chapter 1
introduction
INTRODUCTION

The cardiac disorders comprise a broad spectrum of diseases such as rheumatic heart disease (RHD), ischaemic heart disease (IHD), congenital heart disease (CHD) and hypertension. At all ages and in all countries diseases of cardiovascular system are a major cause of death and disability (Julian and Matthews, 1978). Coronary heart disease is now said to have reached an epidemic proportion in the industrialised nations of the western world and evocative phrases such as 'coronary epidemic' or 'western way of death' commonly appear in the media. The RHD is the most common form of heart disease in the country like India, where nutritional and infectious problems are more. The incidence of RHD in India varies from 16.5% (Sepha et al., 1965) to 59.1% (Dasgupta et al., 1976). Roy et al. (1963) introduced the term juvenile mitral stenosis and reported a very high incidence of severe symptomatic RHD in 17 year patients. Congenital heart disease is also a common and major cause of cardiac disorder in India. The incidence of coronary heart disease in India also seems to be steadily increasing (Vakil, 1949; Malhotra, 1950; Padmavati, 1955; Datey, 1956).

Physician generally faces the major problem of precise diagnosis and complete assessment of such disorders. The pre and post operating considerations assume greater significance in view of increasing surgical practices in such disorders. Methods like bedside clinical examination, electrocardiography, cardiac radiology, angiocardiography and direct measurement of intracardiac pressure are of importance in clinical and morphological evaluation of cardiac patients. Despite these diagnostic measures and introduction of modern managements
including coronary surgery (Blackburn, 1974) unfortunately there is no evidence to indicate any reduction in the overall mortality rate due to cardiac disorder. Therefore, concentration is now on the cure factor rather than the prevention of cardiac disorders.

In view of the growing menace of the cardiac disorders and nonavailability of any instant measure to cure these disorders, better alternative open is to progress towards more reliable methods of early diagnosis. An important requirement felt in such attempts is that the diagnostic methods must be simple to apply and noninvasive so that assessment of cardiac disorder can be carried out as a routine procedure.

The first phase in preliminary evaluation of cardiac patients is to categorise the patients into proper physiological or functional class. This is essential to determine the indication of rational therapy, to assess the response to therapy, to judge the degree of disability and further for prognosis and rehabilitation of cardiac patients.

On the basis of effort intolerance several methods have been suggested for such classification. These include 1) New York Heart Association (NYHA) Classification System (NYHA, 1945), 2) Canadian Cardiovascular Society Classification System (Campeau, 1975), 3) Interview Protocol (Goldman et al., 1981; Peduzzi and Hultgren, 1979), 4) Clinical Taxonomy (Feinstein and Wells, 1977) and 5) Exercise Protocol (Bruce, 1971; Berman et al., 1978; Haskell and DeBusk, 1979; Franciosa et al., 1979).

All above mentioned systems generally used in the routine assessment procedure of the cardiac patients are rather subjective and suffer from the self imposed or physician imposed inactivities (Friedberg, 1956). Further, inadequacy of these systems to evaluate patient's response to therapy, a significant
low reproducibility and poor validity especially in case of congenital heart failure have been already reported in several studies (See, Franciosa et al., 1979). Although exercise testing in cardiac patients is considered as a safe procedure there are reports of acute infarction and death (Cobb and Weaver, 1986) in such testing.

In view of the above prevailing, confusing and inaccurate classification procedures, in the present study a novel approach has been adopted. The integrated nature of the cardiac system and respiratory system is such that (See, Fig. 1 a, b) the abnormality in one leads to functional disorders in other system (McFadden and Ingram, 1984). The cardiac disorders thus, may cause significant change in the overall lung function in absence of any intrinsic respiratory disease (Tancredi, 1981).

The occurrence of the dyspnea and associated pulmonary symptoms in cardiac disorder are correlated to changes in structure and hence function of the lung (Patney et al., 1975). The extent to which these pulmonary changes influence the clinical picture in cardiac disorder has also been studied in terms of the ventilatory function test (Frank et al., 1953; Palmer et al., 1963), pulmonary compliance (Saxton et al., 1965), pulmonary diffusion capacity (Carroll et al. 1953; Curti et al., 1953), and oxygen ventilatory equivalent during steady state exercise (Macintosh et al., 1958). Some have also attempted to correlate the changes in physical parameters of pulmonary system with the functional status of the cardiac patients (Stock and Kennedy, 1953; Palmer et al., 1963).

In view of the scattered and insufficient data regarding the impairment of the pulmonary function in cardiac disorders, an attempt has been made to measure the maximum physical parameters of
the pulmonary system in order to provide a better noninvasive and objective classification system for the precise assessment of the functional status of the patients in various cardiac disorders.