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Review Article

Sexually Transmitted Diseases: An Overview of Common Diseases, Diagnosis and Treatment

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Abstract

Sexually transmitted diseases (STDs) are a significant global health concern, affecting millions of people worldwide. These diseases can lead to serious health complications, including infertility, cancer, and pregnancy problems. The most common STDs include gonorrhea, syphilis, chlamydia, trichomoniasis, and HIV. This review highlights the current state of STDs, their symptoms, diagnosis, treatment options, and prevention strategies. This article explores the causes, transmission, and effects of each disease, as well as the importance of early diagnosis and treatment. The review also explores the challenges in treating STDs, including antibiotic resistance and the need for effective prevention strategies. Understanding STDs is crucial for developing effective prevention and treatment programs, and this review aims to provide a comprehensive overview of the current state of STDs.

Keywords: gonorrhea, syphilis, trichomoniasis, chlymadia, HIV.

INTRODUCTION:

Sexually transmitted diseases (STDs) are a serious global health concern with significant social, economic, and public health implications. These diseases, which are caused by several bacterial, viral, and parasitic agents, are primarily transmitted through sexual contact, however they can also be vertically transmitted from mother to child during childbirth or by contaminated needles and blood products. Furthermore, bacterial sexually transmitted infections including syphilis, gonorrhea, and chlamydia continue to be major health risks, with millions of new cases reported each. Sexually transmitted infections have effects that extend far beyond an individual's physical health. It has important social and economic repercussions. Sexually transmitted diseases can cause several major reproductive health issues, including infertility, ectopic pregnancies, and adverse pregnancy outcomes [1]. More than one million new instances of sexually transmitted diseases (STDs) are diagnosed every day worldwide due to more than 30 different pathogens; trichomoniasis, syphilis, gonorrhea, and chlamydia account for the highest share of STDs with 376 individuals millions of cases every year Although sexually transmitted diseases (STDs) have been around for thousands of years, Acquired Immune Deficiency Syndrome (AIDS), the most serious of this disease, has just recently been identified. Infertility, cancer, and pregnancy problems are just a few of the serious side effects that sexually transmitted diseases (STDs) can cause. They can also negatively impact on patient's quality of life and psychological well-being [2]. Globally, sexually transmitted infections (STIs) are associated with a high disease burden and, consequently, substantial health costs. Globally, syphilis, trichomoniasis, gonorrhea, and chlamydia cause around one million infections each day [3]. The problem with most STDs is that they can occur symptom-free and can thus be passed on unaware during unprotected sexual intercourse. Individual problems may include pelvic inflammatory illnesses, which may result in infertility and ectopic pregnancies. Because their partners are often older and therefore more likely to be infected, female teenagers are likely to be at a higher risk of acquiring an STD than their male counterparts [4]. Sexually transmitted infections (STIs) caused by bacteria include Neisseria gonorrhoeae and Chlamydia trachomatis. With the use of modern molecular and biochemical tools, our understanding of their infectious qualities at the microscopic level has swiftly evolved, but our understanding of their transmission dynamics at the population level has

developed more slowly. Individual risk behaviors like the number of sex partners and condom use have historically been the focus of population-based research of STIs [5]. STIs can cause a range of symptoms and effects at different parts of the female reproductive tract, including genital ulcer disease, vaginitis, pelvic inflammatory disease (PID), and infertility. Women's urogenital anatomy is more exposed and vulnerable to STIs than men's, especially because the vaginal mucosa is thin, delicate, and easily penetrated by infectious agents. The cervix at the distal end of the vagina leads to the upper genital tract, which includes the uterus, endometrium, fallopian tubes, and ovaries [6]. Compared to certain biological factors that increase susceptibility and infectiousness to HIV, it has proven difficult to separate the epidemiologic associations of HIV and STDs with increased sexual activity, contact with core group members who may be at greater risk for STDs, and the trend of choosing infected partners that allow at-risk individuals to interact with new populations with increased STD prevalence [7].

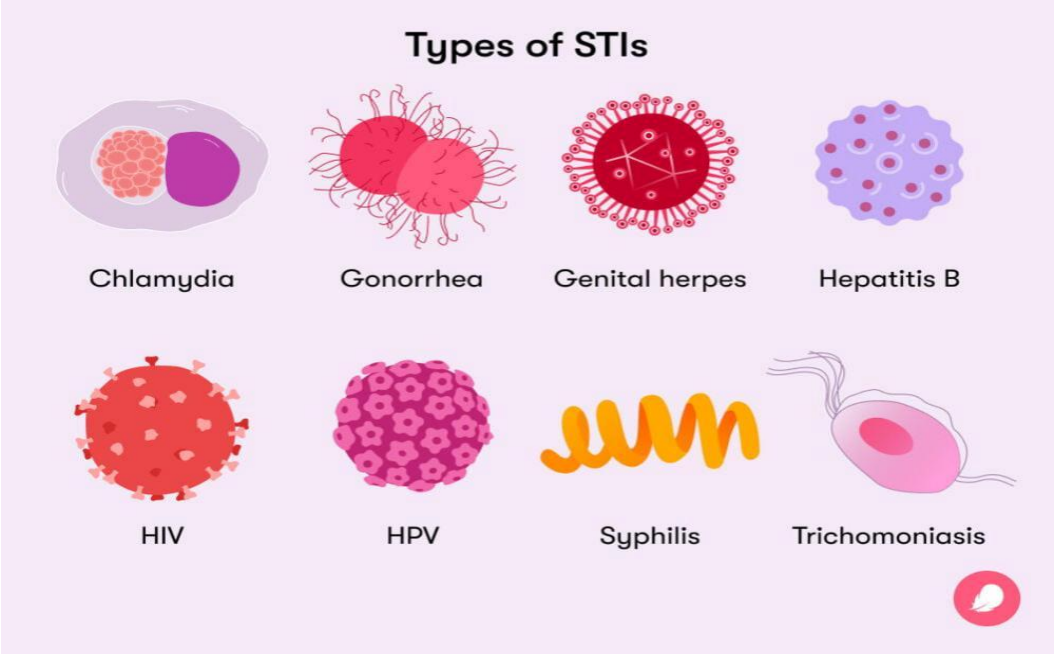

Figure 1: Types of STIs [8]

STD agents do not produce immunity and are extremely susceptible to chemical and physical stimuli. As a result, infections with several distinct species could happen simultaneously. There are various ways that infectious agents can affect fertility. For men, they can cause harm to organs and cells through inflammatory mediators, blockage, and adherence to spermatozoa. For women, they can cause pelvic inflammatory disease and tubal obstruction. Therefore, it seems that persistent or inadequately treated infections are more important than acute infections [9]. A key combination approach required to enhance reproductive health and HIV prevention initiatives is the precise diagnosis of sexually transmitted diseases (STDs) and their efficient clinical care. Because untreated infections may lead to serious, long-term problems, such as facilitation of HIV infection, tubal infertility, bad pregnancy outcomes, and cancer, this is particularly important for women, adolescents, and newborns [10]. Any non-consensual sexual behavior, including unwanted kissing, fondling, or stroking, with or without vaginal and/or anal penetration, is referred to as sexual assault (SA). Physical force, psychological pressure, or refusal of permission because of one's age, handicap, or incapacity from drugs or alcohol are all examples of sexual assault. Non-consensual penetration of the mouth, anus, or vagina is included in the legal definition of rape [11].

TYPES OF STDS:

1. GONORRHEA:

In recent years, gonorrhea, which is brought on by the gram-negative diplococcus Neisseria gonorrhoea, has become more common. Anal receptive sexual contact with an infected partner is the means of anorectal transmission. Contiguous transmission from the vaginal infection is thought to be the cause of the concurrent rectal infection that occurs in 35–50% of women with gonococcal cervicitis [12].

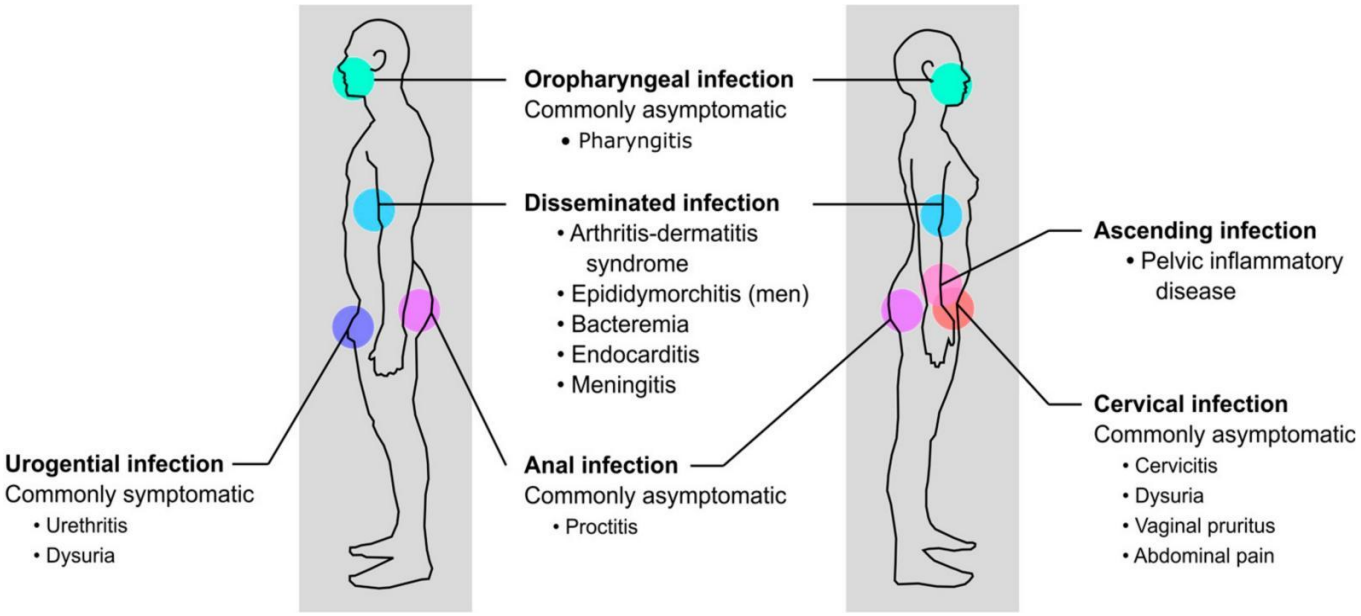

Figure 2: Site of infection and clinical symptoms of gonorrhea in men and women [13]

The vaginal tract serves as the reservoir for this sexually transmitted diseases. The transmission probability during a single interaction is estimated to be 0.5–0.7 from male to female and 0.2–0.3 from female to male, indicating that women are more vulnerable to infection than men. In spite of this, men are more likely than women to experience the symptoms of gonorrhea. For women, N. gonorrhoeae infections are linked to ectopic pregnancy, pelvic inflammatory illness, and infertility; for men, they are linked to epididymitis, prostatitis, and infertility. Additionally, gonorrhea and chlamydia have been linked to a higher risk of HIV infection and transmission [14]. The second most common infection to be reported to the CDC is NG. As with CT, PID, infertility, persistent pelvic pain, and ectopic pregnancies are among the consequences of untreated infections. Globally, gonorrhea is a serious public health issue, particularly in view of the growing resistance to currently prescribed medicines [15].

Treatment of Gonorrhea:

Gonorrhea is difficult to treat since it quickly develops antibiotic resistance and suggestions from guidelines are inconsistent. Dual therapy with ceftriaxone or cefixime with azithromycin or doxycycline is advised by the Canadian STI guideline [16]. Treatment should also be given to patients' sexual partners within 60 days prior to the onset of symptoms. Due to the advent of quinolone-resistant N. gonorrhoeae, fluoroquinolones are not advised for the treatment of gonorrhea or related disorders in the United States [17]. Within one to two weeks of finishing treatment, patients with pharyngeal gonorrheal infections should be evaluated for cure using either a culture or NAATs. Cephalosporin-based outpatient therapies are currently advised for pelvic inflammatory illness. Alternative therapy using parenteral clindamycin and gentamicin should be recommended for patients allergic to cephalosporins and penicillins. A gonococcal vaccine is currently being developed, and a group B outer membrane vesicle meningococcal vaccine offered cross-protection against gonorrhea with an estimated efficacy of 31% (95% CI, 21%-39%). Presumptive treatment should be given to all sexual partners within 60 days of an index patient's gonorrhea diagnosis [18].

2. SYPHILIS:

The spirochaete T. pallidum is the causative agent of syphilis, a bacterial infection that is rather uncommon in the United Kingdom. Antibiotics are easily used to treat early infectious syphilis. Despite being uncommon, localized epidemics among individuals in high-risk sexual networks have been linked to it [19]. With documented rising rates of syphilis among HIV-1-infected individuals over the past ten years, particularly among MSM, syphilis is the second most common cause of GUD among those infected with the virus. Numerous investigations have verified that syphilis infection is linked to a higher risk of contracting and spreading HIV-1, through mechanisms such as mucosal damage and CCR5+ cell infiltration [20].

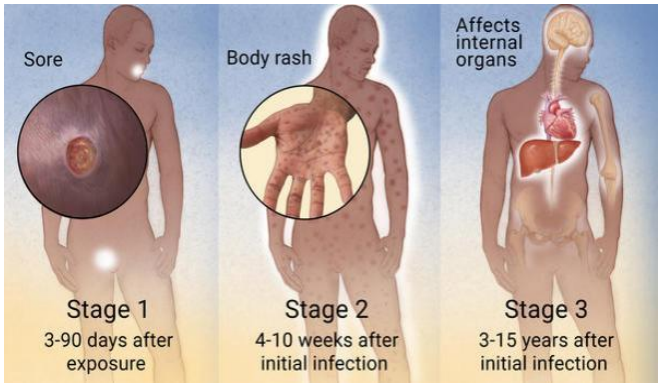

Figure 3: Stages of syphilis [21]

Treponema pallidum is a bacteria that causes syphilis. In the past, syphilis was also known as the French disease, hard chancre, or lues. Like almost no other STI, syphilis has seen a renaissance in recent years. Three phases can be distinguished in the course of the disease: early-stage syphilis occurs within the first year following infection. Late-stage syphilis refers to all stages of the disease that

follow. According to Anglo-American literature, two years is the early stage of syphilis [22]. The main signs of syphilis are aseptic meningitis, pan uveitis, diffuse rash in secondary syphilis, and anogenital or oral painless chancres in primary syphilis. Over the past ten years, syphilis's effects on women have gotten worse. Preterm delivery, low birth weight, and neonatal infections have all been linked to syphilis during pregnancy, which is the second most common cause of stillbirth worldwide. Early detection and treatment of maternal infection can prevent congenital syphilis; nevertheless, even with early diagnosis, many women do not have access to proper syphilis treatment [23].

Treatment of syphilis:

Rapid declines in syphilis diagnoses were a result of better control measures made possible by the greater accessibility of better diagnostic tools and medications. The development of penicillin and even more efficient antibiotic control coincided with a decline in diagnoses following a temporary increase during and immediately following World War II [24]. Serological screening was used to diagnose syphilis. Most of the anecdotal reports of symptomatic syphilis cases seem to be rare. Clinical findings include included condyloma lata, which can be mistaken for genital warts, primary chancres, and secondary syphilis symptoms like rash. Distinguishing between acquired and congenital infections is the primary confounding factor in the diagnosis of syphilis in children older than neonates [25]. Although the exact effect of this widespread testing on the spread of syphilis is unknown, it is generally accepted that the introduction of testing and treatment with the highly effective penicillin was a major factor in the sharp drop in syphilis prevalence in many parts of the world in the years following World War II [26]. Insufficient availability of testing laboratories has hindered syphilis prenatal screening. Increased access to testing for pregnant women and at-risk groups is made possible by POC tests, which lowers the disease burden among sexually active people and speeds up efforts to eradicate congenital syphilis [27]. They thought that the randomization schedule had been compromised. These issues may explain the lack of an effect. Aside from these issues, the three strategies under review were not significantly different (for example, with the contract referral, index patients were only given two days before disease intervention specialists contacted their spouses) [28].

3. CHLAMYDIA:

Nearly 1.5 million Americans are afflicted with chlamydia trachomatis each year, making it the most prevalent disease that needs to be reported in the US. Unfortunately, infections caused by C. trachomatis are frequently overlooked, neglected, and underreported since most women do not experience any symptoms [29]. Patients with recurrent bacterial STIs who had a history of prior sexual abuse reported higher levels of psychological suffering than those who had no history of sexual abuse [30]. The most frequent sexually transmitted illness identified in UK genitourinary medicine (GUM) clinics is chlamydia trachomatis. One The majority of acute infections in men, and especially in women, are asymptomatic; but, if left untreated, they can develop into serious consequences [31]. The detrimental consequences of sexually transmitted C. trachomatis infections on reproduction make them a significant public health concern. Infertility, ectopic pregnancy, and persistent pelvic pain are long-term effects of C. trachomatis infection in women. These symptoms are linked to scarring of the ovaries and fallopian tubes (produced by SALPINGITIS). Furthermore, C. trachomatis infection promotes HIV transmission and may contribute to cervical neoplasia caused by the human papillomavirus (HPV) [32].

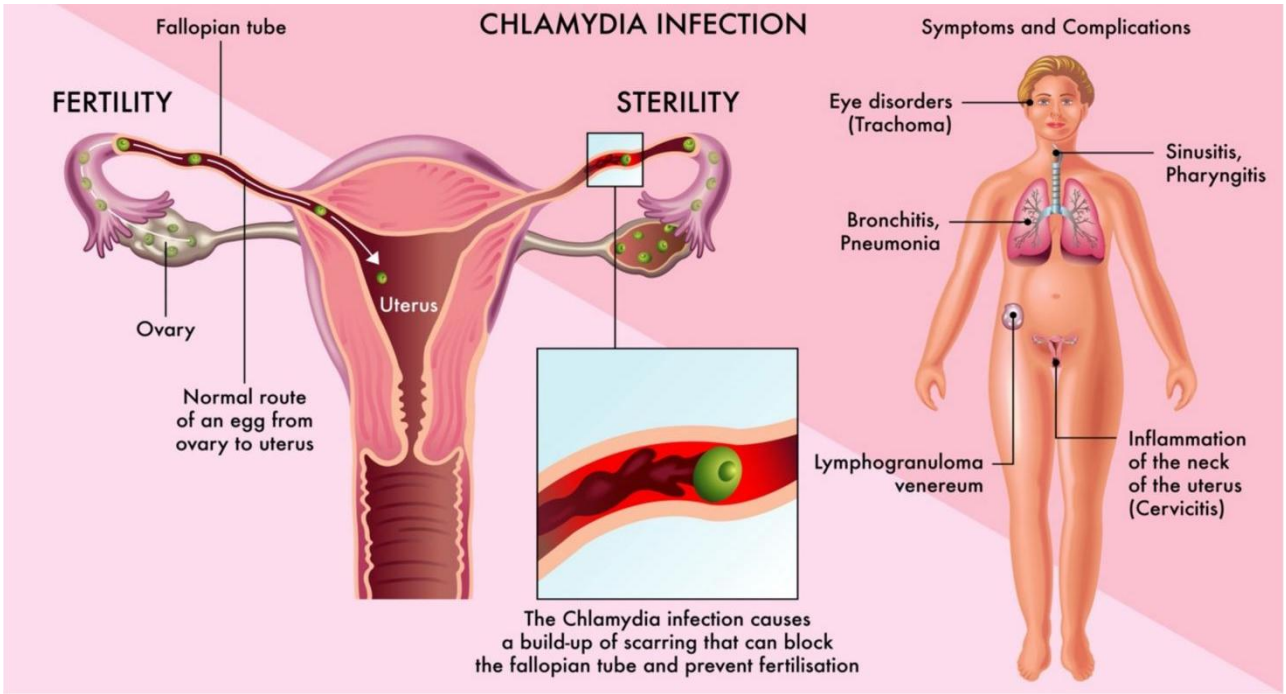

Figure 4: Chlamydia trachomatis infection. Symptoms and possible impact on fertility [33].

Because chlamydia lacks many metabolic enzymes and have significantly smaller genomes (1.04 Mb encoding 895 open reading frames for C. trachomatis), they are dependent on their hosts for many metabolic needs. Due to their intracellular lifestyle and conserved developmental cycle, species share about two-thirds of predicted proteins, reflecting both genetic conservation and evolutionary restrictions. A region of high genomic diversity known as the "plasticity zone" is an exception. It encodes a variety of virulence components, such as phospholipase D, membrane attack complex/perforin protein (MACPF), and cytotoxin, which may be involved in host tropism and niche specialization [34].

Treatment of chlamydia:

Doxycycline, azithromycin, ofloxacin, or erythromycin can all be used to treat the infection. Trachoma serovars A, B, Ba, and C are also members of the species C.trachomatis [35]. It is thought that treating a C. trachomatis infection effectively stops it from spreading to sexual partners. Rifampin, tetracyclines, macrolides, sulfonamides, some fluoroquinolones, and clindamycin are among the medications that are effective against C. trachomatis in tissue cultures. Although rifampin has a high level of activity in vitro, resistance to the medication can easily arise. Rifampin is therefore not used to treat chlamydial infections in humans. Although sulfonamides are not used to treat genital chlamydial infections, C. trachomatis is susceptible to them as well [36]. Doxycycline, azithromycin, ofloxacin, or erythromycin can all be used to treat the infection.Trachoma serovars A, B, Ba, and C are also members of the species C.trachomatis [35]. It is thought that treating a C. trachomatis infection effectively stops it from spreading to sexual partners. Rifampin, tetracyclines, macrolides, sulfonamides, some fluoroquinolones, and clindamycin are among the medications that are effective against C. trachomatis in tissue cultures. Although rifampin has a high level of activity in vitro, resistance to the medication can easily arise. Rifampin is therefore not used to treat chlamydial infections in humans. Although sulfonamides are not used to treat genital chlamydial infections, C. trachomatis is susceptible to them as well [36]. Antibiotics that work against chlamydial infections are intracellularly active and cross host membranes. These mainly interact with the 50S or 30S ribosomal subunits to target protein production. Cell wall biosynthesis-targeting antibiotics also work well [37]. According to individual pharmacokinetic studies, ME0177 and ME0192, inhibitors of bacterial type III secretion (T3S), may be taken into consideration for topical and systemic treatment of chlamydial infection [38]. Compared to clarithromycin, azithromycin has a longer duration of action and a very high intracellular concentration, which may enable a shorter course of treatment and a more flexible dose schedule. Controlled therapy trials for C. pneumoniae infections have not yet been published. First-line treatment is advised for erythromycin, tetracycline, and doxycycline because of their in vitro activity against the pathogen [39].

4. TRICHOMONIASIS:

In men, infection with Trichomonas vaginalis can present with the symptoms and signs of urethritis, epididymitis, or prostatitis; in women, it presents with a vaginal discharge that may be diffuse, ill-smelling, or yellowish-green. 70–85% of all infected persons, however, have minimal or no symptoms, and untreated asymptomatic infection can persist for months or years. T. vaginalis infection elevates the risk of acquiring HIV by a factor of 2 to 3 [40]. Even with a normal vaginal pH, T. vaginalis can still be present. Approximately 5% of women with a pelvic examination have colpitis macularis, also known as a "strawberry cervix," but this number increases to almost 50% with a colposcopy. T. vaginalis complications in women include infection of the Skene and Bartholin glands, as well as a higher risk of pelvic inflammatory illness in women infected with HIV. It can result in prostatitis, urethritis, epididymitis, and reduced sperm motility in men [41]. A single-celled protozoan with four flagella at one end is the parasite T vaginalis. These flagella can be observed driving the parasite under a microscope. Since parasites stick to mucosal tissue, an infection may cause local inflammation. Both men and women can contract T vaginalis parasites, which are easily transferred from one sex partner to another, typically during penile-vaginal intercourse [42].

T vaginalis thrives in certain moist areas of the body [42] :

- Urethra, male or femal
- Vagina
- Vulva

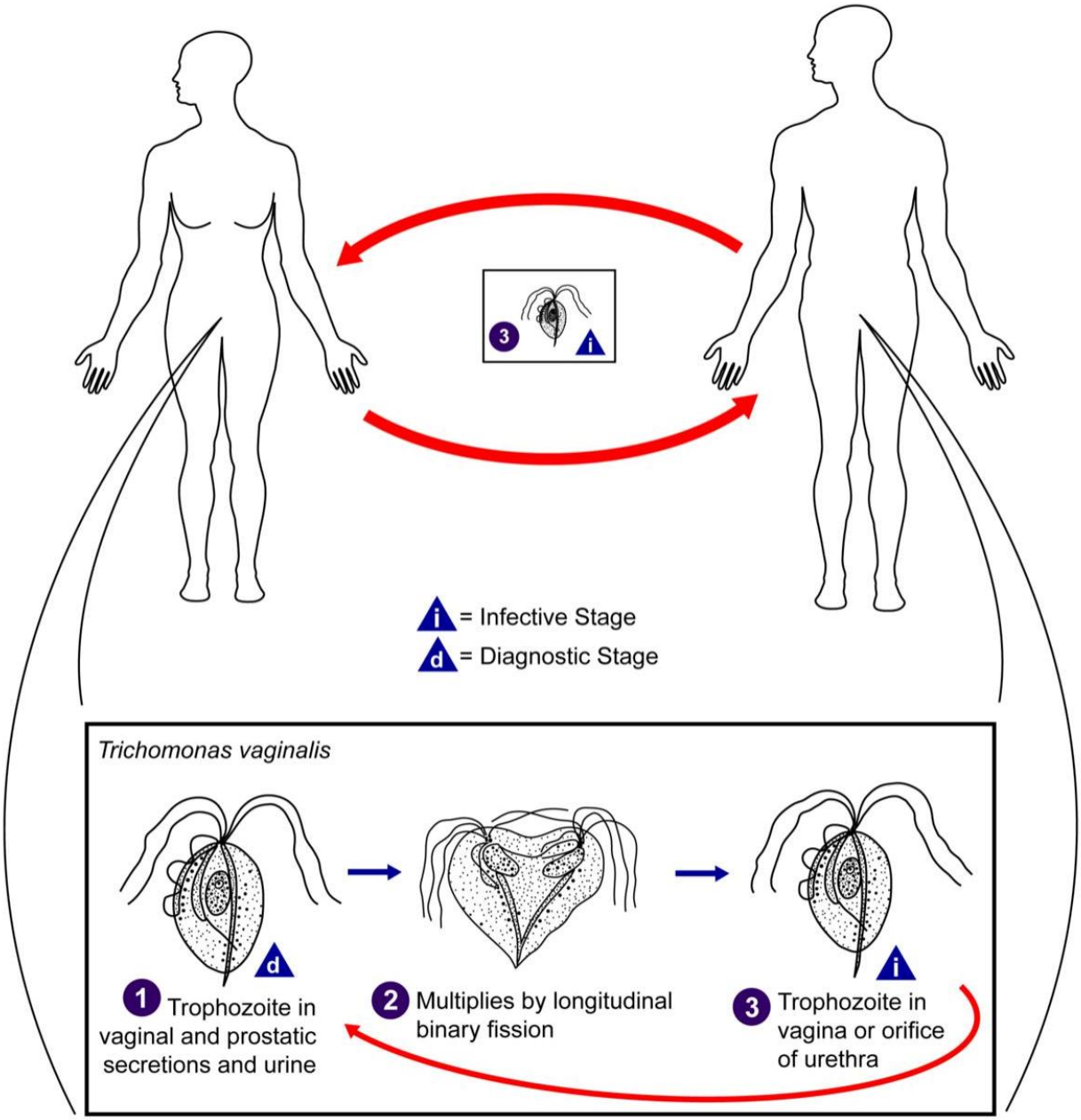

Figure 5: Trichomonas vaginalis [43]

T vaginalis alters the pH of the vagina, has been connected to a decrease in the amount of helpful vaginal lactobacilli, and is positively associated with a higher Nugent level [44]. Although endoflagellar or pseudocyst forms have been reported under stressed conditions, T. vaginalis solely exhibits the trophozoite stage. It is currently unclear how these resistant forms fit into the trichomonad life cycle. Along with its distinct characteristics, T. vaginalis has hydrogenosomes rather than mitochondria, which are organelles involved in metabolism adaption to the hostile infection environment, including particular pathways of cell death [45].

Treatment of Trichomoniasis:

Metronidazole intravaginal gel is not recommended due to its low effectiveness. Even when metronidazole is used in the first trimester, there has never been a reported case of fetal deformity linked to its usage, despite ongoing debate regarding its safety during pregnancy. The management of trichomoniasis during pregnancy and its connection to preterm birth have also been the subject of recent dispute [46]. Two grams of metronidazole as a single dose OR 500 mg twice a day for seven days During the first trimester of pregnancy, metronidazole should not be used. Delay treatment until after the first trimester, when individuals can get metronidazole, if a diagnosis is made during this time [47]. Povidone-iodine cannot have its antiprotozoal effect without iodine release. Therefore, a 10-minute douche with povidone-iodine works better than a 2-minute one. The use of povidone-iodine during pregnancy is not advised for pregnant mothers due to cases of neonatal hypothyroidism [48]. Although two trials that examined fenticonazole vaginal pills as a single dose or two doses spaced 24 hours apart had success rates of about 50%, which appears to be very low, the meta-analysis demonstrated the treatment's significant effectiveness

[49]. One dose of TNZ or a seven-day dose of MTZ may be administered to a patient who does not respond to single-dose MTZ therapy. If this doesn't work, you can give them 2 g of MTZ or TNZ for five days. A consultation for drug resistance testing should be conducted if this is unsuccessful and there is no history of sexual re-exposure [50].

5. HIV:

HIV is a member of the retrovirus class of viruses, which includes the lentiviruses, also referred to as "slow" viruses. There is a significant lag between the initial infection and the development of severe symptoms during the course of infection with these viruses [51]. The human immunodeficiency virus (HIV) is the cause of acquired immunodeficiency syndrome (AIDS). One might say that HIV is tv a modern-day threat and a curse on humanity. Following an increase in the occurrence of highly rare parasitic infections and cancers among physically healthy homosexual men, the scientific community first became aware of and acknowledged the existence of AIDS as a serious disease [52].

HIV:

H- This virus only infects humans and is spread by human-to-human contact rather than by animals. No species, including bats and mosquitoes, can spread it through bites.

I- The immune system of the body serves to defend us against infections, pathogens, and other threats. However, an HIV-positive person is unable to fight against illnesses. But the immune system deteriorates.

V- virus is a little, simple entity that is dormant outside of the body and becomes active once it enters the human body.

AIDS:

A- It is not inherited means it cannot be transmitted from one generation to another. It is transmitted to healthy person by infected person.

I- It decreases the immune system.

D- Creates a deficiency of CD4+ cells in the immune system.

S- It is a collection of diseases [53].

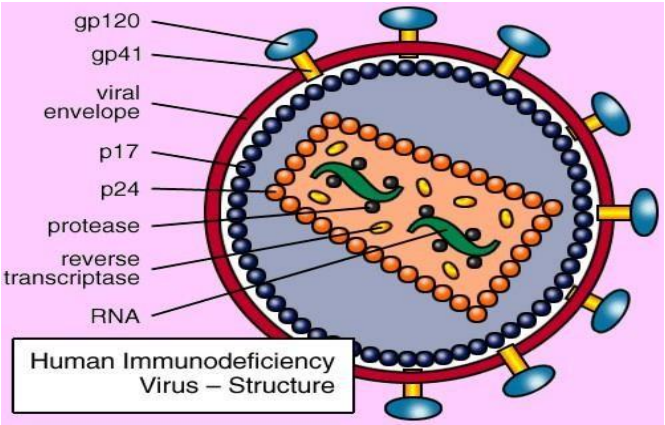

Figure 6: Structure of HIV Virus [53]

Treatment of HIV:

While significant efforts to prevent HIV transmission have focused on individuals at risk of contracting the virus, recent evidence has demonstrated the strong impact of cART on secondary HIV transmission. In HIV-infected individuals, low plasma HIV RNA is associated with decreased concentration of virus in genital secretions, and HIV transmission risk is low when plasma viral loads are <400 copies/mL [54]. Despite these advancements in HIV infection prevention and treatment, the rate of new infections has remained relatively unchanged over the past ten years. The greatest alternative for sustained viral suppression and, consequently, for lowering morbidity and death is antiretroviral therapy. However, current medications do not eradicate HIV-1 infection and lifelong treatment might be needed. The US Food and Drug Administration has approved 21 antiretroviral medications, 20 of which target the viral reverse transcriptase or protease. Three non-nucleoside reverse transcriptase inhibitors and eight nucleoside/nucleotide analogues prevent viral replication after cell entry but prior to integration. Drugs with lengthy half-lives permit once or twice daily dosage, while fixed-dose combination pills streamline treatment regimens by lowering the daily pill burden [55].

CONCLUSION:

Exually transmitted diseases are a major public health concern that requires attention and action. The high prevalence of STDs worldwide necessitates comprehensive prevention and control measures, including education, screening, and treatment. Early diagnosis and treatment can significantly reduce the risk of long-term complications and transmission to others. Healthcare providers should be aware of the latest treatment guidelines and recommendations for each type of STD. Furthermore, research into new treatments and prevention strategies, such as vaccines and microbicides, is essential to controlling the spread of STDs. By working together, reduce the burden of STDs and improve the health and well-being of individuals worldwide. Effective management of STDs requires a multifaceted approach that includes healthcare providers and individuals.

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