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Comparable prevalence and characteristics of peripheral neuropathy in obese subjects and long-standing type 1 diabetes

Aim. The objective of the study was to compare the prevalence and characteristics of peripheral neuropathy in patients with obesity (without dysglycaemia) and long-standing type 1 diabetes (T1DM).
Methods. 130 participants (28 healthy volunteers, age: 43 years), 51 non-obese patients with T1DM (duration: 23.4 years, age: 49.9 yrs) and 51 subjects with obesity and no diabetes or previous bariatric surgery (BMI: 42.9 kg/m^2, age: 48.2 years) were included in the cross-sectional study. Participants underwent assessment of body composition [total body fat (FM%)], respiratory quotient (RQ) through an open-circuit portable indirect calorimeter, Neuropathy Disability Score (NDS), Neuropathy Symptom Profile (NSP), neuropathic pain intensity (VAS), vibration perception thresholds (VPT), and sural nerve conduction velocity (SNCV) and amplitude (SNAP) using the NC-Stat DPNCheck system.
Results. Peripheral neuropathy (according to Toronto Consensus criteria) was present in 43.1% of T1DM patients and in 33% of patients with obesity of whom 31.4% and 19.6% had VPT values ≥25 V, reflecting high risk for foot ulceration, respectively. The obese group had higher NDS, VAS, NSP and VPT (for all p<0,001), and lower SNCV and SNAP (p<0.001) compared to healthy subjects while these measures were comparable to those of T1DM patients. VPT showed significant correlations with NSP, VAS, with waist circumference, age, FM%, HbA1c, serum lipids and blood pressure. Waist circumference and FM% were significantly higher in obese patients with peripheral neuropathy than without. After adjustment for age, VPT was positively associated with waist circumference, FM% and HbA1c but no correlations with RQ were detected in the obese group.
Conclusions. Characteristics of peripheral neuropathy in obese people with normoglycaemia are similar to those in patients with long-standing T1DM. Besides, metabolic factors linked to obesity may play an important role in the development of peripheral neuropathy.

Comments. There are accumulating data that obesity plays a pivotal role in the development of peripheral neuropathy. In the EURODIAB study, higher BMI was associated with peripheral neuropathy in T1DM patients. The ADDITION study showed that abdominal obesity was an independent predictor of peripheral neuropathy in newly diagnosed T2DM patients. The Rotterdam study has also confirmed the association between obesity and peripheral sensory dysfunction even in the absence of diabetes.
The present study brings new data on prevalence and features of obesity-related peripheral neuropathy. Higher waist circumference, BMI, total body fat percentage were independent risk factors for higher VPT in people with obesity. The comparable prevalence and phenotype of peripheral neuropathy in obesity and long-standing T1DM also implies that low-grade inflammation, endothelial dysfunction and metabolic changes accompanying obesity may be as important as dysglycaemia in the development of peripheral neuropathy. The study is well-designed and the aims are clear and relevant. The study cohort is very well defined. Limitation of the study is its cross-sectional design not allowing the evaluation of a causative relationship between obesity and neuropathy. Moreover, data on obstructive sleep apnoea syndrome were not available, which could affect data, as well as small-fibre function was not assessed. If we take into consideration that obesity-related peripheral neuropathy was mostly found to affect small nerve fibres in previous studies, the prevalence of neuropathy might be even higher in this cohort of patients with obesity. In summary, the article investigates relevant questions in a well-defined cohort of patients. As obesity is a pandemic with a worldwide rapidly increasing prevalence, recognizing its complications and the risk factors of these complications is of emergent importance.

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Reference. Lim JZM, Burgess J, Ooi CG, Ponirakis G, Malik RA, Wilding JPH, Alam U. The Peripheral Neuropathy Prevalence and Characteristics Are Comparable in People with Obesity and Long-Duration Type 1 Diabetes. Adv Ther 2022 Sep;39(9):4218-4229. doi: 10.1007/s12325-022-02208-z. Epub 2022 Jul 22. PMID: 35867275; PMCID: PMC9402741.
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