May 2nd, 12:00 AM

A Literature Review of Pain Control in Osteoarthritis Patients Using Blood Flow Restriction Training

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Background

- Osteoarthritis (OA) is a degenerative disease that mainly affects articular cartilage of joints.[1]
- OA most commonly affects the knees and causes pain and reduces quality of life in older adults.[2,3]
- Quadricep weakness and atrophy are the main risk factors for OA of the knee.[2]
- Blood flow restriction (BFR) occludes arterial and venous flow during exercise using a blood pressure cuff placed on the proximal lower limb. This creates an intramuscular hypoxic environment which promotes muscle hypertrophy.[4,5]
- High load training can cause pain and inflammation in knee OA patients due to increased stress.[6]
- BFR can allow patients with knee OA to use lower loads to achieve beneficial effects of rehabilitation.[7,8]

Aims

- Determine if BFR can be utilized as an alternative treatment to decrease pain in OA patients.
- Evaluating if BFR can improve the quality of life of patients living with OA.

Methods

Database	Date	Keyword String	Results
PubMed	8/31/2023	Osteoarthritis OR Rehabilitation AND Blood flow restriction, Blood flow restriction AND Rehabilitation	113
Google Scholar	8/31/2023		28,400

- **Study Selection:** All peer review studies pertaining to patients with knee OA undergoing BFR training for rehabilitation.
  Inclusion criteria: Studies written in the english language
  Exclusion criteria: Studies without full text or not peer reviewed
- **Data Analysis:** Data was analyzed for results relating BFR to pain and other parameters in patients with OA.

Results

Pain and Physical Function	• WOMAC* Pain score was significantly reduced post training in low load and low load + BFR groups only • WOMAC* physical function score was significantly reduced post training in high load and low load + BFR groups only
Muscle Strength	• Significant increases in leg extension 1 repetition maximum in high load and low load + BFR groups
Quadricep CSA	• Significant increases in high load and low load + BFR groups

*WOMAC = Western Ontario and McMaster Universities Osteoarthritis Index

Table 1. Comparison of Low Load + BFR, Low Load, and High Load groups. *Ferraz RB. et. al.* reported key improvement in pain and physical function, muscle strength, and quadricep cross-sectional area (CSA) in low load + BFR group.

	Pre-Intervention Value (m)	Intervention	Mean Adjusted Change	Mean Difference Between 2 Interventions
Quadricep CSA (cm^2)	92	Low Load + BFR	6	2
		Conventional (High Load)	4	
Quadricep Volume (cm^3)	2244	Low Load + BFR	160	82
		Conventional (High Load)	79	
Thigh Muscle CSA (cm^2)	205	Low Load + BFR	9	1
		Conventional (High Load)	10	
Thigh Muscle Volume (cm^3)	5303	Low Load + BFR	172	34
		Conventional (High Load)	206	

Table 2. Comparison of Low Load + BFR and Conventional (High Load) groups. *Ladlow P. et. al.* reported greater increase in quadricep cross sectional area (CSA) and quadricep volume in Low Load + BFR group and a greater increase in thigh muscle CSA and thigh muscle volume in Conventional (High Load) group.

Discussion/Conclusion

- BFR training is shown to reduce pain in OA patients comparable to low intensity training.[9]
- BFR leads to increases in physical function and muscle strength comparable to high intensity training.
- These findings suggest BFR can be used as an alternate treatment modality to high intensity training to reduce pain and improve the quality of life in OA patients.
- A key limitation is the lack of data on the potential adverse effects of BFR.

Implications

Future research should:

1. Aim to create an individualized approach to BFR training. Some patients may require different levels of occlusion to achieve therapeutic effects.
2. Evaluate the risk of BFR as few studies have investigated.[10]

References