ANALYSIS OF THE NEW CLASSIFICATION OF BONE DENSITOMETRY REPORTS*

Osvaldo Sampaio Netto[1], Larissa de Oliveira Lima Coutinho[2], Danielle Cristina de Souza[2]

Abstract   **OBJECTIVE:** To compare the new normatization of bone densitometry reports on findings at the level of the lumbar spine (L1-L4) proposed by International Society for Clinical Densitometry (ISCD) in 2005, with the classification of World Health Organization (WHO) that was routinely been utilized since 1994. **MATERIALS AND METHODS:** Bone densitometry studies performed on the lumbar spine of 200 patients at Universidade Católica de Brasília and Hospital das Forças Armadas, Brasília, DF, Brazil, have been evaluated. Inclusion criteria were: female gender, age ranging between 20 and 49 years, and absence of spine morphological changes visualized on the images. The exclusion criteria were: women more than 50 years or menopausal women. **RESULTS:** Analyzing the bone densitometry reports under the WHO classification, 29 patients were found with osteoporosis, 76 with osteopenia and 95 within normality levels. On the other hand, according to the new ISCD 2005 classification, only 32 patients presented results "below the expected range for age", and 162 "within the expected range for age". **CONCLUSION:** Significant differences were found when comparing the traditional WHO densitometric classification versus the new one proposed by ISCD 2005. So, this new classification should be known and understood by physicians who request or perform bone densitometry studies, aiming at the correct interpretation, explanation and orientation to the patients.
Keywords: Densitometry; Osteoporosis; Spine; Bone density.

Resumo   *Análise da nova classificação de laudos de densitometria óssea.*
OBJETIVO: Comparar a nova normatização de laudos densitométricos de coluna lombar proposta pela International Society for Clinical Densitometry (ISCD) em 2005 com a classificação rotineiramente usada da Organização Mundial da Saúde (OMS) desde 1994. **MATERIAIS E MÉTODOS:** Foram analisados 200 exames de densitometria óssea da coluna lombar realizados na Universidade Católica de Brasília e no Hospital das Forças Armadas. Os critérios de inclusão foram: sexo feminino, idade mínima de 20 anos e máxima de 49 anos, e ausência de alterações morfológicas na coluna lombar visualizadas no exame densitométrico. Como critério de exclusão, foram consideradas as mulheres com mais de 50 anos ou em menopausa. **RESULTADOS:** Pela classificação da OMS, obtivemos 29 pacientes com osteoporose na coluna lombar, 76 com osteopenia e 95 em níveis de normalidade. Entretanto, pela nova classificação da ISCD 2005, apenas 32 pacientes foram classificados em valores "abaixo do estimado para a faixa etária" e 162, em valores "dentro do estimado para a faixa etária". **CONCLUSÃO:** Importante diferença foi encontrada na classificação dos resultados densitométricos ao se confrontar a classificação tradicional da OMS e a nova classificação proposta pela ISCD, o que ressalta a importância da divulgação da classificação entre os médicos que realizam e os que solicitam os exames, para a correta interpretação, explicação e orientação ao paciente.
Unitermos: Densitometria; Osteoporose; Coluna vertebral; Densidade óssea.

INTRODUCTION

Osteoporosis is a condition characterized by low bone mass, capable of resulting in development of bone fractures in the absence of trauma or caused by a low-impact trauma[1].

Since 1994, dual energy x-ray bone densitometry has been considered by the World Health Organization (WHO) as a golden-standard for diagnosing osteoporosis[2] and so the number of bone densitometry studies has increased considerably.

An American survey published in 1992 estimated 1.5 million osteoporotic fractures per year[3], and if this prevalence of osteoporotic fractures remains the same until 2025, about a quarter of the whole female population should present osteoporotic fracture[4].

In the interpretation of bone densitometry studies (Table 1), the result may be expressed in bone mineral density value, standard deviation in relation to young adults (T-score), bone mineral density percentage for young adult (%T), standard deviation in relation to people in the same age range (Z-score), mineral bone density percentage for people in the same age range (%Z).

In 1994, WHO defined the criteria currently utilized worldwide in bone densitometry reports, based on standard deviation in relation to young adult, as follows:

a) normal: standard deviation up to –1.00;

b) osteopenia: standard deviation ranging between –1,00 and –2.50;

c) osteoporosis: standard deviation = –2.50.

In an official publication of 2005, the International Society for Clinical Densitometry (ISCD) recommends the utilization of the T-score and WHO standards only for post-menopausal women and men with = 50 years of age. In premenopausal women and men with less than 50 years of age, the Z-score utilization is recommended as follows[5]:

a) "below the expected range for age": Z-score = –2.00;

b) "within the expected range for age": Z-score > –2.00.

The present study has been developed considering this new classification for bone densitometry reports, and is aimed at comparing the new normatization of lumbar spine bone densitometry reports proposed by ISCD in 2005, with the WHO classification routinely utilized since 1994.

MATERIALS AND METHODS

Two hundred spine bone densitometry studies have been analyzed; 136 of them had been performed in a Lunar® DPX-IQ equipment at Universidade Católica de Brasília, and 64 in a Hologic® QDR4500 equipment of Hospital das Forças Armadas.

Inclusion criteria were: female gender, 20 years as the minimum age, and 49 as the maximum, and absence of lumbar spine morphological changes visualized on densitometric studies. The exclusion criteria were: women more than 50 years or menopausal women.

The software MSExcel® was employed for results analysis.

RESULTS

Mean age in the 200 densitometric studies analyzed was 32.42 ± 9.53 years (age range = 20–49 years).

Results obtained from the analysis according to the WHO classification were the following: 29 patients with osteoporosis of the lumbar spine (T-score $\leq$ –2.50), 76 with osteopenia (T-score $\leq$ –1.00 and > –2.50), and 95 within normality levels (T-score > –1.00). Mean ages were, respectively, 43.3, 31.1 and 30.2 years.

Once the new ISCD 2005 classification was applied, the results were the following:

Table 1 Values included in a lumbar spine bone densitometry report.

	BMD (g/cm²)	T-score	%T	Z-score	%Z
L1	0.861	–0.58	93	0.40	105
L2	0.881	–1.34	86	–0.24	97
L3	0.924	–1.45	85	–0.30	97
L4	1.007	–0.99	90	0.19	102
L1–L4	0.940	–1.27	87	–0.12	99

BMD, bone mineral density.

only 32 patients were "below the expected range for age" (Z-score $\leq$ –2.00), and 162 "within the expected range for age" (Z-score > –2.00).

Applying the new classification to the 29 osteoporotic patients (Table 2), 19 of them were "below the expected range for age", and 10 were "within the expected range for age".

In the present study, following the WHO criteria, we had 76 patients with osteopenia (Table 2), 13 of them "below the expected range for age", and 63 "within the expected range for age".

All the patients rated as "normal" according the WHO criteria (Table 2) remained in the group "within the expected range for age" in the ISCD classification, as it could be expected.

DISCUSSION

In 1994, the WHO normatization played a significant role in the unification of bone densitometry reports, since, at that time, the densitometry technique was in its very beginning, and the studies interpretation was based on different criteria. With such unification, this diagnostic method was diffused, allowing a great progress in the knowledge of osteoporosis. In the last 12 years, the terms osteoporosis and osteopenia became common knowledge among physicians and patients. The arrival of this new classification is significant for representing a progress in the interpretation of this analysis methodology.

The terms Z-score and T-score must be understood by physicians, allowing the correct interpretation of densitometric studies, and for them to be able to explain their meaning for the patients. In the last 12 years, T-score was the classification standard for bone densitometry reports. Based on this new classification, the Z-score starts being utilized in patients up to 49 years of age, and the use of the T-score (OMS, 1994) remains restricted to patients aged 50 years or older. The fact of following two different classification criteria according to the patient's age, might complicate the study interpretation, both for the physician and the patient.

An issue to be highlighted and addressed on a case-by-case basis, is the fact of patients aged up to 49 years who had previously undergone bone densitometry studies, and, according to the WHO criteria, had been considered as osteoporotic, and, on a new study interpreted according to the new criteria, might be rated as normal ("within the expected range for age"). In our survey, we have found this condition in 34.5% of osteoporotic patients.

It is important to note that ten patients rated as osteoporotic, and probably followed-up and oriented towards stopping or reverting the disease progression, started being rated "within the expected range for age", and, consequently, included in the

Table 2 Distribution of patients according to WHO and ISCD classification criteria.

WHO, 1994	ISCD, 2005	Number of patients
Osteoporosis	"Below the expected range of age"	19
	"Within the expected range of age"	10
Osteopenia	"Below the expected range of age"	13
	"Within the expected range of age"	63
Normal	"Below the expected range of age"	0
	"Within the expected range of age"	95

normality group, in spite of the decrease in their bone mineral density according to the WHO criteria of 1994.

The fact of using this new classification "within the expected range for age", leads to an unconcern about these patients who had previously been considered with low rates of bone mineral density an increased risk of fracture. Notwithstanding, ISCD does not present a proposal of conduct and treatment for each classification.

So, this new classification should be comprehensively known and understood by physicians who request or perform bone densitometry studies, aiming at the correct interpretation, explanation and orientation to the patients.

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