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INTEGRATING TRADITIONAL TIB-E-NABAVI WITH CONTEMPORARY MEDICATIONS FOR EFFECTIVE CONGESTIVE HEART FAILURE MANAGEMENT

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ABSTRACT

The present study aimed to discuss treatment of congestive heart failure (CHF) by Tib-e-Nabavi in comparison to modern medicine. CHF is a complex clinical disorder the incidence of which increases with age. The main causes of CHF are coronary artery disease [CAD], ischemic heart disease [IHD], myocardial infarction [MI], hypertension [HTN] and pressure or volume overload. It is diagnosed by electrocardiography [ECG], Echocardiography, BNP level and other lab tests. In Tib-e-Nabavi it is treated with milk, barley, honey and dates and its importance is discussed with reference to Holy Quran and Ahadith. Description according to modern science and benefits in CHF are also given. The other plants that are used for the treatment include the Saussaurea lappa, Cichorium intybus and Nigella sativum. In the modern medicine it is treated by the diuretics, vasodilatory agents and inotropic drugs.

The data collected by reviewing medical books, medicinal books, Holy Quran, Islamic literature, journals, research articles and organized in a systemic way.

Finally, it is concluded that treatment of CHF by modern medicines in combination with Tib-e-Nabavi is beneficial for the patient and increase the compliance rate of patient.

Keywords: *Congestive heart failure, Tib-e-Nabavi, Modern medicines, Holy Quran and Ahadith.*

INTRODUCTION

1.1 GENERAL INTRODUCTION:

1.1.1 DIFINITIONS:

i. Pathophysiological Definition:

Congestive heart failure [CHF] is a clinical syndrome which is caused either by functional or structural cardiac abnormality or non-cardiac abnormality that affects the ability of heart to pump the blood according to the body needs [1]. It is suggested that CHF occurs due to impaired heart efficiency, which adversely affects the heart pumping action. In some patients, the CHF occurs due to reduced left ventricular ejection fraction and is due to the left ventricular systolic dysfunction [LVSD]. In some patients' heart failure occurs with a preserved ejection fraction [PEF] [2]. Simply, the heart failure can be defined as the condition in which the heart is unable to pump the blood to different organ of the body according to their needs and is unable to maintain the normal cardiac output, which is essential for the body to satisfy their needs [3].

ii. Clinical Definition:

CHF is a clinical syndrome, which is characterized by fatigue and breathlessness due to cardiac disease. It is often associated with fluid retention [congestion] due to increased jugular venous pressure [JVP] and edema

or a condition associated with imbalance between oxygen supply and demand [anemia]. In the diagnoses of CHF presence of significant cardiac disease, atypical symptoms and signs are necessary [4].

1.1.2 EXPLANATION:

The human heart is the main vital organ of the body, it works like a pump. The heart is divided into the right and left side and top and bottoms half.

Right side:	**Top:**
Right atrium	Right atrium
Right ventricle	Left atrium
Left side:	**Bottom:**
Left atrium	Right ventricle
Left ventricle	Left ventricle

The blood from the body enters the right atrium and is pushed into the right ventricle, and from the right ventricle the blood is pumped into the lung for oxygenation. After the oxygenation of the blood in the lung it comes back to the left atrium and then enter into the left ventricle of the heart, and then the left ventricle pump this oxygenated blood to each and every organ of the body to nourish the body with oxygen and essential nutrients which are essential for their survival[5].When the CHF occurs, then the pumping action of the heart is badly affected and the heart is unable to pump the blood as a result the heart receives excessive fluid. The fluid then goes back to the lung and other body tissues and causes edema of these organs because the fluid accumulates in these organs [6].

When the left side of the heart is not working properly then the blood goes back to the blood vessels of the lung. In some cases, the fluid is pushed out from lung vessels into the breathing space themselves and leads to pulmonary edema and shortness of breath during walking [6]. In CHF not enough blood is circulated so the tissues and organs receive little amount of blood which is not sufficient to fulfill their needs, and the patient may feel tired [7]. Breathlessness, fatigue, which are the typical symptoms, and the edema, which is a sign of the CHF, are nonspecific and make the diagnoses and treatment of the CHF more difficult. CHF syndrome occurs due to structural, functional or electrical abnormalities of the heart and each of the abnormality require appropriate diagnoses and different treatment strategy. Several typical symptoms and signs do not have a direct relation with the cardiac abnormality but arise due to secondary abnormalities such as abnormality of kidneys and muscles. Due to a number of reasons, it is difficult to define CHF, so it is defined by a number of ways and different experts use different definitions for CHF [8].

1.1.3 SIGN AND SYMPTOMS:

The following are the general signs and symptoms of congestive heart failure.

Shortness breath [during working or walking], Shortness of breath [at rest], Tiredness and weakness, Cough, Wheezing, Weight gain, Edema of the hands, feet, legs, ankles, or abdomen [7], Exertional Dyspnea, Fatigue, Palpitations, Paroxysmal Nocturnal Dyspnea [PND], Orthopnea, Abnormal blood pressure [B.P], Murmur [9], Changes in the frequency of urination

i. Symptoms of Worsening CHF:

Shortness of breath: It becomes worse with time and does not become normal on rest. Weight gain: Usually up to 5 pounds of weight gain in a week. Abnormal heart rate: Heart rate is faster than normal, and the patient may feel tired. Chest discompart usually chest tightness and severs pain in chest. Decreased appetite, and Dizziness and faint [5]

ii. Symptoms of Sever CHF:

Shortness of breath becomes severe. Cough with pink sputum.Sweating and color change to pale. Chest pain is severe and does not reveal on medication and rest [5].

1.1.4 RISK FACTORS OF CHF:

The following condition or diseases damage the heart muscles or damage the heart and lead to CHF.
Damage that occurs after heart attack, Hypertension, Heart muscles are damaged due to infection, Chronic lung disease, Damage in heart valve
Other conditions that lead to heart failure are given below
Diabetes, Chronic kidney disease, Irregular heartbeats, Obesity [10], High cholesterol level, Coronary heart disease [CHD], Viral infection, Substance abuse such as smoking, Chronic obstructive pulmonary disease [COPD], and Asthma [5]

1.1.5 CLASSIFICATION OF HEART FAILURE:

i. Clinical Classification:

The CHF is classified into following two clinical classes.

a. Systolic Heart Failure [SHF]:

The systolic CHF is also called the ejection fraction. In this category of heart failure, the heart muscles weaken or loss ability to pump the blood against the systemic resistance [11]. Systolic dysfunction led to decreased left ventricular contractility and results reduced left ventricular ejection fraction [LVEF] [12].

Causes:

Coronary artery disease [CAD], Hypertension [HTN], Diabetics, non-ischemic idiopathic cardiomyopathy, Valvular heart disease, Myocarditis, and Alcohol [12]

b. Diastolic Heart Failure [DHF]:

It is also called the preserved ejection fraction. In diastolic CHF, the contractility of heart muscles is not affected, and it contract normally but the relaxation of heart is adversely effected because the chambers of the heart becomes rigid and thickened [11]. In diastolic dysfunction, the LVEF is normal, but the diastole of the heart is not normal which results elevated left ventricular volume accompanied with the increased left atrial and chamber pressure [12].

Causes:

Hypertrophic Cardiomyopathies, Valvular heart disease, Restrictive cardiomyopathy, Amyloidosis, and Constrictive pericarditis [12]

ii. Newyork Heart Association [NYHA] Functional Classification:

The Newyork heart association classified the heart failure into following four classes. The main parameters for this classification are given below.

- Physical activity relation with CHF
- The symptoms that appear with physical activity or the symptoms that may become severe with physical activity
- What is the status of these symptoms when the patient is at rest or is not working means that wither the symptoms decrease at rest or not

On the bases of the above three parameters the NYHA classified heart failure into following four classes [13].

Table 1. NYHA Classification of CHF [13]

Class	Symptoms
Class i	Physical activity does not cause symptoms such as fatigue, palpitations, and shortness of breath or angina pectoris. These symptoms are only caused due to history of heart disease.
Class ii [mild]	These symptoms appear due to hard work or heavy exercise, but the symptoms are mild, and shortness of breath is a common symptom.
Class iii [moderate]	These symptoms appear as a result of light exercise or work, but reveals at rest and generally include fatigue, palpitations or shortness of breath.
Class iv [sever]	In this class, the patient is unable to tolerate any physical activity. The patient feels discomfort on a slight physical activity or exercise. The symptoms are also present at rest and the patient is mostly housebound. If any work or physical activity is continued, then the discomfort increases.

1.1.6 EPIDEMIOLOGY OF CONGESTIVE HEART FAILURE:

Heart failure is a major problem and is associated with several deaths. The mortality rate of CHF is decreased in several industrialized countries, but it is still associated with significant mortality rate in the underdeveloped or undeveloped countries. In western societies, it is a major cause of mortality and morbidity. The mortality rates of it increase with age and the mean age of onset is about 65 years of age. Framingham Study shows that the mortality rate increases to 27% per decade in men and about 61% gradient in women. However, this percentage of mortality is not confirmed by other studies. The prevalence of CHF is about 30 to 130 individuals per 1000 in those individuals, which is above 65 years of age. In the USA about 1-5 cases are reported in general population below 65 years of age per annum but it increases as the age increases and the incidence rate recorded is about 40 cases per 1000 in those, which have the age above 75 years [14].

The prevalence rate of heart failure with age in the USA is summarized in the following table.

Table 2. Prevalence rate of heart failure in United State [15]

Age of people	Prevalence rate
20-39 year old	1 %
80 years or above	20%

The lifetime risk of developing heart failure in the US is given in the following table according to the age of the people.

Table.3 Lifetime risk of heart failure in USA [15]

Age of people	Lifetime risk
40 years of age	11.4% for men 15.4% for women
Above 80 years of age	20% for both men and women

In Europe, about 1-2% of the population is affected by this syndrome at adult age and it increases to 6-10% in the patients, which is above 65 years of age. In Europe and North America, the risk of heart failure in individuals who are 40 years of age is about one in five cases. Due to better management and therapy provided to the patients, the risk of heart failure decreased. It is observed that about two in thousands of patients are discharged from the hospital in these countries. Age is one of the important factors in suggesting the preventive treatment for the patient. If better treatment and management is provided to the patient with myocardial infarction or any other risks of heart failure, then the risk of heart failure is decreased sufficiently and the hospitalization due to CHF is decreased [8].

In United Kingdome the CHF account for about 5% of hospital admission per year approximately more than 100000 individuals are admitted per year with, complain of CHF [16].

In Pakistan, the epidemiological study of CHF is incomplete but certain hospital conducted study on the epidemiology in a limited number of patients. These will be discussed one by one as below.

One such study is conducted in the Department of Medicine, Khyber Teaching Hospital and Peshawar in October 2009 to May 2010 and included 100 patients of CHF. The study includes complete history and tests including 12-leads electrocardiogram [ECG], echocardiogram and serial blood tests. In this study, about one hundred patients are studied and the results of this study are given in the following table.

Table 4. Study conducted on epidemiology of CHF in Khyber teaching hospital [17]

Total number of patients studied	Percentage of CHF in men	Percentage of CHF in women	Mean age of onset
100	60 %	40 %	54 years

This study is conducted on 1019 patients in department of cardiology, postgraduate medical Institute, Lady Reading Hospital [LRH], Peshawar, Pakistan and the period of study is from March 2005 to September 2007. The number of men and women with age ranging from 6-82 years in this study are given below.

- Men 583 [57.12%]
- Women 436 [42.78%]

In this study the causes of CHF and their percentage are determined as given in the following table.

Table 6. Results of study conducted by LRH Peshawar Pakistan [18]

Causes	Percentage
IHD	38.56 %
Hypertension	26.30 %
Dilated cardiomyopathy	10.10 %
Obstructive and restrictive Cardiomyopathies	5.39 %
valvular heart diseases	9.32 %
CHD	4.41 %
Constrictive pericarditis	1.07 %
Pericardial effusion	0.68 %
COPD	1.47 %
Thyrotoxicosis	0.68 %
Complete heart block	0.29 %

Another study is conducted in Hayatabad Medical Complex [HMC] and in this study the number of admissions with leading cause of heart failure is observed in 2008, 2009 and 2010. The results of this study are given in the following table.

Table.7 results of study conducted in HMC Peshawar Pakistan [19]

Year of admission	Total number of patients	Percentage of patients with CHF
2008	3502	14.75%
2009	4235	19.32%
2010	5112	22.87%

CHF has a great impact on the economy of patients because it is a leading cause which increases the hospitalization of patients above 65 years of age [14]. The management of CHF consumes a vast range of economic resources of the individual. In most of the industrialized countries, it is estimated that about 1-2% of the budget is consumed on hospitalization. So, CHF badly affects the economy of the patients [20].

1.1.7 ETIOLOGY:

There are many causes that adversely affect the heart contraction function [systole] and also the heart relaxation function [diastole]. The main causes and mechanism of development of heart failure are discussed in more detail as below [20].

i. Coronary Artery Disease [CAD]:

It is one of the most important causes of CHF and accounts for about 70% of cases. The myocardial infarction [MI] led to increase the muscle mass and may also lead to the death of the myocardial cell. The degree of contractility impairment depends upon the size of the infarction. This contractility impairment leads to the development of CHF. MI and myocardial ischemia also slow the ventricular relaxation simply means that it effects the diastolic function of the heart. The other reasons for the systolic or contractile dysfunction include the following, which can be detected on histological examination.

- Interstitial fibrosis
- Cellular infiltrates
- Cellular hypertrophy
- Myocardial cell degeneration [20]

ii. Pressure or Volume Overload:

Ventricular hypertrophy occurs due to pressure or volume overload. If it persists then it lead to alteration of geometry of hypertrophied myocardial cells with collagen disposition and the result is the systolic or diastolic impairment [21]. The example is end-stage renal disease [ESRD] in which there is no or low diuresis which leads to water retention and results in left ventricular hypertrophy. It finally predisposes to CHF [22].

iii. Anemia:

In anemia the tissue is under the stress condition, needs more oxygen, and is mediated by elevated level of 2, 3-diphosphoglycerate levels. The heart failure mechanism is complex and usually the following hemodynamic effects occur in the anemic patients that lead to heart failure.

- Decreased systemic vascular resistance that led to reduced afterload.
- Increased venous return led to increase preload.
- Left ventricular function is elevated due to enhanced sympathetic activity and inotropic factors.

Increased cardiac work and long-lasting volume overload cause progressive cardiac enlargement and also cause ventricular hypertrophy these conditions may lead to CHF [22].

iv. Myocardial Diseases:

Hypoxia is the most common cause of CHF. The ischemia may occur due to CAD such as atherosclerosis and less frequently, the other arterial diseases may also be responsible for it such as polyarthritis. There are certain other causes of myocardial dysfunction such as hypertension and valvular diseases, which lead to myocardial hypertrophy. Following are the two other myocardial diseases that are responsible for CHF [23].

- Myocarditis
- Cardiomyopathy

v. Systolic Blood Pressure:

The patients that are admitted in the hospital with acute heart failure have high systolic blood pressure [SBP]. The majority of the patients that are registered in the hospital usually have SBP greater than 140 mm Hg was observed in 45-50% of patients, those that have SBP of 120-140 mm Hg are 40% and 3-8% of patients have SBP of greater than 90mm Hg.

There are the following two pathophysiological implications of elevated systolic blood pressure.

- The elevated SBP precipitate the heart failure because it increases the vasoconstriction and afterload.
- The neurohormonal activation and cardiac stimulation lead to acute heart failure [24].

1.1.8 PATHOPHYSIOLOGY:

In normal individual, the mean heart rate is 70 beats/minute and the cardiac output at rest is 5L/min accompanied with a stroke volume of 70ml. The normal volume of filled ventricle is about 130ml and the ejection fraction is above 50% of the total ventricular contents. The volume of the residue left is

approximately 60ml.The ejection fraction is reduced to below 45% in case of left ventricular systolic dysfunction and when the ejection fraction becomes 35% or below then the symptoms develops in most of the individuals but some patients remains asymptomatic at even a low ejection fraction. The patients are at risk of thrombus formation when the ejection fraction becomes 10 % [25].

CHF is a complex clinical syndrome and occurs due to a number of causes such as abnormality in cardiac structure, function, rhythm, or conduction. But mostly the CHF develops due to MI which cause systolic dysfunction and HTN which may cause the diastolic dysfunction, or both are responsible for the development of CHF. The other major causes of CHF include Degenerative valve disease, Idiopathic cardiomyopathy, and Alcoholic cardiomyopathy

The heart failure occurs in elders due to several reasons, Including Angina, HTN, Diabetes, and Chronic lung disease [26]

There are certain variable the knowledge of which is essential for the understanding of the phathophysiology of the heart failure. These variables are given in the figure 1.

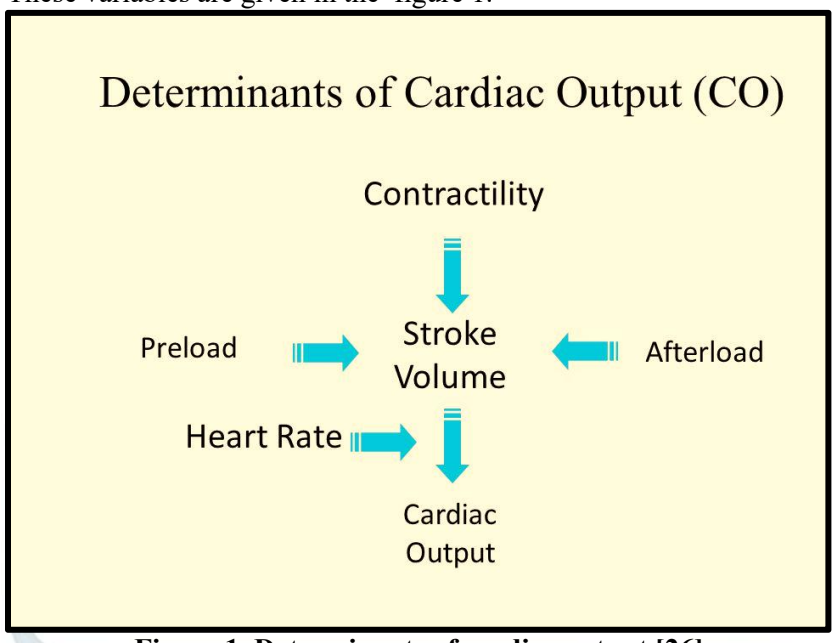

Figure 1. Determinants of cardiac output [26]

The cardiac output is determined by the heart rate and stroke volume. Further the stroke volume is determined by the preload, contractility, and afterload. Further, the understanding of heart failure the knowledge about the cardiopulmonary interactions is important.

- Preload: The volume that enters the left ventricle or the volume that is pumped forward.
- Afterload: The impedance of the flow from the left ventricle.
- Contractility: It characterizes the pump or facilitates the pumping action of the heart.

The preload is clinically determined by measuring the right atrial pressure and mostly is expressed as the end diastolic pressure of the left ventricle. The preload not only depends on the intravascular volume but is also influenced by the resistance to the ventricular filling. The heart is present in the thoracic cavity so the atrial pressure is reduced with the increase in the positive pleural pressure, and it can be observed in the COPD or asthma as a result the ventricular filling is reduced.

Right Atrial Pressure = Central venous pressure - Pleural pressure

The heart is a pumping organ, composed of muscles, and responds to the volume by giving output. When the volume increased then the plateau is seen in the amount pumped in the normal physiological state this is determined by Frank-Starling law. This law states that when the ventricular volume increases then the stretches in the myocardial muscle fibers and the stroke volume increases up to a maximum capacity. If the

volume is further increased beyond that point, then the pulmonary capillary pressure [pulmonary congestion] will be increased but it will not increase the stroke volume or cardiac output [26].

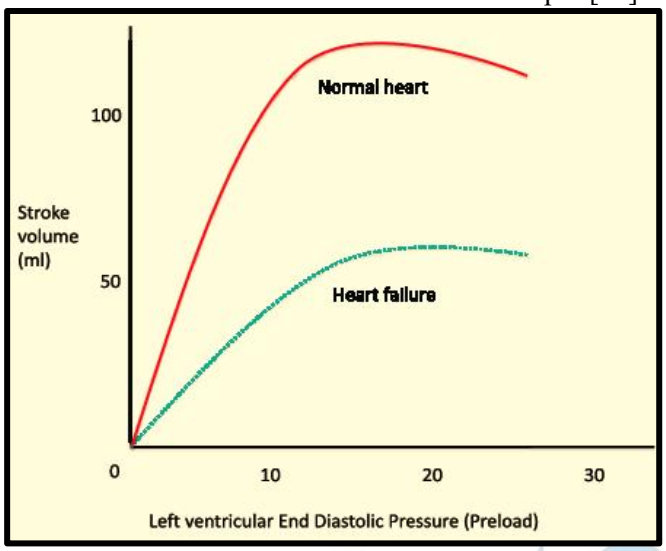

Figure2. The Frank-Starling law of the heart [26]

The heart failure may be systolic heart failure, or it may be diastolic heart failure as discussed previously. In case of systolic heart failure the ventricles becomes dilated and enlarged which leads to impairment of systolic function of the heart [27]. The left ventricular systolic dysfunction occurs due to the following reasons.

- Cardiac injury such as MI
- The exposure of heart muscles to mechanical stress

The impaired contractility may lead to systolic dysfunction and result in low ejection fraction and cardiac dilation [25].

Diastolic heart failure is mostly the problem of the aging population and develops in those individuals, which have longstanding HTN and left ventricular hypertrophy. It may also occur in young individuals which are hypertrophic or have restrictive Cardiomyopathies. Most commonly, the diastolic heart failure occurs in elder patients and mostly includes females. The most common causes of diastolic heart failure include the following [27].

- Increased left ventricular wall thickness
- Smaller left ventricular cavities
- Preserved systolic function by echocardiography
- With some element of mitral regurgitation

Most commonly, the impairment of the filling process led to diastolic dysfunction and the diastole filling is affected by the venous return rate. The normal filling occurs when there is active diastolic expansion. Less blood is accommodated in the ventricle in case of diastolic dysfunction because there is impaired relaxation, or the compliance of the left ventricle is reduced during the diastole. In diastolic dysfunction, there is normal ejection fraction but there is no cardiac dilation. During systole when the heart contracts then the ventricular tension or the tension on the ventricle wall can be determined by the degree of resistance to the outflow within the ventricular tree and at the exit valve. There are a number of causes that increase the afterload [important variable of CHF] of the heart by increasing the resistance against ventricular contraction. These causes include the following.

- Arterial hypertension
- Aortic narrowing
- Disorder of the aortic valves

As a result, the residual volume increases which leads to increased preload [variable of CHF] and ventricular overfilling occurs. It produces greater tension on the ventricular walls. In healthy individuals with normal heart function when the performance is slightly or compensatory increased then the stretched myocardium responds through the elastic recoil. In case of cardiac heart failure, this property of the recoiling of the heart is lost and the heart dilates abnormally for the accommodation of the increased ventricular load. When the heart is unable to handle, the increased ventricular load will lead to pulmonary and systemic venous congestion. At the same time, the myocardial oxygen demand is raises and the patient is at risk of myocardial ischemia or arrhythmia [25].

Another important variable of heart failure is contractility and is determined as the pumping ability of the heart. Contractility is commonly expressed as the ejection fraction. The heart will pump the blood of the same preload with different stroke volumes depending upon the contractility of the heart. There are certain causes that impair the contractility of the heart and then the heart is unable to maintain the ejection fraction. These causes include the following.

- MI
- Pharmacological agents [calcium channel blocker]
- Hypoxemia
- Severe acidosis

Heart failure can be evaluated easily when all the variables that are given in figure-1 are considered together. When the cardiac output falls or reduced the stroke volume or the heart rate changes in order to maintain the cardiac output. If the stroke volume is unable to maintain then the heart rate is enhanced to maintain the cardiac output [26].

The pathophysiology of the CHF also includes the neurohormonal activation to poor perfusion. It can be explained below.

When the renal perfusion is reduced due to heart failure then the rennin is released from the kidney. The rennin cleaves angiotensinogen and forms Angiotensin I then it is hydrolyzed by angiotensin-converting enzyme to angiotensin II. Angiotensin II is a potent vasoconstrictor. Rennin also promote the adrenal aldosterone release which retain water and salt at the distal renal tubule which lead to increase blood volume thus results to increase preload [28].

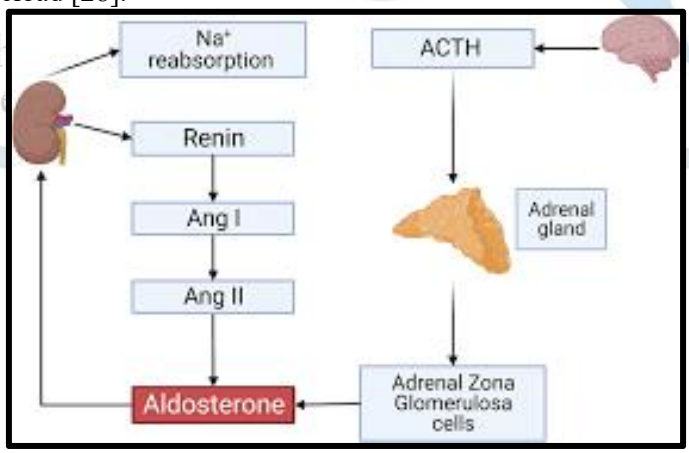

Figure.3 Rennin-angiotensin-aldosterone system

Arginine vasopressin is a hormone and is important for the regulation of water balance and cardiovascular homeostasis. It is derived from 9 amino acids containing protein that is derived from preprovasopressin that enters into the circulation from posterior lobe of the pituitary gland. The Arginine vasopressin is release in response of the hypoperfusion and retain the water and the sodium in the collecting duct of the renal tubule. It has antidiuretic effect that led to increase in the blood volume and results the increase in the preload which promotes the release of the natural vasodilators [Atrial Natriuretic Peptide ANP] from the atrial myocytes to counteract the increase in the preload [28].

1.1.9 DIAGNOSES:

i. Clinical Examination:

There is no specificity and sensitivity of the sign and symptoms for the diagnosis of heart failure and we cannot clearly diagnose the heart failure based on this. The percentage of sensitivity and specificity for diagnosis of CHF is given in the following table.

Table.8 Sensitivity and specificity of for diagnosis of CHF [1]

Symptom	%age of sensitivity	%age of specificity
Orthopnea	21	81
Dyspnea	66	52
PND	33	76
History of edema	23	80

The more common symptoms that are suggested in the patients presenting with CHF are given below.

- Presence of a third heart sound [S3]
- Peripheral edema
- Raised JVP
- Basal crepitations

If any of these signs are present, then there is clinical suspicion of CHF. The sensitivity and specificity for these signs are given in the following table.

Table.9 Sensitivity and specificity of diagnostic signs in patients suspected with CHF [1]

Signs	%age of sensitivity	%age of specificity
Peripheral edema	10	93
Raised JVP	10	97
Third heart sound	31	95
Crepitations	13	91
Tachycardia	7	99

Ankle edema and Pulmonary crepitations are the common sign but these are not specific to heart failure. We cannot clearly diagnose heart failure only from signs because CHF is the combination of sign and symptoms. Therefore, many other tests are performed to diagnose heart failure clearly [1].

ii. Tests for Diagnoses CHF:

Usually, the following tests are performed for the diagnosis of congestive heart failure.

a. Electrocardiography [ECG]:

The ECG usually records the electrical changes from the body surface that occur in the heart during the period of cardiac cycle. It is the most important test for the evaluation of the patients with suspected CHF [29], which gives immediate information about Systolic and diastolic function, Wall thickness, Valve function, and Ventricular Chamber volumes

The ECG also gives information about the heart rhythm and electrical conduction and shows that wither there is sinoatrial disease, Atrioventricular [AV] block, or abnormal intraventricular conduction [30].

The abnormalities in the ECG include Atrial fibrillation, Non-specific ST and/or T wave changes, Pathological Q waves, left bundle branch block, and left ventricular hypertrophy [LVH] [1]

The ECG usually helps in determining the cause of heart failure. From the finding of the ECG, we can develop a better strategy for the treatment of CHF because through this we determine the cause of CHF and be able to treat it [30].

b. Echocardiography:

Echocardiography is the term used for all imaging used for investigation of patients with heart failure. The imaging may be two-dimensional or three-dimensional [30]. In this technique, the echoes of the ultrasound waves are used for mapping the heart in order to study its functions in detail. The ultrasound waves that are used for this purpose have a wavelength of about 1mm or less and the frequency is about 2MHz. There are the following types of echocardiography that are commonly used [31].

- Transoesophageal Echocardiography
- Doppler Echocardiography

The echocardiography is used in case of suspected heart failure and is used to determine the underlining cause of the CHF. This is used to determine the following situations easily [4].

- Visualization of cardiac chambers and valves
- Measurement of systolic and diastolic ventricular contraction and relaxation
- Chamber size and wall thickness
- Valvular stenosis and regurgitation
- Congenital heart defects
- Valvular vegetations
- Intracardiac tumours and

iii. Other Imaging Technique:

The following imaging techniques can also be used for the investigation of heart failure.

a. Nuclear Imaging Technique:

This is used to assess the myocardial structure and function through the use of radionuclide imaging. Thallium-201 is used for imaging and after 3 hours the scanned and the image is taken [31].

b. Pyrophosphate Scan:

In this technique, the technetium-99m is used for imaging. This isotope is injected intravenously [IV] from 1 to 5 days, but the best result is obtained at second and third day. After a few hours the image is taken [31].

c. Radionuclide Ventriculography:

In this technique, a blood pool image is obtained by the following two methods.

The first technique is multiple gated acquisition [MUGA] scanning that is used for imaging purposes. It gives a precise and accurate measurement of left ventricular ejection fraction [LVEF] but the main disadvantage of this method is the exposure of patient to the ionizing radiation. Another disadvantage is that it does not provide visualization of the heart valves. It is a non-invasive technique and is used for the following purpose [1].

In this method, the technetium-99 m injected to the patient by I/V route. The isotope is attached with red blood cells [RBCs] and retain in the vascular space. Over 200 heart beats can be imaged by this method [31].

In the second method bolus of the isotopes are injected to the patient which makes a single pass through the circulation [31].

Both methods are used for the following purpose.

- Identification of areas with inadequate myocardial blood supply
- Quantification of areas with inadequate myocardial blood supply
- Detection of scarring caused by previous MI [1]
- Percentage of ejection fraction
- Ventricular wall abnormality

d. Chest Radiograph:

This is used for the determination of the following in case of acute and chronic heart failure.

- Alveolar pulmonary oedema
- Interstitial pulmonary oedema
- Basal pleural effusions
- Cardiac enlargement
- Cardiomegaly
- Pericardial effusion
- Cor pulmonale
- Left ventricular aneurysm
- Mitral stenosis

Chest radiography can be used alone for the diagnosis of CHF but is used in combination with other clinical sources of clinical evidence.

iv. Exercise Test:

In the exercise test usually, the patients perform the following activities.

- 6-min walk test
- Variety of treadmill
- Bicycle protocols

In this test the patient is usually subjected to perform a limited physical activity in order to determine the following objectives.

- Evaluation of exercise capacity
- Exertional symptoms, such as dyspnoea and fatigue
- Differentiate between cardiac and respiratory causes of dyspnoea [30]

A number of physical disorders usually accompany the CHF and the ECG at rest often does not gives good results. Therefore, the ECG is obtained during or after the exercise. In the presence of ischemia, the S-T segment is depressed and the depression is either horizontal or downward [31].

v. B-Type Natriuretic Peptide:

Brain Natriuretic peptide [BNP] is a peptide hormone that are produced from the precursor protein [pro-BNP]. These are usually present in the heart and perform the functions as Natriuresis, Diuresis, Vasodilatation, and Muscle relaxation [1]

Level of BNP raised in CHF but it can also increase with age and is low in obese patients. The level of BNP in CHF is < 100 pg/ml [29 mol/liter] but the raised level cannot differentiate between the CHF, left ventricular systolic dysfunction and the CHF with preserved ejection fraction. Other factors that reduce the BNP value are Diuretics, ACE inhibitors, Beta-blockers, and Aldosterone antagonists [30]

vi. Cardiac Catheterization:

This test has a risk of mortality, is now rarely used, and is performed to obtain the following information.

- Pressure in different cardiac chambers
- Measurement of pressure difference in two cardiac chambers
- Pulmonary artery pressure [31]

vii. Other Tests for CHF:

a. Blood Urea:

Due to reduced cardiac output and fluid retention the serum urea level increases in the case of CHF. The increase in the urea level usually reflects situations: Reflect congestion, Fluid retention, and Cardiac and Renal dysfunction [32]

b. Creatinine Clearance:

The increase in the creatinine level usually reflects the change in the glomerular filtration rate [GFR] and is an indication for the acute heart failure [32].

c. Pulmonary Function Test:

➢ This test is performed in order to determine whether the cause of CHF is either cardiac or the pulmonary. The pulmonary abnormalities that are associated with CHF usually include the Reduction in vital capacity, Pulmonary diffusion, and Increase in Pulmonary resistance [8] and are determined by this test.

d. Blood Tests:

Blood tests are usually done to determine the underlining cause of CHF. Commonly used blood tests are given in the following table number.

Table. 10 Blood tests [25]

Test	Comments
Blood gas analysis	For assessment of respiratory gas exchange
Full blood count	For investigation of anemias
Plasma alanine and aspartate amino transferase	For investigation of the liver function
Thyroid function test	For investigation of Thyrotoxicosis
Fasting blood glucose	For investigation of diabetes mellitus

1.2 TREATMENT BY TIB-E-NABAVI PEACE BE UPON HIM [P.B.U.H]:

➢ In tib-e-nabavi we can see every medicine and recipe which is beneficial for humans. The CHF can be treated by Honey, Milk, Barely, and Date as medicines and recipes. These are also helpful in all heart disease [33].

All these can be discussed one by one in more detail with reference to its characteristics mentioned in Quran, Ahadith, it's recipe for CHF, dose and description according to modern sciences.

1.2.1 HONEY:

i. With Reference to Quran:

➢ And your Lord inspired the bee, saying: "Take you habitations in the mountains and in the trees and in what they erect. Then, eat of all fruits, and follow the ways of your Lord made easy [for you]." There comes forth from their bellies, a drink of varying color wherein is healing for men. Verily, in this is indeed a sign for people who think"-

[Surah An-Nahal:68-69].

➢ "Is the description of Paradise, which the righteous are promised, wherein are rivers of water unaltered, rivers of milk the taste of which never changes, rivers of wine delicious to those who drink, and rivers of purified honey, in which they will have from all [kinds of] fruits and forgiveness from their Lord, like [that of] those who abide eternally in the Fire and are given to drink scalding water that will sever their intestines"-

[Surah Mohammad: 15].

ii. With Reference to Ahadith:

➢ Hazrat Abu Hurara [R.A] narrates that I heard from Hazrat Mohammad [P.B.U.H] as saying: "A person who takes a sip of honey early in the morning on an empty stomach for at least three days in a month will not suffer from any disease"-Baheqi-Ibnimaja[34].

➢ Hazrat Abdullah Ibni Massod narrates that I heard from Hazrat Mohammad [P.B.U.H] as saying: "Quran and honey are the two sources of healing/cure"-Ibnimaja [35].

➢ Hazrat Anus Bin Malik [R.A] narrates that I heard from Hazrat Mohammad [P.B.U.H] as saying: "Buy honey from the money that you earn legally [Halal] and mix with rain water it is the best recipe for all the diseases"-Masnad Firdose [36].

- Hazrat Khasam [R.A] narrates that: "Once I am ill and I requested Hazrat Mohammad [P.B.U.H] for medicine and praying. He [P.B.U.H] sent a bottle of honey in return"-Ibni asakar, Ibni abi sheeba [36].
- Hazrat Ayisha [R.A] narrates that: "Hazrat Mohammad [P.B.U.H] likes honey in all fluids"-Bukhari [36].
- Hazrat Ayisha [R.A] narrates that I heard from Hazrat Mohammad [P.B.U.H] as saying: "The pelvis is an important part of the kidney and it's problem will greatly effects the patient. The problem in the pelvis can be treated by honey and boiling water"-Abu Daod, Mastadrak Hakim, Alharis, Abu Naeem [33].

iii. Description of Honey According to Modern Science:

a. Synonyms:

- Honey ---------- English
- Shahad ---------- Urdu
- Gabin ---------- Pashto
- Mado ---------- Hindi
- Asal ---------- Arabic

b. Biological Source:

It is deposited by honey bee [Apis Mallifera] in the honey comb and is rich with invert sugar and fructose. It is free from the foreign particles such as parts of insects and leaves etc and contain pollen grain [37].

c. Chemical Constituents:

Table 11. Chemical constituents of honey [36]

Constituents	Percentages
Glucose	30-40 %
Fructose	40-50 %
Sucrose	0.1-10 %
Protein	0.6-2.27 %
Wax	4.6 %
Sodium	7.1 %
Potassium	35 %
Calcium	7.7 %
Sulphure	0.8 %
Iron	0.2 %
Reducing sugar	<20 %

iv. Benefits of Honey in CHF:

The benefits of honey for congestive heart failure are given below.

- Honey acts as a diuretic and can be used as natural diuretic [33].
- The raw honey is rich in energy and fulfills the patient requirements of carbohydrates. The honey also reduces muscle fatigue.
- Honey in combination with lemon consumes the extra fat stores of the body and provides the energy for the body functions. Furthermore, it keeps the cholesterol level in check [38].
- Honey decreases the low-density lipids [LDL] and triglycerides. The increased level of LDL and triglycerides is one of the risk factors for the CHF [39].
- Honey provides the energy needed by the body for blood formation and has positive effects to regulate and facilitate the blood circulation. It also protects the patient from capillary problems and arteriosclerosis [38].

1.2.2 MILK:

i. With Reference to Quran:

➢ "And verily! In the cattle, there is a lesson for you. We give you to drink of that which is in their bellies, from between excretions and blood, pure milk; palatable to the drinker's"- [Surah An-Nahal: 66].

➢ "The description of Paradise which the Muttaqûn [pious] have been promised is that in it are rivers of water the taste and smell of which are not changed; rivers of milk of which the taste never changes; rivers of wine delicious to those who drink; and rivers of clarified honey [clear and pure] therein for them is every kind of fruit; and forgiveness from their Lord. [Are these] like those who shall dwell forever in the Fire, and be given, to drink, boiling water, so that it cuts up their bowels"-[Surah-Mohammad: 15].

ii. With Reference to Ahadith:

➢ Hazrat Tariq Bin Shahab [R.A] narrates that I heard from Hazrat Mohammad [P.B.U.H] as saying: "You have milk of camel it has cure for all diseases"-Ibni Asakar [33].

➢ Hazrat Abdullah Bin Masood [R.A] narrates that I heard from Hazrat Mohammad [P.B.U.H] as saying: "Allah reveals medicine for every type of disease. So drink cow milk because it graze on every type of plant"- Annisayi [40].

➢ Hazrat Abdullah Bin Masood [R.A] narrates that I heard from Hazrat Mohammad [P.B.U.H] as saying: "Cow milk is a cure for diseases, it's butter is medicine, but meat is a disease"-Tibrani [40].

➢ Hazrat Abdullah Bin Umer [R.A] narrates: "Hazrat Mohammad [P.B.U.H] prohibit the use milk of an animal that graze on dirt"-Ibni Maja-Abu Daood [40].

iii. Description of Milk According to Modern Science:

a. Synonyms:

➢ Milk ---------- English
➢ Dood ---------- Urdu
➢ Labun ---------- Arabic

Pai ---------- Pashto

b. Chemical Constituents:

Table 12. Constituents of milk [40]

Source of milk	Water	Fats	Sugar	Protein
Camel	86.5 %	3.1 %	5.6 %	4 %
Goat	86 %	4.6 %	4.2 %	4.4%
Cow milk	86.35%	3.75 %	4.75%	3.4%
Buffalo milk	80.9 %	7.9 %	4.5 %	5.9%

iv. Benefits in CHF:

➢ Milk act as a diuretics and is useful in heart failure.
➢ It is a balance diet for the patient and have the ingredients that are needed by the body.
➢ Milk increases the contraction of the heart [33].

1.2.3 BARLEY:

i. With Reference to Quran:

In the Quran the word habb is used for the grain of any plant including the barley.

➢ "The likeness of those who spend their wealth in the Way of God, is as the likeness of a grain [of corn]; it grows seven ears, and each ear has a hundred grains. God gives manifold increase to whom He pleases. And God is All-Sufficient for His creatures' needs, All-Knower"- [Surah-Al-Baqara:261].

- " And with Him are the keys of the Ghaib [all that is hidden], none knows them but He. And He knows whatever there is in [or on] the earth and in the sea; not a leaf falls, but he knows it. There is not a grain in the darkness of the earth nor anything fresh or dry, but is written in a Clear Record"- [Surah Al-Anaam:59].
- "It is He Who sends down water [rain] from the sky, and with it We bring forth vegetation of all kinds, and out of it We bring forth green stalks, from which We bring forth thick clustered grain. And out of the date-palm and its spathe come forth clusters of dates hanging low and near, and gardens of grapes, olives and pomegranates, each similar [in kind] yet different [in variety and taste]. Look at their fruits when they begin to bear, and the ripeness thereof. Verily! In these things there are signs for people who believe"- [Surah Al-Anaam:99].
- "And a sign for them is the dead land. We gave it life, and We brought forth from it grains, so that they eat thereof"- [Surah Yaseen:33].
- "That We may produce therewith grains and vegetations", [Surah Anbiya:15].

ii. With Reference to Ahadith:

- Hazrat Anus Bin Malik [R.A] narrates that: "Once a tailor invited Hazrat Mohammad [P.B.U.H] and presented curry of meat and pumpkin with barley bread. He [P.BU.H] eat the pieces of pumpkin with bread very humbly- Bukhari, Muslim [41].
- Hazrat Yousaf Bin Abdullah Bin Salam [R.A] narrates that: "I saw Hazrat Mohammad [P.B.U.H] that He [P.B.U.H] took a piece of barley bread, put a date over it and said that is it's curry then he eat it"- Abu Daod [36].
- Hazrat Ayisha [R.A] narrates that: "When someone fell ill then Hazrat Mohammad [P.B.U.H] orders the patient to prepare a coarse meal of barley [talbinah] for the patient. Then said that it relaxes the patient and removes the weakness of patient like the water that removes the dirt from the face during face washing"- Ibni Maja [35].
- Hazrat Ayisha [R.A] ordered a coarse meal of barley for the patient. "She said that the patient doesn't like it but it is very useful for patient"- Ibni Maja [36].

iii. Description of Barley According to Modern Science:

a. Synonyms:

- Barley ---------- English
- Joo ---------- Urdu
- Varbashy ---------- Pashto
- Shaeer ---------- Arabic

b. Botanical Name:

- Hordeum vulgare

c. Family:

- Gramineae

d. Chemical Constituents:

Table 13. Chemical constituents of barley.

Constituents	Quantity Present
Calories [40]	354 kcal
Protein	12.48 %
Fat	2.30 %
Total Carbohydrate [36]	73.48 %
Starch [36]	70 %
Beta-Glucan[40]	4.3-5.5 %
Lignin [41]	17.13 %
Cellulose	33.25 %
Hemicelluloses	20.36 %

Ash	2.18	%
Albuminiods	11.5	%
Total Dietary Fiber [40]	17.3	%
Water [36]	12.5	%

iv. Benefits of Barley in CHF:

- Barley reduces plasma cholesterol and other lipids. The increase in the level of these lipids is one of the risk factors for the CHF and the barley reduce the level of it so eliminating the risk of developing CHF.
- Plasma total cholesterol and triglycerides are significantly reduced in man and total cholesterol and LDL are decreased in the post-menopausal women by taking the grains.
- The dietary fiber that is present in the barley help to regulate the body weight so help in eliminating one of the risk factors of CHF [42].
- Barley is a natural appetizer so beneficial in cardiac patients [33].

1.2.4 DATES:

i. With Reference to Quran:

- "Would any of you wish to have a garden with date-palms and vines, with rivers flowing underneath, and all kinds of fruits for him therein, while he is striken with old age, and his children are weak [not able to look after themselves], then it is struck with a fiery whirlwind, so that it is burnt? Thus does God make clear His Ayât [proofs, evidences, verses] to you that you may give thought"-[Surah:Albaqara :266].
- "It is He Who sends down water [rain] from the sky, and with it We bring forth vegetation of all kinds, and out of it We bring forth green stalks, from which We bring forth thick clustered grain. And out of the date-palm and its spathe come forth clusters of dates hanging low and near, and gardens of grapes, olives and pomegranates, each similar [in kind] yet different [in variety and taste]. Look at their fruits when they begin to bear, and the ripeness thereof. Verily! In these things there are signs for people who believe"- [Surah Al-Anaam:99]
- "And it is He Who produces gardens trellised and untrellised, and date-palms, and crops of different shape and taste [its fruits and its seeds] and olives, and pomegranates, similar [in kind] and different [in taste]. Eat of their fruit when they ripen, but pay the due thereof [its Zakât, according to God's Orders 1/10th or 1/20th] on the day of its harvest, and waste not by extravagance. Verily, He likes not Al-Musrifûn [those who waste by extravagance]"- [Surah Al-Anaam: 141].
- "And in the earth are neighboring tracts, and gardens of vines, and green crops [fields etc.], and date-palms, growing out two or three from a single stem root, or otherwise [one stem root for every palm], watered with the same water, yet some of them We make more excellent than others to eat. Verily, in these things, there are Ayât [proofs, evidences, lessons, signs] for the people who understand"- [Surah Ar-rad:4].
- "With it He causes to grow for you the crops, the olives, the date-palms, the grapes, and every kind of fruit. Verily! In this is indeed an evident proof and a manifest sign for people who give thought"- [Surah An-Nahl:11].
- "And from the fruit of the palm trees and grapevines you take intoxicant and good provision. Indeed, is a sign for people who reason"- [Surah An-Nahl:67].
- "Or [until] you have a garden of palm trees and grapes and make rivers gush forth within them in force [and abundance]"- [Surah A-isra: 91].
- "And present to them an example of two men: we granted to one of them two gardens of grapevines, and we bordered them with palm trees and place between them [field of] crops"- [Surah Al-Kahf: 32].
- "And pain of childbirth drove her to the trunk of palm tree. She said I had died before this and was in oblivion, forgotten"- [Surah Maryam: 23].
- "And shake toward you the trunk of palm tree; it will drop upon you ripe, fresh dates"- [Surah Maryam: 25].
- [Pharaoh] said, "You will believe before I give you permission. Indeed, he is your leader who has thought you magic. So, I will surely cutoff your hands and feet on opposite sides, and I will crucify you on

the trunk of palm trees, and you will surely know that which of us is more sever in [giving] punishment and more enduring"- [Surah Taha:71].

- "And we bought forth for you thereby gardens of palm trees and grapevines in which for you are abundant fruits and from which you eat"- [Surah Al-Mominun: 19].
- "And fields of crops and palm trees with soften fruits"? [Surah Ash-Shuara:148].
- "And place therein gardens of palm trees and grapevines and cause them to burst forth there from some spring"- [Surah Ya Sin: 34].
- "And lofty palm trees having fruits arranged in layers"- [Surah Qaf: 10].
- "Therein is fruits and palm trees having sheaths [of dates]"- [Surah Ar-Rahman: 11].
- "In both of them are fruits and palm trees and pomegranates"-[Surah Ar-Rahman:68].
- "He unleashed it upon them for seven nights and eight days. Violently. You could see which Allah imposed upon them for seven nights and eight days in succession, so you would see the people therein fallen as they are the hollow trunks of palm trees"- [Surah Al-Haqqah:7].

ii. With Reference to Ahadith:

- Hazrat Ayisha [R.A] narrates that I heard from Hazrat Mohammad [P.B.U.H] as saying: "A house in which dates are present then the people of this house will never remain hungry"-Muslim Sharif [35].
- Hazrat Ayisha [R.A] narrates that I heard from Hazrat Mohammad [P.B.U.H] as saying: "Eat old and fresh dates together because satan [Iblees] becomes angry and in trouble because a man becomes healthy by these dates"-Ibni Maja, Nisayi [36].
- Hazrat Yousaf bin Abdullah Bin Salam [R.A] narrates: " I saw Hazrat Mohammad [P.B.U.H] that He [P.B.U.H] took a piece of barley bread and, put a date on it and said it's curry for it then He [P.B.U.H] eat it"-Abu Daod [36].
- Hazrat Abu Saeed [R.A] narrates:"Once I accompanied Hazrat Mohammad [P.B.U.H] on the way Hazrat Umar [R.A] and Hazrat Abu Bakkar [R.A] joined us. We went to the garden of Ansari [resident of Madina] and Hazrat Mohammad [P.B.U.H] ordered him to bring the half ripen dates. We eat these dates very humbly"- Masnad Ahmad-Beheqi [36]
- Hazrat Abdullah bin Jafar narrates that: I saw Hazrat Mohammad [P.B.U.H] eating dates with cucumber"- Bukhari, Muslim, Ibni Maja [36]
- Hazrat Sad bin Abiwaqas narrates that: "Once I feel ill Hazrat Mohammad [P.B.U.H] comes to my house and put his hand on my chest. I feel the effect of his hand in my heart then he says that you have heart problem you should go for treatment to Haris's bin Kalda Saqpi because he is expert [tabib]. He must give you seven Ajwah dates [type of date that are present in the Saudi Arabia] crushed along with its seeds"- Abu Daod, Abu Naeem, Masnad Ahmad [35]
- Hazrat Sad bin Abiwaqas narrates that I heard from Hazrat Mohammad [P.B.U.H] as saying: "A person that eats seven Ajwah dates early in the morning then he will not affected by the poison and magic at that day"- Bukhari [43].
- Hazrat Ayisha [R.A] narrates that I heard from Hazrat Mohammad [P.B.U.H] as saying: "Ajwah dates have cure for all diseases if it is ate at empty stomach then it act as antidote for the poison"-Muslim [36]

iii. Description of Dates According to Modern Science:

a. Synonyms:

- Date ---------- English
- Kajor ---------- Urdu
- Kajora ---------- Pashto
- Tamar, Balah---------- Arabic

b. Botanical Name:

- Phoenix dactylifera

c. Family:

Arecaceae, palm family

d. Chemical Constituents of Date:

Table 14. Chemical constituents of date [36]

Constituents	Percentage
Protein	2.0 %
Carbohydrates	24 %
Sodium	4.7 %
Potassium	7.54 %
Calcium	63.9 %
Magnesium	58.9 %
Copper	0.21 %
Iron	1.61 %
Phosphorus	0.38 %
Sulphure	51.6 %
Chlorine	29.0 %

Dates also contain the following constituents:

- Flavoniods glycosides which include the following.
  - Luteoin
  - Quercitin
  - Apigenin
- Procyanidine oligomers
- Phenolic compounds
- Poly phenolic compounds [44]

e. Constituents of Seeds:

Table 15. Constituents of date seeds [45].

Constituents	Percentage
Moisture	3.1–7.1 %
Protein	2.3–6.4 %
Fat	5.0–13.2 %
Ash	0.9–1.8 %
Dietary fiber	22.5–80.2 %

iv. Benefits of Dates in CHF:

- Potassium is present in the phoenix dactylifera which is useful for cardiac patients to strengthen the heart muscle.
- The seeds of the dates remove the resistance present in the blood vessels and regulate the blood flow.
- It is rich in carbohydrates and protein and is an excellent source of energy for the patient [33].
- As it contain phenolic compounds it help in the prevention atherosclerosis [44].

1.2.5 OTHER PLANTS USED IN TIB-E-NABAVI FOR TREATMENT OF CHF:

i. Kust [Saussaurea lappa]:

It is useful plant for heart patients because it has an important alkaloid called the saussarine in concentration of 0.5 % which effect the ventricles to pump the blood to the body with greater pressure[36].

ii. Chicory [Cichorium intybus]:

It acts as a diuretic and is also important for the blood vessels to regulate the flow [33].

iii. Kilongi [Nigella sativum]:

Hazrat Mohammad [P.B.U.H] said that it is a cure for all the diseases except death, so it is given when the exact medicine for the treatment is unknown [33].

iv. Methi or Foenum [Tigonella gracecus]:
It performs the following two functions.
- Appetizer
- Diuretic

1.2.6 RECIPE AND DOSE FOR HEART FAILURE:

i. Honey:
One teaspoon of honey mixed with one cup of boiling water should be used two times a day [33].

ii. Dates:
Seven dates early in the morning or seven dates crushed along with its seeds [33].

iii. Barley:
In the breakfast the talbinah [coarse meal of barley] is given to the patient [33].

iv. Milk:
Quantity sufficient for the patient [33].

1.2.7 ANOTHER RECIPE FOR CHF IN TIB-E-NABAVI:

Kust [Saussaurea lapa] ---------- 70 gm Chicory [Cichorium intybus] ---------- 5gm
Kilongi [Nigella sativum]---------- 50 gm Methi [Tigonella gracecus]---------- 5gm

i. Dose:
The above ingredients are powdered together and is given one tea spoon two times a day [33].

1.3 TREATMENT BY MODERN MEDICINE:

Following two types of treatment are recommended for CHF in modern medicine.
- General Treatment
- Drug Treatment

1.3.1 GENERAL TREATMENT:

General treatment or non-pharmacological treatment includes the following.

i. Reduction of Physical Activity:
Bed rest for a few days in heart failure is useful for the patient but the prolonged rest may cause several complications in the patients which include deep vein thrombosis. This risk can be reduced by specific exercises such as daily leg exercise [31].

ii. Dietary Modification:
The control diet is usually recommended for the patient such as low salt diet. The salt intake may aggravate the patient's condition, so salt is avoided in the food of the patient [31]. A diet rich with fat is usually restricted in the patients who are obese or overweight because the obesity increases the workload on the heart [4].

iii. Fluid Intake:
The CHF patients may feel intense thirst and increase fluid intake may lead to hyponatremia. The fluid intake should be limited in CHF patients but in case of following conditions, the fluid intake may be increased, or the dose of the diuretics may be increased [4].

- Hot weather
- Diarrhea
- Vomiting or fever

iv. Alcohol Intake:

Alcohol consumption may lead to the damage of the myocardium and the precipitation of arrhythmias. So, alcohol should be avoided in the CHF patients [4].

v. Smoking:

Smoking increases the risk of the following diseases so it must avoided in CHF patients.

- Cardiovascular
- Pulmonary problems
- Cancers

1.3.2 DRUG TREATMENT:

Usually, the following drugs are given for the treatment of CHF.

- Diuretics
- Vasodilatory agents
- Inotropic drugs [4]

i. Diuretics:

These agents increase the sodium and water excretion from the body through the blockade of the sodium and chloride reabsorption [31]. This led to the reduction of the extracellular fluid volume and the net result is the reduction in the ventricular filling pressure [preload] but it does not affect the cardiac output. Cardiac output is reduced in those patients in which the intravascular volume rapidly declines [46]. Diuretics are beneficial to relieve dyspnea and peripheral edema [31]. The diuretics control the symptoms of CHF and also improve the exercise capacity of CHF patients. The diuretics are used with aldosterone antagonists in order to reduce the mortality of CHF [46].

a. Loop Diuretics:

These agents inhibit the transport of sodium, potassium and chloride ions in the ascending limb of loop of Henle and results reduction in the reabsorption of these ions. These are the most efficacious agents because about 25-30% of absorption of these ions occurs in the ascending limb. Following are the loop diuretics that are commonly used [47].

- Furosemide
- Bumetanide
- Torsemide
- Ethacrynic acid

Contraindication :

The contraindications are given below.

- Renal impairment
- Hepatic impairment
- Pregnancy
- Lactation

Adverse Drug Reaction:

Following are the common side effects of loop diuretics [48].

- Ototoxicity
- Hyperuricemia
- Hypotension

- Hypokalemia
- Hypomagnesaemia

b. Thiazide Diuretics:

These are used mostly in the treatment of HTN and have a limited use in the treatment of CHF. It is less effective when used single and combination is useful in treating CHF. It has a synergistic effect with loop diuretics [46]. The thiazide diuretics usually act on the distal convoluted tubule and decreases the sodium reabsorption and increase the potassium excretion. It includes the following drugs [49].

- Chlorothiazide
- Hydrochlorothiazide
- Cyclopenthiazide
- Bendroflozide [commonly used]

Contraindication:

The contraindication is given below [48].

- Renal impairment
- Hepatic impairment
- Pregnancy
- Lactation

Adverse Drug Reactions:

Following are the common side effects of the thiazide diuretics [48].

- Gastrointestinal disturbances
- Altered plasma lipid concentration
- Electrolyte disturbances such as:
- Hypokalemia
- Hyponatremia
- Hypomagnesaemia
- Hyperuricemia
- Hyperglycemia and Gout

c. Potassium Sparing Diuretics:

These agents usually inhibit the sodium conductance channels or act as aldosterone antagonists, but these agents are very low diuretic agents and are not effective in the treatment of heart failure when used alone [46]. These are effective when used in combination with loop diuretics. These agents should be avoided in case of renal failure. Potassium sparing diuretics include the following drugs [31].

- Amiloride
- Triamterene

ii. Vasodilatory Agents:

These agents are useful in patients of sever CHF and elevated systemic vascular resistance. There are a number of the vasodilators that reduce the symptoms of CHF but the hydralazine with isosorbide dinitrate combination, the ACE inhibitors and AT1 receptors blocker proved to be effective in the randomized trials. The following types of vasodilators can be used in the treatment of CHF.

- ACE inhibitors
- Nitro vasodilators
- Hydralazine
- α-Adrenergic blockers
- Calcium antagonists [46]

a. ACE Inhibitors:

These are more potent arterial vasodilatory agents and are the drug of choice for the treatment of CHF. These agents block the enzyme that converts the angiotensin-l to angiotensin-ll which is potent vasoconstrictor and also reduce the rate of bradykinin inactivation. The vasodilation occurs due to diminishing the angiotensin-II level that lead to lower vasoconstriction and increased the bradykinin level that lead to the vasodilatation. These agents also decrease the aldosterone secretion and results the sodium and water retention [47].

These agents are effective for CHF and relieve the symptoms of CHF such as improve exercise tolerance, reduce the incidence of exacerbation and reduce mortality. In combination with the beta blockers form a basis of treatment for all patients with heart failure that has occurred due to left ventricular systolic dysfunction. These are generally advised for patients with asymptomatic left ventricular systolic dysfunction and symptomatic heart failure.

The aldosterone antagonists such as the spironolactone can be given in combination with the beta blockers and ACE inhibitors in patients with moderate to severe heart failure and remain asymptomatic. The spironolactone reduces the mortality and symptoms of heart failure. If the spironolactone cannot used in the patient, then the Eplerenone is used for the management of heart failure. For the patients in whom the ACE inhibitors are contraindicated then the isosorbide dinitrate with hydralazine are used but this combination is poorly tolerated in patients. Before the introduction of the ACE inhibitors the potassium sparing diuretics and potassium supplements should be discontinued due to risk of hyperkaliemia [48].

Contraindication:

The contraindications are given below.

- Renal impairment: These agents should be used with caution in renally impaired patient and should be monitored for side effects. The dose needs to be reduced in these patients.
- Hepatic impairment: The use of these drugs requires close monitoring in patients with impaired liver function.
- Pregnancy: ACE inhibitors should be avoided in pregnancy unless essential.

Adverse Drug Reaction:

Following are the common side effects of ACE inhibitors [48].

- Renal impairment
- Persistent dry cough
- Angioedema
- GIT disturbances
- Altered liver function tests
- Hepatitis
- Hepatic necrosis
- Blood disorders

Table 16. Examples and dose of ACE inhibitors [48].

Drugs	Dose	Dose in renal impairment	Dose in hepatic impairment	Dose in lactation	Dose in pregnancy
Captopril	6.25-12.5mg TID and increased at interval of two weeks upto max or 150mg daily in divided doses	25mg daily but do not increase from 100mg	CI	CI	CI
Cilazapril	500mcg once daily initially increased to 1-2.5mg at weekly interval if tolerated 5mg is max	500mcg don't exceed 2.5mg daily	Max dose is 500mcg once daily in liver cirrhosis avoid	CI	CI

			in ascites		
Enalapril	2.5mg once daily increased upto 10-20mg if tolerated	Max dose is 2.5mg	CI	CI	CI
Imidapril	5mg daily before food	Max dose 2.5mg	Max dose 2.5mg	CI	CI
Lisinopril	2.5mg once daily max dose is 35mg once daily	Max dose is 5-10mg	CI	CI	CI
Ramipril	1.25mg once daily increased upto 10mg BID	Max dose is 2.5mg	CI	CI	CI

b. Nitro Vasodilators:

These are the widely used medications in the treatment of the CHF in clinical practice. These agents act by supplying the NO and by activation of the soluble guanylyl cyclase relaxes the vascular smooth muscles [46].

i. Organic Nitrates:

These are safe and effective agents that are used in the treatment of CHF. Its main action is the reduction of the left ventricular pressure. These agents will cause the reduction in pulmonary and systemic vascular resistance at high doses. These agents are available in a number of formulations which are given below [46].

- Rapid acting nitroglycerine tablets or sprays for sublingual administration.
- Short acting oral agents such as isosorbide dinitrate.
- Long-acting agents such as isosorbide mononitrates
- Topical nitroglycerine ointments and transdermal patches
- Parentral nitroglycerine

Organic nitrates stimulate c-GMP which lead to vascular smooth muscle relaxation, venous dilation and dose dependent dilation of the arterial beds. Venous pooling is promoted by the dilation of the post capillary vessels. It also led to decrease the myocardial oxygen demand and decrease in the blood pressure with reflex [50].

Adverse Drug Reaction:

- CNS:
  - Agitation
  - Confusion
  - Insomnia
- CVS:
  - Arterial fibrillation
  - Angina
  - Syncope
- GIT disturbances
- ENT:
  - Blurred vision
  - Diplopia
- Skin:
  - Cold sweat
  - Rash
  - Crusty skin lesion
- HEME:

- Hemolytic anemia
- Methemoglubinemia
- **Contraindication:**

➢ Severe anemia, closed angle glaucoma, postural hypotension, early MI, head trauma, cerebral hemorrhage, increase intracranial pressure [50].

Table 17. Organic nitrates examples, dose and drug interaction [50].

Drugs	Dose	Drug interaction
Nitroglycerine	Sublingually: 0.3-1mg repeated as desired Orally: 5mg repeated as desired I/V infusion: 10-200mcg/min Spray: 1-2 doses under tongue	Ergot alkaloids Ethanol Metronidazole Sildenafil
Isosorbide dinitrate	Sublingually:5-10mg for quick relief Orally:40-80mg BID LVF:40-160mg upto 200mg if required I/V infusion:2-10mg/hour	Alcohol Calcium channel blockers Dihydroergotamine Sildenafil
Isosorbide mononitrate	10-20mg BID increased upto 120mg daily if requires suggested timing is 8am-2pm Sustain release tablets: 40mg once daily	Alcohol Calcium channel blockers Dihydroergotamine

c. Hydralazine:

Hydralazine preferentially dilates arterioles and has little effect on veins. It also has an effect on the movement of the calcium within the vascular smooth muscles that is responsible for the initiation and maintenance of the contractile state of the muscles. It is also responsible for the increase in cardiac output. It also causes to reduce the systemic resistance and decrease the afterload [50]. In the case of CHF the hydralazine reduces pulmonary and systemic vascular resistance by reducing right and left ventricular after load. The hydralazine is effective in those patients that are renally impaired and can't tolerate the ACE inhibitors. It is more effective when given in combination with organic nitrates [46].

d. α-Adrenergic Blockers:

These agents act as a direct smooth muscles' relaxant and cause relaxation of arterial and smooth muscles that lead to the decrease in the systemic vascular resistance by blocking the α-adrenergic receptors. These drugs cause no or minimal change in the glomerular filtration rate, cardiac output and renal blood flow [47].

Adverse Drug Reaction:

➢ Anxiety, ataxia, dizziness, insomnia, headache, chest pain, edema, tachycardia, abnormal vision, vertigo, GIT disturbances and pruritis [50].

Table 18. Examples, dose and DI of α-Adrenergic blockers [50].

Drugs	Dose	Drug interaction
Doxazosin	1mg daily increase after 1-2 weeks upto 2mg Then increase upto 4mg daily max is 16mg daily.	Clonidine Indomethacine
Prazosin	Initially 500mcg 2-4 times daily and increases upto 4mg daily Maintenance dose is 4-20mg in divided doses	ACE inhibitors NSAIDs B-adrenergic blockers Verapamil
Terazosin	1mg daily max is 10 mg daily	Clonidine

d. Calcium Antagonists:

These drugs inhibit calcium ion conductance across cell membrane in both cardiac muscles and vascular smooth muscles and results the coronary and peripheral vascular smooth muscles relaxation. These drugs also increase the myocardial contractility and cardiac output. It may also lead to the reduction in the peripheral vascular resistance [50]. Verapamil and dilthiazim usually be avoided in CHF because they further depress the myocardial function [48].

Adverse Drug Reaction:

- Constipation, dizziness, fatigue, tremors, bradycardia, headache, syncope, dry mouth and poly urea [47].

Table 19. Examples, dose and DI of calcium antagonists that can be used in CHF [50].

Drugs	Dose	Drug interaction
Amlodipine	5mg once daily max is 10mg daily	Barbiturates, Diltiazim Grape juice Proton pump inhibitors Erythromycin
Felodipine	Initially 5mg once daily maintenance dose is 5-10mg and max dose is 20mg daily	Barbiturates Digitalis glycosides Fentanyl H2 antagonists

iii. Inotropic Drugs:

Following inotropic drugs are commonly used in the treatment of CHF.

- Digitalis glycosides
- β-adrenergic agonists
- phosphodiesterase inhibitors

a. Digitalis Glycosides:

These are the positive inotropic drugs and is beneficial in the patients of CHF associated with atrial fibrillation. Digoxin is the digitalis glycoside that is mostly used in CHF. It increases the calcium ion influx into the intracellular cytoplasm and results the cardiac muscles contractility or positive inotropic effect. It decreases the SA and AV node conductance or negative chronotropic effect. Digoxin is indicated in those patients that have left ventricular systolic dysfunction and not indicated in those patients that have diastolic dysfunction [47].

Contraindication:

- Ventricular tachycardia
- Renal impairment: Reduce dose should be given
- Pregnancy: Dose adjustment [48].

Adverse Drug Reaction:

- Anorexia, delirium, apathy, seizures, atrial fibrillation, AV block, visual disturbances, rash and abdominal discomfort.

Drugs Interaction:

- Alprazolam, amiodarone, verapamil, quinidine, erythromycin, NSAIDs, proton pump inhibitors, and tetracycline increase the digoxin level. Cholestyramine, neomycin, rifampin, sulfasalazine, and penicillamine decrease the digoxin level. Beta blockers cause potentiation of bradycardia [50].

Dose:

- 62.5-125 mcg once daily orally and emergency loading dose by I/V infusion 0.75-1 mg over at least 2 hours [48].

Digoxin toxicity: In elders and particularly in the renally impaired patient's digoxin accumulates that results toxicity. In these patients the serum digoxin level is carefully monitored in order to avoid the digoxin toxicity [31].

Symptoms of Toxicity:

- Anorexia
- Nausea
- Altered vision
- Arrhythmia
- Ventricular tachycardia and AV block

If toxicity occurs, then the digoxin should be withdrawn, and the digoxin specific antibody fragments are given for the reversal of toxicity.

b. β-adrenergic Agonists

Dobutamine and dopamine are the adrenergic agonists that are effective when administered by I/V rout. Dobutamine is β1 selective agonist that increases the intracellular cAMP level and results the increase in the calcium availability for the contractile function. Dopamine is a less potent inotropic agent due to it's unselective action on the adrenergic system [31].

Table 20. Examples, dose, DI and ADR of β-adrenergic agonists that can be used in CHF [48].

Drugs	CI	ADR	Dose
Dobutamine	Phaeochromocytoma	Nausea, chest pain, headache, fever, rash, eosinophilia, palpitation and dyspnoea.	I/V infusion: 2.5-10 mcg/kg/min adjusted according to response
Dopamine	Phaeochromocytoma tachyarrhythmia	Vasoconstriction, fever, gangrene, mydriasis, dyspnoea, Nausea, chest pain, headache	I/V infusion: 2-5 mcg/kg/min adjusted according to response

c. Phosphodiesterase Inhibitors [PDI]:

The following Phosphodiesterase inhibitors are used for the short-term management of CHF.

- Amrinone
- Milrinone

These drugs reduce the degradation of cAMP and cause the inotropism. These also cause the reduction of both the resistance and capacitance vessels that results in a reduction in the preload and afterload. These drugs cause the stimulation of the myocardial contractility and lead to increase cardiac output. These agents are administered parenterally.

CONCLUSION:

In conclusion, the study highlights the potential benefits of integrating Tib-e-Nabavi treatments with modern medicine for the management of congestive heart failure (CHF). The holistic approach, which includes the use of milk, barley, honey, dates, and medicinal plants like Saussaurea lappa, Cichorium intybus, and Nigella sativum, offers complementary therapeutic effects that can enhance patient outcomes. The natural ingredients in Tib-e-Nabavi, such as honey and milk, act as diuretics, potentially reducing the need for conventional diuretic medications, while barley and dates help regulate cholesterol levels, offering an alternative to lipid-lowering drugs. This combined treatment approach not only supports the physiological management of CHF but also promotes patient adherence, improving overall compliance. Thus,

incorporating both modern pharmaceuticals and traditional remedies from Tib-e-Nabavi may provide a more comprehensive and effective strategy in managing CHF, ensuring a balanced and patient-centered treatment regimen

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