapy [14-18] and largely ignored other management techniques. The aim of the present study was to assess the attitudes and practice patterns of Israeli physicians regarding the management of osteoporosis.

Methods

At the end of 1998 and beginning of 1999 a mail survey was sent to a stratified sample of 1,900 Israeli physicians. The sample was selected according to the physician's specialty and geographic location. Physicians representing small specialties were over-sampled. The following specialties were included in the sample: family practice, general practice, orthopedics, obstetrics and gynecology, endocrinology, geriatrics, rheumatology, pulmonology, and gastroenterology. For analysis purposes, physicians' specialty

was divided into three broad categories: family specialists, general practitioners, and other specialties. The questionnaire addressed the following information:

- Personal data such as age and gender.
- Professional background, such as physicians' practice, number of years in the profession, place of work (hospital, sick funds), and percent of female patients in their practice.
- Attitudes regarding the management of osteoporosis. Participants were asked to state whether they agree or disagree that treatment costs for osteoporosis should be part of the services covered by the Ministry of Health through the Israel Mandatory Health Law.
- Physicians' prescribing habits concerning the treatment of osteoporosis. Four different scenarios were presented for which the physicians were asked to provide information on their treatment patterns. The scenarios varied with regard to the patients' age, family history and bone loss.

Scenario 1: A healthy 40-year-old woman, with regular menstrual periods, family history of osteoporosis, and bone mass of 2 standard deviations below the mean.

Scenario 2: A 50-year-old woman, one year after menopause, with a family history of osteoporosis and bone mass of 1.5 SD below the mean.

Scenario 3: A healthy 65-year-old woman with a bone mass of 3 SD below the mean.

Scenario 4: A 75-year-old woman with a hip fracture, and bone mass of 2 SD below the mean.

In order to assess their preferred treatment habits, physicians were asked to recommend the following for each scenario: encouraging physical activity and smoking cessation, and prescribing vitamin D, 1-alpha D3, ERT, anabolic steroids, alendronate, etidronate, calcitonin, or fluoride.

- Physicians' knowledge on the appropriate dosage of eight pharmacological agents for osteoporosis. These included: vitamin D, 1-alpha D3, conjugated estrogens, alendronate, etidronate, nasal calcitonin, injectable calcitonin, and fluoride.

The questionnaire included only closed-ended questions. If no reply was received within 2 months, a second questionnaire was mailed, and a third one was mailed 2 months after the second mailing. Overall, 200 questionnaires were returned by the post office because of incorrect address. As a result of the first mailing 148 questionnaires were returned, 96 additional questionnaires were returned after the second mail and another 79 questionnaires after the third mailing. Therefore, the overall response rate was 19% (323/1,700). Three questionnaires were not included in further analyses because the physicians were pediatric specialists. No statistically significant differences were found in the age, gender, specialty, and seniority of the respondents to the first, second and third mailing.

Data analysis and statistical methods

The accuracy of data entry was checked on an individual basis for each parameter. Differences between means for continuous variables were analyzed using *t*-tests, and differences between proportions were assessed with χ^2 and Fisher's exact tests. Statistical significance was set at 0.05 using two-tailed tests. Logistic regression models were used to evaluate physicians' characteristics in relation to use of ERT and to knowledge about adequate dosage for each pharmacological treatment. The dependent variables included the use of ERT versus no use, and a correct answer regarding dosage of each one of the pharmacological treatments versus an incorrect answer. The following features were included in the models as independent variables: gender, age, years in the profession, place of work, percentage of female patients, and specialty.

Results

The characteristics of the respondents are described in Table 1. Most physicians were middle-aged males, who worked at hospitals and sick funds and had more than 50% female patients. Over two-fifths of the participants were family practitioners, a quarter were general practitioners and the rest included other specialists.

Concerning physicians' attitudes, the majority of the participants (96.2%) thought that expenses for the management of osteoporosis should be part of the services covered by the Ministry of Health through the Mandatory Health Law.

Respondents' treatment habits are described in Table 2. As can be seen, the majority of the participants recommended physical activity and smoking cessation for all scenarios, although the percentages decreased as the age of the woman described in the scenario increased.

For the healthy 40-year-old woman with a family history of osteoporosis (scenario 1), 31% of the physicians recommended vitamin D. Surprisingly, 23% of the physicians proposed 1-alpha D3 and 15% proposed alendronate for treating this pre-menopausal woman with low bone density, despite the fact that there is currently no indication for bone-active drugs to treat such a patient. Physicians recommending alendronate for a 40-year-old woman were significantly

Table 1. Characteristics of the responding physicians

Physicians' characteristics	
Mean age (\pm SD)	45.9 \pm 9.3
Females	30.9%
Mean no. of years in the profession (\pm SD)	16.9 \pm 10.4
Work in hospitals	56.3%
Work in sick funds	79.3%
Specialty	
Family specialists	40.6%
General practitioners	25.2%
Other specialties	34.2%
Having more than 50% female patients	58.3

ERT = estrogen replacement therapy

Table 2. Percentage of participants recommending specific treatments for four different scenarios

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Encouraging physical activity	98.4	95.5	89.4	57.4
Encouraging smoking cessation	93.9	91.9	87.1	75.2
Vitamin D (as part of multivitamin complex)	30.7	33.4	37.0	39.3
1-alpha D3	23.2	30.0	48.1	51.0
Estrogen	6.5	84.1	43.2	18.4
Anabolic steroids	0.6	1.3	2.6	7.4
Alendronate	14.6	14.6	68.4	68.8
Etidronate	2.6	2.9	9.1	14.3
Calcitonin	1.9	3.2	9.4	36.4
Fluoride	5.5	3.9	5.8	9.1

Table 3. Percentage of participants reporting the most appropriate pharmacological dosage for treating osteoporosis

Pharmacological treatment	Adequate dosage	Under-dosage	Over-dosage	Does not recommend
Calcium (500–1,000 mg/day)	43.2	7.0	48.4	1.1
Vitamin D (400–1,000 units/day)	68.5	9.9	6.5	15.1
1-alpha D3 (0.5 µg/day)	27.7	53.4	7.2	11.7
Conjugated estrogens (0.625 mg/day)	90.3	–	7.1	2.8
Alendronate (5–10 mg/day)	55.2	–	37.7	6.6
Etidronate (400 mg/day for 14 days every 3 months)	40.0	27.4	–	32.6
Calcitonin nasal spray (200 units/day)	18.4	52.0	–	29.5
Injectable calcitonin (100 units/3 times a week)	34.8	29.1	11.7	24.3
Fluoride (currently not recommendable at all)	–	–	42.4	57.6

older than those not recommending this treatment (48.6 years old compared with 45.5, $t_{(285)} = 1.99$, $P < 0.05$).

For the 50-year-old menopausal woman described in scenario 2, the treatment plans included ERT (recommended by 84.1% of the participants), 1-alpha D3 (recommended by 30% of the physicians), and vitamin D (recommended by 33% of the participants). Fifteen percent of the respondents recommended alendronate for this scenario despite the fact that this medication is not indicated in Israel for preventive treatment.

For the 65-year-old and 75-year old women, the most frequently recommended treatments included alendronate (68.4% of the participants for scenario 3, and 68.8% for scenario 4) and 1-alpha D3 (48.1% for scenario 3, and 51% for scenario 4). Forty-three percent of the participants suggested using ERT also for the 65-year-old woman, and 36% recommended calcitonin for the 75-year-old woman. Only a minority of the physicians considered anabolic steroids, etidronate and fluoride for all cases.

Logistic regressions were used to evaluate potential determinants of physicians' habits regarding ERT. For scenarios 1, 3 and 4, no statistically significant predictors were observed. For scenario 2 (the 50-year-old patient), younger physicians were more likely to prescribe ERT than older physicians ($b = -0.08$, $P < 0.05$, $\text{Exp}(b) = 0.92$).

The percentage of physicians providing the appropriate dosage for the various medications is shown in Table 3. As can be seen, the majority of participants were knowledgeable regarding vitamin D, conjugated estrogens and alendronate dosages. However, only 43.2% of the physicians knew the most appropriate dosage for calcium, and only around a third for etidronate, calcitonin (injectable) and 1-alpha D3. Most of the physicians (81.5%) did not know the appropriate dosage for calcitonin nasal spray, and as many as 42% incorrectly recommended fluoride for the management of osteoporosis.

No statistically significant relationships were found between physicians' characteristics and their knowledge regarding treatment of osteoporosis.

Discussion

The results of this survey are, to our knowledge, the first to provide detailed information about practice patterns of Israeli physicians regarding management of osteoporosis. Several studies in Europe and the United States have examined the use of hormone replacement therapy, but no study has assessed

physicians' views and knowledge regarding other management interventions.

Our results indicate that the majority of participants recommend lifestyle modification, such as physical activity and cessation of smoking, as management practices for all women regardless of their age and clinical situation. Indeed, physical activity in general, and weight-bearing exercise in particular, have repeatedly been found to provide the mechanical stimuli necessary for the maintenance and improvement of bone density. Two thorough meta-analyses examining the effectiveness of exercise on bone mass recently concluded that physical activity programs have a positive impact on the prevention and treatment of bone loss [19,20].

The percentage of physicians encouraging physical activity decreased with the age of the woman described in the scenarios. Since the present study did not specify the type of physical activity, this decrease may suggest that the physicians perceived physical activity mainly as vigorous exercise, which is certainly not advisable for elderly people [21,22]. However, other types of activities, such as progressive strength training, should be encouraged also in elderly women in order to prevent and treat osteoporosis.

The percentage of respondents recommending ERT for a 50-year-old postmenopausal woman is similar to that reported by physicians in Europe [23]. However, it should

be noted that in the present study no specifications of unwanted situations (such as risk for breast cancer) were given. Similar to other studies [18], physicians reported using less ERT for older women.

Of great concern is that almost a quarter of the respondents recommended 1-alpha D3 and 14% recommended alendronate for a pre-menopausal woman. Although not statistically significant, we found that the lack of knowledge was greater in older than in younger physicians. Older age was also associated with decreased use of ERT, suggesting that more education and guidance should be provided to older physicians.

Except for vitamin D, conjugated estrogens and alendronate, respondents displayed relatively poor knowledge regarding the adequate dosage for the different pharmacological interventions. Specially striking is the finding that as many as 42% of the respondents suggested using sodium fluoride, despite the fact that this drug is not approved by the FDA for osteoporosis, and its effectiveness remains to be proven [24].

A cautionary note should be added regarding the low response rate obtained. Our mail survey followed the recommended method of including a self-addressed return envelope, and performing a second and third mailing with a reminder letter. Despite these efforts we obtained a 19% response rate. However, we found no statistically significant differences between the characteristics of the physicians responding to the first, second, and third mailing, a fact that increases the validity of our results. Indeed it has been indicated that response rates of physicians to mail surveys are always problematic and lower than response rates of other populations [25].

This limitation notwithstanding, this study is the first to assess Israeli physicians' knowledge and attitudes regarding management of osteoporosis in a nationwide sample. Overall, our findings stress the need to provide clear guidelines and to extend the knowledge of physicians regarding the treatment of osteoporosis.

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