

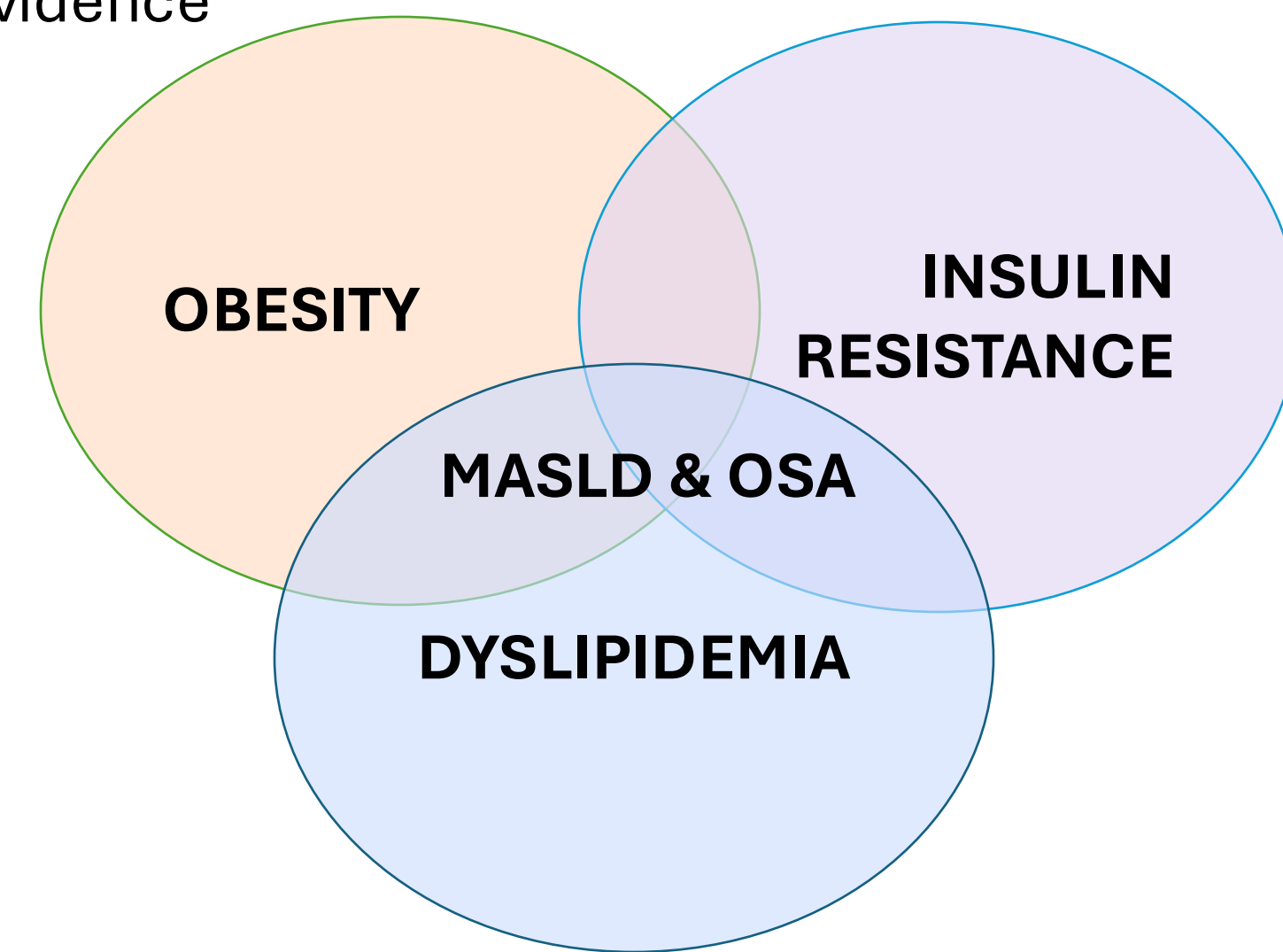
Bridging Gaps in the Management of Metabolic Associated Steatosis Liver Disease and Obstructive Sleep Apnea

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Introduction

- MASLD (formerly NAFLD) affects 25 to 30% of adults
- OSA-related chronic intermittent hypoxia → liver steatosis, inflammation, and fibrosis
- Inconsistent liver outcomes w/CPAP, significant gaps in evidence



Purposes

To conduct a literature review on the impact of OSA-directed therapies and synthesize evidence on hepatic and metabolic outcomes

Methodology

Design: systematic review following PRISMA guidelines

Data Sources: PubMed, Web of Science, CINAHL

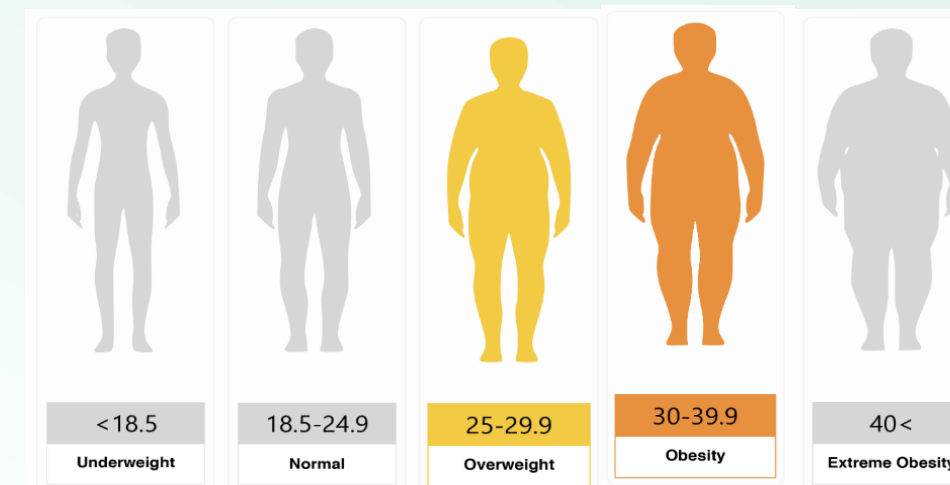
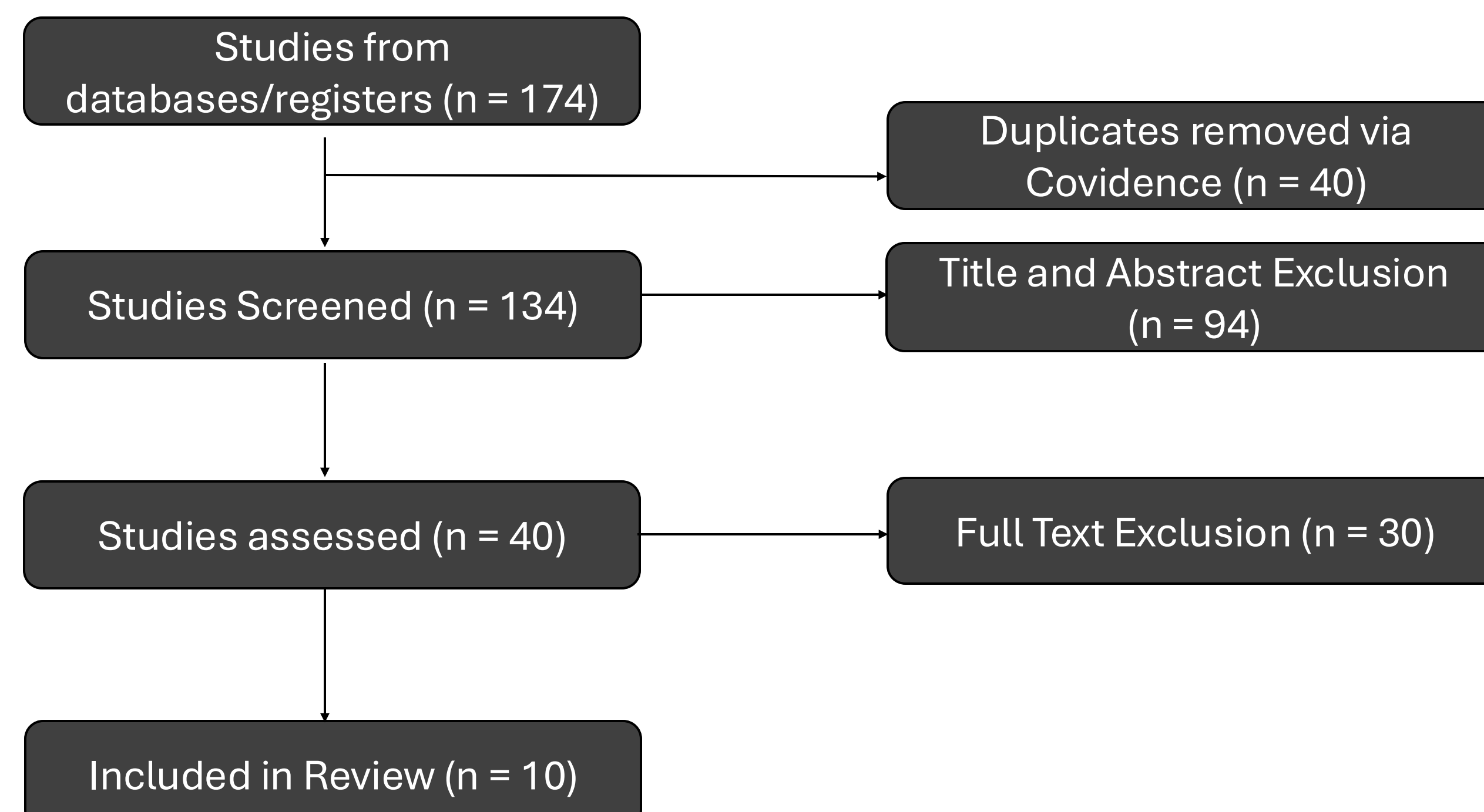
Population: Adults with MASLD + OSA

Interventions: CPAP, hypoglossal nerve stimulation, GLP-1 RA, Lifestyle changes, Bariatric Surgery

Comparison: No CPAP, Sham CPAP, Standard Lifestyle Modification

Outcomes: hepatic, metabolic, anthropometric changes

Risk of Bias: ROB2 (RCTs) and ROBINS-1 (non-randomized)



Male (73.5%)

Female (26.5%)

BMI: 26.3 – 35.0 kg/m²

Moderate-Severe OSA
> 4 hrs/night, 4 weeks to 3 yrs

Author, Year	MASLD Relevant Hepatic Outcomes with OSA Treatment				
	Liver Stiffness	Liver Enzymes: ELF Score / Fibrosis Marker	Liver Fat Change (MRI-PDFF, MR-S and VCTE)	ALT (U/L) Baseline → Post	AST (U/L) Baseline → Post
Shpirer, 2010			C: -16.7 → +0.4; NC: -17.3 → -6.5	C: 35.1 → 24.9; NC: 29 → 41.8	C: 23.7 → 19; NC: 22.5 → 36.3
Chen, 2018				54.2 → 46.52	31.82 → 29.00
Kim, 2018		APRI↓: 0.35 → 0.31 overall	117.6 → 116.2 (↓1.43)	44.5 → 39.1 overall	27.9 → 24.9 overall
Toyama, 2018				34.4 → 31.4	27.9 → 27.7
Hirono, 2021	4.61 → 4.70		CAP: 304 → 303.9	37.6 → 33.1	28.2 → 24.7
Kohler, 2009				ALT↓: 39.1 → 30.3 (ther.); 36.9 → 31.5 (sub-ther.)	AST↑: 29.1 → 30.2 (ther.); 28.2 → 29.5 (sub-ther.)
Jullian-Desayes, 2016			FibroTest and SteatoTest changes reported for Sham and CPAP groups		
Ng, 2021	AutoCPAP: 6.0 → 6.2; SubCPAP: 6.1 → 6.1		IHTG: 13.5 → 14.2; Fat Peak: 0.15 → 0.17	AutoCPAP: 9.2 → 6.4; SubCPAP: 9.8 → 7.2	

Author, Year	MASLD Relevant Metabolic and Anthropometric Outcomes with OSA Treatment			
	Glycemic Control (HbA1c, Fasting Glucose)	Lipid Profile (TG, HDL, LDL, Cholesterol)	Weight Loss (BMI/Weight)	Body Composition
Shpirer, 2010		TG↓ (C): 222.9 → 194.6; NC: 203.5 → 199.3 Chol.↓ (C): 177.4 → 198.4; NC: 163 → 135.5	C: 34.8 → 0.4; NC: 34.1 → -6.5	
Toyama, 2018		TG: 149 → 151.5		Waist: 94.4 → 94.9 cm
Hirono, 2021	BMI: 28.6 → 28.7	TG: 139.5 → 126; LDL: 133.9 → 134.2; HDL: 55.9 → 56.1	BMI: 27.6 → 27.6; BW: 75.6 → 74.8	
Kohler, 2009				Neck: 3.0 → 3.9; WHR: 0.05 → 0.06
Ng, 2021			Weight: ~77-79.7 → ~76.9-79.3	

Discussion

Outcomes: treatment of OSA with CPAP yielded modest AST/ALT, no consistent hepatic, fat, stiffness, or fibrosis (short-mid term)

Improvement: greatest with CPAP ≥4 hours/night, ≥3 months

Limitation: heterogeneity in study design, imaging, outcome, CPAP adherence → narrative review

Implications to Osteopathic Medicine

- Resp/Circ: Diaphragm Release, Thoracic Inlet MFR, Pectoral Traction, Abdominal/Liver/Pedal Pump
- Neuro: Suboccipital release, Rib Raising, Chapman's Reflex, Sacral Rocking
- Structural: BLT for Occiput & Hyoid, Hyoid and Mandibular Release, Cervical MFR
- Metabolic: patient education, sleep hygiene, CPAP & nutritional counseling
- Behavioral: stress management, education, collaborative care

Researchers

- Standardized imaging endpoints (MRI-PDFF, VCTE/MRE)
- Long term RCTs (> 12 months)
- Uniform OSA phenotyping, adherence ≥4 hours/night, ≥70% nights

Clinicians

- CPAP helps cardiometabolic health, not hepatic structure.
- Multimodal care: CPAP + Lifestyle + GLP-1 RA + OMM
- Early screening protocols in liver and sleep clinics

Conclusion

OSA-directed therapies, especially CPAP, modestly improve liver enzymes and some metabolic markers, though findings remain inconsistent across studies. Current evidence is constrained by heterogeneity and short-term follow-up, underscoring the need for further study. Findings emphasize the importance of a multimodal approach — incorporating lifestyle modification, CPAP, osteopathic manipulative medicine, medications, and nutritional counseling — to address the complex interplay between OSA and MASLD.

References

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