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Longitudinal Patterns of Muscle Mass According to Statin Use in Patients with Diabetes

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Introduction

- Diabetes mellitus is frequently accompanied by progressive skeletal muscle loss, accelerated by metabolic factors such as insulin resistance.
- Given the prevalent use of statins for cardiovascular risk management in this metabolically vulnerable population, understanding their long-term impact on muscle health is crucial.
- Previous studies have primarily focused on cross-sectional measures or absolute muscle quantities, largely overlooking longitudinal changes and body size–adjusted indices.
- Therefore, we investigated longitudinal patterns of absolute muscle measures (upper limb, lower limb, and appendicular lean mass) versus a body size–adjusted index, the skeletal muscle index (SMI), according to statin use among patients with diabetes.

Methods

- We conducted a retrospective longitudinal study of adults with diabetes who underwent repeated body composition assessments.
- A total of 138 patients were included and categorized into statin users (n = 96) and non-users (n = 42).
- Skeletal muscle parameters included upper limb lean mass, lower limb lean mass, appendicular lean mass, and SMI.
- Longitudinal trajectories across visits were estimated using linear mixed models with random intercepts and an autoregressive covariance structure.
- Additional models were adjusted for age and sex to account for potential confounders.

Results

- In this diabetic cohort, longitudinal changes in absolute skeletal muscle mass (upper limb, lower limb, and appendicular lean mass) did not differ significantly between statin users and non-users in either unadjusted or age- and sex-adjusted models.
- By contrast, SMI showed a significant time-by-statin interaction in both unadjusted (Δ slope = +0.120, p for interaction = 0.032) and age- and sex-adjusted models (Δ slope = +0.107, p for interaction = 0.038) (Table 1, Figure 1, 2).
- This indicates a steeper decline in body size–adjusted muscle mass among statin users compared with non-users, despite comparable trajectories of absolute lean mass.

Table 1. Time effects and statin-by-time interactions for skeletal muscle outcomes from linear mixed models in patients with diabetes. (Unadjusted vs. adjusted models).

Outcome	Model	Statin users slope (95% CI)	Non-statin users slope	Δ slope (Non-statin − Statin) (95% CI)	*p* for interaction
Upper limb lean mass	Unadjusted	−0.047 (−0.109 to 0.016)	+0.037	+0.084 (−0.042 to 0.209)	0.189
	Adjusted*	−0.011 (−0.075 to 0.053)	+0.077	+0.088 (−0.037 to 0.213)	0.167
Lower limb lean mass	Unadjusted	−0.200 (−0.278 to −0.122)	−0.105	+0.095 (−0.063 to 0.252)	0.236
	Adjusted*	−0.105 (−0.191 to −0.019)	−0.006	+0.099 (-0.057 to 0.256)	0.211
Appendicular lean mass	Unadjusted	−0.196 (−0.299 to −0.093)	−0.060	+0.136 (−0.071 to 0.344)	0.196
	Adjusted*	−0.071 (−0.187 to 0.044)	+0.072	+0.143 (-0.065 to 0.350)	0.176
Skeletal muscle index (SMI)	Unadjusted	−0.108 (−0.163 to −0.053)	+0.012	+0.120 (0.010 to 0.230)	**0.032**
	Adjusted*	−0.081 (−0.132 to −0.029)	+0.026	+0.107 (0.006 to 0.207)	**0.038**

** Adjusted for age and sex from linear mixed models.*

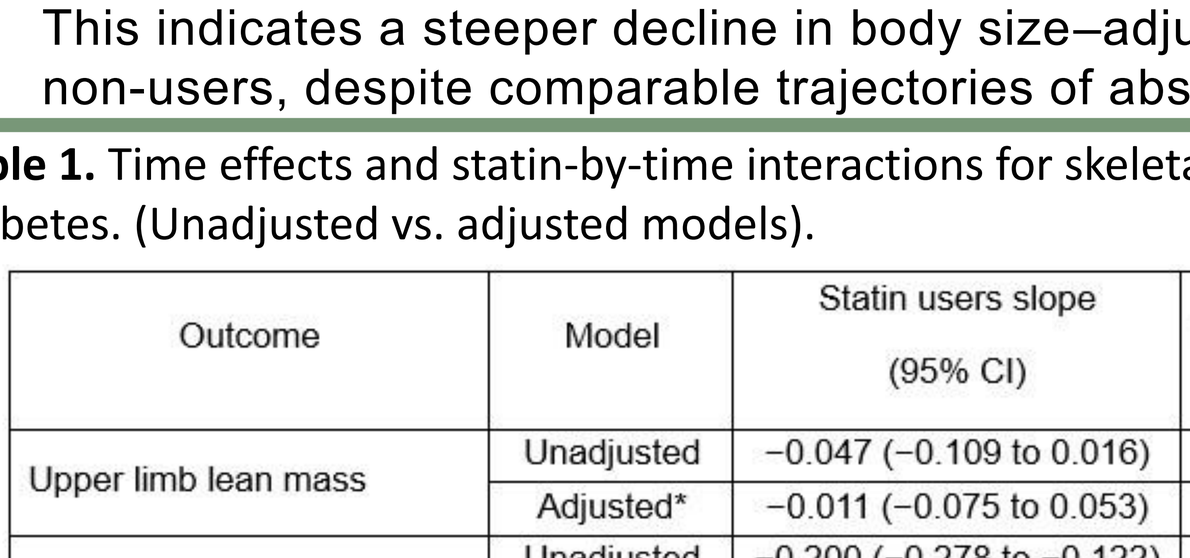

Figure 1. Longitudinal trajectories of skeletal muscle outcomes according to statin use, estimated from unadjusted linear mixed models.

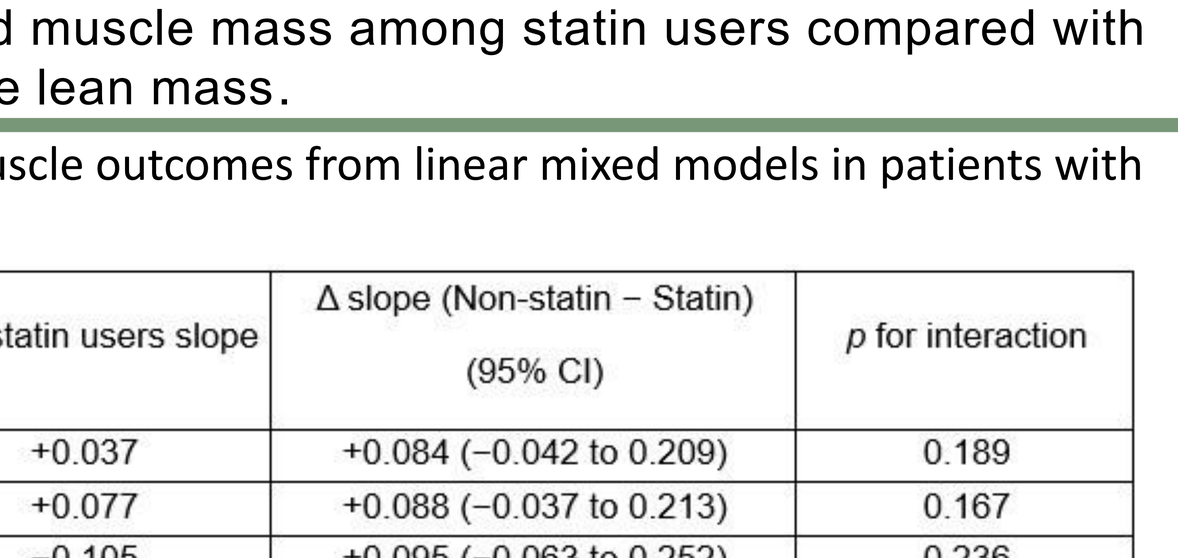

Figure 2. Longitudinal trajectories of skeletal muscle outcomes according to statin use, estimated from age- and sex-adjusted linear mixed models.

Conclusion

- In patients with diabetes, statin use was not associated with differential longitudinal changes in absolute skeletal muscle mass, but it was linked to a less favorable trajectory of SMI.
- These findings suggest that relative muscle depletion may occur in statin-treated patients even when absolute lean mass appears preserved.
- Monitoring body size–adjusted indices such as SMI may help detect subtle muscle deterioration in this high-risk population, providing additional insights into statin-related muscle changes.
- Further research is needed to clarify the clinical significance of these findings.