



Evaluation of Knowledge of Orthopedics and Traumatology Physicians About Nuclear Medicine:

A City Study

Ortopedi ve Travmatoloji Uzmanlarının Nükleer Tıp Alanındaki Bilgilerinin Değerlendirilmesi: Bir Şehir Çalışması

Ebru Salmanoğlu¹, Murat Üzel², Ökkeş Bilal³, Ayşegül Erdoğan⁴

¹Adana City Hospital, Nuclear Medicine Clinic, Adana, Turkey

²Kocaeli University Faculty of Medicine, Department of Orthopedics and Traumatology, Kocaeli, Turkey

³Kahramanmaraş Sütçü İmam University Faculty of Medicine, Department of Orthopedics and Traumatology, Kahramanmaraş, Turkey

⁴Kahramanmaraş Sütçü İmam University Faculty of Medicine, Department of Public Health, Kahramanmaraş, Turkey

ÖZET

Amaç: Ortopedi ve travmatoloji alanında, tanı aşamasında nükleer tıp görüntüleme yöntemlerine sıkça başvurulmaktadır. Ortopedi ve travmatoloji hekimlerinin rutin klinik uygulamada hasta yönetiminde etkili olabilmesi için nükleer tıp konusunda temel bilgilere sahip olması gerekmektedir. Bu müdahale araştırmasının amacı mezuniyet sonrası nükleer tıp konusunda sürekli eğitim seminerinin önemini vurgulamaktır.

Gereç ve Yöntemler: Görev yapan ortopedi ve travmatoloji hekimlerine, bir nükleer tıp hekimi tarafından klinik pratikte sık başvuru olan güncel ve temel nükleer tıp uygulamaları hakkında sunum içeren bir eğitim semineri gerçekleştirildi. Ortopedi ve travmatoloji hekimlerine sunum öncesi ve sonrası 15 çoktan seçmeli sorudan oluşan bir test uygulandı. Soruların 6'sı görüntüleme klinik olgu sunumu şeklindeydi. Sunum öncesi ve sunum sonrası aynı test sonuçları değerlendirildi.

Bulgular: Bu çalışmaya ortalama 9 yıl klinik tecrübesi olan 16 ortopedi ve travmatoloji uzmanı (16 erkek, ortanca yaş 40) katıldı. Tüm katılımcıların eğitim öncesi ve sonrası doğru cevap ortalamaları karşılaştırıldı. Doğru cevap ortalaması eğitim öncesi 6.9±3.0 iken, eğitim sonrası 10.1±2,8 olarak bulundu ($p < 0.05$). Bu durum eğitimin etkili olduğunu gösterdi.

Sonuç: Ortopedi ve travmatoloji uzmanlarının nükleer tıp alanında temel bilgilere sahip olmasının sağlanması yanında nükleer tıp alanında mezuniyet sonrası eğitim verilmesi gerektiği görüldü.

Anahtar Kelimeler: Nükleer tıp, ortopedi ve travmatoloji, eğitim

ABSTRACT

Aim: Nuclear medicine imaging methods are frequently applied to the diagnosis phase in the field of orthopedics and traumatology. Orthopedics and traumatology physicians are required to have basic knowledge about nuclear medicine to be effective for patient management in routine clinical practice. The aim of this intervention research was to underline importance of continuing education seminar about nuclear medicine after graduation.

Material and Methods: An education seminar through a presentation about frequently applied current and basic nuclear medicine examinations in their clinical practice was performed to orthopedics and traumatology physicians practicing in Kahramanmaraş, Turkey by a nuclear medicine physician. A test consisted of 15 multiple choice questions was conducted on orthopedics and traumatology physicians, before and after presentation. Six of these questions were in the form of clinical case reports with images. The same test results were evaluated before and after presentation.

Results: A total of 16 orthopedics and traumatology physicians (16 males, median age 40 years) with an average duration of clinical practice 9 years participated this study. Median correct answers of all participants were compared before and after education. While median correct answers was 6.9±3.0 before education, it was found 10.1±2,8 after education ($p < 0,05$). This situation showed that education was efficient.

Conclusion: It was concluded that orthopedics and traumatology physicians should be provided with basic knowledge in the field of nuclear medicine, as well as postgraduate training in the field of nuclear medicine.

Keywords: Nuclear medicine, orthopedics and traumatology, education

Corresponding Author: Ebru Salmanoğlu, Adana City Hospital, Nuclear Medicine Clinic, Adana, Turkey

email: ebrusalmanoglu@yahoo.com

Cite this article as: Salmanoğlu E, Üzel M, Bilal Ö, Erdoğan A. Evaluation of Knowledge of Orthopedics and Traumatology Physicians About Nuclear Medicine:A City Study. JAMER 2023;8(4)46-9.

Received: 11.10.2023

Accepted: 13.11.2023

Online Published: 05.12.2023

INTRODUCTION

Scintigraphic studies are performed in nuclear medicine for diagnosis of diseases including orthopedics and traumatology related pathologies. Three phase bone scintigraphy and whole body bone scintigraphy are commonly used methods in routine practice. It is necessary to know indications and limitations of these methods to effectively utilize them for diagnosis (1).

Enough education might not be given for this subject during orthopedics and traumatology residency training. There is no obligatory clinical rotation in the field of nuclear medicine specialization according to the decisions of the Medical Specialization Board during orthopedics and traumatology residency training. Furthermore, enough knowledge and experience may not be obtained about this field during orthopedics and traumatology multidisciplinary meetings (2).

There is no similar education study was performed related with assessment of basic and current knowledge of orthopedics and traumatology physicians about in the field of nuclear medicine according to our literature search using with search engines such as 'Pubmed, Google academic, PMC' using key words 'Nuclear Medicine, Scintigraphy, Education, Knowledge, Orthopedic Surgery, Traumatology' and 'Education, Knowledge, Orthopedic Surgery'. An education seminar about nuclear medicine clinical applications in musculoskeletal system was given to orthopedics and traumatology physicians who were working in Kahramanmaraş/Turkey and their knowledge on this subject was evaluated by asking the same questions before and after the presentation in this study. The aim of this study is to evaluate the knowledge level of orthopedics and traumatology physicians in the field of nuclear medicine and to demonstrate the effectiveness of the education.

MATERIAL and METHODS

It was aimed to access all orthopedics and traumatology physicians (n=26) practicing in Kahramanmaraş city of Turkey for this intervention research context. Twenty six orthopedics and traumatology physicians were informed about the research by reaching out by phone.

A total of 16 (61.5%) orthopedics and traumatology physicians in Kahramanmaraş, 2 from the university, 10 from the public hospital and 4 from the private hospital agreed to participate in the study (Table 1). These sixteen physicians were invited to the one of the scientific meetings of orthopedics and traumatology clinic of Sütçü İmam Faculty of Medicine.

Physicians were also informed about same tests with 15-multiple choice questions were going to be applied before and after education. In addition, it was explained that the privacy of personal information and personal data was going to be hidden. Their signed consent forms were

obtained for participating this study. Before starting presentation participants were asked to fill the test during 20 minutes. The test was mainly divided into two parts. The first part was related with questions on demographic information (age, gender, workplace/institution, length of time in practice as a medical doctor, length of time in practice as an orthopedics and traumatology physician) of the physicians. The second part was related with specific questions (n=15) which assess knowledge levels about nuclear medicine. Six of these multiple choice questions were in the form of clinical case report with images (Table 2). The nearly one-hour education was conducted by a nuclear medicine physician. Same questions were asked after education and knowledge levels were evaluated based on these questions. Theoretical and visual education was given on nuclear medicine applications that orthopedics and traumatology physicians encountered in clinical practice such as evaluation of bone and soft tissue infections and evaluation of painful bone prosthesis.

The principle of bone scintigraphy, the differences between three-phase scintigraphy and whole body bone scintigraphy, bone scintigraphy indications and other infection imaging agents in nuclear medicine were described in detail visually and theoretically. Ethics committee approval: Prior to the study, Sütçü İmam Faculty of Medicine ethics committee approval was obtained with the decision number 16 dated 28.12.2015.

Statistical Analysis: Data were statistically evaluated using the Statistical Package for the Social Sciences software (IBM SPSS Statistics for Windows, Version 18.0. IBM Corp., Chicago, IL, USA) Descriptive data were summarized as number (n), percentage (%) and median (minimum-maximum). In the comparison of dependent groups of data, the paired t test was used. A value of $p < 0.05$ was considered statistically significant.

RESULTS

All of participants (n=16) were male and the median age was 40 in this study. While the median working time as a physician was 16 years (Minimum=7-Maximum=36), as an orthopedics and traumatology physician was 9 (Minimum=1-Maximum=30) (Table 1).

The number and percentage of correct answers of the clinicians before and after education were compared on a question-by-question basis (Table 2). The answer rate of 12 questions increased after education. There was a decrease in the answer rate for 2 questions. The answer rate for a question remained the same before and after education.

The mean correct answer of all physicians was compared based on their characteristics before and after education. Comparison of physicians' correct answers based on their characteristics before and after education was found statistically significant ($p < 0.05$) (Table 3).

Table 1. Demographic characteristics of the participants

Characteristics (n=16)	n (%)
Age*	40 (min=32-max=60)
Gender	
Male	16 (100.0)
Female	0 (0.0)
Work place/Institution	
University Hospital	2 (12.5)
Public Hospital	10 (62.5)
Private Hospital	4 (25.0)
Length of time in practice*	
Time of practice as orthopedics and traumatology physician	9 (min=1-max=30)
Total time of medical practice	16 (min=7-max=36)

*Data are expressed as median (minimum – maximum)

Table 2. Correct answers of orthopedics and traumatology physicians before and after education

Questions	Before education n (%)	After education n (%)
1. General information about bone scintigraphy	9 (56.25)	11 (68.75)
2. Bone scintigraphy indications	10 (62.50)	15 (93.75)
3. Imaging of bone and soft tissue infection	3 (18.75)	10 (62.50)
4. Infection imaging agents	4 (25.00)	7 (43.75)
5. Acute osteomyelitis	12 (75.00)	14 (87.50)
6. Case report: Avascular necrosis	6 (37.50)	6 (37.50)
7. Trauma/fracture	5 (31.25)	11 (68.75)
8. Bone tumor	11 (68.75)	10 (62.50)
9. Case report: Stress fracture	11 (68.75)	8 (50.00)
10. Case report: Acute osteomyelitis	4 (25.00)	15 (93.75)
11. Case report: Evaluation of three phase bone scintigraphy and Tc-99m HMPAO labeled leukocyte scintigraphy images of foot	5 (31.25)	11 (68.75)
12. Septic arthritis	3 (18.75)	7 (43.75)
13. Juvenile rheumatoid arthritis	7 (43.75)	9 (56.25)
14. Case report: Aseptic loosening in bone prosthesis	12 (75.00)	14 (87.50)
15. Case report: Bone tumor	9 (56.25)	15 (93.75)

Table 3. Comparison of physicians' correct answers based on their characteristics before and after education

	Before education n (%)	After education n (%)	p
All of physicians	6.9 ± 3.0	10.1 ± 2.8	0.0001
Physicians work less than 5 years (n=7)	6.8±1.5	10.8±2.0	0.004
Physicians work more than 6 years (n=9)	7.0±3.9	9.5±3.3	0.004
Physicians age less than 40 years (n=5)	7.0±0.7	10.8±2.4	0.020
Physicians age more than 41 years (n=11)	6.9±3.7	9.8±3.0	0.007

DISCUSSION

Clinicians need to have knowledge on diagnostic imaging modalities such as direct graphy, computed tomography (CT), magnetic resonance imaging (MRI) that provides anatomical information for investigating musculoskeletal pathologies to manage patient, effectively. Physicians can augment their knowledge within time after graduation.

Considering the literature, this is the first education study to evaluate the knowledge level of orthopedics and traumatology physicians in the field of nuclear medicine. There are a few studies investigating physicians' knowledge levels about nuclear medicine in Turkey. In a study conducted on this subject, nearly approximately 80% of physicians stated that their level of knowledge on nuclear medicine was not enough. The study showed that most of the physicians were aware of nuclear medicine. However, they were not educated about its use in clinical practice (3).

Dasgupta et al. reported that level of knowledge on nuclear medicine was poor among junior doctors. It was shown that the level of knowledge was significantly increased after education (4).

Isah et al. reported that physicians had low awareness on nuclear medicine. Furthermore, knowledge of nuclear medicine in clinical practice was poor based on this cross-sectional study. The authors concluded that physicians should be enlightened thorough lectures and seminar presentations to increase awareness on the role of nuclear medicine in daily practice (5).

Orthopedics and traumatology physicians needed education in the field of nuclear medicine according to our study. It was encouraging to note that the physicians gained the enough level of knowledge with one hour education seminar. This suggests that higher level of proficiency might be achieved by performing regular multidisciplinary meetings in routine orthopedics and traumatology practice.

The level of knowledge of radiologists about nuclear medicine was not enough according to a cross-sectional study which was performed via an online google form. Physicians' attitudes should be augmented to support nuclear medicine for better patient management.

Nuclear medicine is may not taught in medical schools. Low awareness of nuclear medicine can be explained with the small number of nuclear medicine centers or the absence of nuclear medicine departments according to this study (6). However, authors reported that the level of knowledge of nuclear medicine by Togolese doctors was enough (7).

An increase in the answering rate of questions was observed after education except three questions in our study. This shows that education is useful. On the other hand, response rate of sixth question remained the same. The response rates of eighth and ninth questions were decreased after education. Clinicians may not be familiar with scintigraphic images of avascular necrosis, stress fracture due to their circumstances. Furthermore, they may apply to radiologic imaging methods for these disease rather than nuclear medicine methods.

The disadvantage of our study is the low number of participants. We believe that this study should be done in many provinces and in many centers. It is thought that this meeting may be repeated in different cities to increase the number of participants to generalize the results for a larger population. However, generalizability of these results may also be limited by the difficulty of arranging these meetings.

Conclusion

Orthopedics and traumatology physicians can obtain the knowledge and experience related with routine imaging methods such as direct graphy during education in their own department. However, they may not have enough knowledge and experience about in the field of nuclear medicine. If clinicians do not have basic nuclear medicine knowledge, the diagnostic process may take longer, differential diagnosis may be difficult. In addition, the disease may become chronic and the treatment of disease can be difficult. Therefore, it is necessary to review the knowledge of orthopedics and traumatology physicians about the field of nuclear medicine that is acquired during residency training.

Furthermore, the value and importance of updating of knowledge about in the field of nuclear medicine within the scope of continuing education after graduation was understood.

Consequently, renewal of information in nuclear medicine after graduation with continuing education programmes should be emphasized.

Ethics Committee Approval: Sütçü İmam Faculty of Medicine

ethics committee approval was obtained with the decision number 16 dated 28.12.2015.

Conflict of Interest: The authors declare no conflict of interest in this study.

Financial Disclosure: No financial support was received from any institution or organization for this study.

REFERENCES

1. Krumme JW, Lauer MF, Stowell JT, Beteselassie NM, Kotwal SY. Bone scintigraphy: A review of technical aspects and applications in orthopedic surgery. *Orthopedics*. 2019;42(1):14-24.
2. T.C. Sağlık Bakanlığı Tıpta Uzmanlık Kurulu. <https://tuk.saglik.gov.tr/TR-84694/v-24-dokumanlari.html> [Internet] [Son güncelleme tarihi: 11.09.2019;Erişim tarihi:24.09.2023].
3. Ustun F, Bakar C. Çanakkale'deki hekimlerin Nükleer Tıp konusundaki bilgi ve görüşlerinin değerlendirilmesi. *STED*. 2014;23(4):130-7.
4. Dasgupta DJ, Ryan PJ. Awareness and understanding of nuclear medicine among junior doctors in a district general hospital setting: an audit and personal experiences. *Nucl Med Commun*. 2010;31(12):1004-7.
5. Isah AR, Abdulqadir I, Adamu H, Aliyu UM, Abubakar S, Yunusa GH, et al. Knowledge and perception of the practice of nuclear medicine among physicians in usmanu danfodiyo university teaching hospital, sokoto. *Journal of Radiation Medicine in the Tropics*. 2022;3(2):45-9.
6. Adambounou K, Ahonyi KA, Houndetoungan GD, Ouedraogo H, Ntimon B, Sodogas F, et al. Knowledge and perception of nuclear medicine by radiologists in French-speaking sub-Saharan Africa. *Asia Ocean J Nucl Med Biol*. 2022;10(1):68-77.
7. Adambounou K, Adjenou KV, Achy OB, Mossi KE, Gbande P, Adigo AMY. Knowledge and perception of nuclear medicine by Togolese physicians. *Médecine Nucl*. 2015;39:e15-20.