Chapter 1

Introduction
1. INTRODUCTION

Sexually transmitted diseases (STDs) continue to be a significant public health problem worldwide especially in this HIV/AIDS era since the spread of HIV is closely related to STD transmission. Genital infection due to *Chlamydia trachomatis* (CT), an obligate intracellular pathogen is currently recognized as one of the common STDs in both industrialized and developing countries. The World Health Organization (2001) estimated that 92 million new cases of *C. trachomatis* infection have occurred throughout world in 1999 alone. Every year, an estimated four million new cases occur in the United States and three million in Europe. In the western world, the management costs of chlamydia1 infection to health services are enormous.

Apart from sexually transmitted infections, *C. trachomatis* is a leading cause of trachoma and also causes a variety of other infections like chlamydial conjunctivitis, infant pneumonia and lymphogranuloma venereum. Among the 18 well-characterized serovars of *C. trachomatis*, D to K types are responsible for sexually transmitted infections. In case of genital infections, men, women and infants are affected and women bear an inordinate burden because of their increased risk for adverse reproductive consequences. Most of the infections may run an insidious, chronic course, which may persist for months to years causing severe tissue damage. Since genital chlamydial infection causes no or few symptoms, many infections remain undetected.
*C. trachomatis* infection is the most common identified cause of non-gonococcal urethritis (NGU) in men and causes up to half of all acute non-gonococcal urethritis and at least one third of acute epididymitis. Subsequent scarring of the epididymis can lead to infertility. The infections in women more often progress to serious clinical problems like pelvic inflammatory disease (PID), which results from ascending infection. Scarring from PID may cause infertility and ectopic pregnancy in women. In the United States, the Center for Disease Control estimated that one million women experience an episode of PID yearly and of these, 200,000 are hospitalized and as many as 50,000 become infertile as an adverse outcome of these infections (Cates and Wasserheit, 1991). Infants can acquire the infection when they pass through the infected birth canal. Neonatal complications such as conjunctivitis, pneumonia, and asthma result from chlamydial infections in infants. Recent studies suggest that chlamydial infection of the lower genital tract may be an important risk factor facilitating sexual transmission of HIV infection (Stamm, 1999).

Despite its prevalence and debilitating consequences, *C. trachomatis* and other *Chlamydia*-related infections remain unknown to the general public. The high prevalence and vast spectrum of chlamydial diseases and complications that stem from *C. trachomatis* yield many challenges in identification, diagnosis, treatment, and control of the disease. While research has exponentially increased the knowledge on *C. trachomatis* in the last fifty years, obstacles with diagnosis and screening, the lack of educational efforts, and uncoordinated prevention programs have kept the disease out of public knowledge.
The biggest challenge to the control of chlamydial disease is the prevalence of asymptomatic status in 70 to 80% of infected women and up to 50% of men. This results in a large reservoir of unrecognized, infected individuals who are capable of transmitting the infection to their sexual partners. The challenge is further compounded by the fact that the immunity following infection is seen to be type specific and only partially protective; therefore recurrent infections are common (Black, 1997). Screening is therefore indicated for early detection to interrupt the chain of transmission in the community and to prevent the disease sequelae. Partner notification and contact tracing of the infected for subsequent follow up and treatment are important.

Progress in research has yielded several diagnostic methods, which facilitated early diagnosis and reduction in the impact of the disease. The introduction of sensitive DNA detection methods to test noninvasive specimens, such as urine, makes it possible to extend chlamydial diagnosis beyond the traditional settings. Research in the industrialized countries has shown that the detection and treatment of asymptomatic infections in women resulted in a reduction of complications.

Infections with *C. trachomatis* have long been effectively treated with appropriately chosen antibiotics. Until recently, treating chlamydial infections has required multidose therapy with doxycycline for at least 7 days. The advent of single dose therapy of azithromycin for uncomplicated chlamydial genital infections improved patient compliance. No vaccines are available till date, although intensive research efforts are being made in this direction. Several factors like the existence of many immunotypes and their antigenic complexity, lack of complete protective
immunity, persistence of infections and recurrences exist as hurdles for the immunologists to develop an effective vaccine. The mechanism of immune evasion and latency of chlamydiae are poorly understood. A great deal of work remains to be accomplished for an improved understanding of the pathogenesis of chlamydial infections. In the long term, this would lead to novel immune interventions in the form of development of an effective vaccine. Recently, the complete genomic sequencing of \textit{C.trachomatis} has given a wide insight into the existence of many groups of proteins. Several new antigens have been identified which could be potentially suitable for a vaccine design (Stephens \textit{et al.}, 1998).

Broad based screening programmes are needed for prevention and control of genital chlamydial infections (Stamm, 1999). As \textit{Chlamydia} is a sexually transmitted disease, social factors including behavioural changes and consistent access to quality health care need to be included to eradicate this preventable disease.

Even though current literature provides vast knowledge on the epidemiological pattern, genomics and clinical aspects of genital chlamydial infections in industrialized countries, studies of such nature are scarcely available from developing countries like India. The epidemiological picture of genital \textit{C.trachomatis} infection in the community population is yet to be established in the Indian subcontinent. The incomplete epidemiology of genital \textit{C.trachomatis} infection in this country necessitates baseline cross sectional studies to be undertaken to evolve strategies of prevention and control.
It is in this background, a study was planned and executed in Tamil Nadu (a) to characterize the epidemiological pattern of genital chlamydial infection in the apparently healthy community population of Tamil Nadu (b) to study the load of *C. trachomatis* infection in symptomatic STD patients and (c) to standardize and evaluate certain in-house conventional and molecular diagnostic methods for genital chlamydial infection.