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The official journal of the European Society of Parental and Enteral Nutrition, *Clinical Nutrition* is an international journal providing essential scientific information on nutritional and metabolic care and the relationship between nutrition and disease both in the setting of basic science and clinical practice. Published bi-monthly, each issue combines original articles, reviews and educational papers providing an invaluable reference for any specialist concerned with these fields.

Nutrition and nutritional care have gained wide clinical and scientific interest during the past decades. The increasing knowledge of metabolic disturbances and nutritional assessment in chronic and acute diseases has stimulated rapid advances in design, development and clinical application of nutritional support. The aims of ESPEN are to encourage the rapid diffusion of knowledge and its application in the field of clinical nutrition and metabolism.

Being the journal of ESPEN with members from various interests, either focused on basic research or clinical disciplines, the journal reflects the scientific nature of this multidisciplinary background and encourages the coordination of investigation and research from these disciplines. The journal publishes **guidelines, consensus statements, review papers, original articles, short communications, and letters to the Editor** on those factors in acute and chronic diseases, which have metabolic and nutritional implications. It also publishes scientific works related to the development of new techniques and their application in the field of clinical

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15 April 2011

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Hand grip strength: Outcome predictor and marker of nutritional status

[Kristina Norman](#)  [Nicole Stobäus](#), [M. Cristina Gonzalez](#), [Jörg-Dieter Schulzke](#), [Matthias Pirlich](#)

Received 7 July 2010, accepted 23 September 2010, published online 11 October 2010.

Summary

Background & aims

Among all muscle function tests, measurement of hand grip strength has gained attention as a simple, non-invasive marker of muscle strength of upper extremities, well suitable for clinical use. This review outlines the prognostic relevance of grip strength in various clinical and epidemiologic settings and investigates its suitability as marker of nutritional status in cross-sectional as well as intervention studies.

Methods

Studies investigating grip strength as prognostic marker or nutritional parameter in cross-sectional or intervention studies were summarized.

Results and conclusions

Numerous clinical and epidemiological studies have shown the predictive potential of hand grip strength regarding short and long-term mortality and morbidity. In patients, impaired grip strength is an indicator of increased postoperative complications, increased length of hospitalization, higher rehospitalisation rate and decreased physical status. In elderly in particular, loss of grip strength implies loss of independence. Epidemiological studies have moreover demonstrated that low grip strength in healthy adults predicts increased risk of functional limitations and disability in higher age as well as all-cause mortality.

As muscle function reacts early to nutritional deprivation, hand grip strength has also become a popular marker of nutritional status and is increasingly being employed as outcome variable in nutritional intervention studies.

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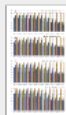
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Hypotheses for the pathogenesis of impaired muscle function in malnutrition.

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Volume 30, Issue 2, Pages 135-142, April 2011

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6. Outcome associated with impaired muscle function

The predictive power of muscle function, and hand grip strength in particular, has been demonstrated in numerous clinical as well as epidemiological studies (see [Table 1](#)).

Table 1. Cut off values and outcome prediction of hand grip strength in clinical and epidemiological studies.

Author	N	Setting/patients	Outcome prediction
Clinical studies			
Klidjian et al. ¹⁸	225	Major abdominal surgery	HGS <85% of standard value (derived from control group) predicted complications in 48 of the 55 patients (87%) who developed them
Webb et al. ¹⁹	90	General surgery	HGS <85% standard for age and sex (derived from control group) predicted 74% of the complications
Guo et al. ⁴⁶	127	Oral and maxillofacial cancer surgery	Patients with HGS < 85% of control value (derived from control group) developed significantly more postoperative complications (48 vs. 18%, $p < 0.05$)
Hunt et al. ¹⁷	205	General surgery	Patients with HGS < 85% of standard developed significantly more postoperative complications (26 vs. 7%, $p < 0.0001$) and total as well as postoperative LOS ($p < 0.001$)
Humphreys et al. ¹⁶	50	General surgery and internal medicine	Predictive of decline in functional status ($\beta = 0.448$, $p < 0.001$)
Kerr et al. ⁴⁸	120	Elderly patients (75–101 years)	Predictive of LOS: 1 kg increase in grip strength was associated with a 3% increase in likelihood of discharge to usual residence (gender-adjusted hazard ratio, HR per kg increase in grip strength: 1.03 (CI 1.001–07)
Vecchiarino et al. ⁴⁹	213	Predominantly elderly patients (72.5 ± 16.5 years) with community-acquired pneumonia	Grip strength ≤ 10 kg: OR of discharge to home: 4.670 (CI 2.102–10.375) OR death within 30 days of discharge: 0.370 (CI 0.149–0.992)
Bohannon et al. ⁵⁰	153	Elderly with community-acquired pneumonia	Predictive of death and/or readmission within one year of discharge. Grip strength correctly classified 75.2% of patients relative to that outcome; OR: 0.969 (CI 0.948 0.987)
Epidemiological studies			
Rantanen et al. ⁸⁵	6089	45–68-year-old men healthy at baseline	Lowest tertile of HGS: increased risk of functional limitations and disability; OR: 2.87 (CI 1.76–4.67) within 25 years
Rantanen et al. ⁸⁶	6040	45–68-year-old men healthy at baseline	Lowest tertile of HGS: increased long-term mortality within 30 years independent of BMI class: OR: 1.36 (CI 1.14–1.63) for BMI group <20; OR: 1.25 (CI 1.08–1.45) for BMI 20–24.9; OR: 1.27 (CI 1.08–1.49) for BMI ≥ 25

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Cited in Scopus: 0				
<input type="checkbox"/> Antihypercholesterolemic property of naringin alters plasma and tissue lipids, cholesterol-regulating enzymes, fecal sterol and tissue morphology in rabbits	Seon-Min S.-M. Jeon, Yong Bok Y.B. Park, Myung-Sook M.-S. Choi	Full-length article	October 2004	Clinical Nutrition Vol. 23, Issue 5, Pages 1025-1034
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