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Number 89

Effects of Omega-3 Fatty Acids on Lipids and Glycemic Control in Type II Diabetes and the Metabolic Syndrome and on Inflammatory Bowel Disease, Rheumatoid Arthritis, Renal Disease, Systemic Lupus Erythematosus, and Osteoporosis

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Preface

The Agency for Healthcare Research and Quality (AHRQ), through its Evidence-based Practice Centers (EPCs), sponsors the development of evidence reports and technology assessments to assist public- and private-sector organizations in their efforts to improve the quality of health care in the United States. This report on Effects of Omega-3 Fatty Acids on Lipids and Glycemic Control in Type II Diabetes and the Metabolic Syndrome and on Inflammatory Bowel Disease, Rheumatoid Arthritis, Renal Disease, Systemic Lupus Erythematosus, and Osteoporosis was requested and funded by the Office of Dietary Supplements, National Institutes of Health, through the EPC Program at the Agency for Healthcare Research and Quality. The reports and assessments provide organizations with comprehensive, science-based information on common, costly medical conditions and new health care technologies. The EPCs systematically review the relevant scientific literature on topics assigned to them by AHRQ and conduct additional analyses when appropriate prior to developing their reports and assessments.

To bring the broadest range of experts into the development of evidence reports and health technology assessments, AHRQ encourages the EPCs to form partnerships and enter into collaborations with other medical and research organizations. The EPCs work with these partner organizations to ensure that the evidence reports and technology assessments they produce will become building blocks for health care quality improvement projects throughout the Nation. The reports undergo peer review prior to their release.

AHRQ expects that the EPC evidence reports and technology assessments will inform individual health plans, providers, and purchasers as well as the health care system as a whole by providing important information to help improve health care quality.

We welcome written comments on this evidence report. They may be sent to: Director, Center for Outcomes and Evidence, Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, MD 20850.

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The authors of this report are responsible for its content. Statements in the report should not be construed as endorsement by the Agency for Healthcare Research and Quality or the U.S. Department of Health and Human Services of a particular drug, device, test, treatment, or other clinical service.

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Chapter 1 was written in collaboration with the Tufts-New England Medical Center Evidence-based Practice Center.

Structured Abstract

Context: Clinical trials report differing effects of omega-3 fatty acids on lipids and glycemic control in type II diabetes and the metabolic syndrome and on inflammatory bowel disease (IBD), rheumatic arthritis, renal disease, systemic lupus erythemosus (SLE), and osteoporosis.

Objectives: To assess the effect of omega-3 fatty acids on 1) total cholesterol, LDL cholesterol, HDL cholesterol, triglycerides, and insulin resistance in type-II diabetes and the metabolic syndrome, 2) clinical score, sigmoidoscopic score, histologic score and requirement for immunosuppressive therapy in IBD, 3) pain, swollen and tender joint counts, acute phase reactants, patient global assessment, and requirement for anti-inflammatory or immunosuppressive therapy in rheumatoid arthritis, 4) renal function, progression to end-stage renal disease, hemodialysis graft patency, mortality, and requirement for immunosuppressive therapy in renal disease, 5) disease activity, damage, patient's perception of disease activity, and requirement for immunosuppressive therapy in SLE, and 6) bone mineral density and fracture rates.

Data Sources: We searched on-line databases to identify potentially relevant studies and contacted industry experts for unpublished data.

Study Selection: We screened 4,212 titles, reviewed 1,097 articles, and included 83 articles. We restricted to randomized controlled trials (RCTs), but included case-control and cohort studies for bone/fracture. We had no language restrictions.

Data Extraction: We abstracted data on study design, study population, and outcomes; source, amount, and duration of omega-3 fatty acid consumption; and randomization, dropouts, blinding, and allocation for RCTs.

Data Synthesis: We performed meta-analyses for diabetes, rheumatoid arthritis, and IBD; and qualitative analyses for the other conditions.

For diabetes, omega-3 fatty acids had a favorable effect on triglyceride levels but no significant effect on total cholesterol, HDL cholesterol, LDL cholesterol, fasting blood sugar, or glycosylated hemoglobin. There was no effect on plasma insulin or insulin resistance in type II diabetics or the metabolic syndrome.

For IBD, omega-3 fatty acids had variable effects on clinical score, sigmoidoscopic score, histologic score, induced remission, and relapse, and no effect on the relative risk of relapse in ulcerative colitis. There was a statistically non-significant reduction in requirement for corticosteroids. No studies evaluated requirement for other immunosuppressive agents.

For rheumatoid arthritis, omega-3 fatty acids had no effect on patient report of pain, swollen joint count, Erythrocyte Sedimentation Rate, and patient's global assessment. There was no effect on joint damage, contrary to a previous meta-analysis. There was a reduced requirement for anti-inflammatory drugs or corticosteroids. No studies assessed requirements for disease modifying antirheumatic drugs.

For renal disease, omega-3 fatty acids had varying effects on serum creatinine and creatinine clearance. Single studies respectively demonstrated reduced progression to end-stage renal disease and improvements on hemodialysis graft patencyrelative. No studies assessed requirements for corticosteroids or other immunosuppressive drugs.

For SLE, omega-3 fatty acids had variable effects on clinical activity. No studies assessed the effect on end organ damage, patient perception of disease, or requirements for other immunosuppressive drugs. One study showed no effect on corticosteroid requirements.

For bone mineral density, the effect of omega-3 fatty acids was variable. No studies assessed the effect on fracture.

Conclusions: The evidence for effects of omega-3 fatty acids on outcomes in the conditions assessed varies greatly. Omega-3 fatty acids appear to reduce serum triglycerides among type II diabetics, but have no effect on total cholesterol, HDL cholesterol, and LDL cholesterol. There appears to be no effect on most clinical outcomes in rheumatoid arthritis, although tender joint count may be reduced. There are insufficient data to draw conclusions about IBD, renal disease, SLE, bone density or fractures, requirement for anti-inflammatory or immunosuppressive drugs, or insulin resistance among type II diabetics.

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