A chronic high-fat diet does not exacerbate muscle atrophy in fast-twitch skeletal muscle of aged mice.

Abstract

NEW FINDINGS: What is the central question of this study? Ageing leads to a loss of mass in skeletal muscle, but the effect of obesity on ageing-related muscle wasting is unclear. In this study, we aimed to demonstrate the specific effect of obesity on fast-twitch skeletal muscle in ageing. What is the main finding and its importance? Our findings show that the obesity induced by long-term ingestion of a high-fat diet does not aggravate muscle wasting in fast-twitch skeletal muscle of aged mice, indicating that the present study provides morphological characteristics for skeletal muscle of sarcopenic obesity. ABSTRACT: Obesity and ageing reduce muscle mass and lead to deficits in muscle maintenance, but it is not known whether obesity accelerates muscle wasting additively in the setting of ageing. We investigated morphological characteristics in fast-twitch extensor digitorum longus (EDL) muscle of mice fed a low-fat diet (LFD) or a high-fat diet (HFD) for 4 or 20 months. The fast-twitch EDL muscle was harvested, and the muscle fibre-type composition, individual muscle cross-sectional area and myotube diameter were measured. We found an increase in the percentage of type IIa and IIx myosin heavy chain fibres in the whole EDL muscle, but a decrease in type IIB myosin heavy chain in both HFD protocols. The cross-sectional area and myofibre diameter were lower in both groups of aged mice (after 20 months of LFD or HFD) compared with young mice (after 4 months of the diets), but there were no differences between mice fed LFD or HFD for 20 months. These data suggest that long-term feeding of HFD does not aggravate muscle wasting in fast-twitch EDL muscle of male mice.