

## Evaluation of the prevalence and severity of pain in patients with stable chronic heart failure

Dioma U Udeoji, Ankit B Shah, Parag Bharadwaj, Peter Katsiyannis, Ernst R Schwarz

Dioma U Udeoji, Peter Katsiyannis, Ernst R Schwarz, Heart Institute of Southern California, Temecula, CA 92592, United State

Dioma U Udeoji, Ankit B Shah, Parag Bharadwaj, Ernst R Schwarz, Cedars-Sinai Medical Center, Los Angeles, CA 90048, United States

Parag Bharadwaj, Ernst R Schwarz, University of California Los Angeles, Los Angeles, CA 90095, United States

**Author contributions:** Udeoji DU designed the study, acquired data, statistically analyzed, and interpreted data, drafted the article, wrote the manuscript and critically revised the manuscript; Shah AB supported the work and made contributions, analyzed data, interpreted data and reviewed the manuscript; Bharadwaj P was a co-investigator and part of the administration, gave supportive contributions, technology and material support, participated in the study design and manuscript review; Katsiyannis P was part of the administration, gave supportive contributions, technology and material support; Schwarz ER was the principal Investigator and part of the administration, gave supportive work/contributions, technology and material support, participated in the study design, manuscript writing, critical revision of the manuscript and general supervision of the work.

**Correspondence to:** Ernst R Schwarz, MD, PHD, FACC, FS-CAI, FESC, Heart Institute of Southern California, 31720 Temecula Parkway, Ste. 200, Temecula, CA 92592, United States. [ernst.schwarz@cshs.org](mailto:ernst.schwarz@cshs.org)

Telephone: 1-951-3020606 Fax: +1-951-2497277

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tionnaire (Edmonton Symptom Assessment System) was administered during a routine outpatient clinic visit. The severity of pain and other symptoms were assessed on a 10 point scale with 10 being the worst and 0 representing no symptoms.

**RESULTS:** Sixty-two patients [age  $56 \pm 13$  years, 51 males, 11 females, mean ejection fraction (EF)  $33\% \pm 17\%$ ] completed the assessment. Thirty-two patients (52%) reported any pain of various character and location such as chest, back, abdomen or the extremities, with a mean pain score of  $2.5 \pm 3.1$ . Patients with an EF less than 40% ( $n = 45$ , 73%) reported higher pain scores than patients with an EF greater than 40% ( $n = 17$ , 27%), scores were  $3.1 \pm 3.3$  vs  $1.2 \pm 1.9$ ,  $P < 0.001$ . Most frequent symptoms were tiredness (in 75% of patients), decreased wellbeing (84%), shortness of breath (SOB, 76%), and drowsiness (70%). The most severe symptom was tiredness with a score of  $4.0 \pm 2.8$ , followed by decreased wellbeing ( $3.7 \pm 2.7$ ), SOB ( $3.6 \pm 2.8$ ), and drowsiness ( $2.8 \pm 2.8$ ).

**CONCLUSION:** Pain appears to be prevalent and significantly affects quality of life in HF patients. Adequate pain assessment and management should be an integral part of chronic heart failure management.

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**Key words:** Heart failure; Pain; Symptoms; Therapy; Palliative care

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### Abstract

**AIM:** To evaluate the prevalence and severity of pain in patients with chronic stable heart failure (HF) in an outpatient clinic setting.

**METHODS:** This is a cross-sectional study evaluating symptoms of generalized or specific pain in patients with chronic stable heart failure. A standardized ques-

## INTRODUCTION

Heart failure is one of the major health problems worldwide especially for people over the age of 65 years<sup>[1,2]</sup>. In the United States, more than 38 million people suffer from heart diseases. Almost six million patients are diagnosed with heart failure (HF) with more than 550 000 newly diagnosed cases each year<sup>[1,3,4]</sup>. HF accounts for 12-15 million office visits per year and over six million hospital admissions in the United States<sup>[1,4]</sup>. HF usually is a chronic illness that might involve multiple organs systems over time leading to a variety of non-organ-specific symptomatology.

The burden of pain is under-recognized by clinicians as a symptom among heart failure patients. Only few studies have demonstrated an association between pain and heart failure. Evidence demonstrated that HF is a gradual disease process, which is initiated with risk factors, often triggered by an acute event, and progresses to changes in cardiac structure to loss of function that subsequently results in clinically overt HF with functional decline, and death<sup>[5-10]</sup>.

The present study was designed to evaluate the prevalence and severity of generalized symptoms and pain in adult patients with stable chronic HF.

## MATERIALS AND METHODS

This is a cross-sectional study of symptom assessment in patients with an established diagnosis of chronic HF. Patients were recruited to participate in the study during a routine outpatient clinic visit between May and December of 2011. The study was approved by the institutional review board. Patients were enrolled after obtaining informed consent.

Inclusion criteria were as follows: (1) age 18 years or older; (2) a primary diagnosis of chronic HF since at least three months; (3) systolic dysfunction; (4) on a stable medication and treatment regimen; and (5) ability to read and understand the English language and respond properly.

Exclusion criteria were (1) unstable patients in new york heart association (NYHA) class IV; (2) patients with concomitant diagnoses that might cause pain or significantly affect quality of life and other symptomatic conditions such as severe chronic obstructive pulmonary disease, diabetes mellitus with end-organ damage, severe liver or kidney failure, active myocardial ischemia, angina pectoris, active or recent malignancies, recent or debilitating strokes, fibromyalgia or other debilitating acute or chronic illnesses; (3) chronic/daily analgesic use for any specific or non-specific non HF-related reasons; and (4) patients with past medical history of cerebral infarction.

All patients were evaluated using a brief cognitive screening test, the "Mini cog"<sup>[11-14]</sup>. This test is a 5-point cognitive screening which consists of a three different word recall (score 0-3) and a clock drawing with the hand

pointing at a specific time (score 0, or 2). Patients with a Mini-cog score of more than three, which rules out dementia were included into the study<sup>[11-14]</sup>. The study was conducted by a healthcare professional who was not directly involved in the patients' care. A standardized questionnaire, the Edmonton Symptom Assessment System (ESAS)<sup>[15-17]</sup> was used to evaluate for symptoms and severity by using a scoring system. The ESAS scoring scale ranges from 0 to 10 with 0 representing no symptoms and 10 representing worst possible symptoms. The presence and severity of the following nine subjective complaints were assessed: pain, tiredness, nausea, depression, anxiety, drowsiness, appetite, wellbeing, and shortness of breath. A diagram of the human body enabled the patient to mark the site of existing pain sensations. The functional status of HF was assessed using both history and physical examination and only patients in NYHA classes II and III were enrolled in the study. Ejection fraction (EF) was measured by 2-D transthoracic echocardiography using the Simpson method either at the time of the visit or echocardiographic data from former visits was used as long as the echo study was performed within six months prior to the beginning of the study. The patients were on a standard regimen containing the following medications: beta blockers (82% of the patients), ACE-inhibitors (44%), angiotensin II receptor blocker (29%), aldosterone antagonists (40%), other diuretics (66%) and digoxin (29%). All patients were on a stable medication regimen without major medication changes except dose adjustments within the last three months. For further analysis, the patients were then divided into two groups: group 1 represented patients with an EF of more than 40%, group 2 represented patients with an EF of less than or equal to 40%. Data between the groups were compared using a student *t*-test. A *P* value of less than 0.05 was considered statistically significant.

## RESULTS

Sixty-two patients were enrolled in the study, 51 men, 11 women, age  $56 \pm 13$  years (range 28-77 years). The EF was  $33\% \pm 17\%$  (range 10%-76%). The total pain score was  $2.5\% \pm 3.1$ . 32% reported pain in more than one anatomical site, 15% reported pain either in the chest, back, neck, abdominal or in the extremities. Four patients (7%) did not indicate the site of pain but reported generalized body pain. Patients suffered different co-morbidities irrespective of the EF. The most common co-morbidities were hypertension ( $n = 38$ , 61%), hyperlipidemia ( $n = 29$ , 47%), end stage renal disease ( $n = 20$ , 32%), and diabetes ( $n = 17$ , 27%). Other common conditions were atrial fibrillation (28%), depression (18%), obesity (16%), osteoarthritis (15%), COPD (8%), gout (8%), thyroid diseases (7%), anemia (7%) and peripheral artery disease (PAD, 3%). Patients reported pain regardless of the EF and co-morbidities. Patients with degenerative joint diseases reported higher pain scores.

Most frequently reported symptoms were tiredness ( $n = 47$ , 76%), decreased wellbeing ( $n = 52$ , 84%), shortness of breath (SOB,  $n = 47$ , 76%), and drowsiness ( $n = 43$ , 69%). The most severe symptoms based on the score were tiredness (score  $4.0 \pm 2.8$ ), decreased wellbeing ( $3.7 \pm 2.7$ ), SOB ( $3.6 \pm 2.8$ ), and drowsiness ( $2.8 \pm 2.8$ ).

Seventeen patients had an EF > 40% (group 1), 11 (65%) males and 6 (35%) females, age  $54 \pm 14$  years (range 32-74 years), forty-five patients had an EF  $\leq 40\%$  (group 2), 40 (89%) males and 5 (11%) females, age  $57 \pm 13$  (range 30-77) years. EFs were  $56\% \pm 11\%$  (range 43%-76%) in group 1 and  $24\% \pm 10\%$  (range 10%-40%) in group 2. Pain score in group 1 was  $1.2 \pm 1.9$ , pain score in group 2 was  $3.1 \pm 3.3$  ( $P < 0.001$  between the groups, Table 1).

Pain was present in both groups regardless of co-morbidities. Thirty-two patients (52%) reported pain of various intensities at various locations with pain scores of  $2.5 \pm 3.1$ .

## DISCUSSION

We evaluated the prevalence and severity of pain in patients with chronic stable heart failure. Fifty-two percent ( $n = 32$ ) of the patients reported presence of pain of various characters and intensities ranging from a scale of 1-10 at different anatomical sites, or generalized pain. Patients reported pain regardless of the EF and co-morbidities. Patients with degenerative joint diseases reported higher pain scores. The prevalence and severity of pain were higher in patients with a lower EF ( $\leq 40\%$ ).

Pain in HF can be secondary to physical, spiritual, psychological and social factors<sup>[4]</sup>. Physical pain experienced by patients can be caused by multiple co-morbidities<sup>[4,18]</sup>. The International Association for the Study of Pain defines pain as an unpleasant sensory or emotional feeling that is associated with potential or actual tissue damage<sup>[19]</sup>. Pain is present in many medical conditions and it is the most common reason for clinician's consultation in the United States<sup>[20,21]</sup>.

Pain that is transient, lasting only until the stimulus is removed or the pathology is healed is regarded as acute while pain that persist for years in conditions like cancer, rheumatoid arthritis, peripheral neuropathy and idiopathic type of pain is regarded as chronic. Some authors define acute pain as pain lasting less than one month while others define acute pain as pain that is less than three months from the time of onset. Chronic pain is defined by some as pain lasting up to six months from the onset or a subjective feeling that extends beyond the expected period of healing. Pain lasting between the intervals of 1 mo to 6 mo is regarded to be subacute.

The presence or absence of psychological and social factors can affect the intensity of pain feeling. Some studies showed that patients with psychological issues, anxiety and/or depression reported higher pain score<sup>[4,22-25]</sup>. Patients who experience severe symptoms such as SOB and fatigue that interfere with daily activities often also

**Table 1 Patients symptoms**

Patients symptoms	All patients	EF > 40%	EF $\leq$ 40%	P value
Pain	$2.5 \pm 3.1$	$1.2 \pm 1.9$	$3.1 \pm 3.3$	0.001
Tiredness	$4.0 \pm 2.8$	$3.7 \pm 2.8$	$4.2 \pm 2.9$	0.276
Nausea	$1.2 \pm 2.3$	$1.2 \pm 2.4$	$1.2 \pm 2.3$	0.497
Depression	$2.5 \pm 3.0$	$1.8 \pm 2.6$	$2.7 \pm 3.2$	0.126
Anxiety	$2.2 \pm 2.5$	$1.7 \pm 2.3$	$2.4 \pm 2.6$	0.143
Drowsiness	$2.8 \pm 2.8$	$2.1 \pm 2.6$	$3.0 \pm 2.9$	0.116
Appetite	$2.7 \pm 3.0$	$2.5 \pm 3.1$	$2.7 \pm 2.9$	0.396
Wellbeing	$3.7 \pm 2.7$	$2.7 \pm 2.5$	$4.1 \pm 2.6$	0.025
Shortness of breath	$3.6 \pm 2.8$	$2.7 \pm 2.9$	$4.1 \pm 2.7$	0.052
Other problems from co morbidities	$2.1 \pm 3.1$	$1.7 \pm 2.8$	$2.3 \pm 3.3$	0.296

Using Edmonton Symptom Assessment System questionnaire; each symptom has scale of 0-10, with 0 = no symptoms and 10 = worst possible symptoms. P values compares group 1 [ejection fraction (EF) > 40] and group 2 (EF  $\leq 40$ ).

complain of pain, which easily can lead to more suffering and even social isolation<sup>[4,19]</sup>.

According to Woolf, there are three classes of pain: nociceptive pain, pathological pain and inflammatory pain<sup>[26]</sup>. Others types of pain are phantom, incident, psychogenic and breakthrough pain.

Nociceptive pain is caused by noxious stimulation of sensory receptors that responds to potentially damaging stimuli. The stimuli can be from thermal, mechanical or chemical injury. Nociceptive pain can be superficial, somatic or visceral. Superficial pain is caused by activation of nociceptors in the skin or other superficial tissue. It is sharp and well-defined e.g., first degree burns and minor wounds. Somatic pain is initiated by stimulation of nociceptors in body surface or musculoskeletal tissues such as the tendons, ligaments, bones, muscles, fasciae, and blood vessels. Such pain is aching, dull and poorly localized pain. It is aggravated by exertion and relieved by rest. Examples include post surgical pain from surgical incisions, broken bones and sprains. Visceral pain is pain (from the visceral organs) due to stretch, ischemia and inflammation. It is diffuse, vague and difficult to locate. It is described as deep squeezing, pressure like, dull or diffuse type of pain which can be associated with malaise, nausea, vomiting or fever.

Pathological pain is a disease state caused by damage to the nervous system e.g., neuropathic pain or by its abnormal function e.g., fibromyalgia, tension headache and irritable bowel syndrome<sup>[26]</sup>.

Neuropathic pain is caused by disease, injury or malfunction to any part of the nervous system- the central and the peripheral<sup>[27]</sup>. It may be associated with abnormal sensations (dysesthesia) or pain from normal non-painful stimuli (allodynia). Neuropathic pain is typically burning, shooting, cutting, drilling, stabbing, piercing, itching, stinging, tingling or it may be felt like a coldness, numbness, "pins and needles" or "electric shock" like type of sensation<sup>[28]</sup>. The pain occur at the level or below the level of injury within days, weeks, or months of the injury.

Neuropathic pain can be episodic and/or continuous in nature. It is divided into three types: (1) the central neuropathic pain involving the brain and spinal cord; (2) the peripheral neuropathic pain involving the peripheral nervous system and (3) the mixed neuropathic pain involving both the central and the peripheral nervous system.

Inflammatory pain is a type of pain that is associated with infiltration of immune cells due to cellular or tissue damage<sup>[26]</sup>.

Psychogenic pain or somatoform pain is pain caused by or increased by a mental, an emotional, or a behavioral factor(s). Such pain can manifest as headache, stomach pain and back pain *etc.*

Phantom pain is a type of pain that result from a part of the body that was surgically or accidentally removed or from which the brain no longer receives signals. This type of pain is mostly reported by amputees.

Breakthrough pain is pain that spontaneously comes on just for short periods of time in patients with a background level of pain and is usually not relieved by the patients' regular pain medication. The character of this breakthrough pain differs from person to person and according to the cause of the pain. This pain type is commonly seen in cancer patients.

Incident pain is type of pain that arises secondary to exertion e.g., stretching a wound, movement of an arthritic joint *etc.*

There is limited data on pain association with chronic heart failure. It has been a priority for physicians to manage pain in chronically ill patient but it is rare for physicians to assess or recognize pain as being a symptom in patients with HF. The presence of pain in chronic heart failure patients are insidious and unnoticed<sup>[7]</sup>. Few studies demonstrated the association of pain with heart failure. A case series using a retrospective review of fifty patients with chronic heart failure for a period of three and a half year indicated that pain was part of multiple symptoms addressed during their hospital visits<sup>[29]</sup>. A multicenter, cross-sectional studies of 60 patients with heart failure indicated that more than fifty percent of these patients reported pain, shortness of breath, tiredness, drowsiness or dry mouth<sup>[22]</sup>. Another study with 1786 chronic heart failure patient who completed questionnaires for symptom assessment of heart failure showed that even though pain is common, pain is not necessarily due to angina even in patients with coronary heart disease<sup>[30]</sup>. Data obtained from three-hundred patients with chronic HF indicated that sixty-seven percent of the patients reported pain with increment in the prevalence of pain as the functional class worsens<sup>[7]</sup>. In a study of ninety-six veterans with chronic HF, more than fifty percent reported pain with more than thirty-seven percent rating their pain as moderate to severe<sup>[4]</sup>. Our study demonstrated that pain was present in more than 50% of the patients which reinforces the evidence that pain is one of the symptoms of chronic HF. The pain sensation in patients with chronic HF might be inflammatory and neuropathic

in origin or a combination of different types of pain, however, a concise classification of the pain character in these patients is outside the frame of the present study.

It is imperative for clinicians to recognize pain as part of expected symptoms in patients with HF. Adequate pain management that might involve palliative care providers and multidisciplinary teams might be effective in minimizing sufferings and improve quality of life<sup>[4,22,31-35]</sup>.

This is a cross sectional subjective assessment of symptoms rather than an objective measure. Patients were randomly selected from an outpatient clinic cohort. No additional questionnaires were provided.

This study did not identify the causal mechanisms behind the association of pain and heart failure.

Pain and other non specific symptoms are usually not regarded as typical symptoms in patients with chronic heart failure<sup>[4,7]</sup>. Evidence supports that more than fifty percent of patients with chronic HF report pain of various characters and intensities. Our data suggest that among other symptoms, pain appears to be prevalent and significantly affects quality of life in heart failure patients. Adequate pain assessment and management should be an integral part of chronic heart failure management. Involving a multidisciplinary team in the management of heart failure can help to address the complex nature of pain and improve the quality of life. Further research to study the causal mechanism of pain association with heart failure is needed.

## COMMENTS

### Background

Pain is a debilitating symptom and a cause of significant burden in patients with chronic diseases. Despite anecdotal data, only few studies demonstrate the clinical relevance of pain in patients with chronic advanced heart failure.

### Research frontiers

Chronic heart failure is of growing incidence and prevalence and is now the main cause for hospital admission among the elderly and increasing expenditure in medicine. The evaluation and treatment of patients with chronic heart failure (HF) needs to go beyond cardiac dysfunction and requires a holistic approach of the multisystem involvement and non-specific symptomatology of the patients. The assessment and recognition of pain as a result of the involvement of the entire body system is of enormous clinical relevance.

### Innovations and breakthroughs

The data show that pain is a prevalent symptom in patients with chronic HF and can present either as localized or generalized pain. Pain significantly impairs quality of life and often is a leading symptom resulting in recurrent physician office visits, emergency department visits, and subsequent hospitalizations. Despite this, pain has never been considered a characteristic symptom of HF.

### Applications

Based on the data, a systematic evaluation of non specific, generalized symptoms including localized or generalized pain should be part of a routine assessment in patients with HF. Adequate pain management will help to (1) alleviate symptoms; (2) improve quality of life; (3) increase patient compliance; (4) reduce emergency visits and hospital admissions; (5) reduce overall morbidity; and (6) reduce costs. Even though pain management is not part of the present study, this aspect requires further investigation.

### Terminology

Heart failure is a condition that is usually caused by a reduction of the contractile function of the ventricular chambers or an impairment of the relaxation properties of the cardiac chambers.



# Peer review

This article retrospectively investigated the prevalence and severity of pain in patients with chronic heart failure. Chest pain is a clinical symptom suggesting myocardial ischemia. The research may include a potential important topic. There are some issues that need to be addressed precisely.

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