

Nutritional Supplements for Musculoskeletal Health

Overview

- Specific nutritional supplementation alone may benefit geriatric patients, particularly those unable to exercise [1].
- Intravenous protein or amino acid supplementation offers benefits for patients undergoing total joint arthroplasty, although effects on muscle strength and function are mixed [2].
- Glucosamine and chondroitin sulfate have an excellent safety profile [3].
- Glucosamine and chondroitin sulfate may serve as an initial treatment modality for many osteoarthritis patients [3].
- Adjuvant oral supplementation containing collagen, hyaluronic acid, chondroitin sulfate, and plasma proteins may increase the efficacy of physical therapy after anterior cruciate ligament reconstruction by shortening the time needed to return to pre-injury activity and reducing analgesic consumption [4].
- Evidence supports the efficacy of glucosamine sulfate in reducing pain, improving function, and possibly regulating joint damage in knee osteoarthritis [5].
- Glucosamine sulfate has potential to relieve pain and improve function with low side effects, but unanswered questions regarding long-term effects and dosage preclude a definitive endorsement [6].
- The lack of substantial evidence currently prevents a ringing endorsement of glucosamine and chondroitin sulfate agents [6].
- Nutritional supplementation markedly reduces hospital costs by reducing rates of ICU admissions, hospital-associated complications, and hospital-acquired infections in orthopaedic surgery [7].
- If cost is not prohibitive, glucosamine and chondroitin sulfate products may be considered reasonable treatment options as part of a multimodal approach for symptomatic primary osteoarthritis of the hand [8].
- Supplementation of n-3 polyunsaturated fatty acids is effective to relieve pain and improve joint function in patients with osteoarthritis [9].
- Conditionally essential amino acid supplementation has a protective effect against common complications and early skeletal muscle wasting after operative fixation of extremity and pelvic fractures [10].
- Perioperative nutritional optimization is associated with improved outcomes for patients undergoing spine surgery [23].

- Additional investigation is needed to determine effective perioperative nutritional protocols for spine surgery [23].
- Substantial barriers to nutritional optimization in spine surgery include inconsistent protocols and patient nonadherence, highlighting the need for multifactorial assessment and standardization of multidisciplinary nutritional protocols [17].

How It Works

- Intravenous protein or amino acid supplementation offers benefits for total joint arthroplasty, although effects on muscle strength and function are mixed [2].
- Glucosamine and chondroitin sulfate have an excellent safety profile and may serve as an initial treatment modality for many osteoarthritis patients [3].
- Adjuvant oral supplementation containing collagen, hyaluronic acid, chondroitin sulfate, and plasma proteins may increase the efficacy of physical therapy by shortening the time needed to return to pre-injury activity and reducing analgesic consumption after anterior cruciate ligament reconstruction [4].
- Glucosamine sulfate may have a synergic action with non-steroidal anti-inflammatory drugs for the treatment of knee osteoarthritis [5].
- Evidence supports glucosamine sulfate efficacy in reducing pain, improving function, and possibly regulating joint damage in knee osteoarthritis [5].
- Nutritional supplementation markedly reduces hospital costs by reducing rates of ICU admissions, hospital-associated complications, and hospital-acquired infections [7].
- Glucosamine and chondroitin sulfate products may be considered reasonable treatment options as part of a multimodal approach for symptomatic primary osteoarthritis if the cost is not prohibitive [8].
- Protein supplementation is a low-cost intervention that is easy to incorporate into perioperative management for total knee arthroplasty [11].
- Protein supplementation has beneficial effects on muscle strength that could potentially reduce the risk of longer-term complications, such as falls and periprosthetic fracture, after total knee arthroplasty [11].
- Integrating targeted nutrition into prehabilitation pathways may help reduce complications and support faster functional gains in total joint arthroplasty [12].
- Omega-3 fatty acids protect cartilage from acute injuries by reducing the mechanical sensitivity of chondrocytes [13].
- EPA supplementation could offer a promising strategy for preventing post-traumatic osteoarthritis progression following acute cartilage injuries [13].
- Protein supplementation appears to have beneficial effects on mitigating muscle atrophy in the postoperative period following anterior cruciate ligament reconstruction, total hip arthroplasty, total knee arthroplasty, and surgical treatment of hip fracture [14].

- An eight-week collagen-based supplement containing type I and type III collagen peptide and type II hydrolyzed collagen had a positive effect on pain and quality of life levels and some functional test results in patients with meniscopathy [16].

What the Evidence Shows

OSTEOARTHRITIS MANAGEMENT

- Glucosamine sulfate has the potential to relieve pain and improve function with low side effects [6].
- Unanswered questions regarding long-term effects and dosage of glucosamine sulfate preclude a definitive endorsement [6].
- A lack of substantial evidence currently prevents a ringing endorsement of glucosamine and chondroitin agents [6].
- If cost is not prohibitive, glucosamine and chondroitin products may be considered reasonable treatment options as part of a multimodal approach for symptomatic primary osteoarthritis [8].
- Oral chondroitin is more effective than placebo on relieving pain and improving physical function in osteoarthritis [19].
- Glucosamine showed an effect on stiffness outcomes in osteoarthritis [19].
- Supplementation of n-3 polyunsaturated fatty acids (omega-3 PUFAs) is effective to relieve pain and improve joint function in patients with osteoarthritis [9].

PERIOPERATIVE AND POSTOPERATIVE SUPPLEMENTATION

- Specific nutritional supplementation alone might benefit geriatric patients, especially those unable to exercise [1].
- While effects on muscle strength and function are mixed, intravenous protein or amino acid supplementation offers benefits in total joint arthroplasty [2].
- Conditionally essential amino acid (CEAA) supplementation has a protective effect against common complications and early skeletal muscle wasting after operative fixation of extremity and pelvic fractures [10].
- Beneficial effects of protein supplementation on muscle strength could potentially reduce the risk of longer-term complications, such as falls and periprosthetic fracture, after total knee arthroplasty [11].
- Protein supplementation appears to have beneficial effects on mitigating muscle atrophy in the postoperative period following ACL reconstruction, total hip arthroplasty, total knee arthroplasty, and surgical treatment of hip fracture [14].
- Oral nutritional supplementation and dietetic assistance represent low-risk interventions that may improve morbidity and mortality in hip fracture aftercare for older people [15].
- A comprehensive balanced nutrition supplement resulted in lower complication rates and mortality at 120 days postoperatively for hip fracture patients [20].

SPECIFIC SUPPLEMENT EFFICACY AND LIMITATIONS

- An eight-week collagen-based supplement had a positive effect on pain and quality of life levels and some functional test results in patients with meniscopathy [16].
- Patients do not benefit from creatine supplementation during the first 12 weeks of rehabilitation after anterior cruciate ligament reconstruction [21].

Practical Considerations

- Adjuvant oral supplementation containing collagen, hyaluronic acid, chondroitin sulfate, and plasma proteins may increase the efficacy of physical therapy after anterior cruciate ligament reconstruction by shortening the time to return to pre-injury activity [4].
- Adjuvant oral supplementation containing collagen, hyaluronic acid, chondroitin sulfate, and plasma proteins may reduce analgesic consumption after anterior cruciate ligament reconstruction [4].
- Evidence supports the efficacy of glucosamine sulfate in reducing pain and improving function in knee osteoarthritis [5].
- Glucosamine sulfate may possibly regulate joint damage in knee osteoarthritis [5].
- Glucosamine sulfate has potential to relieve pain and improve function with low side effects in osteoarthritis [6].
- Lack of substantial evidence currently prevents a ringing endorsement of glucosamine and chondroitin sulfate agents [6].
- If cost is not prohibitive, glucosamine and chondroitin sulfate may be considered reasonable treatment options as part of a multimodal approach for symptomatic primary osteoarthritis of the hand [8].
- Protein supplementation after total knee arthroplasty has beneficial effects on muscle strength [11].
- Beneficial effects of protein supplementation on muscle strength after total knee arthroplasty could potentially reduce the risk of longer-term complications such as falls and periprosthetic fracture [11].
- Oral nutritional supplementation and dietetic assistance represent low-risk interventions that may improve morbidity and mortality in older people after hip fracture [15].
- Substantial barriers to nutritional optimization in spine surgery include inconsistent protocols and patient nonadherence [17].
- Standardization of multidisciplinary nutritional protocols is needed in spine surgery [17].
- Use of low-cost commercially available amino acid supplementation resulted in fewer overall complications postoperatively [18].
- Amino acid supplementation is a low-risk intervention for the patient population studied [18].

Key Evidence

- [L1] This study shows proof-of-principle that specific nutritional supplementation alone might benefit geriatric patients, especially relevant for those who are unable to exercise. [1] ([10.1016/j.jamda.2015.05.021](#))
- [L1] While effects on muscle strength and function are mixed, intravenous supplementation offers benefits. [2] ([10.1186/s13018-025-05847-4](#))
- [L2] The excellent safety profile of these supplements should be discussed with patients, and they may serve a role as an initial treatment modality for many OA patients. [3] ([10.1016/j.arthro.2008.07.020](#))
- [L1] Adjuvant oral supplementation may increase the efficacy of physical therapy by shortening the time needed to return to pre-injury activity and the analgesic consumption. [4] ([10.1177/2325967118s00040](#))
- [L4] The evidence supports efficacy in reducing pain, improving function, and possibly regulating joint damage. [5] ([10.1186/s12891-022-06046-6](#))
- [L5] The authors conclude that while glucosamine sulfate has potential to relieve pain and improve function with low side effects, unanswered questions regarding long-term effects and dosage preclude a definitive endorsement, and the lack of substantial evidence currently prevents a ringing endorsement of these agents. [6] ([10.5435/00124635-200109000-00009](#))
- [L4] Nutritional supplementation has been shown to markedly reduce hospital costs by reducing rates of ICU admissions, hospital-associated complications, and hospital-acquired infections. [7] ([10.5435/jaaos-d-23-00300](#))
- [L4] If the cost is not prohibitive, these products may be considered reasonable treatment options as part of a multimodal approach for symptomatic primary osteoarthritis. [8] ([10.1016/j.jhsa.2013.05.017](#))
- [L1] Supplementation of n-3 PUFAs is effective to relieve pain and improve joint function in patients with OA. [9] ([10.1186/s13018-023-03855-w](#))
- [L1] CEAA supplementation has a protective effect against common complications and early skeletal muscle wasting after operative fixation of extremity and pelvic fractures. [10] ([10.2106/jbjs.21.01014](#))
- [L5] Protein supplementation is a low-cost intervention that is easy to incorporate into perioperative management, and the beneficial effects on muscle strength could potentially reduce the risk of longer-term complications, such as falls and periprosthetic fracture. [11] ([10.2106/jbjs.22.01357](#))
- [L4] Integrating targeted nutrition into prehabilitation pathways may help reduce complications and support faster functional gains. [12] ([10.1016/j.arth.2026.03.088](#))
- [L5] The findings suggest that EPA supplementation could offer a promising strategy for preventing PTOA progression following acute cartilage injuries. [13] ([10.1186/s13018-024-05081-4](#))
- [L1] Protein supplementation appears to have beneficial effects on mitigating muscle atrophy in the postoperative period following ACLR, THA, TKA, and surgical treatment of hip fracture. [14] ([10.1177/2325967123s00326](#))
- [L1] However, oral nutritional supplementation and dietetic assistance represent low-risk interventions that may improve morbidity and mortality. [15] ([10.1097/corr.0000000000000658](#))

- [L1] The results of the study showed that the eight-week collagen-based supplement had a positive effect on pain and quality of life levels and some functional test results in patients with meniscopathy. [16] ([10.1186/s12891-024-08244-w](#))
- [L4] Despite these benefits, substantial barriers like inconsistent protocols and patient nonadherence remain, highlighting the need for multifactorial assessment and standardization of multidisciplinary nutritional protocols. [17] ([10.5435/jaaos-d-25-00757](#))
- [L5] The use of the low-cost commercially available amino acid supplement resulted in fewer overall complications postoperatively and was a low-risk intervention for their patient population. [18] ([10.2106/jbjs.22.00078](#))
- [L1] Oral chondroitin is more effective than placebo on relieving pain and improving physical function, while glucosamine showed effect on stiffness outcome. [19] ([10.1186/s13018-018-0871-5](#))
- [L1] The comprehensive balanced nutrition supplement resulted in lower complication rates and mortality at 120 days postoperatively. [20] ([10.1097/01.blo.0000224054.86625.06](#))
- [L1] The results demonstrate that patients do not benefit from creatine supplementation during the first 12 weeks of rehabilitation after ACL reconstruction. [21] ([10.1177/0363546503261731](#))
- [L4] Perioperative nutritional optimization has been associated with improved outcomes for patients undergoing spine surgery, but additional investigation is needed to determine effective perioperative nutritional protocols. [23] ([10.5435/jaaos-d-24-01101](#))

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