SUPPLEMENTARY CONTENTS

Table 2. Data Extraction

No	Author and Year	Country	Design	Sample	Intervention	Duration of Intervention	Conclusion
1.	Radovanovic et al., (2025)	Italy	Multicentre, Randomized, Single-Blind, Placebo-Controlled Trial	**Total: 150 patients** Intervention Group: n=76 Control Group: n=74	**Intervention Group:** 2x/day, Oral supplementation with 1.66 g of L-arginine and 500 mg of liposomal vitamin C (Bioarginine-C™) **Placebo Group:** Matching placebo.	4 weeks	The addition of oral L-arginine supplementation to standard inhalation therapy has been shown to improve dyspnea and enhance activities of daily living in patients with chronic obstructive pulmonary disease.
2.	Conway et al., (2024)	Australia	A Randomized Controlled Pilot Study	**Total: 33 patients** Intervention Group: n=12 Control Group: n=21	**Intervention Group:** Individualized dietary counselling + 2x/day, consume powdered supplementation 200 ML containing 450 kkal dan 27,6 g protein. **Control Group:** Individualized dietary counselling + recommended to purchase powdered supplementation.	12 Weeks	Nutritional support has been demonstrated to significantly improve both the nutritional status and quality of life in malnourished patients with chronic obstructive pulmonary disease.
3.	Baggs et al., (2023)	United States	A Randomized, Placebo-Controlled, Multi-Center, Double-Blind Study	**Total: 622 patients** Intervention Group: n=313 Control Group: n=309	**Intervention Group:** Standard care + 2x/day, consume nutrient-dense ready-to-drink liquid (237 mL) contained 350 kcal, 20 g protein, 11 g fat, 44 g carbohydrate, 1.5 g beta-hydroxy-beta-methyl butyrate plus 160 IU vitamin D and other essential micronutrients **Control Group:** Standard care + 2x/day, consume nutrient-dense ready-to-drink liquid contained 48 kcal, 12 g carbohydrate, and 10 mg vitamin C, but no other macro- or micronutrients	During hospitalization and for 90 days post-discharge	Consuming a nutrient-dense ready-to-drink liquid on a daily basis has been reported to enhance quality of life, including improvements in mental health, vitality, social functioning, and overall general health among individuals receiving the intervention.
4.	De Brandt et al., (2022)	Belgium	Double-Blind, Randomized, Placebo (PL)-Controlled Trial	**Total: 40 patients** Intervention group: n= 21 Control Group: n= 19	**Intervention Group:** 4x/day Oral Beta-alanine supplementation consisting 3.2 g/day (four pills of 800 mg/day) **Control Group:** maltodextrin supplementation	12 weeks	Supplementation with beta-alanine has been found to effectively elevate muscle carnosine levels in patients with chronic obstructive pulmonary disease without causing any adverse effects.
5.	Rafiq et al., (2022)	Netherlands	Multicentre, Double-Blind, Randomized Controlled Trial	**Total: 157 patients** Intervention Group: n=75 Control Group: n=82	**Intervention Group:** 1x/week, consume 16,800 IU vitamin D (3 tablets of 5600 IU) **Control Group:** Matching placebo orally once a week	1 years	Vitamin D supplementation has not been shown to decrease the frequency of exacerbations among patients with chronic obstructive pulmonary disease who are deficient in vitamin D.
6.	Engelen et al., (2022)	United States	A Randomized	**Total: 32 patients**	**Intervention Group:** Low EPA	4 weeks	Daily supplementation

No	Author and Year	Country	Design	Sample	Intervention	Duration of Intervention	Conclusion
			Double-Blind Placebo Controlled 3-Group Design	Low EPA+DHA: n=10 High EPA+DHA: n=12 Placebo: n=10	(Eicosapentaenoic Acid) + DHA (Docosahexaenoic Acid) Group: 2.0 g/day EPA+DHA and High EPA+DHA Group: 3.5 g/day EPA+DHA. **Control Group:** Placebo capsules (olive oil).		with n–3 polyunsaturated fatty acids (PUFAs) for a period of four weeks has been shown to promote a shift towards positive daily protein homeostasis in patients with chronic obstructive pulmonary disease, with effects observed to be partially dose-dependent.
7.	Camargo et al., (2021)	New Zealand	A Randomized Double-Blinded, Placebo-Controlled Trial	**Total: 775 patients** Intervention Group: n=402 Control Group: n=373	**Intervention Group:** Initial oral dose of 200,000 IU vitamin D3 followed by 100,000 IU monthly. **Control Group:** Placebo	Average follow-up of 3.3 years	Monthly vitamin D supplementation has not demonstrated a significant effect in preventing the risk of exacerbations in patients with asthma or chronic obstructive pulmonary disease.
8.	Matheson et al., (2021)	United States	Randomized Clinical Trial	**Total: 652 patients** Intervention Group: n=328 Control Group: n=324	**Intervention Group**: 2x/day, consume nutrient-dense ready-to-drink liquid containing 350 kcal, 20 g protein, 11 g fat, 44 g carbohydrate, 1.5 g calcium, and 26 other essential vitamins and minerals. C**ontrol Group:** 2x/day, consume nutrient-dense ready-to-drink liquid containing 48 kcal, 12 g carbohydrate, and 10 mg vitamin C, but no other macro- or micronutrients	During hospitalization and until 90 days after discharge	Nutritional therapy provided to patients has been shown to improve handgrip strength and further contribute to the recovery of older adults experiencing malnutrition.
9.	Deutz et al., (2021)	United States	Multicentre, Randomized, Placebo-Controlled, Double-Blind Trial	**Total: 214 patients** Intervention Group: n=109. Control Group: n=105	**Intervention Group:** Standard-of-care + 2x/day, consume nutrient-dense ready-to-drink liquid with 350 kcal, 20 g protein, 11 g fat, 44 g carbohydrate, 1.5 g calcium-HMB, 160 IU vitamin D and other essential micronutrients **Control Group:** Standard-of-care + 2x/day consume ready-to-drink liquid, contained 48 kcal, 12 g carbohydrate, and 10 mg vitamin C, but no other macro- or micronutrients.	From within 3 days of hospital admission and up to 90 days after discharge	The use of supplementation was associated with a significant decrease in mortality risk, along with enhancements in handgrip strength, body weight, and nutritional biomarkers.
10.	Ahmadi et al., (2020)	Iran	Single-blind, Randomized Clinical Trial	**Total: 44 Patients** Intervention Group: n=23 Control Group: n=21	**Intervention Group:** Daily 250ml of whey beverage fortified with magnesium and vitamin C (275 mg elemental magnesium, 685 mg vitamin C, 15.9 g whey protein) +	8 weeks	Nutritional interventions have been reported to lower levels of inflammatory cytokines, enhance skeletal muscle mass index and muscle

No	Author and Year	Country	Design	Sample	Intervention	Duration of Intervention	Conclusion
					dietary advice and routine care **Control Group:** Dietary advice and routine care		strength, and potentially improve quality of life among patients with moderate to severe chronic obstructive pulmonary disease.
11.	Nguyen et al., (2020)	Vietnam	Randomized Controlled Trial	**Total: 120 patients.** Intervention Group: n=60 Control Group: n=60	**Intervention Group:** Tailored nutrition counselling once per month 30-45 minutes for 3 months based on a specifically developed written nutrition resource **Control Group:** Received the same educational resource at baseline without any discussion	3 months	Nutritional counselling may enhance dietary intake, improve nutritional status, and positively influence functional outcomes and quality of life in malnourished individuals with chronic obstructive pulmonary disease
12.	Granados-Santiago et al., (2020)	Spain	Randomized Controlled Trial	**Total: 42 patients** Intervention group: n=21 Control Group: n=21	**Intervention Group:** Counselling on COPD self-management include pharmacological management, symptomatic control, and healthy lifestyle promotion **Control Group:** routine care	During hospitalization and until 90 days after discharge	Significant improvements were observed in the intervention group, including enhanced perceptions of health status, increased knowledge about COPD, better adherence to pharmacological treatments, improved general functioning, and healthier lifestyle measures.
13.	van Beers et al., (2020)	Netherlands	Randomized Controlled Trial	**Total: 81 patients**. Intervention Group: n= 42 Control Group: n= 39	**Intervention Group:** Phase 1 (4 months): 3 portions/day of nutritional supplement enriched with leucine, vitamin D, and polyunsaturated fatty acids. Phase 2 (8 months): 1 portion/day + motivational interviewing-based nutritional counselling. **Control Group:** Phase 1 (4 months): Placebo. Phase 2 (8 months): Structured feedback on physical activity level	12 Month	Nutritional interventions have the potential to increase plasma concentrations of supplemented nutrients, total body weight, physical activity levels, and overall health status, although they do not appear to enhance exercise capacity.

Table 3. Risk of Bias Assessment Using Cochrane Rob 2

Author (Year)	Domain 1: Bias from randomization process	Domain 2: Bias due to deviations from intended interventions	Domain 3: Bias due to missing outcome data	Domain 4: Bias in measurement of outcome	Domain 5: Bias in selection of reported result	Overall Risk of Bias
Radovanovic et al., (2025)	Low	Some concerns	Low	Some concerns	Low	Some concerns
Conway et al., (2024)	Low	Some concerns	Low	Some concerns	Low	Some concerns
Baggs et al., (2023)	Low	Low	Low	Low	Low	Low
De Brandt et al., (2022)	Low	Low	Low	Low	Low	Low
Rafiq et al., (2022)	Low	Low	Low	Low	Low	Low
Engelen et al., (2022)	Low	Low	Low	Low	Low	Low
Camargo et al., (2021)	Low	Low	Low	Some concerns	Low	Some concerns
Matheson et al., (2021)	Low	Low	Low	Low	Low	Low
Deutz et al., (2021)	Low	Low	Low	Low	Low	Low
Ahmadi et al., (2020)	Low	Some concerns	Low	Some concerns	Low	Some concerns
Nguyen et al., (2020)	Low	Some concerns	Low	Some concerns	Low	Some concerns
Granados-Santiago et al., (2020)	Low	Low	Low	Low	Low	Low
van Beers et al., (2020)	Low	Low	Low	Low	Low	Low