Transmission of Nonviral Sexually Transmitted Infections and Oral Sex

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ABSTRACT

Introduction. Oral sex is usually considered a lower-risk sexual activity when compared with sex, but it is frequently the cause of sexually transmitted infections (STI). In particular, STI transferred through oral sex might have no visible symptoms, depending on the type of infection.

Aims. The aim of this study is to review the literature about the role of oral sex in the transmission of nonviral STI.

Main Outcome Measures. State-of-the-art information in the area of STI in relation to sexual function and self–care, this last important for development of STI prevention products such as vaginal microbicides. Sexual behaviors assessed focusing on receiving oral sex and giving oral sex.

Methods. A search of the main electronic databases including registers of clinical controlled trials was performed in addition to a hand search of the most relevant Journals. The following electronic databases were searched: PubMed, Embase, Google Scholar, literature review of research articles, and public health department Internet Web sites, for the period of 1945–2011. In addition to searching the Clinical Trials Registry at the US National Institutes of Health, we also used the meta Register of Controlled Trials and the Cochrane Central Register of Controlled Trials.

Results. STI affect the mucous membranes both directly and indirectly producing characteristic diagnostic signs and lesions. Daily dental clinical activity needs an appropriate knowledge of any kind of oral lesions-related STI. The reader is offered a practical approach with clinically relevant recommendations that may prove useful in his/her daily practice when dealing with STI.


Key Words. Oral Sex; Genital Intercourse; Nonviral-sexually Transmissible Infections; Orogenital Sexual Activity; Sexual Health; Sexual Behavior

Introduction

Daily dental clinical activity needs an appropriate knowledge of any kind of oral lesions related to nonviral sexually transmitted infections (STI).

Oral sex is a common sexual practice between both heterosexual and homosexual couples of various age [1]. That orogenital practices are in common use is clear from the reports of Kinsey et al. [1], who stated that nearly 60% of all American men had had such contact, while women seemed somewhat less interested.

Oral sex refers to sexual activities related to the stimulation of the genitalia by the use of mouth, tongue, teeth, or throat and includes both oro-anal and orogenital practices.
There are different types of oral sex activities, such as fellatio, cunnilingus (orogenital sex), and anilingus (oro-anal sex), which are correlated to the different origin of infection, even if the most common sexual practice still remains vaginal sex [2].

Johnson et al. [3] reported that 72.9% of men and 66.2% of women refer to have experienced cunnilingus, instead 69.4% of men and 64% of women declare to have practiced fellatio. Previous studies, among adolescents, report contrasting findings regarding the sequence of sexual initiation: a study, among female adolescents, reports that lots of them practiced orogenital stimulation before than the traditional vaginal intercourse [4]. On the other hand, data from the 2002 National Survey of Family Growth among 15- to 19-year-olds indicate vaginal sex as initial type of sexual intercourse even if these conclusions should be correlated to racial/ethnic group and socioeconomic status [5].

The majority of patients practice unprotected orogenital contact: oral sex is often performed without a condom or any form of barrier protection because people are not scared about pregnancy.

Even if infrequently investigated, oral sex can transmit oral, respiratory, genito-urinary, and enteric pathogens. It is plausible that performing oral sex may increase the risk of oral disease, either through the introduction of microbes and mechanical trauma to the oral cavity [6]. Oral status is strictly correlated with the transmission of infections: wounds and abrasions in mouth, bleeding gums, unhealthy periodontal status (gingivitis and periodontitis), and lip sores increase chances of acquiring infection by getting the systemic circulation. Otherwise, injuries because of fellatio must be considered as an etiological factor to hemorrhagic changes of the oral mucosa: erythema, petechiae, ecchymoses, dilated blood vessels, vesicles, and submucosal hemorrhage [7] could be secondary to intraoral trauma [8]. The responsible mechanism of these injuries are postulated to be combined muscular actions initiated reflexively through tactile stimulation, and the negative pressure in the posterior oropharynx created through fellatio, both acting simultaneously on the mucosa of the soft palate.

There are various vehicles likely responsible of infections: saliva, precum, sperm, vaginal secretions, and menstrual blood. The intact mucosal membrane, the diluent function of saliva, and the antimicrobial action of salivary enzymes constitute a defensive barrier to infection by pathogenic microbes.

Sexually transmitted diseases affect the mucous membranes both directly and indirectly producing characteristic diagnostic signs and lesions. The aim of this work is to review the scientific literature about the oral transmission of nonviral STI.

Search Strategy

A search of the main electronic databases including registers of clinical controlled trials was performed in addition to a hand search of the most relevant journals. For the identification of studies, detailed search strategies were developed for each database searched. Selected articles were reviewed for data extraction.

The bibliographies of relevant clinical trials and relevant articles were checked for identifying studies outside the hand searched journals. The following electronic databases were searched: PubMed, Embase, Google Scholar, literature review of research articles, and public health department Internet Web sites, for the period of 1945–2011. In addition to searching the Clinical Trials Registry at the US National Institutes of Health, we also used the meta Register of Controlled Trials and the Cochrane Central Register of Controlled Trials. No language restriction was placed. The last electronic search was conducted on 14 March 2011.

Disagreements were resolved by discussion. All studies meeting the inclusion criteria underwent validity assessment and data extraction. All studies rejected at this or subsequent stages, and reasons for exclusion, were recorded.

Syphilis

Syphilis, like other STI, is a sociologic marker that reflects the sexual behaviors of individuals belonging to this society. In the past decade, the prevalence of infective syphilis in the developed world increased significantly [9]. Since 1980s, the evolution of STI has been characterized by the resurgence, and since 2000 by a significant recrudescence of syphilis, the appearance of resistance of gonococcus to fluoroquinolones and the emergence of lymphogranuloma venereum [10]. This phenomenon could be attributable to human immunodeficiency virus (HIV) immunodepression and iatrogenic immunosuppression.

Syphilis is an STI caused by an anaerobic filamentous spirochete, the bacterium Treponema pal-
Syphilis is transmitted from person to person through direct contact with a syphilis sore. This ulcer, commonly called chancre, appears on the external genitals, vagina, anus, or in the rectum, on the lips, and in the mouth. This bacterium can be transmitted during vaginal, anal, or oral sex (analingus, cunnilingus, and fellatio). Pregnant women with syphilis may also transmit it transplacentally or during birth to the fetus [11], leading to malformations of the skin, mucous membranes, skeletal, eye, liver, kidney, and central nervous system. The congenital disease gives rise to Hutchinson’s triad dental abnormalities, deafness, and eye damage, as well as bone, skin, and neurological anomalies of the face [11].

This venereal disease is a prototypic STI with oral signs and manifestations. Although oral manifestations of syphilis are frequently observed during secondary disease, oral lesions may be present during every stage of the disease.

The mouth is rarely the site of primary syphilis and, above all, because of its transient nature, the oral ulceration of primary syphilis often goes unnoticed by the patient or by any unsuspicious clinician [12].

Primary syphilis is usually the consequence of orogenital or oro-anal contact with an infectious lesion. Kissing may, rarely, cause transmission [13]; indeed, it has been suggested that intrafamilial oral acquisition of syphilis in a child may have occurred in this way, although more usually oral syphilis in a child is indicative of sexual abuse [14].

Primary syphilis is represented by a lesion (chancre or syphiloma), that is an indolent nodule, round or oval form, red-brown color, with very sharp and regular margins, edges slope gently down to the bottom. It appears at the point of penetration of the bacterium and solitary ulcer is often on the lip or tongue: the upper lip is more commonly affected than the lower in males while the opposite occurs in females—probably reflecting the anatomy involved with fellatio and cunnilingus [15].

Secondary syphilis is characterized by nonspecific oral lesion, pharyngitis, glistening patch, oral ulcers, lingual fissures, but the most well-recognized manifestations are the mucous patch, an irregular, often ulcerated plaque of about 1 cm diameter, covered by a gray with necrotic membrane surrounded by an erythematous border [16] and the maculopapular lesions on the hard palate. The mucous patches may coalesce to give rise to, or de novo as, serpiginous lesions, sometimes termed snail track ulcers [17–19]. Papular syphilides are rare. They manifest as red round nodules with a gray center that may ulcerate on the buccal mucosa or commissures.

After a latent phase, tertiary syphilis manifests itself with serious systemic diseases, with neurosyphilis, with gummas, that are destructive granulomas and with glossitis or mucosal atrophy, syphilitic leukoplakia, which may transform into oral squamous cell carcinoma.

Untreated syphilis can eventually cause brain damage, heart disease, blindness, and death. Open syphilis sores or chancre provide also an easy entry and exit for HIV and increase viral load. In effect, oral syphilitic lesions disrupt the protective epithelial barrier and recruit HIV target cells, increasing the risk for HIV transmission [20].

Gonorrhea

Gonorrhea is an STI caused by bacteria, Neisseria gonorrhoeae also called Gonococcus. It is a species of Gram-negative coffee-bean shaped bacteria. The incubation period is 2–30 days with most symptoms rising between 4 and 6 days after infection, even if a small number of people could be asymptomatic.

As a sexually transmitted disease, the genital tract is its reservoir [21]. Women are more susceptible to infection than men: the transmission probability during a single contact is estimated to be 0.5–0.7 from male to female and 0.2–0.3 vice versa. Despite it, gonorrhea rates of symptomatic disease in men are higher than women.

N. gonorrhoeae infections are associated with infertility, pelvic inflammatory disease, and ectopic pregnancy in women and epididymitis, prostatitis, and infertility in men. Furthermore, Chlamydia and gonorrhea have been associated with increased risk of transmission and acquisition of HIV infection [22].

The most common symptoms reported by men are urethral discharge and dysuria, while women usually complain about cervical or vaginal discharge; therefore, the routine examination for gonorrhea is designed to the demonstration of the bacterium in the secretion from the genital organs directly implicated in sexual intercourse [23]. Anyhow, a considerable portion of N. gonorrhoeae infections occurs at nongenital anatomic sites among men who have sex with men (MSM) [24].

It is well established that N. gonorrhoeae can be transmitted through unprotected vaginal and anal sex and through oral sex from the male urethra to the oropharynx [23]. Hence, gonococci may be
transferred from the genitalia to the mouth by cunnilingus and/or fellatio.

Osborne and Grubin [25] pointed out fellatio as the culprit of gonococcal colonization of the pharynx of patients affected by gonorrhea; nevertheless, the authors did not exclude cunnilingus, autoinoculation, or even ordinary kissing as possible modalities of transmission of *N. gonorrhoeae*. This statement needed further scrutiny [25].

In 1980, the British Co-operative Clinical Group demonstrated that also cunnilingus predisposed to gonorrhea: it was stated that 14% of men practicing cunnilingus with presumed affected women were positive to pharyngeal gonorrhea vs. 3% among men with pharyngeal infection who denied this practice [26].

Patients with oral gonococcal infection may be asymptomatic (79%) or show severe oral symptoms such as a painful pharyngitis (15%), purulent tonsillitis (5%), or lymphadenopathy [27]. The lesions related to gonorrhea are not pathognomonic and may be confused with several oral diseases.

The clinical signs and symptoms of pharyngeal gonorrhea do not suggest the presence of gonococci at this site because the condition is largely asymptomatic. Any symptom would be indistinguishable from those of common oral infections [22].

Nowadays, diagnosis of pharynx infection requires a swab specimen to demonstrate the presence of the gonococcus, even if this pose several methodical issue [23].

**Neisseria Meningitidis**

Orogenital sex is implicated as a route of transmission also for *Neisseria meningitidis*, a gram-negative, aerobic, encapsulated, coffee-bean shaped diplococcus that can parasitize the nasopharynx of healthy individuals as a harmless saprophyte.

The natural habitat and reservoir for meningococci are the mucosal surfaces of the human nasopharynx and, to a lesser extent, the urogenital tract and anal canal [28].

It is well known that this bacterium is frequently present in the pharynx of healthy people and that during orogenital intercourse it can be directly inoculated in the genital mucosa. As a matter of fact, *N. meningitidis* remains the leading worldwide cause of meningitis and fatal sepsis [29].

As confirmed by literature, gonorrhea of the genitourinary tract is occasionally caused by orogenital sexual practice. Hagman et al. described the cases [30] of three patients who harbored meningococci in the genitourinary tract with the same serogroup/serotype of the pharyngeal meningococci of their sexual partners.

Urra et al. [31] presented a story of urethritis caused by *N. meningitidis*, serogroup C. The microorganism was isolated from the nasopharynx and endocervix of the patient’s sexual partner and such evidence was confirmed by genotyping techniques. The similarity of the urethral and nasopharyngeal isolates’ electrophoretic patterns, using pulsed-field gel electrophoresis, attested the transmission via orogenital contact: the identical strain was isolated from the patient’s urethral exudates and from his sexual partner’s pharyngeal exudates.

Another case report [32] confirms the transmission of *N. meningitidis* group A by fellatio, in a young heterosexual couple, which caused an acute purulent urethritis in the 18-year-old boyfriend; *N. meningitidis* was present in the urethra of the man and in the throat of his girlfriend.

Fiorito et al. [33] described an unusual primary neonatal conjunctivitis acquired at delivery from the mother’s endocervical infection. The microorganism was isolated from the cervix, the neonate conjunctive, and the oropharynx of the mother’s male partner, showing the same serotype and genotype.

Quarto et al. [34] described a case of acute urethritis in a heterosexual man caused by *N. meningitidis*, serogroup Y. The symptoms began 6 days after a single episode of fellatio with an occasional female partner.

Kanemitsu et al. presented a similar case of acute urethritis in a 48-year-old heterosexual man [35]. The symptoms appeared 1 day after a fellatio performed by a prostitute; *N. meningitidis* was isolated in the urethral discharge.

**Vaginal Infections**

**Vulvovaginal Candidiasis**

The vulvovaginal candidiasis is a common inflammatory disease caused by yeast in female population of childbearing age.

*Candida albicans* is the etiologic agent responsible for 30% of all vaginitis and 85% of mycotic vulvovaginitis, probably because of the high capacity of the yeast to adhere to vaginal epithelial cells, especially at certain times of the menstrual cycle [36]. Other species include *C. glabrata* and *C. tropicalis* [37].
Oral contraceptives, sexual activity, antimicrobial use, and many other possible risk factors have been associated with vulvovaginal candidiasis in anecdotal reports and occasionally in clinic-based studies, but none of these associations has been conclusive [38].

The real incidence of vulvovaginitis is unknown, but apparently about 75% of women experience at least one episode of yeast vulvovaginitis during their reproductive years [37] and 40–50% of them suffer from recurrent episodes [39]. Recurrent vulvovaginal candidosis is not a chronic infection but a disease with recurrent episodes (from three to four attacks during the year) [40] and the cause of recurrences is still unknown in the majority of the cases.

It is possible that intestinal colonization by Candida spp. is responsible of the reinoculation of the yeast in the vagina so the “intestinal reservoir” might be responsible for a large number of recurrent infections without the classic predisposing factors [36,41].

The classic symptoms of vaginal candidiasis are represented by itching, burning, dyspareunia accompanied by vaginal discharge (leukorrhea) of different intensity, and cervico–vaginal erythematous–ulcerated lesions [36]. The signs and symptoms of yeast vulvovaginitis are not diriment, so clinicians need laboratory tests to confirm diagnosis [37].

Vulvovaginal candidiasis is not usually defined as an STI even if it is suggested that oral contact with genitalia (cunnilingus) may predispose to the recurrent form [42]. Moreover, it is reported that candida is present in up to 50% of the mouth of healthy patients, likely because of oral–genital contacts [43].

Despite of this, in 1993, Evans et al. did not find any evidence that either vaginal candidosis (acute form) or bacterial vaginosis (BV) was sexually transmitted [44]. According Mårdh, the oral cavity has been assumed to be the main reservoir for the genital tract of women with recurrent episodes of genital candidosis, even if more researches are required [40,45].

Markos et al. in 1992 analyzed the possible correlation between recurrent vulvovaginal candidiasis and the practice of oral sex (fellatio/cunnilingus), considering the practice as the possible vehicle for transmission of C. albicans. Performing oral sex might contribute to the recolonization of the vagina from the oral cavity so predisposing to the recurrent vulvovaginal candidiasis. The use of the sheath and/or abandoning the practice of oral sex was associated with a decrease in incidence of recurrences [46].

Rylander et al. in 2004 noticed a significant association between orogenital sex and candidiasis: Candida was present in 42% of sexually active women undergoing a genital examination at an adolescent health center [39].

As confirmed by literature, there is a correlation between oral sex and recurrent vaginal candidiasis but not between oral sex and general (acute) forms of vaginal candidiasis. Edwards et al. assumed as an explanation that the antimicrobial substances (i.e., lysozyme, NO, thiocyanate, etc.) in saliva might kill bacteria on genitalia but not Candida spores letting them to survive and give a recurrence [43]. Furthermore, Rylander et al. proposed that saliva may promote the growth of candida by moistening or irritating the vulvar mucosa or modifying the local immunological state [39].

Candida cytopathy (Figures 1 and 2) is characterized by cytoplasmic tunnels and holes with a sharply condensed border.

**Chlamydia Trachomatis**

*Chlamydia trachomatis* is a Gram-negative obligate intracellular parasite belonging to the Chlamydiaceae family. It can be transmitted through vaginal, anal or oral intercourse but also from mother to fetus.

*C. trachomatis* infections are the most common bacterial STI found in adolescents. Young women are more susceptible to STI than older women because of their not yet completed cervical
anatomic development, sexual behavior, and health care behavior [47]. STI caused by *C. trachomatis* bacteria affect women more than men.

Chlamydia is known as a “silent” disease because the majority of infected people have no symptoms. If symptoms do occur, they usually appear within 1–3 weeks after exposure. Common symptoms include pain and burning sensation when urinating, smelly vaginal or penile discharge, spotting after intercourse. Most infections are asymptomatic and, therefore, untreated. In extreme cases, cervical chlamydial infections may cause severe damage to women’s reproductive system, including pelvic inflammatory diseases and permanent infertility.

Urogenital infection with *C. trachomatis* is well recognized, but there are few data about pharyngeal colonization [48]. As a matter of fact, Chlamydia can be also found in the throats of women and men who recently performed unprotected active oral sex with an infected partner [49].

Positive pharyngeal specimens for *C. trachomatis* have been isolated from patients who had oro-genital contact with infected heterosexual females and from homosexual man with a history of oro-genital contact with infected partner. None of these patients had any symptoms of pharyngitis.

Diagnosis of pharyngeal *C. trachomatis* infection requires a posterior pharynx swab or mouthwash oral–throat rinses [50].

In particular, *C. trachomatis* has been isolated from the throat of a patient affected by TRIC ocular disease, likely secondary to infection or contamination of the throat by the nasolacrimal secretions [51]. TR- stands for trachoma and the -IC for inclusion conjunctivitis [52].

Six cases of prolonged and recurrent tonsillitis associated with *C. trachomatis* have been reported in the literature. The bacteria have been found in tonsillar crypts of all the patients, and in the urogenital swabs in five patients, and in three sexual partners [53]. Pharyngeal infection apparently resulted from direct inoculation. The available data suggest that tonsillitis, the most common problem in otorhinolaryngology, may be caused by *C. trachomatis* more often than suspected [54].

However, the isolation of *C. trachomatis* in the pharynx is not common, despite of the presence of a genital infection and a history of active oral sex [55]. The use of Polymerase Chain Reaction (PCR), in a population at high risk of sexually transmitted disease, showed that the prevalence of *C. trachomatis* in the pharynx was very low. This means that transmission of *C. trachomatis* to the oropharynx does not pose a serious health risk. Hence, the screening of patients for oropharyngeal *C. trachomatis* is not useful [48].

**BV**

BV was reported for the first time in 1995 by Gardner and Dukes, who described its unique clinical signs, symptoms, and distinctive nature of the vaginal discharge. BV is currently the most prevalent cause of infectious vaginitis among women attending for genitourinary diseases.

BV is characterized by important changes in the vaginal ecosystem: saprophyte flora is absent or greatly reduced and replaced with a mixed, predominantly anaerobic flora. Lactobacillus populations, which are usually dominant in healthy women, are substituted by a polymicrobial group of organisms that includes *Gardnerella vaginalis* and anaerobic Gram-negative rods such as *Prevotella*, *Bacteroides*, *Fusobacterium*, *Porphyromonas* and *Peprostreptococcus* species, *Mycoplasma hominis*, *Ureaplasma urealyticum*, and often *Mobiluncus* species [56–59].

BV is the most prevalent form of vaginal disturbances in reproductive age women even if more than 50% of all women with BV are asymptomatic. Common clinical symptoms of BV are related with anaerobic bacteria production of enzymes (aminopeptidases) that degrade protein and decarboxylases that convert amino acids and other compounds to amines raising the vaginal pH. Symptomatic women usually complaint malodor-
ous (like rotten fish), whitish and foamy vaginal discharge. BV has been associated with many gynecological and obstetric complications such as cervicitis, salpingitis, endometritis, postoperative infections, urinary tract infections, pelvic inflammatory disease, mild abnormal Pap smear results. Moreover, BV is likely linked with cervical intraepithelial neoplasia, preterm delivery, premature rupture of the membranes, chorioamnionitis, and postpartum endometritis [57,60–62].

Diagnosis of BV is established by Amsel’s criteria: presence of homogeneous discharge; vaginal fluid pH > 4.5; positive amine test; microscopic analysis of Gram-stained smear of vaginal discharge where “clue” cells (epithelial vaginal cells covered with mass of adherent bacteria, mostly coccobacilli) should be detected [61,63].

BV risk factors are as follows: multiple partners, exposure to semen, prior trichomoniasis, intrauterine device usage, smoking, indigent population, and frequent use of scented soap [61].

The role of sexual transmission in BV remains unclear: some studies show similar risk behavior in groups with BV and other STI but others refute this [44,60,64].

Among heterosexual women, noncoital sexual behaviors, such as receptive oral sex, receptive anal sex and nonpenetrative digitogénital contact, have also been identified to confer an increased risk of BV acquisition [65]. According with Schwebke et al. history of BV, a greater number of partners, and more frequent episodes of receptive oral sex, are associated with unstable vaginal flora. Women reporting more frequent episodes of oral sex had a corresponding increase in the number of episodes reported in their diary. Strictly similarities exist between the anaerobic bacteria associated with gingivitis and those associated with BV [66].

In a prospective cohort study (including 256 heterosexual female patients) Nandwani et al. found a highly significant difference in the rate of BV among women who reported receptive oral sex in the previous 4 weeks and women who did not experience cunnilingus in the past 4 weeks [67].

An attempt to explain the unconfirmed association of BV in lesbians, and between BV and receptive cunnilingus in women, was done by Tchamouroff. According to him, the evidence associating BV with oral sex is too strong to be ignored. In a parallel prospective study of 256 heterosexual female patients attending the same department, 55 (21%) were diagnosed as having BV. Forty-one (37%) out of 111 women, who practiced receptive cunnilingus in the previous 4 weeks, had BV. Fourteen (10%) out of 145 women, who did not have oral sex, had BV. Six (67%) out of nine lesbians, who practiced receptive cunnilingus in the previous 4 weeks, had BV. In both heterosexual and homosexual female groups there was a strong association between BV and receptive cunnilingus (P < 0.001). A possible explanation could be that the mouth is full of Gram-positive and Gram-negative organisms including Bacteroides oralis and, although in much smaller quantities, lactobacilli [60,68].

Even if lactobacilli are part of normal oral flora, it is not clear if they are saprophyte into the vagina. Lactobacillus phages may be directly inoculated into the vagina from the male (or female) partner. Blackwell hypothesized that a sexually transmitted lactobacillus phage may specifically destroy the endogenous healthy lactobacillus vaginal flora. Moreover, the overgrowth of endogenous anaerobic bacteria and G. vaginalis may explain why anaerobic vaginosis behaves epidemiologically as a sexually transmitted agent [59].

Mechanical transfer of infectious agents in lesbian couples is most likely to occur via cunnilingus, a common practice among lesbians [69]. According to Berger, lesbians in monogamous relationships usually have concordant vaginal secretions that probably reflect the sexual transmission of BV between them [69,70].

Microscopy of the wet mount should be considered the most powerful diagnostic tool for the presence of clue cells (Figure 3), epithelial cells covered by tiny bacteria (pleomorphic bacteria).

Pregnancy and Oral Sex

Pregnancy appears to be usually accompanied by a decrease in sexual desire, coital frequency, and orgasm. Sexual behavior in pregnancy has been traditionally restricted and is currently poorly defined. Abortion is only rarely caused by coitus, even if a clear relationship between coitus and orgasm to prematurity, distress of the fetus, and newborn has not been established. Air embolism in pregnancy associated with cunnilingus and vaginal insufflations have been reported as an infrequent cause of deaths of the mother and the fetus within minutes because air passes beneath the fetal membranes and into the circulation of the subplacental sinuses [71,72].

The BV complex of microbes, compared with a normal vaginal microflora dominated by facultative lactobacilli, is associated with significantly increased risks for preterm labor, preterm prema-
ture rupture of membranes, and other perinatal infectious complications. Pathogenic mechanisms include an ascending route of infection and/or inflammatory process because of microbial products and maternal and/or fetal response(s) with production of prostaglandins and cytokines [73].

As above mentioned, oral sex may play a role in the pathogenesis of BV: cunnilingus practiced during the pregnancy could be the responsible of the transmission of BV pathogens, increasing the risk of preterm birth.

In the presence of periodontal disease, oral opportunistic pathogens and/or their inflammatory products also may play a role in prematurity via a hematogenous route [74].

Fusobacterium nucleatum and Capnocytophaga species are common oral pathogens and infrequent causes of systemic infection in patients with compromised immunity or disrupted mucosal integrity. The isolation of both organisms from a clinical specimen suggests an oral source of infection [75].

F. nucleatum is a common oral species that can be found both in healthy and diseased subgingival sites and is the most frequently isolated species from amniotic fluid cultures among women with preterm labor and intact membranes. Furthermore, the species and subspecies of fusobacteria identified from amniotic fluid are F. nucleatum subspecies vincentii and F. nucleatum subspecies nucleatum. These fusobacteria could be acquired both by oral-hematogenous route and cunnilingus from a partner [73].

A case report described the occurrence of chorioamnionitis, fever, fetal tachycardia, and uterine tenderness in a 23-year-old woman at the 24th week of gestation in preterm labor. After bacteriological studies an placental cultures, F. nucleatum and Capnocytophaga species were found. Reviewing the patient’s history, it was established a temporal relation between orogenital contact and the onset of amniotic infection. At the intraoral examination, the patient did not show any odontogenic focus, but the positive history of periodontal disease in her partner suggests that chorioamnionitis may have been due to an ascending infection after orogenital contact [75].

Another case presented a case of Streptococcus viridans intra-amniotic infection occurred at the 25th week of gestation. History revealed a clear temporal relationship between the onset of symptoms and cunnilingus. A history of recent cunnilingus may be associated with the presence of Streptococcus viridans in the amniotic fluid including all species displaying alpha hemolysis (i.e., S. salivarius, S. mitis, S. mutans, and S. sanguis species) that are normal saprophytes in the human upper respiratory tract [76].

Alanen described a case of intra-amniotic infection caused by Capnocytophaga sputigena, frequently found in the normal bacterial flora of the oral cavity but not in the vagina. Oral sex during pregnancy was the most probable source of the infection. The aborted fetus showed signs of pneumonia upon histological examination. The bacterial species was identified using broad PCR directly from the amniotic fluid and after bacterial culture [77].

**Enteric Infections**

A great number of bowel bacterial pathogens (Salmonella, Shigella, Campylobacter) or intestinal parasites (Amoeba, Giardia, and Cryptosporidia) are transmitted through sexual practices. Furthermore, because feces can contain multiple pathogens, polymicrobial infections may result from a single sexual exposure causing diarrhea, rectal bleeding, anal itching, fever, nausea, and abdominal pain or stomach cramps, increasing gas, bloating [2].

Direct oral-anal sexual contact (anlingus) is a common practice among MSM and is implicated in the transmission of various enteric pathogens [78]. Because of their larger numbers of sexual partners, promiscuity and prevalent mode of sexual practices
such as analingus and anal intercourse, homosexual men commonly acquire giardiasis, amebiasis, shigellosis, and campylobacteriosis [79].

On the other hand, the incidence of these infections in heterosexuals is lower, maybe because of different sexual behaviors.

Homosexuality and oral-anal sex were the most important risk factors in Entamoeba histolytica, G. lamblia, and helminthic infections. Three factors make “hyperendemic” enteric protozoan infection in homosexual men: the original endemic level in the general population; the prevalence of sexual acts that facilitate transmission; the frequency of exposure to an infected person [80].

Outbreaks of shigellosis among MSM have occurred because of direct or indirect oral-anal contact but usually are caused by *Shigella flexneri* [81].

In the past, shigellosis in Seattle-King County has been primarily a disease of children, their parents, and foreign travelers. During July 1975, an outbreak of shigellosis in Seattle’s community of MSM (nearly 30% of all cases of shigellosis) involved both *S. flexneri* and *S. sonnei*. Fellatio and/or oral-anal contact were declared by 90% of the infected homosexual men. It was reported the finding of *S. flexneri*, a previously unusual organism in Seattle [82].

Approximately 40,000–100,000 people die yearly from amebiasis, the second leading cause of death from parasitic diseases.

In the United States, the majority of the reported cases are in immigrants or in travelers to endemic areas such as Mexico, Central America, and South America. A prevalence rate of 20–30% has been documented in selected populations of homosexuals of North America and Europe.

Although *E. histolytica* may be isolated from stool specimens in 20–30% of selected homosexual populations, reports of severe disease are rare. Despite of this, a case reported the death of a 35-year-old MSM secondary to fulminant amebic colitis leading to perforation [83].

In a controlled study, 67.5% of 200 homosexual men and 16% of 100 heterosexual men were found to be infected with intestinal parasites. *E. histolytica* was isolated from 27% of the homosexual and 1% of the heterosexual men; *Giardia lamblia* was isolated from 13% of the homosexual and 3% of the heterosexual men.

The real problem is that undiagnosed and untreated infections, frequently asymptomatic, add to the reservoir of infection in the homosexual community [84].

**Conclusions**

The first comprehensive study that examined the prevalence of the oral sex was published in the *Time* magazine [85]. A report, performed by the National Center for Health Statistics and based on a computer-administered survey over 12,000 Americans between 15 and 44 years old, stated that over half of the questioned teenagers have had oral sex. This report provided evidence that oral sex among teenagers is “on the rise.”

In a recent study, Herbenick et al. [86] analyzed the most recent partnered sexual event reported by 3990 adults (ages 18–59) in United States. However, oral sex (giving and receiving) was frequently a part of participants’ most recent sexual event, particularly for men ages 25–49 and women ages 18–39.

The same authors conducts a similar study among the black and Hispanic populations in the United States [87], in Americans men and women over age 50 [88] and in men and women ages 14–94 in the United States [89].

Nevertheless, if STI status is unknown for partners, condoms or dental dams is recommended when performing or receiving oral intercourse. The plastic wrap may also be used as a barrier during oral intercourse, but many find that the thickness of the plastic dulls sensation [90].

Public health programs among youths and minorities may underlie higher condom use rates among these groups. Condom use may be further improved by continuing such programs and also expanding outreach to older persons and whites, suggesting prolonging use as relationships develop, and highlighting that condom use does not necessarily interfere with the sexual experience [91,92].

Two recent cases [93,94] supported the prophylactic use of chlorhexidine rinse to reduce the retrograde entry of bacteria from oral cavity to the urethra. This approach will be a new, easy, attractive, and effective method for the prevention of nongonococcal urethritis, prostatitis, and epididymitis following insertive oral intercourse. Chlorhexidine is poorly absorbed from skin, mucosa, and gastrointestinal tract indicating a systemic safety.

Self-care may be important for development of STI prevention products such as vaginal microbiicides [95].

Furthermore, it does not cause any bacterial resistance and suprainfection. Is important cyto logical diagnosis to proceed with a correct therapy
In sample’s preparation of the a phase contrast or direct microscopy are required. A spatula is used to collect the cells from the buccal mucosa. The spatula is immediately dabbed (not rubbed) in a drop of sterile saline solution, previously applied on a microscope slide. Soon after, the specimen is mounted with a coverslip and the sample is thus ready to be examined under the pH microscope, without any fixation or staining.

In bacterial cytoadhesion, the adhesion of bacteria to cells (Figure 4–6) is a necessary prerequisite to bacterial duplication, colonization, interbacterial coaggregation, and subsequent infection. Interbacterial coaggregation (Figure 7) is indispensable for the formation of pilus and consequent transfer of bacterial virulence factors by means of plasmids.

As reported from Sadeghi-Nejad et al. [97], there is a need for state-of-the-art information in the area of STI in relation to sexual function.

Early and late recurrences of the infection and related pathologies are frequent. They may have a very different impact from the psychosexual point of view, according to the severity of lesions, aggressiveness of related treatments and their side effects, frequency of recurrences and their severity, and quality of psychosexual support from relatives and health care providers [98].

We advise physicians to be receptive to discuss sexuality issues and provide patients with adequate therapy.
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