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Single-Slice Hounsfield Unit (HU) Value of the Chinese Proximal Humerus on Routine Chest CT: A Study on Opportunistically Screening for Low Bone Density

Valor de Unidad Hounsfield (HU) de Corte Único del Húmero Proximal Chino en una Tomografía Computarizada de Tórax de Rutina: Un Estudio sobre la Detección Oportunista de Baja Densidad Ósea

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SUMMARY: A Study on Relationship between Single-Slice Hounsfield Unit(HU) value of the Chinese proximal humerus and Bone Mineral Density(BMD) Using Routine Chest CT and Dual-energy X-ray Absorptiometry(DEXA) was performed. Data were collected from 240 individuals who underwent DEXA and routine chest CT scans (including full images of the proximal humerus) on the same day at 967 Hospitals between January 2019 and December 2021. The method of measuring single-slice HU values of the proximal humerus on routine chest CT scans exhibited high reliability and repeatability (intraclass correlation coefficient > 0.961, P < 0.001). A strong positive correlation was observed between single-slice HU values of the proximal humerus and DEXA results, with the 20-mm HU value demonstrating the highest correlation. Across different BMI groups, the Area Under Curve (AUC) for the 20-mm HU value was consistently the largest (AUC=0.701–0.813, P< 0.05). Therefore, the 20-mm HU value can be considered a reliable reference for the opportunistic screening of low BMD, with reference values of -4HU for underweight individuals, -13HU for normal weight individuals, -7HU for overweight individuals, and -16HU for obese individuals. Values below these thresholds indicate a risk of low BMD. This study enriches the Chinese BMD data and offers a swift and effective approach for opportunistically screening low BMD.

KEY WORDS: Proximal humerus; Hounsfield units; Bone mineral density; Chinese.

INTRODUCTION

As society continues to age, the prevalence of osteoporosis is on the rise (Lee *et al*., 2013), posing significant health risks and economic burdens to individuals and communities (Yu & Xia, 2019). Studies have shown that osteoporotic fractures at the proximal humerus rank only below those at the spine and hip joints in frequency, with a significantly increased risk of recurrent fractures within the first year post-fracture (Dang *et al*., 2019; Seyok *et al*., 2023). Local BMD at the proximal humerus plays a crucial role in treatment planning and prognosis (Spross *et al*., 2017; Warner *et al*., 2018). Low BMD can compromise bone mechanical stability and heighten the risk of fixation failure (Schumaier & Grawe, 2018). While DEXA remains the primary method for BMD assessments to date (LeBoff *et al*.,2022), its usage is generally declining (Overman *et al*., 2015; Kanis *et al*., 2021). A report suggests that 98 % of patients with osteoporosis did not undergo DEXA scans in the two years preceding fractures (Barton *et al*., 2019), severely hampering early diagnosis and intervention efforts (Curtis *et al*., 2013).

Hounsfield unit (HU) value is a numerical representation of the density of local tissues or organs in the human body based on CT examination. It indicates the structural characteristics of local tissues and is unaffected by human factor (Schreiber *et al*., 2014). There is a strong

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correlation between HU values at the spine, hip, wrist, and proximal femur and DEXA results (Lee *et al*., 2013; Wagner *et al*., 2017; Nappo *et al*., 2018; Kılınc *et al*., 2022) providing a theoretical foundation for using CT HU values as an opportunistic screening method for low BMD in clinical practice. Chest CT scans typically encompass the proximal humerus, the HU values of which correlate positively with DEXA results (Lee *et al*., 2016; Zhang *et al*., 2021; Earp *et al*., 2021). This correlation enables clinicians to potentially use HU values for the opportunistic screening of low BMD at the proximal humerus, predicting osteoporotic fractures and assessing BMD in patients with osteoporotic fractures (Lee *et al*., 2016; Earp *et al*., 2021; Zhang *et al*., 2021; Liu *et al*., 2023).

To affirm the strong positive correlation between proximal humeral HU values and DEXA results, the study standardized equipment and techniques to ensure that chest CT scans and DEXA examination results were obtained on the same day. Through quantitative analysis of the correlation between single-slice HU values of the proximal humerus and DEXA results across individuals with varying BMIs, HU thresholds for detecting low BMD were established. This data serves to streamline clinical opportunistic screening for low BMD and enriches the Chinese BMD data.

MATERIAL AND METHOD

Approval for this study was obtained from the Ethics Committee for Research of Basic Medical College of Dalian Medical University.

General information. This retrospective analysis included 240 individuals (71 men and 169 women) who underwent DEXA and routine chest CT scans on the same day at 967 hospitals from January 2019 to December 2021. The participants had an average age of 58 ± 12 years and an average BMI of 25.1 ± 4.5 kg/m^2. The inclusion criteria included Chest CT covering the entire proximal humerus region, no history of proximal humerus fractures or surgeries, no severe degenerative arthritis of the shoulder joint, no history of tumors or connective tissue diseases, and an angle of 0 to 60 degrees between the humerus and the long axis of the body (Fig. 1A). A total of 437 CT HU values of the proximal humerus were ultimately included in the study.

Acquisition of Chest CT Scans. Chest CT scans were conducted using a 64-slice spiral CT scanner (Neusoft, China) at a voltage of 120 kVp and a slice thickness of 5.0 mm. Participants were positioned at the center of a couch in a supine position, with their arms extended overhead

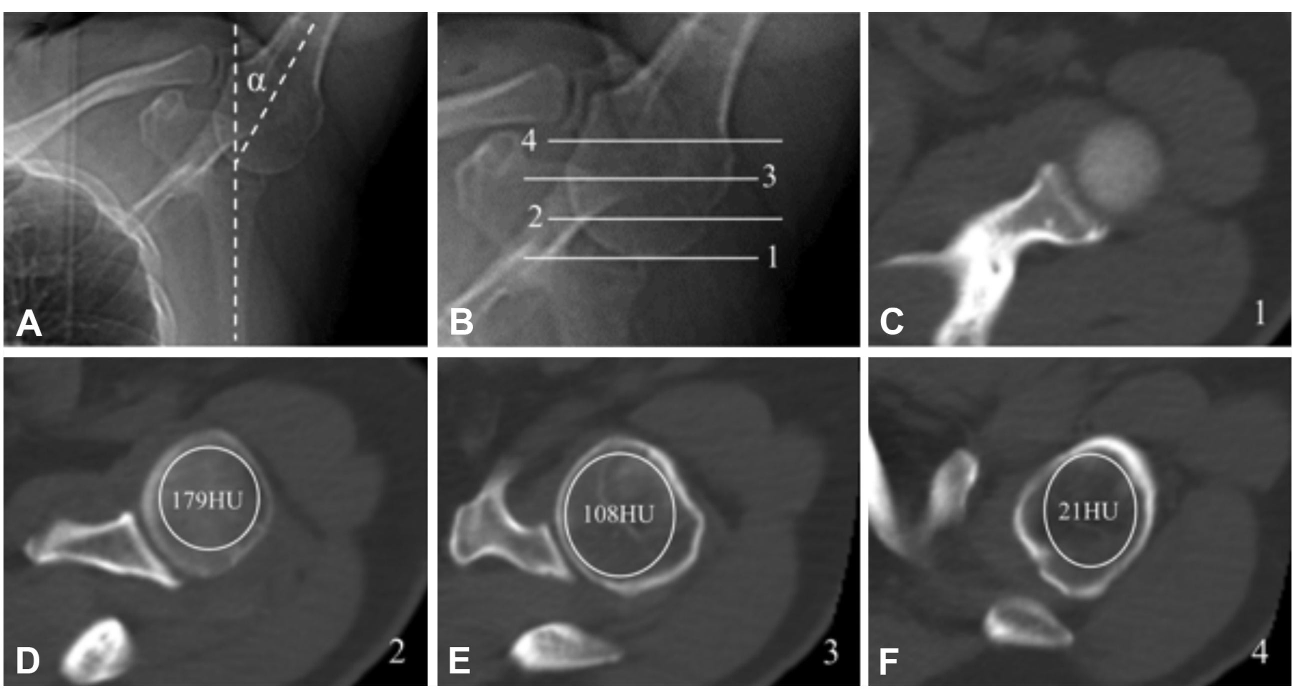


Fig. 1. HU measurements at the proximal humerus. Schematic illustration of the angle between the humerus and the long axis of the body: The inclusion criteria for a is 0–60° (A); Schematic illustration of HU measurements on the three transverse slices of the proximal humerus (B); Reference transverse slice (first slice showing the cortical bone of the humerus) (C); First transverse slice (0 mm) measurement (D); Second transverse slice (10 mm) measurement (E); Third transverse slice (20 mm) measurement (F). CT, computed tomography; HU, Hounsfield units.

and hands behind their head, ensuring alignment with the horizontal plane of the body, for chest CT axial scanning.

HU Measurement. On the original chest CT images, three adjacent transverse slices were selected beneath the cortical bone of the humeral head, with a 10-mm spacing between each slice. These slices were identified as the 0-mm slice, 10-mm slice, and 20-mm slice. Two experienced radiologists, blinded to each other's measurements, independently measured the average HU value of each individual slice (Fig. 1). HU measurements were conducted using a bone window, focusing on trabecular bone within the widest possible range while avoiding cortical bone, subchondral bone, bone cysts, and sclerotic lesions.

BMD Assessment using DEXA. In accordance with the diagnostic criteria established by the World Health Organization (Gregson *et al.*, 2022), DEXA scans (MEDIX-90) were conducted to measure BMD of the spine (L1-L4) and hip joints (including the femoral neck, greater trochanter, and intertrochanteric region of the femur) for each participant, as these two regions provide a comprehensive assessment of overall bone health. Following the approach outlined by Earp *et al.* (2021) and Johnson *et al.* (2016), participants were categorized into three groups based on the lowest T-score weighted for the lumbar spine and hip joints, namely normal BMD (T ≥ -1), reduced BMD (-2.5 < T < -1), and osteoporosis (T ≤ -2.5). Data from these three categories were collected, analyzed, and compared.

Statistical Analysis. Statistical analysis was performed using SPSS (IBM SPSS 25.0, IBM Corporation). Descriptive statistics, including mean ± standard deviation (x ± S) and 95 % confidence interval (CI), were used to summarize demographic characteristics and HU values. Independent sample t-tests were applied to normally distributed continuous variables, while the Mann–Whitney U test was used for non-normally distributed continuous variables. The chi-square test was used for categorical variables. The reliability of measurements between two physicians was evaluated using the intraclass correlation coefficient (ICC). Scatter plots were used to visualize the linear relationship between DEXA results and HU values. Pearson correlation coefficients were computed for correlation analysis. The ability of proximal humeral HU values to identify low BMD was assessed using receiver operating characteristic (ROC) curves. A significance level of P < 0.05 was considered statistically significant.

RESULTS

The method of measuring single-slice HU values of the proximal humerus on routine chest CT scans exhibited high reliability and repeatability (ICC > 0.961, P < 0.001) (Table I).

Single-slice HU values of the proximal humerus showed statistically significant differences between individuals with normal BMD and those with low BMD (reduced BMD, osteoporosis) (P<0.001). As BMD decreased, HU values tended to decline. The 0-mm HU value was the highest among individuals with normal BMD, measuring 157.2 ± 39.8 HU. This was followed by those with reduced BMD, with a value of 132.5 ± 30.2 HU, while individuals with osteoporosis exhibit the lowest HU value at 116.4 ± 31.7 HU (Table II).

Single-slice HU values (at 0-mm, 10-mm, and 20-mm slices) of the proximal humerus exhibited a positive correlation with BMDs and T-scores of the femoral neck, hip, and lumbar spine

Table I. ICC analysis of measurement results from two observers

Measurement Slice	ICC	95 % CI Lower Limit	95 % CI Upper Limit	P Value
0 mm	0.961	0.825	0.989	<0.001
10 mm	0.983	0.940	0.995	<0.001
20 mm	0.983	0.948	0.994	<0.001

Abbreviations: ICC, intraclass correlation coefficient.

Table II. Descriptive analysis of patient demographics and comparison between normal BMD, reduced BMD, and osteoporosis.

Patient Information	Total	Osteoporosis	Reduced BMD	Low BMD	Normal BMD	P (Reduced/ Normal BMD)	P (Osteoporosis/ Normal BMD)	P (Osteoporosis/ Reduced BMD)	P (Low/Normal BMD)
Patient Number	240	32	92	124	116				
Sex (M/F)	71/169	3/29	28/64	31/93	40/76	**0.565a**	**0.006a**	**0.018a**	**0.108a**
Age(Years)	59.13 ± 12.11	63.14 ± 8.74	60.63 ± 11.35	61.27 ± 10.78	56.82 ± 13.04	0.004	<0.001	0.164	<0.001
BMI(Kg/m^2)	25.05 ± 4.53	23.68 ± 5.07	24.42 ± 3.27	24.23 ± 3.81	25.95 ± 5.06	0.006	<0.001	0.049	<0.001
0-mm HU	142.3 ± 38.4	116.4 ± 31.7	132.5 ± 30.2	128.4 ± 31.3	157.2 ± 39.8	<0.001	<0.001	<0.001	<0.001
10-mm HU	46.7 ± 39.6	17.5 ± 28.2	37.3 ± 36.5	32.2 ± 35.6	62.3 ± 37.8	<0.001	<0.001	<0.001	<0.001
20-mm HU	-3.3 ± 40.5	-37.1 ± 24.4	-14.0 ± 37.7	-19.9 ± 36.2	14.7 ± 37.2	<0.001	<0.001	<0.001	<0.001

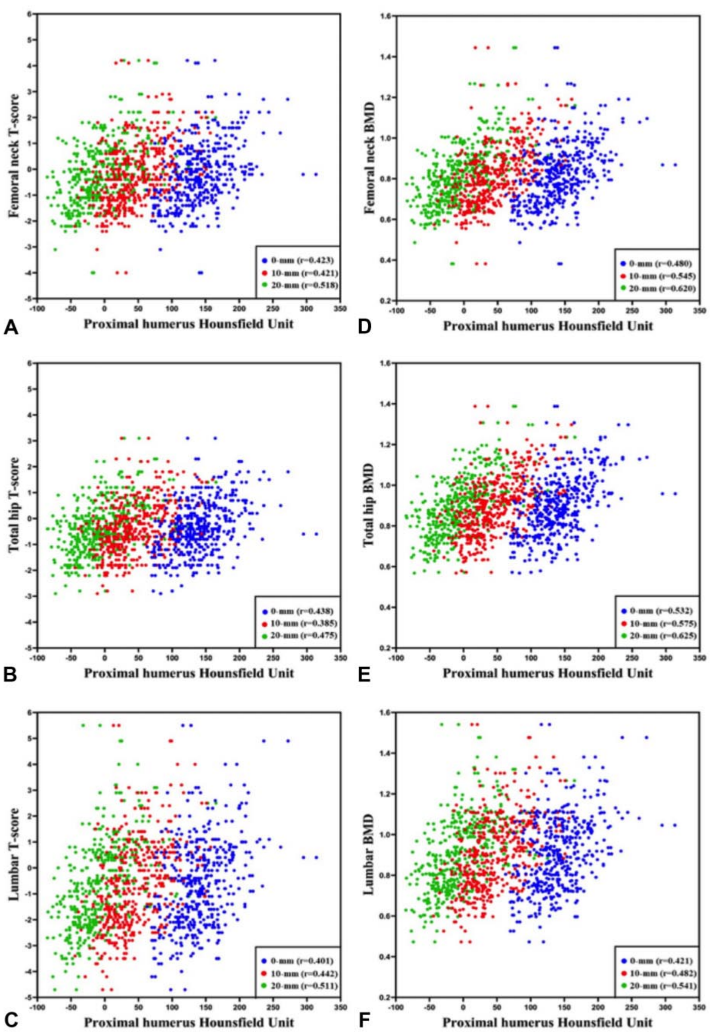
Note: Data are expressed as mean ± standard deviation. Abbreviations: BMD, bone mineral density; HU, Hounsfield units; BMI, body mass index. aChi-square test; the remaining are Mann-Whitney U tests.

(r=0.385–0.625; P<0.001). Among these, the correlation between the 20-mm HU value and the BMDs and T-scores of the femoral neck, hip, and lumbar spine was the strongest (Table III, Fig. 2). The 240 study participants were subsequently divided into four groups based on the BMI, namely underweight (BMI < 18.5 kg/m^2), with 9 cases; normal weight (18.5 ≤ BMI < 25 kg/m^2), with 124 cases; overweight (25 ≤ BMI < 30 kg/m^2), with 76 cases; and obese (BMI ≥ 30 kg/m2), with 31 cases. Among individuals in different BMI categories, there was a robust positive correlation between the 20-mm HU value of the proximal humerus and DEXA results (r=0.549–0.793, P< 0.001) (Table IV).

Table III. Pearson correlation analysis between HU values and DEXA results.

		Proximal Humeral HU and Femoral Neck DEXA Results		Proximal Humeral HU and Hip DEXA Results		Proximal Humeral HU and Lumbar Spine DEXA Results	
		HU:Femoral Neck BMD	HU:Femoral Neck T Score	HU:Hip BMD	HU:Hip T Score	HU:Lumbar Spine BMD	HU:Lumbar Spine T Score
0-mm	Pearson Correlation Coefficient	0.480	0.423	0.532	0.438	0.421	0.401
	P Value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
10-mm	Pearson Correlation Coefficient	0.545	0.421	0.575	0.385	0.482	0.442
	P Value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
20-mm	Pearson Correlation Coefficient	0.620	0.518	**0.625***	0.474	0.541	0.511
	P Value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

* indicates the highest Pearson correlation coefficient. Abbreviations: DEXA, dual-energy X-ray absorptiometry; BMD, bone mineral density.



The AUC for the 20-mm HU value consistently ranked the highest across different BMI groups (AUC=0.701–0.813, P<0.05) (Fig. 3, Table V). These values served as the thresholds for identifying low BMD, thereby providing references for clinical opportunistic screening within different BMI categories. For underweight individuals, the reference value was -4HU; for those with a normal weight, it was -13 HU; for overweight individuals, -7HU; and for obese individuals, -16HU.

Fig. 2. Scatter plots illustrating a consistent positive linear relationship between single slice HU values of the proximal humerus and T-scores of the femoral neck (A), hip (B), and lumbar spine (C), as well as the BMDs of the femoral neck (D), hip (E), and lumbar spine (F). Each plot also includes the Pearson correlation coefficients between HU values acquired at different slices and the DEXA results. Abbreviations: BMD, bone mineral density; HU, Hounsfield units.

Table IV. Pearson correlation analysis between 20-mm HU values and hip BMD in different BMI groups.

	Total	Underweight	Normal	Overweight	Obese
Pearson Correlation Coefficient	0.625	0.793	0.645	0.549	0.579
P Value	<0.00	<0.001	<0.001	<0.001	<0.001
No. of Participants	240	9	124	76	31

Note: Based on the BMI, participants were divided into four groups, namely underweight (BMI < 18.5 kg/m^2), normal weight (18.5 ≤ BMI < 25 kg/m^2), overweight (25 ≤ BMI < 30 kg/m^2), and obese (BMI ≥ 30 kg/m^2).

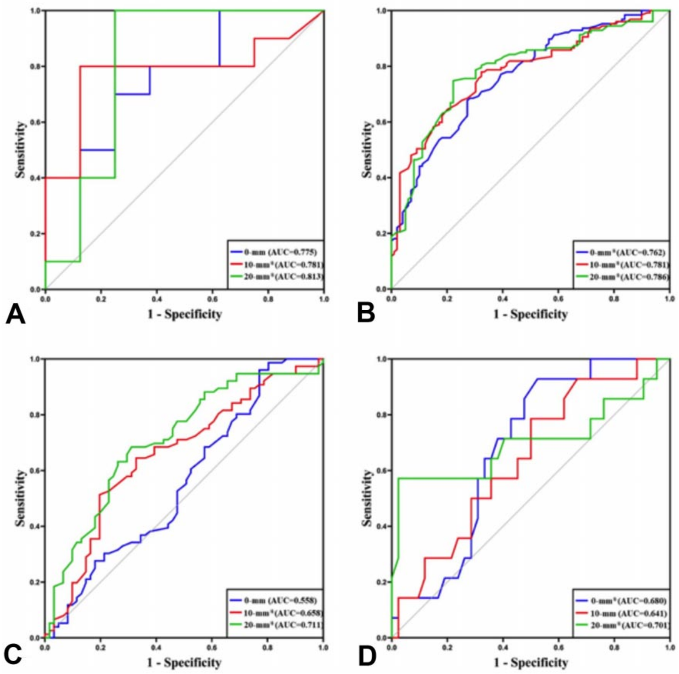


Fig. 3. Based on the BMI, participants were divided into four groups, namely underweight (BMI < 18.5 kg/m^2), normal weight (18.5 ≤ BMI < 25 kg/m^2), overweight (25 ≤ BMI < 30 kg/m^2), and obese (BMI ≥ 30 kg/m^2). Figure 3 shows the ROC curves of HU values at different slices for identifying low BMD in the underweight group (A), normal weight group (B), overweight group (C), and obese group (D). Note: *P < 0.05.

Table V. AUCs of HU values at 0-mm, 10-mm, and 20-mm slices for identifying low BMD across different BMI groups.

			95 % CI	
Measurement Slice	AUC	P Value	Lower Limit	Upper Limit
Underweight				
0 mm	0.775	0.051	0.557	0.993
10 mm	0.781	**0.046**	0.551	1.000
20 mm	0.813	**0.026**	0.572	1.000
Normal Weight				
0 mm	0.762	**<0.001**	0.701	0.824
10 mm	0.781	**<0.001**	0.721	0.840
20 mm	0.786	**<0.001**	0.726	0.846
Overweight				
0 mm	0.558	0.247	0.459	0.656
10 mm	0.658	**0.002**	0.565	0.751
20 mm	0.711	**<0.001**	0.624	0.799
Obese				
0 mm	0.680	**0.045**	0.538	0.822
10 mm	0.641	0.116	0.482	0.801
20 mm	0.701	**0.026**	0.504	0.897

SP < 0.05 Abbreviations: HU, Hounsfield units; BMD, bone mineral density; ROC, receiver operating characteristic curve; AUC: area under the curve; CI: confidence interval.

DISCUSSION

Previous studies have demonstrated a strong correlation between the HU values of various anatomical sites, such as the spine, hip, wrist, proximal femur, and proximal humerus, and DEXA results, indicating that CT HU values can serve as a screening method for low BMD (Lee *et al*., 2013, 2016; Wagner *et al*., 2017; Nappo *et al*., 2018; Earp *et al*., 2021; Zhang *et al*., 2021; Kılınc *et al*., 2022). In addition, it has been noted that BMI can influence BMD, with studies showing an inverted U-shaped relationship between BMI and lumbar spine BMD. Overweight individuals may experience a lower risk of vertebral fractures, whereas obese individuals may face a higher risk. Furthermore, BMI has been inversely associated with the incidence of osteoporosis (Yu & Xia, 2019; Li *et al*., 2022; Tang *et al*., 2023). The findings of this study further reinforce the strong correlation between HU values of the proximal humerus and DEXA results, with lower HU values indicating poorer BMD. The reference single-slice HU thresholds established in this study for identifying low BMD across different BMI levels provide a rapid and effective approach for BMD screening in clinical practice. Orthopedic surgeons can use these reference values to conduct initial BMD assessments and formulate preoperative and postoperative plans for patients with fracture.

The intervals between examinations and the reconstruction algorithms used for the CT scan can impact the HU measurement of the proximal humerus and DEXA results. Poorer BMD tends to correlate with lower HU values.

The BMD of healthy individuals undergoes continuous changes due to the dynamic processes of bone absorption and formation. In addition, bone remodeling is an ongoing process, with trabecular bone undergoing remodeling approximately every 200 days (Eriksen *et al*., 2010). Ye *et al*. (2023) found a strong correlation coefficient of 0.860 between CT HU values of the proximal femur and T-scores from DEXA scans of the femoral neck if both were acquired on the same day. Conversely, Lee *et al*. (2016) reported a correlation coefficient of 0.431 between HU values of the central part of the humeral head and the BMD of the humeral shaft when the interval between the two examinations was three months. This coefficient was notably lower than that reported by Ye *et al*. (2023), suggesting the importance of conducting CT scans and DEXA examinations on the same day to ensure the accuracy of collected data.

CT reconstruction algorithms can significantly impact the accuracy of HU measurements (Ohno *et al*., 2019). Previous studies have relied on measuring HU on post-processed CT images (Lee *et al*., 2016; Zhang *et al*., 2021; Liu *et al*., 2023), introducing potential inaccuracies. To address this, in this study, we standardized equipment and measurement techniques to directly measure single-slice HU values of the proximal humerus on original CT images, mitigating potential biases introduced by post-processing (Davis *et al*., 2018). The results demonstrated high ICCs (ICC > 0.961, P < 0.001) between the two sets of measurements, indicating excellent reliability and repeatability of our approach using routine chest CT scans to measure the single-slice HU of the proximal humerus.

The study revealed statistically significant differences (P < 0.001) in the single-slice HU values of the proximal humerus between individuals with normal BMD and those with low BMD (reduced BMD, osteoporosis). Specifically, the 0-mm HU value was the highest among individuals with normal BMD, measuring 157.2 ± 39.8 HU. This was followed by those with reduced BMD, with a value of 132.5 ± 30.2 HU, while individuals with osteoporosis exhibit the lowest HU value at 116.4 ± 31.7 HU. This reaffirms the linear relationship between BMD and HU values, with poorer BMD corresponding to lower HU values.

There is a robust correlation between single-slice HU values of the proximal humerus on chest CT scans and DEXA results, making the former a rapid and efficient method for opportunistic screening of low BMD.

Our findings revealed a significant correlation between single-slice HU values of the proximal humerus and BMDs of various skeletal regions, including the hip, femoral neck, and lumbar spine (r = 0.385–0.625, P < 0.001). Among these, the correlation between the 20-mm HU values and the DEXA results was the strongest (r =0.625, P<0.001). In comparison to the BMD of the lumbar spine (r=0.541, P<0.001), the correlations of the 20-mm HU values with the BMDs of the hip and femoral neck were notably higher (r=0.621, r=0.625, P<0.001). This enhanced correlation may be attributed to degenerative changes, such as osteophytes and endplate sclerosis, observed in the lumbar spine. These changes can lead to falsely elevated BMD measurements and T-scores, masking genuine alterations in trabecular bone mass and resulting in an overestimation of lumbar spine BMD. Therefore, correlations between single-slice HU values of the proximal humerus and BMDs of the hip and femoral neck are considered more reliable than that with the BMD of the lumbar spine (Katzman *et al*., 2014; Lee *et al*., 2016). Given that the highest correlation observed was between the 20-mm HU values and DEXA results (r = 0.625, P < 0.001), we propose using HU values at this specific slice as a rapid and efficient method for opportunistic screening of low BMD. This approach not only ensures swift measurements but also eliminates data bias associated with multi-slice HU measurements, thereby enhancing measurement reliability and repeatability.

This study performed ROC curve analysis using single-slice HU values of the proximal humerus across various BMI groups. The results demonstrated that the AUC for the 20-mm HU values was the highest (0.701–0.813, P< 0.05) (Fig. 3). In comparison to the HU values on other slices, the 20-mm HU values were found to be more suitable for clinical opportunistic screening of low BMD. Strong positive correlations were observed between the 20-mm HU values of the proximal humerus and DEXA results across different BMI groups (r=0.549–0.793, P< 0.001). The AUCs exceeded 0.701 for all four groups. Specifically, healthy and overweight individuals had AUCs of 0.786 and 0.711 (P < 0.001), respectively, while underweight and obese individuals had AUCs of 0.813 and 0.701 (P=0.026), respectively (Table V). The results revealed that the reference value for screening low BMD was -4 HU for underweight individuals, with a sensitivity of 75 %, a specificity of 100 %, a positive predictive value (PPV) of 83 %, and a negative predictive value (NPV) of 100 %. At -62 HU, the sensitivity reached 100 %, while at -4 HU, the specificity was 100 %. For healthy individuals, this reference value was -13 HU, exhibiting a sensitivity of 78 %, a specificity of 75 %, a PPV of 81 %, and an NPV of 71 %. At -53 HU, the sensitivity was 100 %, while at 68 HU, the specificity was 100 %. For overweight individuals, the reference value was -7 HU, with a sensitivity of 69 %, a specificity of 68 %, and a PPV and NPV of 70 % and 64 %, respectively. At -70 HU, the sensitivity reached 100 %, while at 126 HU, the specificity was 100 %. Finally, for obese individuals, the reference value was -16 HU, with a sensitivity of 98 %, a specificity of 57 %, and a PPV and NPV of 80 % and 87 %, respectively. At -37 HU, the sensitivity was 100 %, while at 79 HU, the specificity was 100 %. Early identification of reduced BMD allows timely intervention to prevent deterioration or even fractures (Chen *et al*., 2006). It is important to acknowledge the variations in HU thresholds for detecting low BMD between this study and previous studies. For example, Lee *et al*. (2013) reported an average HU value of -16.9 ± 16.4 for proximal humeral diaphysis in cases of complex proximal humeral fractures. Earp *et al*. (2021) identified a threshold of 93.1 HU for detecting abnormal BMD in the proximal humerus. Liu *et al*. (2023) observed that males with HU values below 98 HU and females below 100 HU at the proximal humerus are at risk of fragility fractures. These differences may stem from the method of calculating HU thresholds, with prior studies relying on average HU values from multiple slices of the proximal humerus, whereas we focused on single-slice (20-mm) HU values. It is speculated that using single-slice HU measurement simplifies the process and reduces measurement errors, thereby enhancing the reliability of this method.

CONCLUSION

Single-slice HU values of the proximal humerus on routine chest CT scans is highly reliable, showing a positive correlation with DEXA results. Notably, the 20-mmsingle-slice HU values demonstrate the highest correlation with DEXA results, serving as critical thresholds for identifying low BMD. These thresholds, varying across different BMI groups, provide reference values for the opportunistic screening of low BMD in clinical settings. This study enriches the Chinese BMD data and offers a swift and effective approach for opportunistically screening low BMD.

LIMITATIONS. This retrospective study is subject to inherent selection bias in subject recruitment. Notably, there was a significant sex imbalance, with substantially fewer men than women in the study. Future investigations should stratify by sex to derive more precise HU reference values for detecting low BMD. In addition, it is worth noting that the correlation coefficient between HU values of the proximal humerus and T-scores was lower than that with BMD values. This discrepancy is because T-scores, as per guidelines[8], are applicable only to postmenopausal women and men over 50 years old. Since the elderly population may face a higher risk of low BMD, we chose not to restrict the age range and included all eligible adults. Furthermore, the sample size of the study cohort, particularly the underweight group with low BMD, was relatively small, comprising only five cases. Subsequent investigations should aim to address this limitation by recruiting a larger sample sizes for analysis.

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RESUMEN: Se realizó un estudio sobre la relación entre el valor de la Unidad Hounsfield (HU) de corte único del húmero proximal chino y la densidad mineral ósea (DMO) mediante TC de tórax de rutina y absorciometría de rayos X de energía dual (DEXA). Se recopilaron datos de 240 personas que se sometieron a DEXA y tomografías computarizadas de rutina de tórax (incluidas imágenes completas del húmero proximal) el mismo día en 967 hospitales entre enero de 2019 y diciembre de 2021. El método para medir los valores de HU de un solo corte del húmero proximal en las tomografías computarizadas de tórax mostraron alta confiabilidad y repetibilidad (coeficiente de correlación intraclase > 0,961, P < 0,001). Se observó una fuerte correlación positiva entre los valores de HU de un solo corte del húmero proximal y los resultados de DEXA, demostrando el valor de HU de 20 mm la correlación más alta. En diferentes grupos de IMC, el área bajo la curva (AUC) para el valor HU de 20 mm fue consistentemente el más grande (AUC = 0,701–0,813, P <0,05). Por lo tanto, el valor de HU de 20 mm puede considerarse una referencia fiable para el cribado oportunista de DMO baja, con valores de referencia de -4 HU para personas con bajo peso, -13 HU para personas con peso normal, -7 HU para personas con sobrepeso y -16 HU para personas obesas. Los valores por debajo de estos umbrales indican un riesgo de DMO baja. Este estudio es un aporte para los datos chinos sobre la DMO y ofrece un enfoque rápido y eficaz para detectar de forma oportunista la DMO baja.

PALABRAS CLAVE: Húmero proximal; Unidades de Hounsfield; Densidad mineral del hueso; Chino.

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