Comparison of Liver Elastography Between Obese and Non-Obese Children: A Systematic Review and Meta-Analysis

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INTRODUCTION

Non-invasive Liver fibrosis evaluation in suspected NAFLD has been studied in obese adults, but few studies have addressed the utility of Transient and Shear-wave Elastography assessing early-stage fibrosis in pediatric population. We aimed to perform a systematic review and meta-analysis to compare Liver Elastography findings between obese and non-obese children.

MATERIALS and METHODS

- PubMed, MEDLINE (OVID), Cochrane Library, Embase, Scopus and Web of Science were searched to January 2022 to identify manuscripts that evaluated Liver steatosis/Liver fibrosis on Elastography (Transient or Shear-wave) in obese children compared to non-obese children.
- Meta-analyses were performed using a random-effect model with the inverse variance method. For continuous outcomes Mean Difference (MD) was used. Heterogeneity was assessed by the inconsistency index (I2).

RESULTS

- 3182 articles initially identified, and 5 studies were deemed eligible for inclusion with perfect agreement between investigators (kappa=1.0).
- 296 obese children and 528 non-obese controls were included in the studies (Table 1). Three studies used Shear-wave Elastography, four used Transient Elastography and one used both. ALT and AST values were higher in the obese group.
- On the non-stratified meta-analysis obese children were found to have higher values of Liver Stiffness Measurement (LSM) measured in kilopascals (kPa) compared with non-obese controls (MD: 1.80, 95% CI: 0.27 - 3.34)
- When stratifying this effect was only significant when using Transient Elastography (MD: 1.49, 95%: 0.16 - 2.82) (Figure 1).

DISCUSSION

- Obese children present higher values of Liver Stiffness compared to non-obese children, more studies are needed to further validate this non-invasive testing and used as a predictor for NAFLD at early ages.

Table 1: Characteristics of included subjects

Study	Group	Sample size	Age (year)	Female %	ALT	AST	Total Cholesterol	Triglycerides
Saglam (2021)	Obese	41	11.4 (9.6-13.5)	46.3%	18 (15-22)	21 (19-23)	156 (142-172.75) mg/dl	107.5 (87-135.5) mg/dl
	Non-obese	25	11.7 (9-13.2)	52%	13 (10.1-16.2)	23 (17.7-25.3)	137.5 (128-149.75) mg/dl	68 (59.25-98.25) mg/dl
Zeng Fansen (2020)	Obese	67	10.9 (6-17.4)	28.4%	59 (23-101)	32 (21-58)	4.7 (4.3-5.7) mmol/L	1.4 (0.9-1.9) mmol/L
	Non-obese	139	10.2 (5-17)	41.7%	19 (15-25)	27 (16-34)	3.1 (2.8-3.3) mmol/L	1.1 (0.8-1.3) mmol/L
Mărginean (2019)	Obese	77	10.4 ± 3.4	33.7%	26.50 ± 43.1	27.33 ± 23.6	NA	NA
	Non-obese	210	11.3 ± 3.83	54.8%	13.64 ± 6.9	22.29 ± 10.9	NA	NA
Kwon (2019)	Obese	59	10.9 ± 2.4	38%	91.27 ± 97.7	57.00 ± 48.5	173.97 ± 37.23 mg/dl	NA
	Non-obese	47	10.1 ± 2.8	40%	16.28 ± 9.8	26.40 ± 11.8	146.65 ± 59.07 mg/dl	NA
Cho Y (2015)	Obese	52	13.0 (3.5–17.6)	26.9%	75 ± 83	48 ± 45	NA	149 ± 73 mg/dl
	Non-obese	107	11.2 (1.3-17)	49.5%	17 ± 14	24 ± 7	NA	97 ± 65 mg/dl

Figure 1: Forest plot of of the effect in Liver stiffness Measurement (kPa)