Nutritional Interventions in Heart Failure: A Systematic Review of the Literature

MARTHA ABSHIRE, MS, RN,[1] JIAYUN XU, PhD, RN,[1,2] DIANA BAPTISTE, DNP, RN,[3] JOHANA R. ALMANSA, MSN ANP-BC, RN,[4] JINGZHI XU, BSN, RN,[1] ABBY CUMMINGS, RN, FNP,[4] MARTHA J. ANDREWS, PhD,[5] AND CHERYL DENNISON HIMMELFARB, PhD, RN, ANP[3]

Baltimore, Maryland and Salt Lake City, Utah

ABSTRACT

Background: Heart failure (HF) is a major health care burden and there is a growing need to develop strategies to maintain health and sustain quality of life in persons with HF. The purpose of this review is to critically appraise the components of nutrition interventions and to establish an evidence base for future advances in HF nutrition research and practice.

Methods and Results: Cinahl, Pubmed, and Embase were searched to identify articles published from 2005 to 2015. A total of 17 randomized controlled trials were included in this review. Results were divided into 2 categories of nutrition-related interventions: (1) educational and (2) prescriptive. Educational interventions improved patient outcomes such as adherence to dietary restriction in urine sodium levels and self-reported diet recall. Educational and prescriptive interventions resulted in decreased readmission rates and patient deterioration. Adherence measurement was subjective in many studies. Evidence showed that a normal-sodium diet and 1-liter fluid restriction along with high diuretic dosing enhanced B-type natriuretic peptide, aldosterone, tumor necrosis factor α, and interleukin-6 markers.

Conclusions: Educational nutrition interventions positively affect patient clinical outcomes. Although clinical practice guidelines support a low-sodium diet and fluid restriction, research findings have revealed that a low-sodium diet may be harmful. Future research should examine the role of macronutrients, food quality, and energy balance in HF nutrition. (*J Cardiac Fail 2015;21:989–999*)

Key Words: Diet, sodium restriction, fluid restriction.

Heart failure (HF) is an international public health concern with increasing prevalence and direct health costs. Currently >5 million people in the United States and an estimated 23 million people worldwide are living with HF.[1] By 2030 an estimated 8 million people or 1 out of 33 individuals will have HF in the United States, and medical costs are expected to more than double.[2] Within the context of rapidly developing health care technologies that prolong the lives of persons with HF, there is a growing need to develop strategies to maintain health and sustain quality of life.

There are 6 nutrients that are essential to nutrition: carbohydrates, fats, proteins, water, vitamins, and minerals (including sodium).[3–5] Adequate nutrition is particularly important for persons with HF because the risk for developing electrolyte imbalance and vitamin and micronutrient deficiencies increase with the use of diuretics.

Behavior change to modify nutrition is challenging for persons with HF to accomplish because they are frequently managing multiple comorbidities and organ failure.[6,7] Adding to the challenges of adherence, there is conflicting evidence to support optimal HF nutrition, particularly sodium and fluid intake.[8] A recent meta-analysis examined evidence regarding sodium intake and mortality, and found low-sodium restrictions to increase overall mortality rates in general cardiac disease populations.[9] Much of the evidence related to HF nutrition is based on observational studies. The evidence from trials testing nutritional

From the [1]Johns Hopkins University School of Nursing, Baltimore, Maryland; [2]College of Nursing, University of Utah, Salt Lake City, Utah; [3]Department of Acute and Chronic Care, Johns Hopkins University School of Nursing, Baltimore, Maryland; [4]Heart Failure Bridge Clinic, Johns Hopkins Hospital, Baltimore, Maryland and [5]Academic Affairs, Johns Hopkins University School of Nursing, Baltimore, Maryland.

Manuscript received August 17, 2015; revised manuscript received October 7, 2015; revised manuscript accepted October 14, 2015.

Reprint requests: Martha Abshire, MS, RN, Johns Hopkins University School of Nursing, 525 N Wolfe Street, Baltimore, MD 21205. Tel: 443-340-6201; Fax: 410-955-7463. E-mail: mabshir1@jhu.edu

See page 998 for disclosure information.

1071-9164/$ - see front matter

http://dx.doi.org/10.1016/j.cardfail.2015.10.004

interventions in HF has not been summarized in the literature to date. The purpose of the present review is to summarize the current evidence and provide insight for future innovations in HF nutrition research and practice.

Methods

To identify the latest literature, we searched Cinahl, Pubmed, and Embase for studies published from 2005 to July 2015 on nutrition and HF as exemplified by the following Pubmed search strategy: ((“Diet”[Mesh] OR “Nutrition Therapy”[Mesh] OR “Thirst” [Mesh] OR “Sodium Chloride, Dietary”[Mesh] OR “Sodium, Dietary”[Mesh] OR “salt”[Title/Abstract] OR “thirst”[Title/Abstract] OR nutri*[Title/Abstract] OR diet*[Title/Abstract]) AND (“Heart Failure”[Mesh] OR “heart failure”[Title/Abstract] OR “CHF” [Title/Abstract] OR “HF”[Title/Abstract])).

The searches returned 1,045 studies. In addition to the search terms, studies were included if they were written in English, human research, nutrition and nutritional supplement (ie, protein shakes) interventional studies, adults, and left-sided HF. Studies were excluded if they reported on pharmaceutical or vitamin supplement intervention. Several studies mentioned dietary education as part of a self-care intervention but did not elaborate on what the dietary education provided or did not measure nutrition-related outcomes and were therefore excluded (Fig. 1). Titles, abstracts, and full text were reviewed by ≥2 independent reviewers to determine eligibility (D.B. and J.A.: 68% agreement; A.X. and A.C.: 73% agreement). A 3rd reviewer (M.A.) reconciled disagreements. After full text review, 17 studies met the criteria. After discussing the studies, the reviewers divided the studies into 2 categories: education-based interventions and prescriptive nutrition interventions (Tables 1 and 2). Though not mutually exclusive categories, studies that examined knowledge-related factors and

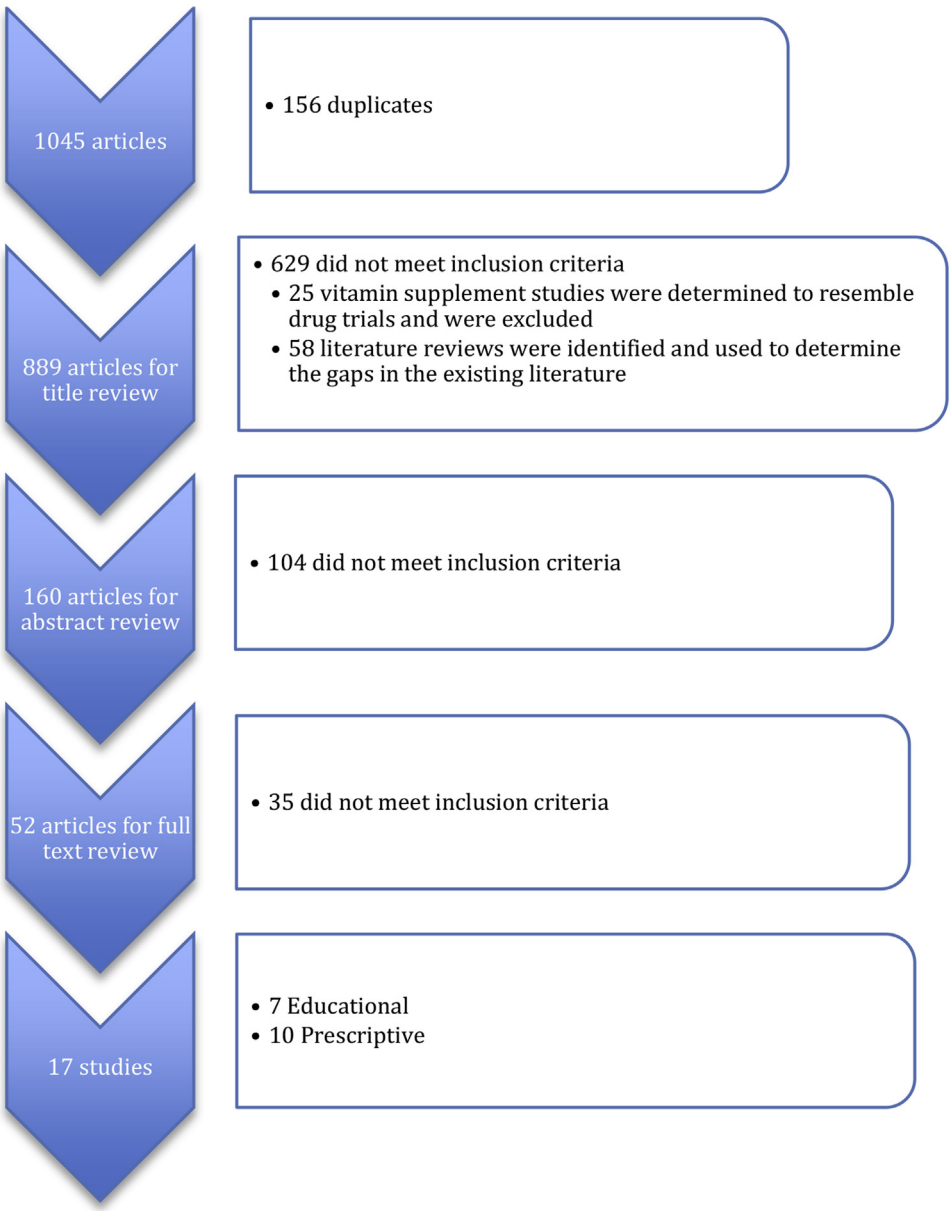

Fig. 1. Article selection.