

Supplementary materials

Table 1. Study characteristics of included articles in systematic review.

Author	Year	Study design	Human/Animal?	Sample Size	Study population	Control	Intervention	Outcomes
Enokida et al. [14]	2022	Clinical Trials (ongoing)	Human	80	Men and Women aged 14 to 45.	Spontaneous heal, no HBOT	HBOT: 2.0-2.5 ATA for 60-120 minutes	Maturation of anterior cruciate ligament evaluated by MRI. quantitative evaluation, physical findings, knee function and safety will be evaluated.
Chan et al. [15]	2004	Experimental research using a rabbit model.	Animal	64 (control:32 and experimental:32)	Rabbits (specific age and weight were not mentioned). Gender: Male.	Does not undergo HBOT	HBOT: 2.5 ATA for 2 hours everyday	Displacement-time curve: increases at the rate of 7.2 mm/min constantly. Control : Intact left medial collateral ligament, the mean

								percentage of failure load in HBOT group at 2 weeks: 20.6%, 4: 49.1%, 8: 63.9%, and 12 weeks:76.3%. For non-HBOT groups, 2 weeks:13.5%, 4 weeks:25.3%, 8 weeks: 36.5%, and 12 weeks:57.3%. Histology analysis: HBOT group had collagen fibres at higher density and better alignment than non-HBOT group.
Chan et al. [16]	2007	Experimental study on	Animal	Cell (fibroblasts from rabbit	New Zealand white rabbits	Cells maintained in	HBOT: 2.5 ATA for 120	HBOT when treated increased

		platelet growth factor and hyperbaric oxygen for the treatment of BB healing.		medial collateral ligament)	(specific ages and genders not mentioned).	5% CO ₂ / 95% air.	minutes for 48 hour	the MCL cell count than controlled cells. PDGF-bb also increased the cell count of MCL when treated dose dependently compared to controlled cells. Type one PDGF-bb combined with HBOT treatment, H/C ratio was 101.6% ± 4.1%, P/C ratio was 99.7% ± 4.7%, HP/C ratio was 103.8% ± 3.2%. Type three collagen after HBOT or HBOT and PDGF-bb
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								decreased the collagen by H/C ratio was 90.6% ± 2.1%, P/C ratio was 100.7% ± 5.7%, HP/C ratio was 92.3% ± 2.2%.
Horn et al. [17]	1999	Experimental study on understanding hyperbaric oxygen effect on healing of rat model's ligament.	Animal	48 Sprague-Dawley rats.	Sprague-Dawley rats, No gender mentioned	Controls: 24 rats recovered without intervention.	HBOT: 2.8 ATA for 1.5 hours a day for 5 days after the surgery	At 4 weeks, ligaments exposed to HBOT needed a higher statistical force to cause failure compared to those not exposed to HBO, indicating enhanced healing. At the sixth week there were no additional statistics in which the increase of

								force or stiffness was observed. This suggests that four weeks are necessary for ligament healing.
Hsu et al. [18]	2004	Experimental research on use of hyperbaric oxygen therapy on patellar tendinopathy in rabbit models.	Animal	13 New Zealand male rabbits.	The study population contains a four month old male rabbit with three kg.	The left knee of each rabbit served as a control, remaining intact.	HBOT: 2.5 ATA for 120 minutes, 30 daily sessions, starting 6 weeks after treatment	HBOT effectively enhances the healing of tendinopathy by increasing cross-linking and synthesizing collagen. The collagen tensile load had HBOT was 34.8% higher than the tendon control at 10 weeks.. About 82.2% of hydroxyproline concentrations

								increase the hyperbaric oxygen therapy. Hyperbaric oxygen therapy indeed provides validated results in tendinopathy treatment.
Ishii et al. [19]	2002	Experimental study on utilizing HBOT for healing of ligament	Animal	44	44 male Wistar rats that are eight weeks old and weigh between 250-270g are considered.	Control Group (Group A): Normobaric room air at one atmosphere absolute for one hour.	HBOT: - 1.5 ATA for 30 min once a day - 2 ATA for 30 min once a day	The outcomes prove that HBOT can effectively heal tendon repairs in comparison with control groups and ATA for sixty minutes have enhanced the deposits of extracellular matrix and increased collagen synthesis.

							- 2 ATA for 60 min once a day	
Kuran et al. [20]	2012	Experimental study in determining the healing of achilles tendon repair using hyperbaric oxygen treatment	Animal	Fifty-six male Wistar albino rats	The study population contains twenty four rats from each population. Within age of five to seven months, male, and weighing between 200-260 grams	1.Group 1: Tendon repair without any treatment 2.Group 2: HBOT therapy after tendon repair 3. Group 3: Repair of tendon after injection with steroids. 4. Group 4: Repair of tendon and	HBOT: 2.4 ATA for 70 minutes for 7 day	Hyperbaric oxygen therapy has increased the fibrosis volume and neovascularization shows the histopathology study. Biochemical differences were seen in all the groups. Additionally, variation was observed in higher levels considering

						treatment of HBOT HBOT after injection of steroid.		inflammation and vascularization after steroid administration. HBOT was able to heal Achilles tendon repair.
Leite et al. [11]	2024	ACL reconstruction rabbit model	Animal	12 New Zealand rabbits, male and matured skeletally.	Rabbits that undergo reconstruction of ACL with or absence of adjuvant HBOT weighing around 2.8 kg.	Ambient air group (n = 6), and placed in normal air till the entire time.	HBOT group (n = 6), exposed to 100% oxygen at 2.5 ATA, for 5 days with 2 hour daily treatment beginning after the 1 st day of surgery.	HBOT improved the Anterior cruciate ligament graft maturation and integration. The HBOT has also enhanced biochemical properties, widened, and reduced the tunnel of the graft. This paves way for the research in future.
Mashitori et al. [21]	2004	Experimental study on rats	Animal	76 Male sex rats of spargue-	Sprague-Dawley rats	Room air	HBOT group (Group H):	Weight gain in rats exposed to

				<p>Dawley with a count of seventy six.</p>	<p>(eleven weeks old rat weighing between 369 to 9 g)</p>	<p>group (Group C): 38 rats exposed to room air</p>	<p>38 rats, HBO: 2.5 ATA, 2 hours, 5 days in a week.</p>	<p>hyperbaric oxygen (Group H) was lesser compared to the control group. (Group C) at 3, 7, 14, and 28 days postoperatively, with significant differences observed at 7, 14, and 28 days . Macroscopic inspection showed that compared to Group C, Gropp H has a higher scar tissue rate, with the most significant difference observed at 7 days postoperatively. Histologic</p>
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								findings showed that cells of inflammation are dominant in scar tissue three days postoperatively, transitioning to active fibroblasts dominating the tissue by 2 weeks. Compared to Group C at 7 and 14 days postoperative the Type I procollagen are expressed maximum in Group H , indicating a positive hyperbaric oxygen therapy effect on expression of
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								genes. At Group H the healing and stiffness of tendons are higher compared to Group C in fourteen days.
Takeyama et al. [22]	2007	Experimental study	Animal	128 male Sprague-Dawley rats	Sprague-Dawley rats , 11 weeks old, weight 356 ± 14 grams	Normal atmospheric pressure groups for MCL and ACL injuries (Groups MC and AC, respectively)	HBOT groups for MCL and ACL injuries (Groups MH and AH, respectively), 100% oxygen 2.5 ATA for 2 hours for 5 days in a week	HBOT administration increased type I procollagen gene expression in MCL and ACL injury. Tissue inhibitors of metalloproteinases (TIMPs) gene expression, increased after operation in 2 groups.

								<p>MMP gene expressions were not affected by HBO.</p> <p>Injured MCL, TIMP gene expressions were not affected, and in injured ACL, increase in TIMP gene expressions.</p> <p>Type I procollagen expression in injured MCL increased with HBOT on the 7th day.</p> <p>Injured ACL has increased expression type I procollagen than normal ACL, with HBOT increasing</p>
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								gene expression at 28 days after injury.
Yagashita et al. [23]	2019	Experimental study	Human	32 professional or semi-professional rugby players, with grade 2 MCL knee injury HBOT group =16, non-HBOT group=16.		HBOT group (n=16), non-HBOT group (n=16)	HBOT: 2 ATA for 60 minutes; 5 HBOT treatments in 10 days after injury.	VAS scores at pain at rest immediately before: 18.8 ± 17.7 and after: 17.3 ± 16.4 , HBOT therapy on the same day ($p=0.11$). pain while walking, before: 37.4 ± 20.1 and after: 32.4 ± 21.8 , HBOT therapy ($p<0.001$). pain while jogging, before: 50.7 ± 25.6 and after: 43.9 ± 25.0 , HBOT therapy.

									<p>Time to return to play: 31.4 ± 12.2, 10-58 days in HBOT group and 42.1 ± 15.8, 18-71 days in non-HBOT group. Early or late HBOT application, time to return to play in early HBOT group was 27.9 ± 9.3, 10-41 days within two days after injury (n=11) and in the delayed HBOT group, 39.0 ± 13.1 23-58 days three to five days after injury (n=5). No significant differences.</p>
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Yeh et al. [24]	2007	Experimental study on HBOT on tendon integration and graft in bone tunnel	Animal	40 rabbits	40 New Zealand rabbits that weighs 3.2 to 1.6 kg were utilised	The control group $n=20$ is caged and exposed to normal air	HBOT: 2.5 ATA x 120 minutes for 2h daily, for 5 consecutively days	The electronic microscope showed that regeneration of collagen fibres have increased after HBOT treatment. Hence, after ACL surgery HBOT can potentially improve the results.
Zang et al. [25]	2020	Experimental study	Human	100 human patients with ACL (control:50 and experimental:50)		Control group only treated with PRP	HBOT combined with PRP	Total effective rate: 90.0%, was higher than the control group (68.0%) ($p<0.05$). Scores of Lysholm, Tegner, and IDKC were higher compared

								<p>to the control group ($p<0.05$). The contents of IGF-1, BGP, and MMP-1 were less than before treatment, and lower than the control group ($p<0.05$). HBOT combined with platelet-rich plasma can improve the therapeutic effect of ACL reconstruction, improving the serum contents of IGF-1, BGP, and MMP-1.</p>
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Table.2 The modes of HBOT intervention and variable measured (outcomes) in 14 articles

Author	Treatment	Pressure	Treatment time	Variables measured	Details of measured variables
Enokida et al. [14]	HBOT	2.0-2.5 ATA	60-120 minutes	Functional Outcomes	Knee joint swelling, muscle atrophy, range of motion, anterior movement amount, half-month movement amount over time
Chan et al. [15]	HBOT	2.5	2 hours, daily	Histologic analysis	Density and alignment of collagen fibers in healing
				Biomechanical outcomes	Force and displacement at tensile tests
Chan et al. [16]	HBOT and Platelet growth factor-bb	2.5 ATA	120 minutes per 48 hours	Biochemical analyses	Type I collagen and Type III Collagen synthesis
Horn et al. [17]	HBOT	2.8 ATA	1.5 Hours a day for 5 days	Biomechanical outcomes	Force and displacement
Hsu et al. [18]	HBOT	2.5 ATA	120 minutes for 10 Weeks	Mechanical analysis	Tensile load
				Biochemical analysis	Hydroxyproline, pyridinoline,
				Histological analysis	Vascularity
Ishii et al. [19]	HBOT and intermittent oxygen	Group B:1.5 Group C:2 Group D:2	Group B:30 min daily. Group C:30 min daily. Group D:60	Histological analysis	Ligament healing
				Biochemical analysis	Pro- $\alpha 1$ (I) mRNA expression

			min daily.		
Kuran et al. [20]	Steroid injection and HBOT therapy	2.4 ATA	70 minutes per day for 7 days	Histologic analysis	Inflammatory Cells, veins and fusiform fibroblast cells
				Biomechanical outcomes	Tensile behaviours Like rigidity, elastic modulus and energy absorption density, rupture loads, maximum loads)
Leite et al. [11]	HBOT (Adjuvant)	2.5 ATA	2 h daily for 5 days	Radiological imaging	Magnetic resonance imaging (MRI), or high-resolution peripheral Quantitative computed tomography (HR-pqct) scan
				Biomechanical analysis	Tension force (force, stiffness, and elongation of ligament rupture)
Mashitori et al. [21]	HBOT	2.5 ATA	2 h for 5 days	Biomechanical analysis	Tensile failure (ultimate load and stiffness)
				Biochemical analysis	Type I procollagen gene expression
Takeyama et al. [22]	HBOT	2.5 ATA	2 h for 5 days	Biochemical analysis	Gene expressions of procollagens, matrix metalloproteinases (MMP) and MMP tissue inhibitors
Yagashita et al [23]	HBOT	2.8 ATA	60 minutes, 5 treatments in 10 days	Functional Outcomes	VAS scores, time to return to play, pain reduction
Yeh et al. [24]	HBOT	2.5 ATA	2 h for 5 days	Histological analysis	Tendon-bone interface
				Biomechanical analysis	Tension strength

Zang et al. [25]	HBOT and platelet- rich plasma	-	-	Biochemical analysis and Functional Outcomes	The clinical efficacy, knee joint, Lysholm, Tegner, IDKC scores, serum insulin-like growth factor- 1 (IGF-1), osteocalcin (BGP) and matrix metalloproteinase-1 (MMP-1)
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