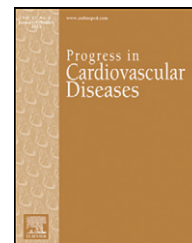


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# A Review of the DASH Diet as an Optimal Dietary Plan for Symptomatic Heart Failure



Luay Rifai<sup>a,\*</sup>, Marc A. Silver<sup>b</sup>

<sup>a</sup>Section of Cardiology, Advocate Lutheran Hospital, Park Ridge, IL, United States

<sup>b</sup>Heart Failure Institute and the Division of Medical Services, Advocate Christ Medical Center, Oak Lawn, IL, United States

## ARTICLE INFO

### Keywords:

Heart failure

Nutrition

DASH

Diet

## ABSTRACT

Despite tremendous focus, effort, drug and device development and resources dedicated to the care of patients at risk for and with heart failure (HF), the epidemic continues. The HF patient presents with a widely deranged physiology and typically at the same time is malnourished adding to the disease complexity and therapeutic challenges.

Most nutritional approaches for patients with HF focus on dietary restrictions (of salt and water) and lack uniformity or clarity or focus on meeting nutritional needs, barriers and deficits of the patient with HF.

Finally, it seems reasonable to anticipate that any dietary program recommendation should contribute in a positive way toward HF management goals and at its foundation positively contribute to the deranged physiology. In many ways the “Dietary Approaches to Stop Hypertension” (DASH) dietary program fulfills these needs and early evidence supports the notion that the DASH diet may be optimal for patients with HF. This brief review examines some of this evidence and provides recommendations for the HF community.

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The patient with symptomatic heart failure (HF) (American College of Cardiology (ACC)/American Heart Association (AHA) Stages C and D) has, at once, a wide derangement of multiple homeostatic balances that exist in the normal physiologic state. Importantly, in addition to that burden, these patients are often poorly nourished which contributes to their functional status, disease progression and natural history.<sup>1,2</sup>

Compared to the attention, resources and drug and device innovations devoted to the control of homeostasis gone awry in HF patients, relatively little attention has been devoted to identifying an optimal dietary pattern for these patients and

how that contributes to a holistic approach to their management and how it might influence outcomes.

In fact, barriers in usual care of patients with HF frequently arise from failure to provide clear and adequate dietary counseling. Beyond the failure to understand and comply with a complicated dietary regimen, only few patients with HF meet the general nutritional recommendations.<sup>3–6</sup>

It is worthwhile, therefore, to expect a dietary plan to substantially contribute to an overall care plan for patients with symptomatic HF and to apply the same metrics to a dietary therapy that we would expect of any drug, device or therapy we may recommend to patients with HF (Table 1).

Statement of Conflict of Interest: see page 553.

\* Address reprint requests to Luay Rifai, MD, Advocate Lutheran General Hospital, 1775 Dempster St., Parkside B-01, Park Ridge, IL 60068, United States.

E-mail address: [luay.rifai@advocatehealth.com](mailto:luay.rifai@advocatehealth.com) (L. Rifai).

<http://dx.doi.org/10.1016/j.pcad.2015.11.001>

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**Abbreviations and Acronyms**

ACC = American College of Cardiology

AHA = American Heart Association

BP = blood pressure

CV = cardiovascular

CVD = cardiovascular disease

DASH = Dietary Approaches to Stop Hypertension

HF = heart failure

HTN = hypertension

LV = left ventricular

LVEF = left ventricular ejection fraction

NO = nitric oxide

NYHA = New York Heart Association

QoL = quality of life

Among several proposed dietary plans that benefit cardiovascular (CV) health, the “Dietary Approaches to Stop Hypertension” (DASH) dietary pattern proved consistent with many dietary recommendations and was formally adopted into the dietary guidelines for Americans 2010, and more recently the 2013 AHA/ACC CV risk prevention guidelines (Strong recommendation: 2013: AHA: level 1 A).<sup>7–9</sup> Many aspects of the DASH diet plan make it an important contender as an optimal plan for many HF patients. This review focuses on some of the rationales for such a consideration as well as recommendations for next steps.

CVD. To date, however, few trials investigated the relationship between several components of the DASH diet and rates of HF.<sup>22–25</sup>

In a retrospective study that included postmenopausal women 50–79 years of age previously enrolled in the Women’s Health Initiative, a large and complex clinical investigation for the prevention of diseases, Levitan et al.<sup>26</sup> examined the relationship of dietary patterns with morality among mostly Caucasian women who had at least one HF hospitalization with follow-up for 4.6 years. The findings demonstrated that higher intake of vegetables, nuts and legumes, and whole grains was associated with significantly lower mortality rates, but other dietary components including sodium were not (Table 2).

In a small cohort of patients with HF and preserved left ventricular (LV) ejection fraction (LVEF), two important reports by Hummel et al.,<sup>27</sup> included a dietary intervention using a DASH diet with further restricted sodium provided to all participants during the study diet period. Patients were mainly women, with a mean age of 72 years and New York Heart Association (NYHA) class II/III, and had treated HTN and chronic kidney disease stage II/III. Ambulatory 24-h BP and 24-h urinary sodium were examined at the baseline and end of the study. Measures of arterial elasticity and diastolic dysfunction were assessed using radial artery tonometer and echocardiography, respectively. The results suggested desirable influences of DASH diet in HF; three weeks of a further sodium-restricted DASH dietary pattern resulted in lower BP, arterial stiffness, and oxidative stress, as well as favorable changes in LV diastolic function and ventricular–arterial coupling<sup>28</sup> (Table 2). However, since the DASH diet was found to lower BP regardless of sodium restriction, the implicated results of the diastolic parameters could very well be exclusive of the lowered sodium, and rather more attributable to the DASH diet itself.

Authors have explored several nutritional supplemental strategies in chronic stable HF patients, based on anticipated positive effect of DASH diet components. In 2006, Fuentes and colleagues<sup>29</sup> evaluated the ability of daily oral magnesium supplementation, an abundant micronutrient in the DASH

**DASH diet**

Prompted by the rising prevalence of hypertension (HTN) in the United States, the DASH diet was developed in the mid-1990s. The DASH dietary pattern is characterized by an emphasis on high amounts of fruits and vegetables, protein and fiber, low-fat dairy products, whole grains, poultry, fish, and nuts, in addition to sufficient amounts of other nutrient-rich foods containing minerals known to have a positive effect in lowering blood pressure (BP), including potassium, calcium, and magnesium.<sup>10,11</sup> On the other hand, it is low in total and saturated fat, cholesterol, red meat, sweets and sugar-containing beverages.<sup>12</sup>

Although considered low in sodium, the DASH diet has been shown to substantially reduce BP irrespective of lowering of dietary sodium intake,<sup>13</sup> and also has demonstrated beneficial CV effects for a wide range of population subgroups, and was associated with reducing the risk of developing coronary heart disease and HF.<sup>14–16</sup> These advantages were overall due to the favorable effect various DASH’s micronutrients had on metabolic risk,<sup>17</sup> low-density lipoprotein cholesterol,<sup>18</sup> insulin sensitivity,<sup>19</sup> as well as decreased markers of inflammation, liver dysfunction, and coagulation abnormalities.<sup>20</sup> Also, modification of dietary patterns with the DASH diet had significant effects on levels of serum homocysteine, an amino acid linked to an increased risk of CV disease (CVD), stroke, and peripheral vascular disease.<sup>21</sup>

**DASH in HF populations**

Collectively, the aforementioned findings provide additional insights into the mechanisms by which diet might influence

**Table 1 – Attributes of an ideal care plan for patients with symptomatic heart failure.**

Requirements of a Heart Failure Therapy (Drug, Device or Diet)
Reflect an understanding of the patients complex physiology Ex. Salt avid, volume expanded, deranged target organs
Positively influence unfavorable physiology Ex. Positively impact LV remodeling, elevated arterial compliance or LV filling pressures
Be effective Ex. Improve mortality, morbidity, exercise capacity, life quality
Be safe Ex. Limited adverse events, wide therapeutic window
Be simple to comply with Ex. Suitable for patients with lower health literacy, few missed “doses”
Be economical Ex. Affordable for patient and society

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