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Awareness of Post-stroke Osteoporosis Among Physical Medicine and Rehabilitation Physicians in Türkiye: A Cross-sectional Study

Türkiye'deki Fiziksel Tıp ve Rehabilitasyon Hekimleri Arasında İnme Sonrası Osteoporoz Farkındalığı: Kesitsel Bir Çalışma

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Abstract

Objective: The aim of this study is to evaluate the level of knowledge and awareness regarding post-stroke osteoporosis among physical medicine and rehabilitation (PMR) physicians in Türkiye.

Materials and Methods: Our study, designed as an observational cross-sectional study, included 151 PMR physicians. An online survey system was used to collect data. The survey consisted of a total of 20 questions categorized under the following headings: General information, the relationship between stroke and osteoporosis, evaluation and diagnosis, management and treatment, and education and awareness.

Results: Among the participants, 51% (n=77) reported having a moderate level of knowledge about osteoporosis, 27.2% (n=41) good, 12.6% (n=19) poor, 4.6% (n=7) very poor, and 4.6% (n=7) very good. Thitry-eigh out of 151 physicians (25.2%) always, 67 (44.4%) often, 37 (24.5%) sometimes, and 8 (5.3%) rarely evaluated their patients after stroke for osteoporosis. One-hundred thirty-three physicians (88.1%) answered yes to the question of whether they needed training and resources on post-stroke osteoporosis.

Conclusion: In our country, the knowledge level of PMR physicians about post-stroke osteoporosis was determined to be moderate. Our physicians stated that they frequently evaluate patients after stroke in terms of osteoporosis.

Keywords: Stroke, osteoporosis, physician, awareness

Öz

Amaç: Bu çalışmanın amacı, Türkiye'deki fiziksel tıp ve rehabilitasyon (FTR) hekimleri arasında inme sonrası osteoporoz ile ilgili bilgi ve farkındalık düzeyini değerlendirmektir.

Gereç ve Yöntem: Gözlemsel kesitsel bir çalışma olarak tasarlanan çalışmamıza 151 FTR hekimi dahil edildi. Veri toplamak için çevrimiçi bir anket sistemi kullanılmıştır. Anket, genel bilgiler, inme ve osteoporoz ilişkisi, değerlendirme ve tanı, yönetim ve tedavi (3 soru) ve eğitim ve farkındalık başlıkları altında kategorize edilmiş toplam 20 sorudan oluşmaktadır.

Bulgular: Katılımcıların %51'i (n=77) osteoporoz hakkında orta, %27,2'si (n=41) iyi, %12,6'sı (n=19) kötü, %4,6'sı (n=7) çok kötü ve %4,6'sı (n=7) çok iyi düzeyde bilgi sahibi olduğunu bildirdi. Yüz elli bir hekimden 38'i (%25,2) her zaman, 67'si (%44,4) sıklıkla, 37'si (%24,5) bazen ve 8'i (%5,3) nadiren inme sonrası hastalarını osteoporoz açısından değerlendirmektedir. Yüz otuz üç hekim (%88,1) inme sonrası osteoporoz konusunda eğitim ve kaynağa ihtiyaç duyup duymadıkları sorusuna evet yanıtını vermiştir.

Sonuç: Ülkemizde FTR hekimlerinin inme sonrası osteoporoz hakkındaki bilgi düzeyinin orta düzeyde olduğu belirlenmiştir. Hekimlerimiz inme sonrası hastaları osteoporoz açısından sıklıkla değerlendirdiklerini belirtmişlerdir.

Anahtar kelimeler: İnme, osteoporoz, hekim, farkındalık

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Introduction

Stroke is the second leading cause of death worldwide and the leading cause of long-term disability, affecting millions of people each year (1,2). Beyond its obvious neurological effects, stroke has important but often understudied effects on a variety of physiological systems (3,4). One area that requires greater attention is the effect of stroke on bone density, a critical determinant of overall skeletal health and integrity (5).

Accumulating evidence suggests that stroke may negatively impact bone density, increasing the risk of osteoporosis (OP) and subsequent major fractures, thereby increasing patient morbidity and mortality (5,6). A study conducted in Türkiye found the prevalence of post-stroke OP to be 40.5% in women and 12.7% in men (7). This phenomenon may be attributed to immobility, neurological impairment, and endocrine dysregulation after stroke (8,9). The risk of fragility fractures is approximately sevenfold higher after stroke and is associated with prolonged disability and increased mortality (10).

Post-stroke bone loss is focal, affecting the paretic side more than the non-paretic side, and is most evident within the first few months following the stroke (8). Despite the known risks of OP and fractures after a stroke, stroke patients are rarely screened or treated for OP. One large study found that dual-energy X-ray absorptiometry (DXA) testing was performed in only 5.1% of stroke survivors, and only 3.2% of those who had not previously received treatment were prescribed anti-OP medications within 12 months (11).

In light of this information, the aim of our study is to evaluate the level of knowledge among physical medicine and rehabilitation (PMR) physicians in Türkiye regarding OP as a complication of stroke, as well as their clinical approaches in daily practice. We believe that the findings of this study will help raise awareness of post-stroke OP among PMR physicians.

Materials and Methods

This study was approved by the University of Health Sciences Türkiye Hamidiye Scientific Research Ethics Committee (decision number: 2025-25-22, date: 09.01.2025). All procedures involving human participants were conducted in accordance with the 1964 Helsinki Declaration and its later amendments.

Our study was designed as an observational cross-sectional study and included 151 PMR physicians. Only PMR physicians who were actively involved in the clinical assessment of patients and at least 3 years experience were eligible for inclusion; individuals who were not practicing PMR or not engaged in direct patient evaluation were excluded from the study. Participants voluntarily completed the online survey and, since online surveys were anonymous, the participant stated that they agreed to participate in the study.

Communication with PMR physicians was established through online health portals and professional email channels. The survey assessed participants' general information (including professional title and working hours), as well as their knowledge and awareness regarding post-stroke OP. The survey was developed by the authors of this study and reliability analysis was performed. All questions were prepared in accordance with the current guidelines and compilations. The survey consisted of a total of 20 questions, categorized under the following headings: general information (2 questions), the relationship between stroke and OP (6 questions), evaluation and diagnosis (7 questions), management and treatment (3 questions), and education and awareness (2 questions). In addition to assessing the overall knowledge and awareness of PMR physicians, the study also analyzed the relationship between these variables and professional characteristics such as title and working hours.

Sample Selection of the Research

The exact number of actively practicing PMR physicians in Türkiye could not be determined from any available database. Therefore, calculations were made based on known or estimated values. Assuming a total of approximately 10,000 PMR physicians in Türkiye—based on the assumption that the distribution of medical specialties is relatively balanced—sample size calculations were performed. When the confidence interval was accepted as 95%, the error rate as 5%, the population rate as 90% and the population size as 10,000 PMR physicians, it was concluded that at least 137 PMR physicians should be included in the study (12).

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics version 22. The conformity of the parameters to normal distribution was evaluated by Kolmogorov-Smirnov and Shapiro-Wilks tests. In addition to descriptive statistics (mean, standard deviation, frequency), inferential statistical methods were applied.

For comparisons between two groups of quantitative data, the Student's t-test was used for normally distributed variables, whereas the Mann-Whitney U test was applied for non-normally distributed variables. To examine the relationships between continuous variables, Pearson correlation analysis was used for normally distributed data, and Spearman's rho correlation analysis for non-normally distributed data. Chi-square tests were used to compare categorical variables. The reliability of the survey was assessed using Cohen's Kappa coefficient. The significance level was evaluated as $p<0.05$.

Results

The demographic characteristics of the PMR physicians are presented in Table 1. According to the findings, 53% of the participants were residents, 41% were specialists, 2% were lecturers, 3.3% were associate professors, and 0.7% were professors. In terms of professional experience, 50.3% of the physicians had 3-4 years of experience, while 17.2% had more than 12 years of experience. Regarding their self-reported knowledge of OP, 51% of the participants described their level of knowledge as moderate, 4.6% as very poor, and 4.6% as very good.

Statistical analyses on the relationship between stroke and OP, evaluation and diagnosis, management and treatment, education and awareness are shown in Tables 2a-d.

The correlation analysis between professional title, years of experience, self-reported OP knowledge, and various survey parameters is presented in Table 3. A statistically significant relationship was found between professional title and several key survey responses. As the academic title of the physicians increased, the proportion of correct answers to the questions "In which period is the decrease in BMD most evident after stroke?" and "In which anatomical location do fractures most commonly occur after stroke?" also increased ($p<0.05$). It was found to be statistically significant that as the title increased, 25-OH vitamin D and calcium tests were requested more frequently, balance exercises were planned more to prevent OP, and there was no need for more training or resources regarding OP ($p<0.05$). It was observed that physicians with longer working duration answered the question "In which localization do fractures most frequently occur in stroke patients?" with statistically significant accuracy. As working duration increased, physicians statistically significantly took gender into account more when assessing the risk of OP, requested 25-OH vitamin D and calcium tests more frequently, and stated that there was no need for more education or resources regarding OP.

Higher self-reported levels of OP knowledge were significantly associated with better performance across multiple survey domains ($p<0.005$). Physicians who reported greater knowledge were more likely to correctly identify the period in which bone mineral density (BMD) loss is most pronounced after stroke. They also demonstrated a more accurate understanding of the laterality and anatomical localization of BMD reduction, and more precisely identified the sites where fractures are most commonly observed in stroke patients. In clinical practice, these physicians more frequently assessed OP risk factors and more regularly evaluated their post-stroke patients for OP. They were also more likely to utilize clinical evaluation methods for OP screening and reported greater awareness of the fracture risk assessment tool-stroke score, a tool used to estimate fracture risk in stroke survivors. Furthermore, physicians with higher knowledge levels placed greater emphasis on nutritional factors

Table 1. Demographic data of participants

		n (%)
Professional title	**Resident**	80 (53)
	Specialist	62 (41)
	Assistant professor	3 (2)
	Associate professor	5 (3.3)
	Professor	1 (0.7)
Working duration (year)	**3-4**	76 (50.3)
	5-8	29 (19.2)
	9-12	20 (13.2)
	>12	26 (17.2)
Osteoporosis knowledge	**Very poor**	7 (4.6)
	Poor	19 (12.6)
	Moderate	77 (51.0)
	Good	41 (27.2)
	Very good	7 (4.6)
Frequency of stroke patients assessment	**Often** **Sometimes** **Rarely or never**	98 (64.9) 53 (35) 0

Table 2a. Relationship between stroke and osteoporosis

Question	Correct answer	n (%)
In which period is the decrease in BMD most prominent following a stroke?	First few months	58 (38.4)
Decrease in BMD occurs only on the hemiplegic side after stroke	False	135 (89.4)
Decrease in BMD is more pronounced in the upper extremity after stroke	True	26 (17.2)
In which location do fractures most frequently occur in stroke patients?	Hip	91 (60.3)
FRAX is sufficient to determine the risk of fracture after stroke	False	104 (68.9)

BMD: Bone mineral density, FRAX: Fracture risk assessment tool

Table 2b. Evaluation and diagnosis parameters		
Question	**Answer**	**n (%)**
Do you assess osteoporosis risk factors in your post-stroke patients?	Yes	125 (82.8)
What factors do you consider when assessing the risk of osteoporosis in your patients?	Age	150 (99.3)
	Gender	144 (95.4)
	Mobility status	146 (96.7)
	Nutritional status All of the above	127 (84.1) 126 (83.4)
	Other (additional disease, medication used, family history, smoking/alcohol use, etc.)	12 (7.9)
How frequently do you assess your patients for osteoporosis following a stroke?	Always	38 (25.2)
	Often	67 (44.4)
	Sometimes	37 (24.5)
	Rarely	8 (5.3)
	Never	1 (0.7)
Which methods do you use to screen for osteoporosis in your post-stroke patients?	Clinical evaluation	102 (67.5)
	Laboratory	127 (84.1)
	DXA All of the above	151 (100.0) 95 (62.9)
	Other (X-ray)	1 (0.6)
How frequently do you request 25-hydroxy vitamin D and calcium tests in stroke patients?	Always	66 (43.7)
	Often	56 (37.1)
	Sometimes	26 (17.2)
	Rarely	3 (2.0)
	Never	0 (0.0)
How often do you request DXA scans for stroke patients?	Always	37 (24.5)
	Often	64 (42.4)
	Sometimes	46 (30.5)
	Rarely	4 (2.6)
	Never	0 (0.0)
Have you ever heard of the FRAC-stroke score for assessing fracture risk in stroke patients?	Yes	52 (34.4)
	No	99 (65.6)

DXA: Dual-energy X-ray absorptiometry, FRAC: Fracture risk after ischemic stroke

in treatment planning, showed a higher preference for vitamin D and calcium supplementation in managing post-stroke OP, and were less likely to report a need for additional education or resources on the subject.

To assess the reliability of the questionnaire, it was administered twice to a group of 20 participants with a two-week interval. The consistency of responses was evaluated using Cohen's Kappa coefficient. Among the 18 items, 3 showed almost perfect agreement (κ>0.80), while 5 demonstrated substantial agreement (κ>0.60). Six items indicated moderate agreement (κ=0.40-0.60), two items showed fair agreement (κ=0.20-0.40), and the remaining two exhibited only slight agreement (κ<0.20). These results suggest that the questionnaire generally demonstrates moderate to high reliability across most items (13). The average Cohen's Kappa value was 0.621, indicating a generally good level of reliability for the survey (Figure 1).

Discussion

Stroke is a risk factor for OP, falls, and fractures (14,15). Stroke is often associated with impairment in motor, sensory or balance functions, all of which predispose to fall-related injuries such as fractures. Moreover, the accelerated loss of bone mass after stroke also contributes to fractures in stroke survivors. When fractures occur in the post-stroke period, they can hinder rehabilitation, delay functional recovery and even lead to further complications.

Table 2c. Management and treatment parameters		
Question	**Answer**	**n (%)**
What treatment approaches do you apply to your stroke patients diagnosed with osteoporosis?	Pharmacological treatment	148 (98.0)
	Exercise	141 (93.4)
	Nutrition counseling	122 (80.8)
	All of the above	116 (76.8)
What types of physical activities or exercises do you recommend to stroke patients for the prevention of osteoporosis?	Walking	145 (96.0)
	Weight bearing exercises	90 (59.6)
	Balance exercises	118 (78.1)
	Flexibility/stretching exercises	61 (40.4)
	All of the above	36 (23.8)
Which pharmacological agents do you prefer in the treatment of post-stroke osteoporosis?	Vitamin D and calcium supplements	148 (98.0)
	Bisphosphonates	143 (94.7)
	Denosumab	135 (89.4)
	Parathyroid hormone analogs (e.g., teriparatide)	21 (13.9)
	All of the above	21 (13.9)

Table 2d. Education and awareness parameters		
Question	**Answer**	**n (%)**
What resources or materials do you use to inform your patients about osteoporosis?	Brochures	90 (59.6)
	Training seminars	43 (28.5)
	Online resources	70 (46.4)
	All of the above	20 (13.2)
	Other (verbal)	13 (8.6)
Do you feel the need for additional education or resources regarding osteoporosis and its management, particularly in post-stroke patients?	Yes	133 (88.1)
	No	18 (11.9)

With appropriate screening and pharmacologic treatment, many post-stroke fractures are potentially preventable (16). However, patients with a recent stroke are rarely screened and treated for OP, which may increase the risk of fractures (11). Therefore, this study was designed to raise awareness of post-stroke OP among healthcare professionals in Türkiye and to inform strategies for its early screening, prevention, and management.

In this study, 4.6% of 151 PMR physicians rated their OP knowledge as very poor, 12.6% as poor, 51.0% as moderate, 27.2% as good, and 4.6% as very good. Regarding knowledge-based questions, 38.4% correctly identified the period when BMD loss is most prominent post-stroke, 89.4% correctly recognized that BMD loss occurs only on the hemiplegic side, and 17.2% correctly responded that it is more pronounced in the upper extremity. Additionally, 60.3% correctly answered the most common fracture location after stroke, and 68.9% accurately assessed the adequacy of the FRAX tool in this context.

A total of 125 physicians (82.8%) reported evaluating OP risk factors after stroke. In terms of frequency of evaluation for OP following stroke, 38 participants (25.2%) stated they always, 67 (44.4%) often, 37 (24.5%) sometimes, and 8 (5.3%) rarely perform such assessments. Regarding post-stroke calcium and vitamin D testing, 66 physicians (43.7%) reported always requesting tests, 56 (37.1%) often, 26 (17.2%) sometimes, and 3 (2.0%) rarely. As for DXA use in OP screening after stroke, 37 participants (24.5%) stated they always, 64 (42.4%) often, 46 (30.5%) sometimes, and 4 (2.6%) rarely use this method. In response to the question regarding the need for further education or resources about OP, 133 of the 151 participants (88.1%) answered affirmatively. These results suggest that, despite certain knowledge limitations, many physicians incorporate OP screening into routine post-stroke management. Kapoor et al. (11) retrospectively evaluated whether patients followed at 11 stroke centers in Ontario, Canada between 2003 and 2013 were evaluated for OP. Of 16,581 stroke patients, 5.1% overall and 2.9% of those who had not had a previous test had undergone a BMD scan, and 15.5% overall and 3.2% of those who had not had a previous treatment were prescribed medications for fracture prevention within 1 year of stroke. An association was found between increased OP pharmacotherapy and female gender, poststroke OP, poststroke falls, and fractures (11). According to the study conducted by Kapoor et al. (11), it can be said that patients after stroke are evaluated more in terms of OP in our country and that DXA screening is performed at higher rates. However, Kapoor et al. (11) utilized patient records, whereas our results are based on physician self-report, which may be influenced by recall bias or an overestimation

Table 3. Correlation analyses between survey questions and demographic data of participants

		Title	Working duration	OP knowledge
In which period is the decrease in BMD most evident?	r	-0.272**	-0.147	-0.347**
	p	**0.001**	0.072	**0.000**
Decrease in BMD occurs only on the hemiplegic side	r	-0.027	-0.018	-0.165*
	p	0.741	0.829	**0.043**
Decrease in BMD is more evident in the upper extremity	r	-0.143	-0.074	-0.270**
	p	0.080	0.368	**0.001**
In which localization do fractures occur most frequently	r	-0.226**	-0.199*	-0.297**
	p	**0.005**	**0.014**	**0.000**
Assessing OP risk factors	r	0.024	0.117	-0.260**
	p	0.771	0.152	**0.001**
Gender as a risk factor	r	0.083	0.169*	0.036
	p	0.313	**0.038**	0.663
OP evaluation frequency	r	0.006	0.030	-0.279**
	p	0.938	0.718	**0.001**
Clinical evaluation as a OP screening method	r	-0.042	-0.021	-0.166*
	p	0.608	0.799	**0.042**
Frequency of requesting vitamin D calcium tests	r	0.206*	0.296**	-0.039
	p	**0.011**	**0.000**	0.636
FRAC-stroke	r	-0.094	-0.041	-0.200*
	p	0.253	0.618	**0.014**
Nutrition as a treatment method	r	-0.128	-0.047	-0.160*
	p	0.117	0.565	**0.050**
Balance exercises as a type of physical activity	r	-0.171*	-0.127	-0.126
	p	**0.035**	0.120	0.122
Vitamin D and calcium as drug therapy	r	-0.046	0.003	-0.189*
	p	0.574	0.968	**0.020**
Training seminar as a information method	r	-0.102	-0.002	-0.063
	p	0.211	0.983	0.439
Training and resource demand	r	0.290**	0.257**	0.316**
	p	**0.000**	**0.001**	**0.000**

BMD: Bone mineral density, OP: Osteoporosis, FRAC: Fracture risk after ischemic stroke, *: Correlation is significant at the 0.05 level **: Correlation is significant at the 0.01 level

of actual clinical behavior. For this reason, it does not seem possible to make a one-to-one comparison. However, in our literature review, there is no survey study among physicians regarding post-stroke OP awareness. Similar studies are aimed at determining the general OP awareness and knowledge level of physicians from various branches.

The study by Rieder et al. (17) reported the attitudes of 251 Austrian physicians towards OP risk factors and prevention methods. Almost half of the physicians believed that OP has less impact on public health than coronary heart disease, stroke or diabetes. They stated that prevention is the most important factor in OP management. The most effective prevention strategies for physicians for both premenopausal and postmenopausal women were physical activity, high calcium intake and postmenopausal estrogen replacement. 83% of physicians thought that lack of exercise had a major impact on the risk of OP, while 64% thought the same about low calcium intake, 95% about estrogen deficiency and 80% about a positive family history (17). In a survey of physicians in China, only 76% of respondents reported treating patients with OP in their offices. 91% of respondents believed that OP was underdiagnosed. The asymptomatic nature of the disease (66%), inaccessibility (45%), and high cost of diagnostic tools (54%) were considered the main reasons for underdiagnosis. DXA was used for diagnosis by only 53% of physicians. 33% of physicians surveyed were unaware of published guidelines

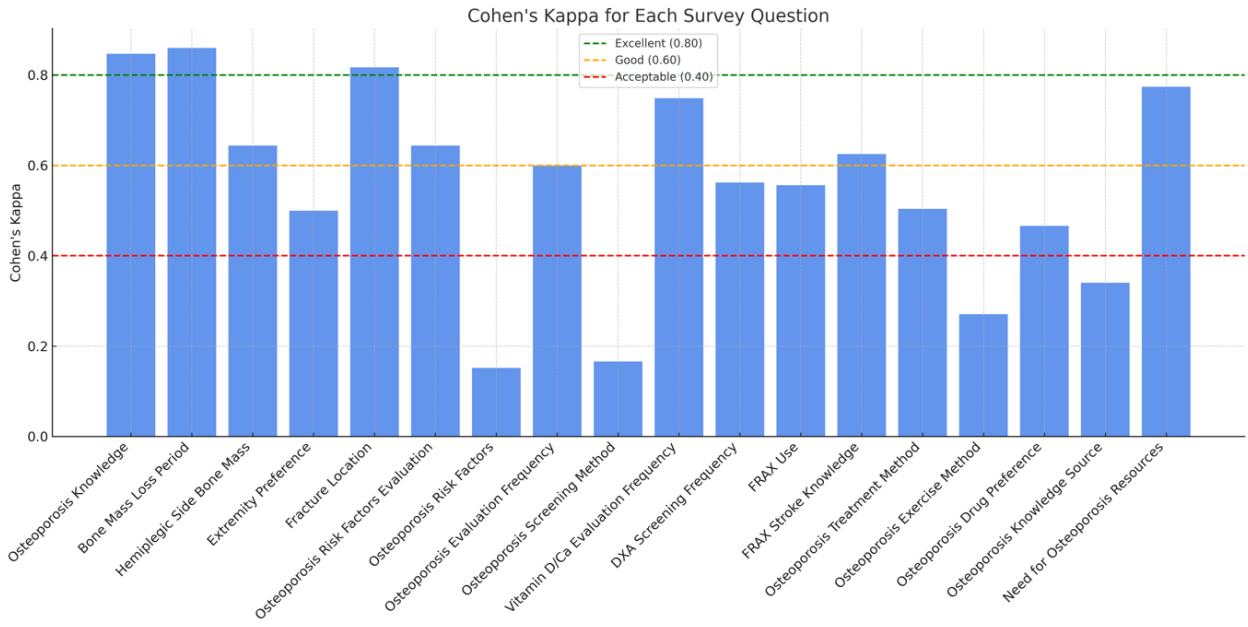

Figure 1. Reliability analysis of the questionnaire

for BMD measurements. Regarding treatment goals, 82% believed that prevention of future fractures and 66% believed that improvement in patients' quality of life were critical or very important, whereas only about half of physicians considered an increase in BMD to be important. On the other hand, 60% of physicians considered treatment cost to be a critical or very important element in OP management (18). In another study, the knowledge and practice scores of Iranian family physicians were at a moderate level, with only 14% and 38.5% having good knowledge and practice, respectively. The attitude score was at a good level, with 64.1% of participants having a positive attitude. The mean knowledge and practice score was significantly higher among family physicians working in the public sector. The attitude score of family physicians who had completed OP training courses was higher (p=0.03). Only 23.5% of family physicians were aware of the existence of a national OP guideline (19). In a study conducted on 141 physicians and nurses in Saudi Arabia, 127 (90.1%) of the participants were found to have good knowledge while 14 (9.9%) had poor knowledge (20). In a study conducted on general practitioners in Germany, the majority of physicians (82.7%) felt competent in the management of OP and only 11.2% did not see OP as a significant problem in their practice. Approximately half reported that they were well acquainted with the national OP guideline (51.7%), while 22.6% admitted that they were not familiar with it at all (21).

In our study, among PMR physicians, the rate of those with moderate knowledge about OP after stroke was 51%, the rate of those who stated that it was good/very good was 31.8%, and the rate of those who stated that it was low/very low was 17.2%. 99.3% of physicians considered age, 95.4% gender, 96.7% mobility status, and 84.1% nutritional status as OP risk factors. In the treatment of post-stroke OP, 98% of physicians preferred medication, 93.4% exercise, and 80.8% nutrition. The rate of preference for vitamin D and calcium as medication was 98%, bisphosphonate was 94%, and denosumab was 89%. The majority of physicians recommended walking and balance exercises (96% and 78%, respectively) as physical activity types. When compared with the literature, the knowledge level of PMR physicians in Türkiye is observed to be higher than in some countries and lower than in some countries. DXA request rates and OP risk factor rates appear to be similar to other survey studies in the literature. However, it does not seem possible to compare the results of our study with other studies in the literature. While general OP awareness and knowledge levels were determined in other studies, our study evaluated post-stroke OP, a special area of OP.

Study Limitations

To the best of our knowledge, our study is the first study in Türkiye regarding post-stroke OP awareness among PMR physicians and provides important information regarding the knowledge level, awareness, and diagnostic and treatment approaches of PMR physicians. However, there are some limitations to our study. First, the study was restricted to PMR physicians, and did not encompass other pertinent specialties like neurology or endocrinology, which may also play a role in post-stroke OP management. Secondly, since the current number of active PMR physicians in Türkiye could not be accessed through any database, the sample calculation was made based on known or estimated values.

Conclusion

This study demonstrates that despite moderate overall knowledge, PMR physicians in Türkiye often exhibit strong clinical awareness and proactive engagement in the diagnosis and treatment of post-stroke OP. The widespread request for further training, as indicated by nearly 90% of participants, reflects a critical gap that can be addressed through formal, evidence-based continuing medical education. Given that many post-stroke fractures can be avoided, comprehensive management—including early detection, medical therapy, and rehabilitation—plays a key role in improving prognosis and reducing long-term disability. We believe that this study will increase attention and awareness about post-stroke OP in our country.

Ethics

Ethics Committee Approval: This study was approved by the University of Health Sciences Türkiye Hamidiye Scientific Research Ethics Committee (decision number: 2025-25-22, date: 09.01.2025). All procedures involving human participants were conducted in accordance with the 1964 Helsinki Declaration and its later amendments.

Informed Consent: Participants voluntarily completed the online survey and, since online surveys were anonymous, the participant stated that they agreed to participate in the study.

Footnotes

Authorship Contributions

Concept: Y.E.D., M.C., Ç.Ç., G.Ö., P.A., A.A., F.Ü.Ö., İ.A., Design: Y.E.D., M.C., Ç.Ç., G.Ö., P.A., A.A., F.Ü.Ö., İ.A., Data Collection or Processing: Y.E.D., M.C., G.Ö., Analysis or Interpretation: Ç.Ç., P.A., A.A., F.Ü.Ö., İ.A., Literature Search: Y.E.D., M.C., P.A., Writing: Y.E.D., M.C., P.A.

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