The heart is mainly made up of muscle (the myocardium) and pumps blood around the body. The heart muscle needs a good blood supply to work well. Blood to the heart is supplied by three main blood vessels called the coronary arteries. These coronary arteries branch into many smaller arteries, which take blood and oxygen to the whole heart.

In an acute myocardial infarction (AMI or heart attack), a coronary artery or one of its branches is suddenly blocked. The part of the heart muscle supplied by this artery thus, loses its blood and oxygen supply. The part of the heart that does not receive oxygen begins to die, and some of the heart muscle may be permanently damaged unless the blockage is quickly undone. This blockage usually occurs due to a blood clot (thrombosis), which forms inside a coronary artery or one of its branches. The clot blocks the blood flow to a section of the heart. Blood clot does not usually form in normal arteries. It usually forms if the artery has fatty lumps or plaques (atheromatous) on the inside.

It may take many years for the fatty lumps to form and become bigger so as to obstruct blood supply. Once complete blockage occurs due to a clot forming on an atheromatous plaque, severe chest pain occurs. This pain of heart attack is usually described as crushing, squeezing, pressing, and heavy or occasionally stabbing or burning in nature. The pain may also travel down the left or both arms and into the jaw. Autonomic symptoms like sweating, nausea and faint feeling commonly occur along with the pain. These symptoms vary from person to person and usually last up to several minutes, maybe up to an hour. Recognizing the early warning signs of a heart attack and getting immediate medical aid, help in minimizing damage to the heart and also in chances of survival.

The seriousness of the heart attack often depends upon the size and the location of the heart muscle that is damaged. Many people have only a small amount of damage to their heart, which heals as a small patch of scar
tissue over a period of time. The heart continues to function normally in such cases. But if a larger area is involved, some complications like heart failure, abnormal heart rhythms or even sudden death may occur. The most crucial time after a heart attack is the first few days. If no complications arise during this period, then chances of full recovery are reasonably good. The main objective of the patient in such uncomplicated cases is then to try and get back to normal life and to minimize the risk of further heart attack by adopting a healthier lifestyle.

Due to advances in treatment, more victims of a heart attack survive and go on to live normal, healthy lives. But a significant minority of individuals suffer a heart attack which leaves them somewhat disabled over a longer period of time. Although they are still alive, their quality of life is adversely affected. It is these individuals who need to be identified and rehabilitated physically, socially, psychologically and vocationally in order to help them perform a normal healthy role in the family as well as in the society. For individuals, the goals of therapy are alleviation of symptoms, improvement in functional capabilities, limitation of the progression of disease, and a lessening of the psychological consequences of illness. There is also the significant secondary aspect of the increased emphasis on preventive care. Individuals may be ambulatory and asymptomatic until treatment brings about changes in symptoms and lifestyle. So the adverse effect of long-term medication in a chronic illness like heart attack on the quality of life of survivors cannot be underestimated and ignored.

Medical treatment of chronic conditions is directed at both the alleviation of symptoms and, if possible, the prolongation of life. As cure is often not possible, the goals of therapy are to limit the complications of the disease process both medical and symptomatic, so that life may be comfortable, functional and satisfying. This is an important concept, since prolongation of life may lead to an improvement in all aspects of quality of life.
An attempt has been made to study the rehabilitation status of individuals after a first heart attack. In order to do so, it was essential to evaluate the medical status of all the respondents included in this study. This was done with the help of parameters which broadly describe the condition of the individual at initial hospitalization after the heart attack (T1), three months after AMI (T2), and finally at one year after AMI (T3). The data was collected at T1 (N=100), T2 (N=98) and T3 (N=97). Two of the respondents passed away after T1 and one respondent passed away after T2, thus the difference in the number of respondents at T2 and T3. The results and the percentages calculated thereof are based upon the number of respondents who were alive at the given time.

It is assumed that in an uncomplicated AMI, the individual should adapt his normal or even a healthier role after recovery from AMI. The medical evaluation was done for all the respondents admitted in the Emergency Medical OPD of PGIMER, Chandigarh with a definitive diagnosis of a first AMI as diagnosed by the attending doctor. The initial evaluation was done once the respondent was stable and had been shifted to the ward.

Chest Pain

Chest pain is usually relieved after initial treatment after an AMI. Persistent pain could be due to ongoing myocardial ischemia, recurrent myocardial ischemia or even due to other causes like pericarditis. In the present study, a significant number of respondents (81 percent) did not have any chest pain after hospitalization (T1). But 19 percent of the respondents complained of chest pain during hospitalization (Figure 4.1). At T2, more than three fourth (78.6 percent) of the respondents did not have any angina/chest pain whereas, at T3, 79.4 percent respondents did not have any angina/chest pain.
At this time, a little less than one fourth (20.6 percent) of the respondents complained of angina/chest pain.

**Breathlessness**

Breathlessness or shortness of breath after an AMI is a common manifestation, and may occur due to variety of conditions. It occurs primarily due to reduced left ventricular function and indicates left heart failure. In the present study, during hospitalization (T1), a majority of respondents (84 percent) did not have any breathlessness while, 16 percent respondents complained about it. At T2, still a majority (87.8 percent) of respondents did not complain of breathlessness, the rest (12.2 percent) had some amount of breathlessness, primarily while walking in the corridor. At T3, a majority of respondents (88.7 percent) did not have any chest pain. The 11.3 percent respondents, who had complained of breathlessness, had it while walking in the corridor.
**Killip Class**

The Killip classification is a classification system used in individuals with an acute myocardial infarction (heart attack), in order to risk stratify their outcomes. Individuals with a low Killip class are less likely to die within the first 30 days after their myocardial infarction than individuals with a high killip class (Killip and Kimball, 1967).

- Killip class I includes individuals with no clinical signs of heart failure. Mortality rate = 6%
- Killip class II includes individuals with rales in the lungs, an S3 gallop, and elevated jugular venous pressure. Mortality rate = 17%
- Killip class III describes individuals with frank pulmonary oedema. Mortality rate = 38%
- Killip class IV describes individuals in cardiogenic shock. Mortality rate = 81%
Killip class is measured only at the time of initial hospitalization. In the present study, a majority of respondents (82 percent) were in Killip class I (Figure 4.2). 12 percent respondents were in Killip class II, 6 percent respondents were in more severe Killip class (Killip class III and Killip class IV). Those respondents, who were in Killip class I and II had better chances of recovery as compared to those who were in Killip class III and Killip class IV.

Arrhythmia

Abnormal heart rhythms may occur within the first few hours after an AMI as an AMI may upset the electrical activity of the heart. These abnormal heart rhythms are called arrhythmia. Arrhythmia is defined as irregularity in heart beat. It is caused by disruption of the normal functioning of the electrical conduction system of the heart and could cause a potentially dangerous heart rhythm. Arrhythmias include Tachyarrhythmias, which means that the heartbeat is too fast. The other is, Bradyarrhythmias, which mean that the heartbeat is too slow. Bradyarrhythmias are also called heart blocks. Symptomatic tachyarrhythmias have to be treated with anti-arrhythmic drugs or by DC shock. Symptomatic bradyarrhythmias may require drugs like atropine or even implantation of a pacemaker. A temporary cardiac pacemaker is a device that helps the heart to beat normally until it can recover on its own. Temporary pacemaker is implanted from a femoral or subclavian vein. Through this vein a pacing electrode is put in the right ventricle and is connected with a temporary generator, which is placed outside the body. If bradyarrhythmia persists, a permanent pacemaker generator is implanted by making a pocket in the subclavicular area just iunder the skin.
In the present study, a significant number (90 percent) of the respondents did not have any arrhythmia (Figure 4.3). Only 10 percent respondents had tachy arrhythmia. Out of these ten respondents, only two required to be treated with DC shock. Other respondents did not require any treatment and recovered on their own. At T2, a significant majority of respondents (96.9 percent) did not have any tachy arrhythmias. Only a negligible number of respondents (3.1 percent) had tachy arrhythmias but did not require any treatment, as they were asymptomatic and not hemodynamically significant. At T3, almost all respondents (97.9 percent) had recovered and did not have any tachy arrhythmia. Only 2.1 percent of the respondents had tachyarrhythmia but did not require any treatment.

At T1, a significant majority of respondents (86 percent) did not have any bradyarrhythmia. Only 14 percent had bradyarrhythmia. Out of these, five respondents required treatment while four were asymptomatic and did not require any treatment. Eight of these respondents had to be treated with a temporary pacemaker while two were treated with drugs. At T2, almost all (97 percent) respondents had recovered and were better as only two percent required treatment with a permanent pacemaker. At T3, the number...
respondents who required a pacemaker remained the same as almost all other respondents did not have any bradyarrhythmia.

**Chest X - Ray**

Cardiac enlargement on chest x ray is generally indicative of poor heart function. However, it can also be due to accumulation of fluid around heart known as pericardial effusion. In the present study (Figure 4.4), a majority of respondents (81 percent) did not have any cardiac enlargement at T1. Only 19 percent had cardiac enlargement.

At T2, a significant majority (87.8 percent) of respondents did not have any cardiac enlargement. Only a few (12.2 percent) were detected to have cardiac enlargement. At T3, the number of respondents who had improved increased up to 88.7 percent. Only 11.3 percent respondents were detected to be having cardiac enlargement.
Echocardiography

Echocardiography is the ultrasound examination of the heart. It is a vital tool for evaluating cardiac function. Ejection Fraction is an important indicator of pumping action of the heart. A normal person is able to pump out more than 60% (EF > 60%) of the blood it receives with one contraction. The present data shows (Figure 4.5) that at T1, two third (67 percent) of respondents had good ejection fraction, meaning thereby that the heart was pumping out blood normally. Almost one-fourth respondents had EF between 40 to 49%, 7 percent respondents had lower than 40% EF thereby indicating poor capacity of the heart to pump blood normally. At T2, a little over half of the respondents (59.2 percent) had an EF of 50 or above. There were one third of the respondents (33.7 percent) who had EF between 40 to 49% and 7.1 percent respondents continued to have EF less than 40%. At T3, the status remained unchanged.

Ejection Fraction

Figure 4.5
**Regional Wall Motion Abnormality** or RWMA denotes that an area of the heart is not moving properly and that indicates that, that much portion of the heart muscle is non functional or functioning subnormally. In the present study, a significant majority (91 percent at T1), of respondents had RWMA at all three times indicating that a portion of their heart muscle was not functioning optimally (Figure 4.6). By T2 and T3, the number of respondents who did not have RWMA increased (12.2 percent) and (13.4 percent) respectively.

**Left Ventricular Thrombus** means that in case the heart is not contracting well, blood stagnates in the ventricle and can form a thrombus. This thrombus has a potential risk of migrating (forming an embolism) via the major vessels thereby causing a stroke or damage to a vital organ. In the present study, only 2 percent respondents had an embolism throughout the course of the study.

**Mitral Regurgitation** (MR) occurs when sometimes, due to AMI, the mitral valve dysfunction occurs due to enlargement of heart or ischemia of
subvalvular apparatus particularly the papillary muscle. Due to this, amount of blood goes back to the atrium during ventricular systole thus reducing the amount of blood that goes out of the heart with each contraction. This results in further decrease in cardiac output. In the present study, a significant majority of respondents (91 percent) did not have any regurgitation.

**Mitrail Regurgitation**

**Figure 4.7**

Only 9 percent respondents had mild to moderate MR (Figure 4.7). More patients recovered, as those who did not have MR were 93.9 percent. Only 6.1 percent had mild to moderate MR. At T3, only 5.2 percent respondents had mild to moderate MR and a significant majority of respondents (94.8 percent) did not have any MR.

**Left Ventricular Aneurysm**

Sometimes after an AMI, the dead muscle gets thinned out portion of left ventricular wall gets ballooned out with every ventricular contraction forming an aneurysm. This is called Left Ventricular Aneurysm. This is an irreversible damage to the heart muscle and can cause worse...
of heart failure, arrhythmias, thromboembolism to various organs and even sudden arrhythmic death.

**LV Aneurysm**

**Figure 4.8**

In the present study, more than three fourth (84 percent) of the respondents did not have any LV aneurysm at T1 (Figure 4.8). Only 16 percent respondents had an aneurysm. The number remained same at T2 and at T3.

**Tread Mill Test**

Tread Mill Test (TMT) is a test to evaluate the cardiac capacity to respond to increased bodily demands during physical exercise. It helps to measure how well the heart muscle functions and whether it is getting adequate blood supply. Under resting conditions, even a diseased heart can continue to meet the required blood supply (cardiac output) to the body and heart itself. However, during exercise, the cardiac output needs to be increased manifold, which a diseased heart is unable to do. This capacity is tested by TMT. TMT also tests whether heart muscle is getting adequate blood supply during increased requirements (inducible ischemia). There are
standard protocols for carrying out and evaluating the test. In the present study, TMT was performed on almost all the respondents (96.9 percent) at T2.

**TMT**

![Figure 4.9](image)

It was strongly positive for almost one third of the respondents (30.6 percent) moderately positive for more than one fourth (28.6 percent) of the respondents; mildly positive for another more than one fourth (29.6 percent) of the respondents and negative for 8.2 percent of the respondents. TMT could not be performed on 3.1 percent of respondents (Figure 4.9).

**Coronary Angiography**

Coronary Angiography is the study of arterial blood supply of the heart. It can show specific sites of narrowing in coronary arteries. In angiography, a small tube (catheter) is inserted through the artery of an arm or leg and negotiated into the arteries of the heart. A radio opaque dye is injected into the catheter and X-ray pictures are obtained as the dye flows through coronary arteries. Coronary angiography is mandatory to know the extent and severity of coronary vascular disease before any revascularization procedure.
can be attempted. Also, the detailed cardiac function can be studied during coronary angiography. In the present study, coronary angiography was performed in 71.4 percent of the respondents (Figure 4.10) and results obtained. Nearly one fourth (23.5 percent) of the respondents had three-vessel disease whereas; a little more than one-fourth (28.6 percent) respondents had two-vessel disease.

Coronary Angiography

![Coronary Angiography Figure 4.10](image)

One vessel disease was detected in 16.3 percent of the respondents and left main vessel disease was detected in only 2 percent of the respondents. Nearly two thirds of the respondents (63.3) were advised further revascularization, which was successfully undertaken. 8.2 percent of respondents were advised medical treatment only.

Overall Medical Status

Almost at all times, a significant majority of respondents were not too sick or unwell despite the AMI. Majority of the respondents did not develop any complications associated with heart attack (Figure 4.11). At the time of hospitalization (T1), a majority (87 percent) of respondents enjoyed better health as compared to 12 percent respondents who were not in very good
health. Only one respondent was very sick and needed extra care. At T2, 8 percent of the respondents were in good health as compared to 8.2 percent the respondents who were not enjoying very good health.

**Overall Medical Status**

The percentage of respondents who were very sick rose to 2 percent. At T3, the significant majority (88.7 percent) of the respondents enjoyed good health; 10.3 percent of the respondents were moderately sick. Only one percent respondent was very sick at T3.

Large majority of respondents in the present study had near normal function and were in functional class II. Minority of the respondents had inducible ischemia as demonstrated by positive treadmill test and required revascularization. They did not have any symptoms to interfere in their normal day-to-day life. More than three-fourth of the respondents (82 percent) suffered a mild heart attack (Killip Class I) making it easier for them to recover and go on to lead a healthy life.
Thus, a significant majority of respondents enjoyed a reasonably good health as per the parameters set for the present study thereby suggesting that most of the respondents were not physically incapacitated by their AMI. Majority of patients in the present study, therefore, should have made complete recovery and achieved complete physical, social, psychological, sexual and vocational rehabilitation. This overall health status of the respondents served as a basis on which quality of life and their rehabilitation status was measured in the present study.