

SUPPLEMENTARY DATA

1.The US scanning protocol

For optimal shoulder US assessment, the patient should sit with the elbow flexed 90°, palm up. Rotate the arm externally, fixing the elbow on the iliac crest to show the subscapularis tendon. For the supraspinatus tendon, place the patient's arm posteriorly, placing the palm side of the hand on the superior aspect of the iliac wing.

The triceps entheses were assessed with the elbow flexed to 90°. The subjects were in a supine position with 30° semi-flexion of the knee to assess the patellar and quadriceps entheses. Then, they were brought into a prone position with their feet hanging over the examination table to assess the Achilles tendon and plantar fascia entheses.

Scoring system of elementary lesions

Supplementary Table SI. Scoring of elementary lesions

Elementary lesion	Score 0	Score 1	Score 2	Score 3
Thickening	< Cut off *	Thickening < 1 mm	Thickening: 1 mm ≤ but < 2 mms	Thickening ≥ 2 mms
Hypoechogenicity	No changes	Mild changes	Moderate changes	Severe changes
Calcifications	No changes	Mild changes	Moderate changes	Severe changes
Enthesophytes	No changes	Mild changes	Moderate changes	Severe changes
Erosions (max size of the erosion)	No erosion	> 0 mm but < 2 mm	≥ 2 mm and < 4 mm	≥ 4 mm
Power Doppler ^a	No changes	Mild changes	Moderate changes	Severe changes

Normal values* for each enthesal thickness were defined as quadriceps tendon entheses < 6.1 mm, proximal and distal patellar tendon entheses < 4 mm, Achilles tendon entheses < 5.29 mm, plantar fascia aponeurosis < 4.4 mm, triceps tendon entheses < 4.3 mm. An increase of less than 1 mm exceeding the threshold was scored as grade 1, 1mm ≤ but < 2 mms was scored as grade 2, and ≥ 2 mms was scored as grade 3) (1). ^aPower Doppler signal must be approximately < 2 mm near the bony cortex at the enthesis site.

2. The calculations of US scores

Supplementary Table SII. The calculations of US scores

Inflammation score	Thickening + Hypoechogenicity + Power Doppler scores
Cronisity score	Calcifications + Enthesophytes + Erosions scores
Total US score	Inflammation score + Cronisity score

3. The calculations of the cut off value of thickness

The cut off value of thickness increase for each enthesis area in elite athletes was calculated separately using the mean +2SD method, as calculated in previous studies (supplementary Tables SIII-SIV) (8).

Supplementary Table SIII. The calculations of the cut off value of thickness

Grade	Cut-off value
0	$\leq \text{Mean} \pm 2\text{SD}$
1	$>\text{Mean} \pm 2\text{SD} - \leq \text{Mean} \pm 3\text{SD}$
2	$>\text{Mean} \pm 3\text{SD} - \leq \text{Mean} \pm 4\text{SD}$
3	$>\text{Mean} \pm 4\text{SD}$

Supplementary Table SIV. The cut off value of thickness for each enthesis area according to gender

Variable	Female				Male			
	Grade 0	Grade 1	Grade 2	Grade 3	Grade 0	Grade 1	Grade 2	Grade 3
Quadriceps	≤ 0.55012	≤ 0.60678	≤ 0.66344	> 0.66344	≤ 0.64014	≤ 0.71166	≤ 0.78318	> 0.78318
Proximal Patella	≤ 0.49022	≤ 0.55453	≤ 0.61884	> 0.61884	≤ 0.52696	≤ 0.58219	≤ 0.63742	> 0.63742
Distal Patella	≤ 0.44836	≤ 0.49984	≤ 0.55132	> 0.55132	≤ 0.45042	≤ 0.49738	≤ 0.54434	> 0.54434
Achilles	≤ 0.40128	≤ 0.44802	≤ 0.49476	> 0.49476	≤ 0.42040	≤ 0.46460	≤ 0.50880	> 0.50880
Plantar Facia	≤ 0.38058	≤ 0.42687	≤ 0.47316	> 0.47316	≤ 0.41212	≤ 0.46168	≤ 0.51124	> 0.51124
Triceps	≤ 0.36760	≤ 0.41860	≤ 0.46960	> 0.46960	≤ 0.38078	≤ 0.41907	≤ 0.45736	> 0.45736

Medial epicondil	≤ 0.27838	≤ 0.31047	≤ 0.34256	> 0.34256	≤ 0.32500	≤ 0.36915	≤ 0.41330	> 0.41330
Lateral Epicondil	≤ 0.45738	≤ 0.51467	≤ 0.57196	> 0.57196	≤ 0.44846	≤ 0.49139	≤ 0.53432	> 0.53432
Subscapularis	≤ 0.52604	≤ 0.60556	≤ 0.68508	> 0.68508	≤ 0.52608	≤ 0.59507	≤ 0.66406	> 0.66406
Supraspinatus	≤ 0.60142	≤ 0.68053	≤ 0.75964	> 0.75964	≤ 0.64852	≤ 0.73193	≤ 0.81534	> 0.81534

Supplementary Table SV. Comparison of inflammation and chronicity scores of lower and upper extremity enthesis areas in athlete groups and sedentary controls

Paramater	Inflammation scores		Damage scores	
	Lower extremity	Upper extremity	Lower extremity	Upper extremity
Athletics, median (IQR)	5 (1–9)^a	0.5 (0–2.5)	5 (1.8–8.3)^b	0 (0–0)
Basketball, median (IQR)	1 (0–2)	0 (0–1)	3 (1–6)	0 (0–0)
Bicycle, median (IQR)	1.5 (0–4)^c	1.5(0–3.3)	1 (0–3)	0 (0–2)
Golf, median (IQR)	2 (0–4)^d	0(0–1)	3 (2–7)	0 (0–0)
Handball, median (IQR)	2 (0.5–3)^e	0(0–1.5)	7 (1.5–9)	2 (0–7)^a
Climb, median (IQR)	1.5 (1–3.8)^a	2 (1–4.8)^f	6 (3–8.8)^f	1 (0–5.5)^a
Archery, median (IQR)	0 (0–2)	3 (1.3–4.8)^a	1 (1–5.8)	1 (0–2.8)^a
Control group, median (IQR)	0 (0–1)	0(0–1.5)	2 (0–4.5)	0 (0–0)

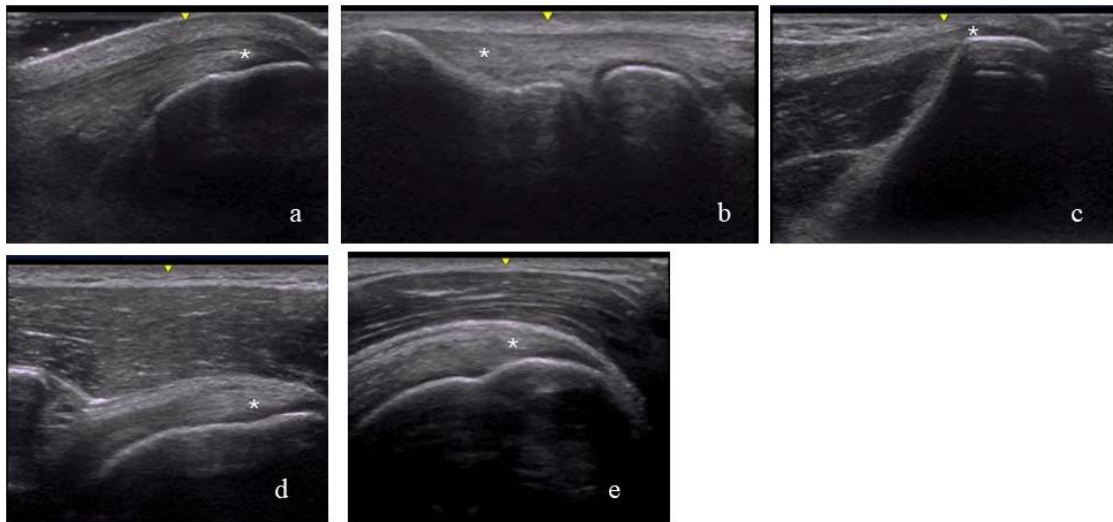
IQR – interquartile range; a) p < 0.001; b) p = 0.049; c) p = 0.007; d) p = 0.045; e) p = 0.003;

f) p = 0.001.

4. Normal Enthesis Areas in The Upper Extremity

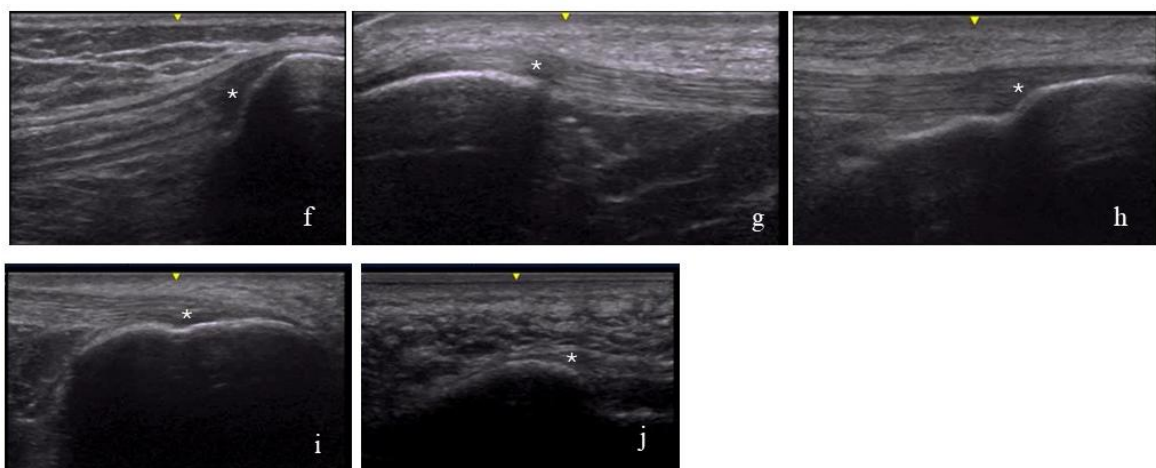
Supplementary Figure S1. Normal enthesis area in the upper extremity

A – triceps tendon enthesis area, B – lateral epicondyle enthesis area, C – medial epicondyle enthesis area, D – subscapularis enthesis area, E – supraspinatus enthesis area

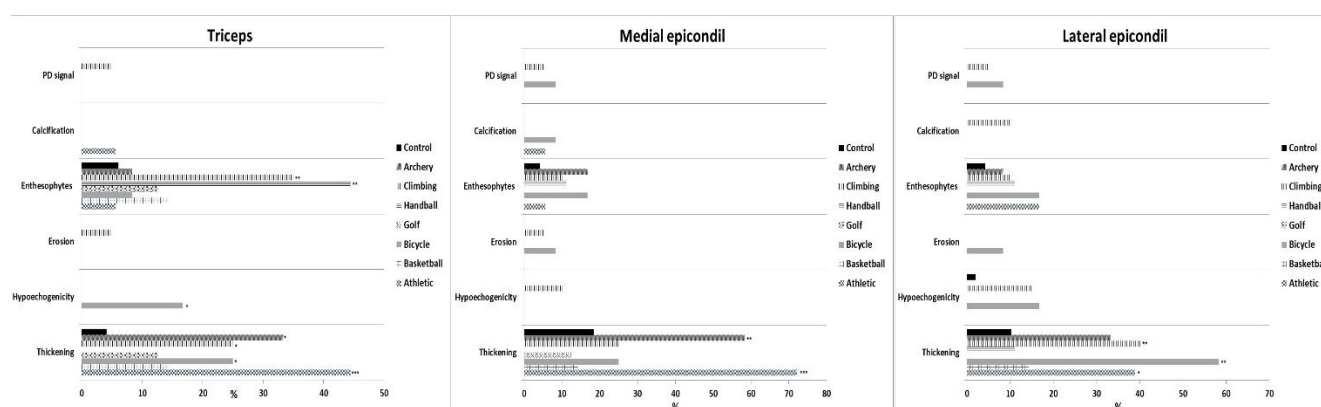
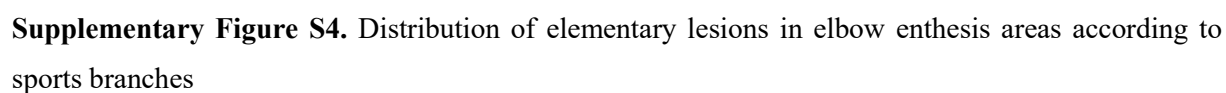


Supplementary Figure S2. Normal enthesis area in the lower extremity

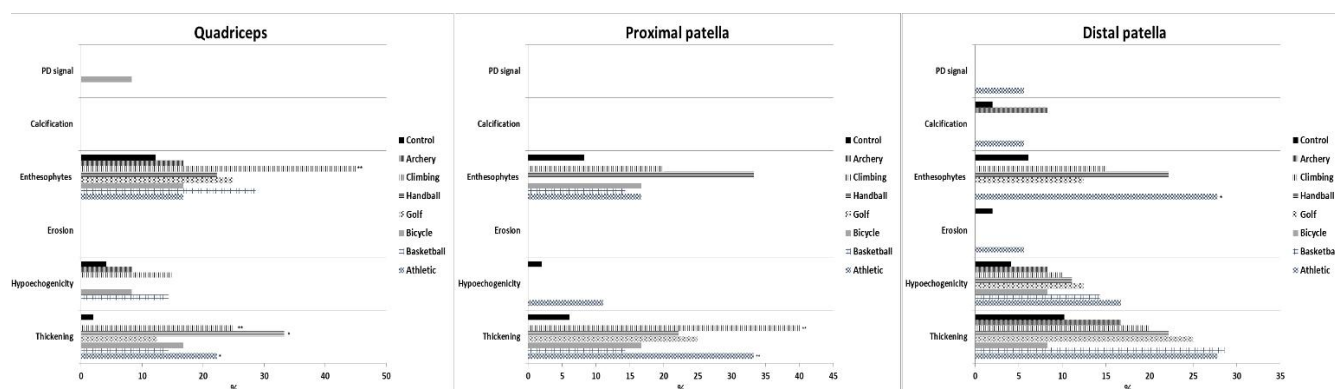
F – quadriceps tendon enthesis area, G – proximal patellar tendon enthesis area, H – distal patellar tendon enthesis area, I – Achilles tendon enthesis area, J – plantar fascia enthesis area



Supplementary Figure S3. Distribution of elementary lesions in shoulder enthesis areas according to sports branches



Supplementary Figure S5. Distribution of elementary lesions in knee enthesis areas according to sports branches



Supplementary Figure S6. Distribution of elementary lesions in heel enthesis areas according to sports branches

