



Assessment of Dietary Intake of Heart Failure Patients

Chetan kumar¹, Dr.Pragati²

¹ PhD Scholar, Lalit Narayan Mithila University, Darbhanga, Research Scholar, Patna

² Assistant professor, Department of Home Science, Lalit Narayan Mithila University, Darbhanga, 846008, Bihar

BACKGROUND: The need for defined diets as part of an overall plan to better patient outcomes and lower the burden of HF on citizens and healthcare systems is underscored by a sense of the central role of food in patients.

OBJECTIVE: To assessed the dietary intake of patients with heart failure.

METHODS: The study sample consisted of 55 male patients and 45 female patients Mean Age (70±3.17) and SD 1.359. The diet of each participant was assessed using 48 hours of dietary recall. Dietary Nutrients include vitamins, minerals, iron, oil, fibers, sodium intake, and fluid intake. Specific dietary goals were based on guidelines.

RESULTS: Mean energy intake was (1761.74±359.46). The mean Protein intake was (33.3±4.52), the Mean Score of BMI was 2.69 while SD was .895 in this present study. The mean sodium intake was 2015.39mg. Patients were following 1-2 liter fluid restriction per day recommended by doctors. Chi-square analysis showed no correlation at $P < 0.5$ ($\text{Chi}^2 = 11.68$, $p = .04$). The mean score of the patient regarding symptoms was 2.36 and SD was 1.092 in this present study. The mean score of the patient history was 3.18 and SD was 1.66.

CONCLUSION: This study indicates that the dietary quality of the person should be better and should be prescribed a diet plan with the need to adhere to it and even need to be educated about the importance of nutrients and how a healthy balanced diet helps them to reduce the disease progression.

Keywords: heart failure, Clinical dietary Intervention, Sodium intake, Dietary Interventions

I. INTRODUCTION

Worldwide, an estimated 64.3 million people have HF.¹ Heart failure is becoming a serious health issue in low and middle-income nations like India.² Estimates of the prevalence of HF in India. The figures vary between 1.3 million and 4.6 million, with a yearly occurrence ranging from 491,600 to 1.8 million. However, faulty surveillance systems result in a lack of accurate data. The future burden of HF in India will continue to be significantly influenced

by the population, epidemiology, and health change.³ In the prevention and risk reduction of heart failure, diet is a major modifiable risk factor. Over the past century, there has been advancement in our knowledge of how nutrition plays a role. Major changes have occurred in nutrition studies more recently to better understand the function of foods and diets.⁴

To effectively manage heart failure, one must keep an eye out for changes in nutritional status as well as changes in signs and symptoms. Everyone, whether they are ill or well, engages in some amount of daily self-care, but if a person is identified as having a complicated chronic illness like heart failure, the importance of self-care and the benefit of specialized assistance becomes more apparent.⁵ Strong evidence was presented by a study that suggests the risk of heart disease may be decreased by eating a diet high in fruits, vegetables, legumes, grains, fish, and chicken while limiting red meat, high-fat dairy products, and refined grains. When dietary treatments are started as a modification in the general eating pattern, they could be simpler to carry out and might be more complete. Dietary changes seemed to be more successful in preventing symptoms from getting worse. Because general dietary patterns may be simple for the public to translate into diets, dietary pattern analysis may be helpful in establishing dietary recommendations.⁶

Dietary negligence could be a risk factor for CAD patients that may be modified to lower the risk. While eating yogurt, vegetables, and fruits can suppress CAD, eating chicken, meat, eggs, and junk food is linked to a higher risk of developing CAD. An elevated risk of HF can also be indicated by anthropometric measurements, symptoms, and ECHO.⁷ The increased likelihood of poor economic position, social isolation, and incorrect or inadequate food consumption among the elderly makes them more vulnerable to malnutrition. In order to guarantee that a person's nutritional status is properly handled, screening can help detect nutritional risks and develop quick interventional strategies. If detected and addressed early enough, the majority of these problems are preventable.⁸ One area that might be researched to perhaps enhance the fate of HF patients is nutritional intervention. Numerous studies have examined the impact of different foods on HF patients, frequently with contradictory findings. To stop the progressive decline in heart function in these individuals, consumption must be maintained given the high energy and food requirements of the human heart.⁹

As per the American College of Cardiology/American Heart Association's (ACC/AHA) Joint regulation, patients should limit their salt consumption. These recommendations support the following dietary recommendations for diabetes, hypertension, and hypercholesterolemia common underlying and concomitant diseases in HF.¹⁰⁻¹⁴ Many of recent studies have found evidence that some nutrients have an impact on the advancement of heart failure and related outcomes when consumed in accordance with the DASH diet.¹⁵⁻¹⁷ According to a research, if a person's food is of low quality, their sickness may advance, and various strategies will likely be needed to treat this problem. Healthcare professionals must give patients precise and straightforward dietary recommendations for certain foods and food groups. Effective large-scale intervention tactics are furthermore required because altering one's diet is challenging, especially in the aftermath of a life-threatening illness.¹⁸⁻¹⁹ (Javier Marhuenda et al) revealed that there

is a clear relationship between food and HF in his study. For improved illness management, a healthy diet should include fruits, vegetables, fiber, vitamins, antioxidants, vitamin C, and minerals.²⁰

The HF Even eutrophic patients who progress and receive drug therapy at diagnosis are at risk of nutritional impairment and micronutrient deficiency, which emphasizes the need for a thorough evaluation of those people's nutritional status in order to develop personalized and effective nutritional advice. There are already precise recommendations for vitamins and minerals, but not for proteins, carbs, or fats. Studies highlight the necessity of supplementing micronutrients above the RDA to guarantee micronutrient support and address the increased losses.^{21,22}

II.METHODOLOGY

Through purposive sampling of 100 respondents who were willing to be part of the study were recruited from heart cure clinic (kankarbagh) some patients from HDNA (danapur) and some patient from the (Daksh) heart care clinic Patna Bihar. After taking informed consent throw a well design questionnaire demographic profile (educational status, employment status, monthly income, anthropometric measurement and medical history) were collected from 100 heart failure patients.

Patients having HF investigated in this study consisted of patients age between 30-80 years who reported ever being diagnosed having heart failure by health care provider. Patient who had been history of diabetes, CKD, HTN, and COPD, Thyroid were included in this study and patient with Inability to communicate, mental retard or memory related diseases were excluded from my study.

A single 24 hours dietary recall were collected using individual food consumption record tracker. All questions were asked by me to patient during a facial interaction with every patient. The collected data from respondents included details concerning age, religious affiliation, daily fluid and salt intake, body mass index, NYHA class evaluation, and Echo measurement. To assess food preferences, a separate form was utilized to examine the frequency of high-fat food, dairy product, sugary food, and salty snack consumption among participants. The primary nutrient of interest was sodium, fluid intake, oil intake, fruits and vegetable intake. This analysis used the heart failure specific sodium intake recommendation from the (ACC/AHA)²² Additional nutrients promoted by the DASH Diet, which documented associations with impact on heart failure outcomes, were also assessed.^{21,22} The DASH diet promotes a high quality diet that includes consumption of fruits, vegetables, whole grain, low fat, fat free dairy products, lean meat, poultry and fish, spare intake of fats, oils, sweets, and added sugar. Nutrients included in the dash diet are potassium, calcium, magnesium, fiber, saturated fat, protein and cholesterol.²³⁻³²

Food Consumption analysis were collected by the form and the participants' dietary diversity was determined based on the various food categories they consumed. We applied arithmetic mean and standard deviation tests to evaluate both qualitative and numerical variables. The data were analyzed using the latest version of SPSS, with significance considered at $p < 0.05$. Prior to their participation in the study, patients were provided with information about the

study's objectives and requirements, adhering to ethical guidelines. Participants were included in the study only after obtaining their verbal and written consent.

III. RESULTS & DISCUSSION

The socioeconomic and demographic profile revealed that the majority 38% of the subjects were in the age group of 50-60years while 26% of the respondent in the age group of 60-70 years, 16% of the respondents were in the age group of 40-50 years and 12% of the respondent in the age group of 70-80years. The mean age group of the subjects was (70 ± 3.17) and SD 1.359.

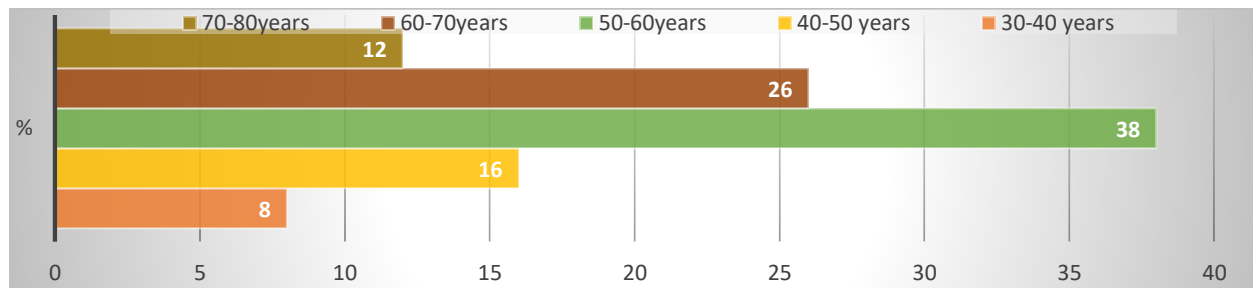


Fig1: Age Status of the Respondents

LEMON *et al.*(2010)³³ conducted a study to assess the dietary quality of a person with heart failure in NHANES(1999-2006) they reported that out of 50074 mean age of the patients was 70.3 years . The age of the subjects was almost the same when compared to the present study.

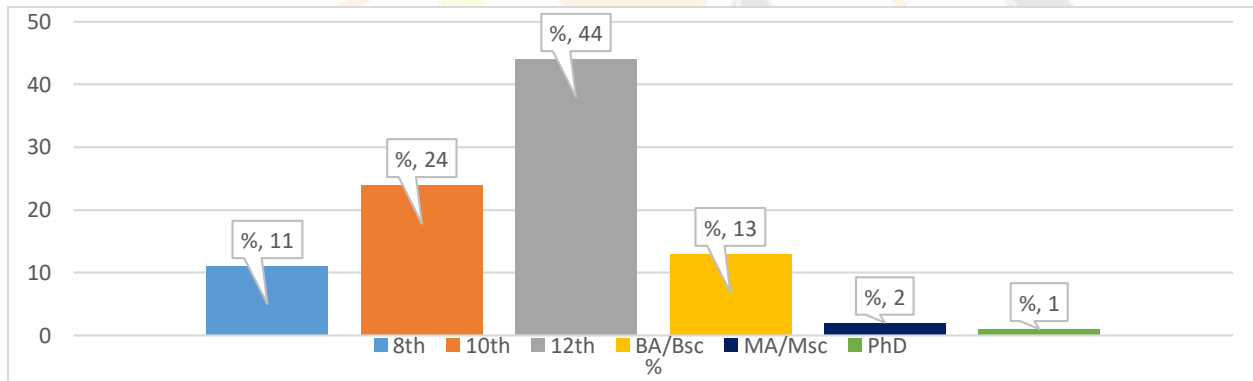


Fig 2: Education Qualification of the Respondents

Education Qualification indicates that 44% of the respondents were studied up to the intermediate, 24% were studied up to matriculation, 11% were studied up to 8th standard 13% had done Bachelors and 2% up to the Master and the rest 1 % had done Ph.D. In this study none of the respondents were illiterate. The mean Education qualification was 2.74 and SD was .960 in this study. Hilal UYSAL *et al.*(2019)³⁴conducted a similar study which reported that out of total hundred subjects, 50% were studied up to matriculation 29% a studied up to intermediate, 5% were found graduate, and rest 16% were illiterate. In present study most of the respondents were literate.

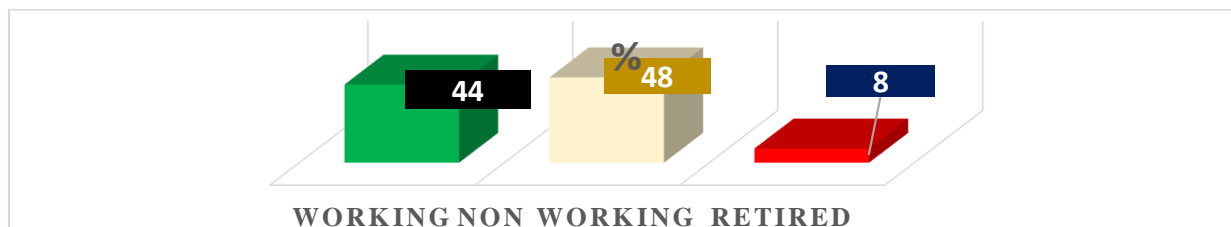


Fig 3: Employment status of the respondents

The employment status of the respondents shows that 48 % of the people were not working just because due to age and disease issue while somehow 44% were working and earning and rest 8 % were doing government job and now they were retired person. Mean score of the respondent income was 2.65 and SD was 1.359 in present study. Amare *et al.*(2015)^{35,36} conducted a study on malnutrition and associated factors among heart failure patients out of 284 heart failure patients, 56% were employed and 42% were non employed. Employment status of the subjects was more when compare to the present study.

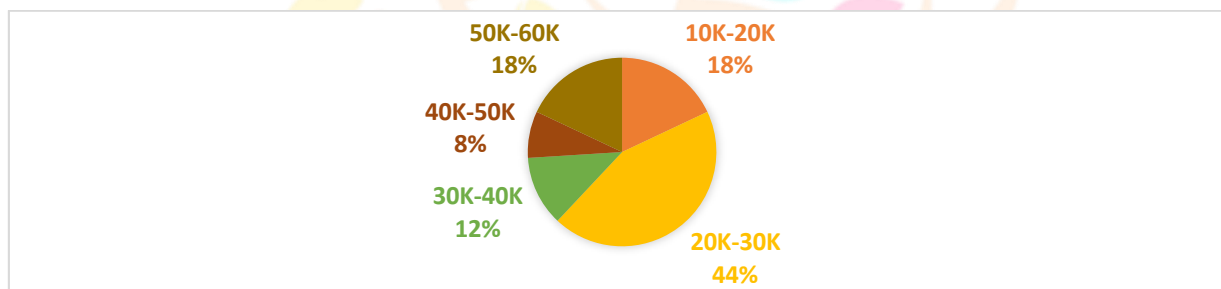


Fig 4: Economic status of respondents

48% of the patients were not working, 44% of the respondent monthly income was 20000-30000 rupees, 18% were earning 50-60 thousand per month, while 18% were earning 10-20thousand per month from various source, 8% were earning 40-50k per month and rest 12% were earning 30-40k in a month. Lemon *et al.*(2010)³⁷ conducted a study to access the NHANES(1999-2006) Out of 574 respondent they reported that the majority 48% of their subjects where earning 114583 in Australia while 33.8% were earning between 114583-228530 while rest 18.5% were earning more than 228530 monthly in Australia. The earning of subjects was very high in Australia when compared to this Indian study.

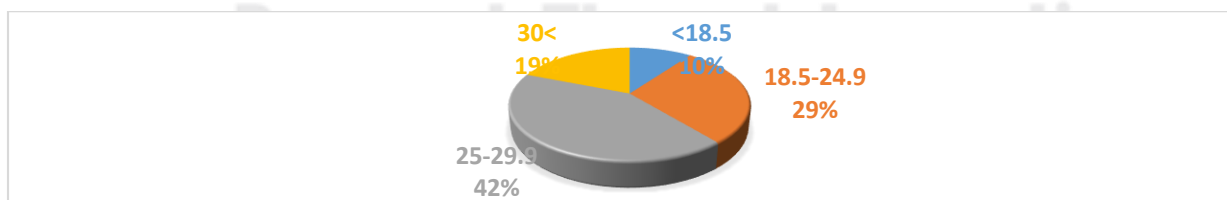


Fig 5: Nutritional status of HF Patients (BMI)

Information regarding nutritional status in graph shows that 29% of respondents were found to be healthy, 45% of respondents were found to be overweight, 19% were in obesity grade ii and 10% were found to be underweight in

present study. Mean Score of BMI was 2.69 while SD was .895 in this present study. Hilal UYSAL *et al*(2019)³⁸ conducted their study which reported that out of total N=100 respondents, 5% were underweight, 34% were healthy BMI, majority of the respondents were overweight, 21% of the respondents were obese and rest three percent subjects were on morbid obese. The majority of the subjects was overweight when compared to the present study.

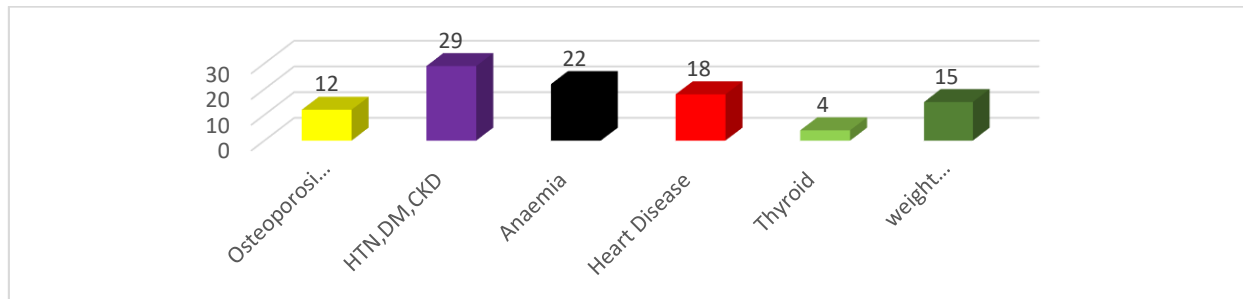


Fig: 6 Health History of patients

Information regarding Health history status in figure 6 shows that 29% of the patient had hypertension diabetes and kidney problem while 22% of patient had anemic while 18% had history of heart disease and due to age issue 12% had osteoporosis and COPD problem and 4% of patient had thyroid issue in present study. Mean score of the patient history was 3.18 and SD was 1.66. J.L Bonilla-palomas *et al*.(2011)³⁹ conducted a study which impact of malnutrition on long term mortality reported that out of 200 patients 58.2% of patients were diabetic while 48.1% had low hemoglobin less than 12 gram per DL. Amare *et al*.(2013)⁴⁰ reported that out of 234 respondents 36% were hypertensive 6% had chronic kidney disease and 4.2% had other medical issues along with heart failure. Chi-square Calculation indicates that there was statistically no significant correlation at $p < 0.05$ between education level and nutritional status ($p = 0.109$) and nutritional status and income level chi-square level $\chi^2 = 6.63$, $P = 0.356$). The reason of more person fall in health category because of availability of food and they are from village area.

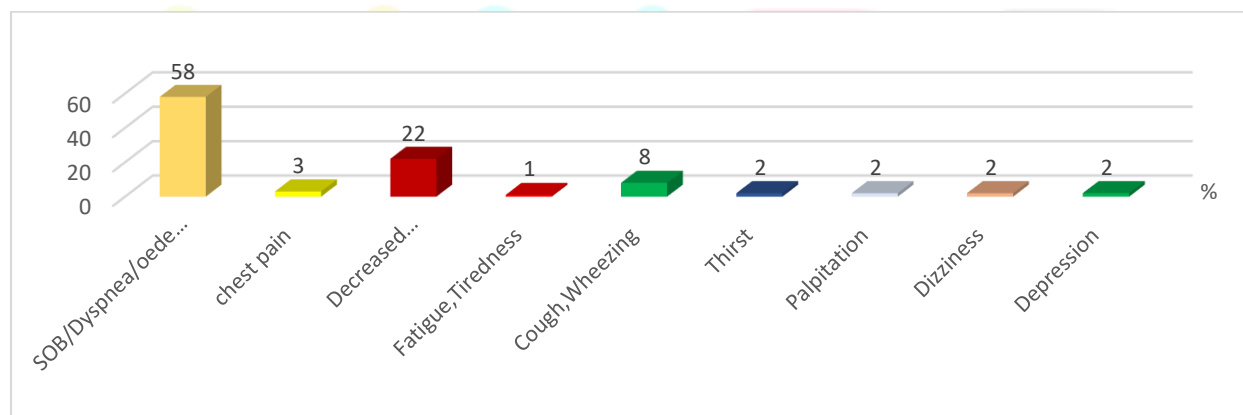


Fig 7: Symptoms of HF Patients

Information regarding symptoms of HF patient in figure shows that 58 % of the respondents had Shortness of breath, edema while 22% had nausea and decreased appetite while 8% had cough issue and 2% of HF patient had

thirst, Palpitation, dizziness and depression respectively. The mean score of the patient regarding symptoms was 2.36 and SD was 1.092 in this present study.

Assessment of food consumption patterns of the participant reveals that in this study that While 45% of the participants never ate two or more eggs per week as recommended, 42% consumed eggs occasionally; while 13% of participants always consume eggs in week. 20% of the respondents were taking always fruits while 49% of the respondents were never taking fruits in daily. Now only 25% of the respondents were eating vegetables regularly while majority 45% was taking sometimes.68% were taking grains in the form of Maida, wheat always while only 9% were not taking grains daily. 40% only were taking milk daily due to some myth and lack of awareness. Majority of patients like 60 % were not taking meat due to high oily content and 63% were not taking dry fruits regularly due to high price or myth or non-availability of Foods patient were need to eat less actually they were taking those items in moderation or in high content like 8% patient were taking sugars in their daily diet while 71% respondents said they were not taking saturated fats in their diet but 18% were consuming fatty foods daily in any form. 84 % patient said they were not taking salty snacks or extra salt added food item in their diet but 12% were directly adding salt while dining.40% were using creams or whole fat milk in their diet daily. 24% of the respondents were taking red meat even after cardiac issue and 55% were taking fried foods, Potato chips, salty canned packed food in daily diet.

TABLE:1 Total Energy, Protein, Carbohydrate, Fats, Fibers, Vitamins, Minerals, Electrolytes and fluid consumptions According to (N=100)

| | USDA/USCF/DASH RECOMMENDED | MEANIntake | MEANDifference | SD |
|----------------------|-------------------------------|------------|----------------|--------|
| Energy (kcal) | 1735.89 | 1761.74 | 25.85 | 359.46 |
| water from food (ml) | 170.89 | 217.52 | 46.63 | 20.51 |
| Total protein (gm) | 44.98 | 33.3 | -11.68 | 3.52 |
| Total fat (ml) | 46.8 | 59.4 | 12.6 | 4.58 |
| carbohydrate(gm) | 299.87 | 397.79 | 97.92 | 7.33 |
| fiber(gm) | 25.94 | 17.9 | -8.04 | 2.21 |
| vitamin E (mcg) | 15 | 13.06 | -1.94 | 0.4 |
| B1 (mcg/dl) | 0.81 | 0.759 | -0.051 | 0.021 |
| vitamin B2(mcg/dl) | 0.962 | 0.906 | -0.054 | 0.042 |
| B6(mcg/dl) | 0.945 | 0.88 | -0.06 | 0.05 |
| Vitamin B9(mcg/dl) | 311.2 | 313.45 | 2.25 | 6.44 |
| C (mg) | 71.25 | 54.36 | -16.89 | 3.311 |
| Sodium (gm) | 1908.65 | 2015.39 | 106.74 | 2.44 |

| | | | | |
|--------------------|--------|--------|---------|-------|
| Vitamin K(gm) | 2.2 | 2.33 | 0.13 | 0.199 |
| Calcium (mg/dl) | 1.2 | 1.089 | -0.11 | 0.1 |
| magnesium (mEq/dl) | 253.4 | 217.88 | -35.52 | 7.81 |
| Phosphorous(mg/dl) | 412.01 | 386.58 | -25.43 | 6.47 |
| Iron(mg) | 7.01 | 5.93 | -1.08 | 0.28 |
| Zinc (mcg/l) | 8.43 | 7.21 | -1.22 | 0.061 |
| Vitamin A(mcg) | 811.01 | 607.84 | -203.17 | 2.144 |

The energy intake vary between 26-32 kcal/kg Ideal body weight, with 50-55% of carbohydrate consumption, 20-25% fat consumption of total calorie and 30% protein by total calorie. However patient who is having HF need more protein compare to normal population range from 1.1gm/kg IBW while in malnourished patient with cardiac cachexia need 1.5-2.0gm/kg IBW.

Published studies have associated the DASH diet, which includes low fat and increase the low fatty milk products, complex carbohydrates, fish, vegetables, and Mediterranean diet (Butler,2016)and further recommended this diet for patients with HF just only because of its magical effects. Fatty food can cause weight gain so should be avoid by HF patients. Assessing by the guidelines this study found that patients had higher average total energy intake, higher mean carbohydrate, fat, water, salt, intake but patients had lesser protein, fiber, vitamin E, B1,B2,B6, Vitamin C, Calcium, magnesium, phosphorous, iron, Zn &Vitamin A consumption compare to the USDA/USCF/DASH recommendation. (Table 1) In this study the total energy intake Mean was (1761.74±359.46). The protein intake of the participants in this study was found to be less. (Table 1).Low Potassium level has been linked with HF related mortality. My study found that calcium level was low in majority of patients even phosphorous, zinc, vitamin A also was below to the recommended amount. This study found the dietary iron intake was lesser and should be in normal range.(Vieira et al.,2004) have reported decreased intake of vitamin A,C and K level in his study while in my study also consumption was below the required amount.

This Study found that Participants complied with the fluid restriction recommendations, they gained or lost weight often ($p > .05$). Colin Ramirez et al. (2004) showed that fluid consumption less than 1.5 L caused extracellular fluid levels to decrease. This study found that most of the participants was following 1-2L fluid restriction per day recommended by doctors($\chi^2=11.68$, $p=.04$). In this study Lower sodium intake were recommended by doctors to HF patients but due to lack of awareness patients were taking more salt in their diet Similar to (Yancy et al.2013), low sodium compliance was found to be higher in HFrEF Patients ($p > .05$).This suggest that the participants consumed foods without reading food label. This study found that sodium intake of most participant was 2015.39 mg.

TABLE :2 GUIDE FOR HEART HEALTHY DIET⁴⁰⁻⁴⁴

| | Dash Diet(Based on 2000Kcal) | USDA Healthy US Style (Based on 1800Kcal) | USDA Healthy US Style (Based on 1900kcal) | USDA Healthy vegetarian diet (based1800 kcal) |
|--------------------------------|------------------------------|---|---|---|
| Grains | 6-8 serving daily | 170gm daily(3 whole and3 refined per day | 170gm daily(2 whole and2 refined per day | 170gm daily(3 whole and3 refined per day |
| Vegetables | 4-5 serving daily | 454 gm | 454 gm | 454 gm |
| Fruits | 4-5 serving daily | 300gm | 300gm | 300gm |
| Nuts,seeds, legumes | 4-5 serving daily | 396gm | 396gm | 396gm |
| Fat free low fat dairy product | 2-3 serving daily | 140gm daily | 170gm daily | 85gm daily |
| Lean meat, Poultry, fish | 170g daily | 56gm daily | 56gm daily | 56gm daily |
| Fats and oils | 2-3 serving daily | | | |
| Sweets and sugar | ≤ 5 serving weekly | Limit:no quantity specified | Limit:no quantity specified | Limit:no quantity specified |
| Sodium | <2.3g daily | Limit:no quantity specified | Limit:no quantity specified | Limit:no quantity specified |
| Alcohol | Avoid Alcohol | Limit:no quantity specified | Limit:no quantity specified | Limit:no quantity specified |

CONCLUSION AND RECOMMENDATIONS

Result of this study indicates that the dietary quality of the person should be better and should be prescribed a diet plan with need to adherence on it and even need to educate about the importance of nutrients and how a healthy balance diet help them to reduce the disease progression and help them to feel better throughout in the journey of HF treatment. Patient need to educate about the fluid salt and fat intake limitation while treatment. An awareness steps will be more beneficial at this point of disease. Heart failure patients were poorly nourished. People with this increasingly common clinical syndrome require public health approaches and clinical nutritional interventions.

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