# Diet and lifestyle in patients with neuromuscular disorders and their impact on clinical parameters and quality of life: a narrative systematic literature review.

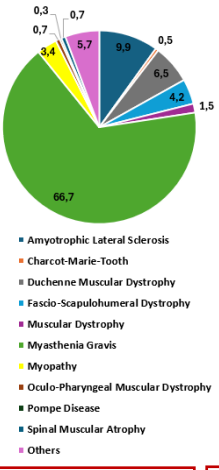
S. Marconi[1#*], G. Gilberti [1,2#], B. Zanini[1], M. Marullo[1], G. Montani[3], B. Risi[2], M. Castellano[1], A. Padovani[1,4], M. Filosto[1,2,4].
#= equally contribution
1 Department of Clinical and Experimental Sciences, University of Brescia, 25123, Brescia, Italy.
2 NeMO-Brescia Clinical Center for Neuromuscular Diseases, 25065 Gussago, Brescia, Italy.
3 Dietetics and Clinical Nutrition Service, ASST Spedali Civili, 25123 Brescia, Italy.
4 Unit of Neurology, ERN EURO-NMD Center ASST Spedali Civili, 25123 Brescia, Italy.

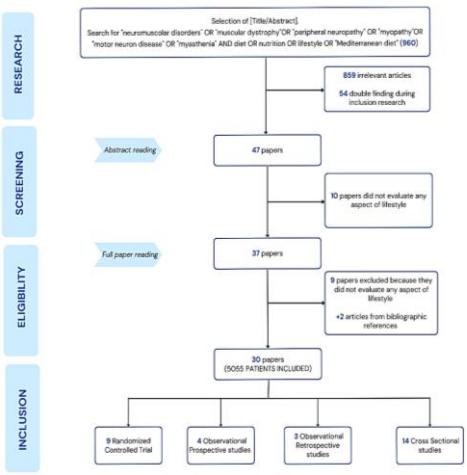
## NEUROMUSCULAR DISORDERS (NMDs)


This qualitative systematic review, performed on PubMed, Web of Science, and Scopus following PRISMA guidelines, aimed to investigate the **relationship between diet and lifestyle, the progression of NMDs and the quality of life (QoL).**

This systematic review included 30 articles, with a total of 5055 patients.

### Pathological Conditions




### Demographic data

**Age**: 90.9% of patients with available data (94.8% adults; 5.2% under age).

**Gender**: 98.9% of patients with available data (51.7% females; 48.3% males).

**Ethnicity:** 37.3% of patients with available data (95.8% Asian, 4% Caucasian, 0.1% African and Hispanic).

**Education level:** 45% of patients with available data (38.3% university degree, 25.9% secondary degree, 23% primary school degree, 10.2% low education and 0.09% no education).

### Clinical data

**Steroid treatment**: 80.1% of patients with available data (40.3% on therapy).

**Supplementation**: 15.1% of patients with available data (24.5% Vitamins, 11.8% Vitamin D, 9.6% Minerals and 3.1% Calcium; no protein supplements).

**Type of nutrition**: 22.4% of patients with available data (94% fed orally; 5.2% artificially).

**Gastrointestinal disorders**: 41% of patients with available data (10.4% dysphagia or swallowing problems, 3.5% diarrhea, 3% constipation, 2.5% gastrointestinal reflux, 0.9% nausea and 0.4% vomiting).

**Comorbidities:** 64.8% of patients with available data (19.1% hypertension, 16.3% neuropsychiatric disorders, 13.7% osteoporosis, 7.6% dyslipidemia, 6.3% type-2-diabetes, 4.8% respiratory diseases, 2.5% cardiovascular disease and 0.8% liver involvement).

| **BMI** (kg/m$^2$) or **Z score n (%)** | |
|---|---|
| N. of patients with available data | 2912 (57.6) |
| N. of data expressed as mean, standard deviation or median | 2399 (82.4) |
| Data of BMI category | 513 (17.6) |
| Underweight | 68 (13.2) |
| Normal weight | 246 (48.0) |
| Overweight | 143 (27.9) |
| Obese (>30) | 56 (10.9) |
| **Waist circumference** | |
| N. of patients with available data | 211 (4.2) |
| Mean, standard deviation or median | 211 (100) |
| **Body composition (Fat Mass - Lean Mass)** | |
| N. of patients with available data n (%) | 307 (6.1) |
| **Screening for malnutrition** | |
| N. of patients with available data n (%) | 234 (4.6) |
| At risk for severe malnutrition | 64 (27.3) |

| **Lifestyle aspects n of articles (%)** | |
|---|---|
| Diet/Food habits | 21 (70) |
| Physical activity | 16 (53.3) |
| Sleep quality | 2 (6.7) |
| Addictions (smoking and/or alcohol) | 2 (6.7) |
| Emotional perception and care | 11 (36.7) |
| **Diet/Eating habits** | |
| N. of patients with available data n (%) | 1299 (25.7) |
| **Physical Activity** | |
| N. of patients with available data n (%) | 4220 (83.5) |
| **Sleep quality** | |
| N. of patients with available data n (%) | 807 (16.0) |
| **Addictions** | |
| N. of patients with available data n (%) | 189 (3.7) |
| Current smokers | 17(4.2) |
| Current drinkers | 24 (6.0) |
| **Emotional perception and care** | |
| N. of patients with available data n (%) | 3219 (63.7) |

### Results:

- **Calories, proteins, lipids and fibers, as well as vitamin C, vitamin E, zinc, selenium and calcium were lower than recommended.**
- **A reduced consumption of fruits and vegetables, legumes, nuts and seeds, replaced by discretionary ultra-processed foods, has also been detected.**
- **High-caloric, nutrient-dense and Mediterranean diets showed potential benefits in both mitigating oxidative stress and muscle degeneration.**
- **Although physical activity was associated with improved motor performance and QoL, adherence was low, particularly among female patients.**
- **Negative emotional status emerged as a critical, but often neglected, factor influencing patients' overall well-being.**

### Conclusion:

This qualitative review underscores how taking charge of diet quality, nutrition and lifestyle (physical movement, emotional condition and sleep) could support NMDs patients throughout the disease course and improve their QoL.
The active involvement of caregivers could also improve the QoL of these families.