



## Food Insecurity Status in Heart Failure Patients in Iranian Population

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### ABSTRACT

**Background:** We were conducted this study to assess the prevalence of food insecurity in heart failure patients households and the relationship between food security and some variables in this households. **Methods:** In this cross sectional study, a total of 300 heart failure patients' households were studied in Imam Reza hospital of Mashhad. The Iranian version of household food insecurity access scale was used to measure food security. **Results:** Among the participants in this study, 129 patients (43%) were secure, 42 patients (14%), 82 patients (27.3%) and 47 patients (15.7%) were mild, moderate and severe insecure, respectively. Chi-square test results show that there is a strong association between diabetes, hypertension, body mass index (BMI), and food security distribution ( $P < 0.01$ ). **Conclusions:** Based on our findings, food insecurity is mild to severe prevalent in heart failure patients households, meanwhile there is a strong relationship between diabetes, hypertension, BMI and food security status, so it is important to assess their food status and prevent from worsening their nutritional status.

**Key words:** Food insecurity; Heart failure; Nutrition.

### Introduction

Heart failure (HF) is a syndrome caused by abnormal heart structure and function, which associated with high mortality, frequent hospitalization, poor quality of life, numerous ailments, and require a complex treatment regimen (Dickstein *et al.*, 2008). Approximately 1-2% of adult population in developed countries suffers from HF, which this prevalence increased by more than 10% among people aged 70 and over, meanwhile economic burden of heart failure is estimated at \$ 28 billion.

This amount also increases with an aging population (Mosterd and Hoes, 2007). Cachexia is one of the possible outcomes of heart failure, which occurs in 10-15% of patients. This complication is associated with worsening symptoms and functional capacity of the body, increasing the number and duration of hospitalizations, and increased risk of mortality (Akashi *et al.*, 2005). By the way, HF is in a relation with some diseases such as diabetes mellitus, renal insufficiency, hypertension and

obesity (Widmer, 2011). Consequences of HF, especially in older patients, caused by biological, functional and psychological factors that nutritional status of the environment is one of them (Amare *et al.*, 2015). Food and nutrition, including basic needs of human society and providing it lies in the context of food security. Food security is defined as access for all people at all times to enough food for an active and healthy life that includes: 1) The availability of healthy food and adequate nutrition and 2) the ability and confidence to obtain acceptable foods in a way that is acceptable in terms of population (Salarkia *et al.*, 2014). In contrast, food insecurity is defined as "limited or uncertain access to nutritionally adequate and safe food or limited or uncertain ability to acquire acceptable foods in a socially acceptable ways". Food insecurity is variable from concerns about access to food at the household level to a state of severe hunger among children who do not have food to eat. This condition is along with the potential consequences of nutrition, health status, chronic diseases and mental health (Melgar-Quinonez *et al.*, 2006).

Previously, various studies were conducted in the field of food security survey in heart patients (Ford, 2013, Gowda *et al.*, 2012, Parker *et al.*, 2010, Seligman *et al.*, 2010) that show the negative relationship between food intake status and the cardiovascular disease risk. But none of them had been studied food security of patients with HF, as we mentioned above this disease is bring with itself many consequences that they are being in close relation with food status.

Based on all above explanations, the aim of our study was to found the food security status in HF patients.

### Materials and Methods

*Participants & Study design:* In this cross-sectional study, a total of 500 HF patients (households) were selected from their medical records in Imam Reza hospital in city of Mashhad by using simple random sampling. The calculation of the sample size conducted based

on the Amare study (Amare *et al.*, 2015) by G\*Power (Version 3). After adjusting 20% for missing data and  $\alpha = 0.05$  and 80% power of the tests, we arrived the sample size equal to 332. One hundred seventy patients were excluded from the study, because of disagreement to contribute to study and 32 questionnaires were not properly filled out. Therefore, 300 questionnaires were analyzed. The data were collected between September 2016 and January 2017, in Imam Reza hospital of Mashhad, Iran.

*Procedure of study:* In this study, questionnaires have been filled via a face-to-face interview with responsible for household nutrition by trained person, and for enhance accuracy; all participating households were informed that their responses would remain confidential. The Iranian version of 9-item questionnaire of household food insecurity access scale (HFIAS) was used to measure food insecurity. This questionnaire was validated in Iran by Salarkia (Salarkia *et al.*, 2014). This questionnaire contains 9-items from the food security: 1) Did you worry that your household would not have enough food? 2) Were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources? 3) Did you or any household member eat a limited variety of foods due to a lack of resources? 4) Did you or any household member eat food that you preferred not to eat because of a lack of resources to obtain other types of food? 5) Did you or any household member eat a smaller meal than you felt you needed because there was not enough food? 6) Did you or any other household member eat fewer meals in a day because there was not enough food? 7) Was there ever no food at all in your household because there were not resources to get more? 8) Did you or any household member go to sleep at night hungry because there was not enough food? 9) Did you or any household member go a whole day without eating anything because there was not enough food? And the answers were, no (0 score), rarely (1 score), sometimes (2 score),

and often (3 score), based on the HFIAS questionnaire scores, households were grouped in four categories of food access insecurity: secure (0–1), mildly food insecure (2–7), moderately food insecure (8–14) and severely food insecure (15–27) (Salarkia *et al.*, 2014).

**Ethical considerations:** All participating households provided informed consent after being acquainted with the purpose of study. The approval of this research was obtained from the research committee of the Iran University of Medical Sciences.

**Data analysis:** Descriptive statistics were carried out to describe demographic data. Categorical variables are reported through frequencies (percentages) and the Chi-square test was performed. All the statistical procedure was calculated with SPSS software, version 24, (SPSS Inc., Chicago, IL, USA).

## Results

Fifty five percent (165 people) of participants in this study were male. 54 percent were over 60

years old and 68.6 percent (205 people) had a body mass index (BMI) more than 25 kg/m<sup>2</sup>. The number of people with diabetes, hypertension, hyperlipidemia as well as other demographic indicators and the food security has been determined by a separation of these variables in **Table 1**. Among the participants in this study, 129 patients (43%) were secure, 42 patients (14%) were mild, 82 patients (27.3%) were moderate and 47 patients (15.7%) were also sever.

To examine the relationship between measured variables and food security of participants; food security was divided into the two categories of secure and insecure (including three mild, moderate and severe categories). Chi-square test results show that there is no significant relationship between hyperlipidemia and food security distribution, ( $P = 0.73$ ). In other cases, a strong correlation was observed ( $P < 0.01$ ) that accurate results can be seen in **Table 2**.

**Table 1.** Distribution of subjects based on the status of food security

| Variables                | Food security categories |           |           |           | Total      |
|--------------------------|--------------------------|-----------|-----------|-----------|------------|
|                          | Secure                   | Mild      | Moderate  | Severe    |            |
| Gender                   |                          |           |           |           |            |
| Male                     | 87 (29)                  | 19 (6.3)  | 50 (16.7) | 9 (3)     | 165 (55)   |
| Female                   | 42 (14)                  | 23 (7.7)  | 32 (10.7) | 38 (12.7) | 135 (45)   |
| Years of education       |                          |           |           |           |            |
| < 12                     | 35 (11.7)                | 26 (8.7)  | 65 (21.7) | 44 (14.7) | 170 (56.7) |
| ≥ 12                     | 94 (31.3)                | 16 (5.3)  | 17 (5.7)  | 3 (1)     | 130 (43.3) |
| Job                      |                          |           |           |           |            |
| Occupied                 | 79 (28.3)                | 10 (3.3)  | 33 (11)   | 3 (1)     | 125 (41.7) |
| Jobless                  | 18 (6)                   | 22 (7.3)  | 36 (12)   | 42 (14)   | 118 (39.3) |
| Retired                  | 32 (10.7)                | 10 (3.3)  | 13 (4.3)  | 2 (0.7)   | 57 (19)    |
| BMI (kg/m <sup>2</sup> ) |                          |           |           |           |            |
| < 25                     | 54 (18.1)                | 7 (2.3)   | 23 (7.7)  | 10 (3.3)  | 94 (31.4)  |
| ≥ 25                     | 75 (25.1)                | 35 (11.7) | 58 (19.4) | 37 (12.4) | 205 (68.3) |
| Age (year)               |                          |           |           |           |            |
| < 60                     | 85 (28.3)                | 20 (6.7)  | 39 (13)   | 18 (6)    | 162 (54)   |
| ≥ 60                     | 44 (14.7)                | 22 (7.3)  | 43 (14.3) | 29 (9.7)  | 138 (46)   |
| Hypertention             | 55 (18.3)                | 23 (7.7)  | 52 (17.3) | 26 (8.7)  | 156 (52)   |
| Diabetes                 | 44 (14.7)                | 23 (7.7)  | 41 (13.7) | 20 (6.7)  | 128 (42.7) |
| Hyperlipidemia           | 37 (12.3)                | 11 (3.7)  | 25 (8.3)  | 10 (3.3)  | 83 (27.7)  |

**Table 2.** The relationship between demographic variables and risk factors of cardiovascular disease with food security status

| Variables                            | Food security categories |            | P-value |
|--------------------------------------|--------------------------|------------|---------|
|                                      | Secure                   | Insecure   |         |
| Gender                               |                          |            |         |
| Male                                 | 87 (29)                  | 78 (26)    | < 0.001 |
| Female                               | 42 (14)                  | 93 (31)    |         |
| Years of education                   |                          |            |         |
| <12                                  | 35 (11.7)                | 135 (45)   | < 0.001 |
| > 12                                 | 94 (31.3)                | 36 (12)    |         |
| Job                                  |                          |            |         |
| Occupied                             | 79 (28.3)                | 46 (15.3)  | < 0.001 |
| Jobless                              | 18 (6)                   | 100 (33.3) |         |
| Retired                              | 32 (10.7)                | 25 (8.3)   |         |
| Body mass index (kg/m <sup>2</sup> ) |                          |            |         |
| <25                                  | 54 (18.1)                | 40 (13.4)  | 0.001   |
| >25                                  | 75 (25.1)                | 130 (43.5) |         |
| Age (year)                           |                          |            |         |
| <60                                  | 85 (28.3)                | 77 (25.7)  | 0.001   |
| >60                                  | 44 (14.7)                | 94 (31.3)  |         |
| Hypertention                         | 55 (18.3)                | 101 (33.7) | 0.005   |
| Diabetes                             | 44 (14.7)                | 84 (28)    | 0.009   |
| Hyperlipidemia                       | 37 (12.3)                | 46 (15.3)  | 0.733   |

### Discussion

This investigation was a cross-sectional study designed to assess the prevalence of food insecurity in heart failure patients. This findings indicated that household food insecurity were 15.7% sever and 27.3% moderate in heart failure patients, that can show a strong relationship with the consequences of this illness. In Charitha Gowda's study used the US department of agriculture food security scale module in order to assess the relationship between food insecurity and inflammation in US, observed that 21.5% of study population was food insecure and they also found that food insecurity was associated with higher levels of C-reactive protein (an inflammatory marker) has been linked to health conditions such as peripheral arterial disease, and cardiovascular disease (Gowda *et al.*, 2012, Shankar and Li, 2008). Numerous studies in the United States have indicated that food insecurity is related with adverse health outcomes, including diabetes, hypertension, and cardiovascular

disease that the mechanism of this relationship have not been well studied yet (Olson, 1999, Seligman *et al.*, 2007, Seligman *et al.*, 2010, Stuff *et al.*, 2004, Vozoris and Tarasuk, 2003).

In this study after divided food security into two categories (secure and insecure), we observed that years of education, job, BMI, age, hypertension and diabetes are in a strong relation with food security status. In Parker's study that conducted to assess the relationship between food security and metabolic syndrome in US adults the results show that Members of households with very low food-secure were more likely to have abnormal glucose, HDL-c and systolic blood pressure compared with other categories of household food security (Parker *et al.*, 2010). In study conducted by Stuff, food insecurity was positively associated with obesity in non-whites (Stuff *et al.*, 2007).

However, food security status was not in a relation with hyperlipidemia, Likewise, Hilary indicated that an association between food

insecurity and hyperlipidemia was weak and not significant (Seligman *et al.*, 2010). On the other hand, in Tayie's study that carried out to investigate the relation between food insecurity and dyslipidemia in US, the results show that food insecure women may be in a risk of hyperlipidemia (Tayie and Zizza, 2009). We hypothesized that, this non-significant result was because we do not adjusted this variable for some important confounders such as any medical treatment, food intake patterns, dietary fiber and physical activity. As observed in this study and other mentioned studies, food security is in a strong relation with health condition in heart failure patients.

This study has some strengths: For the first time we used the Iranian version of 9-item HFIAS questionnaire, according to the hospital where the study was conducted is a referral hospital results can be generalized to all heart failure patients in Mashhad. And some limitations: cross sectional design of the study is the first limitation that we have to note, and the second one is that we do not adjusted our variables for medical treatment, food intake patterns and physical activity, so we suggest that future studies consider this parameters.

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## Conclusions

The results of this study showed that food insecurity is mild to severe prevalent among heart failure patients households and also observed that some variables such as diabetes, hypertension and BMI had a relation to food insecurity. So there is a need to identify food insecure heart failure patients and modify their food status.

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## Authors' contributions

Vafa M and Bahrami LS designed the study. Bahrami LS, Arabi SM and Hamidi Z carried out the study and informed the patients. Tanha K analyzed the data. Bahrami LS and Vafa M designed the manuscript and all authors studied and approved the final version of the manuscript.

## Conflict of interest

The authors declare that they have no conflict of interest.

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