SUMMARY & CONCLUSION
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Reproductive tract infections are often associated with the adverse outcomes such as infertility, intrauterine growth retardation, fetal death, premature delivery, abortions and increased vulnerability to HIV/AIDS. Many men and women suffer from RTIs; with an estimated 340 million new cases of curable STIs occur each year, with 151 million of them in South and Southeast Asia. The control of RTIs especially sexually transmitted infections, is an urgent health priority in many countries. Incidence/prevalence data plays a main role in controlling these RTIs and STIs. A generic term RTIs refers to three different groups of infections such as, (a) infections that are transmitted through sexual contact viz., gonorrhoea, trichomoniasis, syphilis, chancroid, genital herpes, genital warts and HIV infection, (b) endogenous infections which are caused by overgrowth of organisms that may be present in the reproductive tract of healthy women such as bacterial vaginosis and vulvovaginal candidiasis, and (c) iatrogenic infections that are linked with the procedures such as insertion of IUD in family planning and abortion.

RTIs, often the most serious long-term sequelae arise in women. Young women are particularly susceptible to RTIs because they have fewer antibodies to fight against the pathogens and greater cervical ectopy. Female RTIs usually originate in the lower genital tract as vaginitis or cervicitis and may produce symptoms such as abnormal vaginal discharge, genital pain, itching and burning sensation with urination. This symptomatic presentation can overlap with and be diagnosed as a normal physiological change and normal physiological discharge may be misdiagnosed as RTIs. In some instances, despite availability of these services, symptomatic people do not seek or delay seeking appropriate diagnostic and treatment services. In India, married women are reluctant to seek medical treatment because of lack of privacy, lack of a female doctor at the health facility, the cost of treatment and their subordinate social status. This reluctance is exacerbated when symptoms are embarrassing as they are with RTIs especially among adolescents.

The various epidemiological reports from India reveal the current status of increasing incidence in RTIs as 18.7% in Indore district of Madhya Pradesh, 48.5%
among the young married women in Tamil Nadu. Similarly, a report from National Family Health Survey II done by the International Institute for Population Sciences, Mumbai demonstrated a rate of 18.4% prevalence of RTI.

The RTI is influenced by the factors such as under nourishment, immunosuppressive treatment and due to hormonal imbalances among women of childbearing age and in young adult women. The magnitude of disease is generally high particularly in the category of high risk group women. The study was conducted among the women attending the Integrated Counseling and Testing Centre (ICTC) of Primary Health centre, Sendamangalam, Namakkal district. A total of 523 clinically suspected female subjects with and without Clinical symptoms were included in this study. Among 523 vaginal and cervical samples collected from the patients, 107 samples exhibited culture positive for *Candida* spp and 27 samples were bacteriologically positive for *Neisseria gonorrhoeae*. The overall prevalence of vulvovaginal candidiasis was found to be 20.4% and the occurrence of gonorrhoea was 5.16% among the ICTC patients. Among the *Candida* species isolated, the intra prevalence rate of *Candida albicans* was found to be as high as 75.7% and only a very low percentage of (3.73%) isolates were obtained in case of *Candida dubliniensis* and *Candida krusei*. The prevalence of vulvovaginal candidiasis in various age groups among women attending ICTC clinic was studied. Significantly, 57.4% of samples in the age group of 26-35 years were found to be positive for VVC. Similarly, as high as 14.5% and 13.9% of prevalence was noticed in the age group of 16-25 and greater than 46 years of women who were both married and unmarried. However, only 8.6% of prevalence was observed among women in the age group of 36-45 years who attended ICTC Clinic. Among the cervical discharge samples obtained from the study subjects a maximum of 13.9% (14 cases) of women in the age group of 26-35 years were colonized for *N. gonorrhoeae*, only 6% of women in the age group of 16-25 years exhibited the gonococcal infection and only 4 women in the age group of 36-45 years were positive for *N. gonorrhoeae*. More significantly, women in the age group with more than 46 years did not develop gonococcal infection and all the samples that belong to this age group did not colonize for *N. gonorrhoeae*. 

ISOLATION, IDENTIFICATION AND MOLECULAR CHARACTERIZATION OF CANDIDA SPP AND NEISSERIA GONORRHOEA FROM ICTC PATIENTS.
The positive samples for *Candida* spp and *N. gonorrhoeae* were analyzed for various socio-demographic characteristics, risk factors and symptoms. The association of significance with the various study variables were assessed with SPSS package version 10. Vulvovaginal candidiasis was found to be predominant among the illiterate women and occurrence of candidiasis among married and unmarried women were found to be 75 (n=415) and 32 (n=108) respectively. Among the women, who were positive for vulvovaginal candidiasis, 41, 34 and 32 belong to moderate, low and higher economic status. The infection for VVC was not found in 195 women who worked in day shift whereas, 41 (51%) women were positive for VVC who worked in night shift. Women who worked as daily wages had the vaginal infection of 23.9%. The symptoms like itching, dysuria or vulval burning, smell and curd like vaginal discharge, burning micturition were found to be statistically significant and the other symptoms like pain in lower abdomen and vaginal lesions or sores in genitalia does not showed any positive association. Among the 75 (70.09%) married women who were positive for vulvovaginal candidiasis, 42 (66.7%) had extramarital sexual contact. Similarly out of 107 positive women, 12 (42.9%) had premarital sexual relationship. In the present study, among the women who suffered from vulvovaginal candidiasis 59.3% were found to have more than one sexual partner. Similarly, out of 118 individuals who lack their knowledge in usage of condoms, as high as 56.0% of individuals were suffered from VVC.

The incidence of *N. gonorrhoeae* among the illiterate women was 85.1%. Among the 226 women belonging to daily wages category, 16 women were found to be infected with gonococci. Similarly out of 247 women, only 7 women had gonococcal infection. Out of 84 women who are night shift workers, 15 were infected with gonococci and only 5 (276) women were positive for gonococci. A total of 20 females (n= 27) were positive for gonorrhoea among the married women, out of which 3% (n=10) of their life partners are working in local area, 8 (10%) were moffusal and 2 (33%) were working in other nations. The females with VVC of whom their partners working in foreign had positive association with the gonorrhea infection. Out of 27 gonorrhoea positive females, 22 belonged to low socio-economic status. None of them were in high economic group. Majority of the positive subjects
(81.4%) were in the low economic group. Among the 27 positive gonorrhoea subjects, pain in the lower abdomen was the most common complaint (20/27) reported by the females who attended ICTC clinic. A similar observation was made for dysuria or vulval burning, smell or curd like vaginal discharge, burning micturition, pain in lower abdomen and vaginal lesions or sores in genitalia. The symptoms of gonorrhoea were also statistically significant. The infection rate with respect to the various risk factors was as high as 28.6% and 64.3% amongst patients who had extramarital and premarital sexual contact respectively. The factor like prior hospitalization may not influence the positivity as the percentage observed was very low (11.1%).

Antibiotic resistance of the etiologic pathogens could pose an important hurdle in prevention and control of infections. Over the past decade, strains of *Candida* spp and *N. gonorrhoeae* have been reported to develop high levels of resistance against several antimicrobial agents, previously used for the treatment. Antifungal sensitivity pattern for *Candida* spp and antibiotic sensitivity pattern for *N. gonorrhoeae* were determined using six different antifungal and eight different antibiotics respectively which belong to various generation of drugs. Based on the zone of inhibition, sensitive, partial sensitive and resistant strains were identified in accordance with NCCL standard. About 95% of the *Candida* isolates were sensitive to the polyene drug, Amphotericin B. The susceptibility for Nystatin, a polyene drug was reduced (23.4%). Among the azole group of antifungals, Ketoconazole was effective against 43% of the isolates followed by Fluconazole (31.8%), Itraconazole (19.6%) and Clotrimazole (17.8%). A maximum of 81.5% of the *N. gonorrhoeae* isolates were sensitive towards the antibiotics Erythromycin and Spectinomycin. Antibiotics such as Kanamycin, Penicillin G and Ampicillin showed 74.1%, 70.4% and 66.7% respectively. *N. gonorrhoeae* was highly resistant towards the antibiotics Ciprofloxacin (70.3), Cefotaxime (55.6%) and Tetracycline (51.9%).

The various extracellular enzymes that influence the pathogenesis of *Candida* spp such as biofilm production, secretary aspartyl protease, phospholipase, sensitivity to hydrogen peroxide and hemolytic activity were determined. A total of 78.5% of *Candida* spp produced biofilm. Among the non albicans *Candida*, all species of *C. krusei* yielded higher amount of biofilm (100%) followed by *C. tropicalis* which
produced 72.7%. A total of 85.1% of *C. albicans* can produce biofilm. *C. tropicalis* dominated (81.8%) in the production of Secretory aspartyl proteinase followed by *C. albicans* and *C. krusei* which was 77.7% and 75% respectively. Only 28.5% of *C. glabrata* produce SAP. None of the *C. dubliniensis* produced this extracellular enzyme. Around 71.96% of Candida spp produced SAP. About 55.1% of Candida spp produced phospholipase. Among the Candida spp, *C. albicans* ranks first (69.1%) in phospholipase production followed by *C. tropicalis* (27.2%). In this study, *C. albicans* produced higher amount of phospholipase when compared to non-Candida albicans. *C. krusei* exhibits 100% resistant towards hydrogen peroxide (H$_2$O$_2$). Next to the *C. krusei*, 80.2% of *C. albicans* were resistant to hydrogen peroxide. The sensitivity to H$_2$O$_2$ was found to be less among the species of *C. dubliniensis* (50%). Totally 76.6% of Candida spp were resistant to hydrogen peroxide which indicates the ability of these species to overcome Lactobacillus in Vaginal environment. All the *C. albicans* and *C. dubliniensis* exhibit hemolytic activity (100%). Out of 107 Candida spp, a total of 10 isolates of *C. tropicalis* exhibited hemolytic activity.

The molecular characterization of MDR Candida spp was carried out with drug resistance gene such as ERG11, CD1, CD2 and MDR. The plasmid mediated drug resistance of *Neisseria gonorrhoeae* was determined based on the amplification of PPNG and TRNG gene in the plasmids using PCR. In this study, out of 27 strains of *N. gonorrhoeae*, 4 gonococcal isolates were found to be Penicillinase Producing *N. gonorrhoeae* (PPNG). Among the 4 PPNG isolates, 2 belonged to African type and others were Asian type. Among the tetracycline resistance strains, 9 isolates showed positive for TRNG in which 8 isolates belonged to Dutch type and only one were found to be American type. The isolates that possess the drug resistance gene were further sequenced to determine the differences in their wild type genome. The phylogenetic relationship of 18s rRNA genes of MDR Candida and quinolone resistant gene of MDR *N. gonorrhoeae* was also identified.

The study indicates a higher prevalence of both the Candida spp and *N. gonorrhoeae* among the women attending ICTC clinic at Sendamangalam, Namakkal. Women tend to consider many symptoms as normal, do not seek treatment
until the rate of discomfort increases and so apparently remain infected for a long time. This is particularly true for the young women. Rural men and women in India need accurate health education about gynecologic and reproductive morbidity. Health services should be improved with appropriate counselors and made more accessible so that women feel comfortable in seeking treatment and to feel confident over maintaining the medical history confidentially. It is not feasible to screen all asymptomatic women with the present infrastructure and facilities available in India. Screening could be done after risk assessment of the women and targeting these subgroups for education and regular provision of RTI diagnosis and treatment services. High co-infection rate of *N. gonorrhoeae* with the vulvovaginal candidiasis highlight the considerable burden of these diseases. This indicates the need for appropriate measures must be implemented widely and consistently to assure prompt and effective treatment for infected persons and their sexual partners leading to reductions in disease burden. The proportion of drug resistance pathogens was remarkably high. From the present study, it was clearly evident that 95% of the drugs demonstrated poor inhibitory action against the isolates obtained from ICTC patients. This is alarming and calls for urgent attention. Increase in such multi-drug resistance pathogen poses serious implication for the therapy of these infections. The antibiotic susceptibility is crucial to detect the emergence of new resistance. Therefore, continuous monitoring of changing drug resistance is necessary to update treatment recommendations on a regular basis. Over the counter usage of drugs should be completely prohibited and monitored to control the spread of antibiotic resistance. Since there is a continuous development of resistance exhibited by pathogens to the commonly used antibiotics, an urgent clinical intervention accompanied with better drugs using plant extracts and probiotics may serve as better alternative therapy in the treatment of RTIs. This may also prevent the drug resistance acquired by the etiologic agents.

Reproductive Tract infections (RTIs) are a major health problem affecting most of the young people in developing countries including India. The highest awareness and knowledge were reported only for HIV/AIDS and the consequences of other RTIs were unaware among the public. Hence the people should be well
informed on the health risks associated with sexual activity and on how to protect themselves and others against these infections. Adolescents should be educated on the health consequences of RTIs including HIV/AIDS and the usage of condoms and other barrier methods which can minimize the risk of transmission but does not provide complete protection. Although educating and creating awareness among the ICTC patients have a limited effect on changing attitudes and behavior, they are important components for treatment and prevention of such diseases. Health educators in the region should play an important role in educating the ICTC population about prevention and transmission of STDs and put it into the public consciousness. Educational activities at schools should be increased so as to inform the students about these problems and to offer young people better and more correct information about these infections.