A Dissertation on

PREVALENCE OF GONORRHOEA AMONG MEN HAVING SEX WITH MEN (MSM) ATTENDING STI CLINIC IN A TERTIARY CARE CENTER IN SOUTH INDIA – FACILITY BASED CROSS SECTIONAL STUDY

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DECLARATION BY THE CANDIDATE

I, **Dr. VENKATESH. Y** solemnly declare that the dissertation titled "**PREVALENCE OF GONORRHOEA AMONG MEN HAVING SEX WITH MEN (MSM) ATTENDING STI CLINIC IN A TERTIARY CARE CENTER IN SOUTH INDIA – FACILITY BASED CROSS SECTIONAL STUDY"** is a bonafide work done by me at the Department of Dermatology, Venereology and Leprosy, Government Stanley Medical College and Hospital during 2017 – 2020 under the guidance of my guide, Prof. Dr. N. SARAVANAN MD (DVL) and under the supervision of my HOD, Prof. Dr. PARIMALAM KUMAR, M.D,D.D.,Dip.,N.B.,MNAMS.,FIAD.,FRCP.

The dissertation is submitted to THE TAMILNADU DR.M.G.R. MEDICAL UNIVERSITY towards the partial fulfilment of requirement for the award of M.D Degree in DERMATOLOGY, VENEREOLGY and LEPROSY (BRANCH XX).

Place:

Date: Signature of the candidate

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This is to certify that this dissertation entitled "**PREVALENCE OF GONORRHOEA AMONG MEN HAVING SEX WITH MEN (MSM) ATTENDING STI CLINIC IN A TERTIARY CARE CENTER IN SOUTH INDIA – FACILITY BASED CROSS SECTIONAL STUDY"** is a bonafide work done by **DR. VENKATESH. Y,** post graduate student of the Department of Dermatology, Venereology and Leprosy, Government Stanley Medical College and Hospital, Chennai – 600001 during the academic year 2017 – 2020 for the partial fulfilment of university rules and regulation for the award of M.D Degree in DERMATOLOGY, VENEREOLOGYAND LEPROSY (BRANCH XX). This work has not been submitted previously for the award of any degree.

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PREVALENCE OF GONORRHOEA AMONG MEN HAVING SEX WITH MEN (MSM) ATTENDING STI CLINIC IN A TERTIARY CARE CENTER IN SOUTH INDIA – FACILITY BASED CROSS SECTIONAL STUDY

INTRODUCTION

INTRODUCTION

Gonorrhoea is one of the commonest sexually transmitted infections globally. In India, the prevalence of gonorrhoea varies from 3% to 19% among the patients attending STI clinic.[1] The prevalence of pharyngeal and rectal gonococcal infections varies from 5 to 15 percent globally in the adult men who have sex with men (MSM).[2]

Gonococcal infection can be symptomatic or asymptomatic. The symptomatic gonococcal infection can present as urethritis, cervicitis**,** pharyngitis, proctitis, bartholinitis**,** balanoposthitis, conjunctivitis and vulvovaginitis.

If left untreated it can cause local complications like epididymitis, seminal vesiculitis, prostatitis, tysonitis, littritis, cowperitis, bartholin abscess, skenitis, pelvic inflammatory disease and infertility and even systemic complication like Disseminated gonoccoal infection (DGI), arthritis, dermatitis, tenosynovitis, endocarditis, myocarditis, pericarditis, meningitis, pneumonitis and hepatitis.

The three common sites which acts as a reservoir for spreading of infection are oropharyngeal, urethral and rectal mucosa. Most of the urethral infections are symptomatic and patients seek immediate health care. But most of the pharyngeal and rectal infections remain asymptomatic and serves as an unrecognized reservoir for transmission of the infection.

Men who have sex with men (MSM) and Gonorrhoea

In India, NACO estimates that 2.5 million men having sex with men (MSM) are at risk of contracting HIV infection due to multiple anonymous partners and commercial sexual practices.[3] The rate of acquiring gonococcal infection is more among men who have sex with men than heterosexuals.

Major risk factors identified among MSM are

- Receptive or insertive oral and anal sex without using condom
- Having other sexually transmitted infections
- Having sex with multiple anonymous partners
- Substance abuse

An important factor which favours the persistence of gonococcal infection among MSM is low partner notification rate.[4] This leads to the condition that men with pharyngeal and rectal gonorrhoea may go unnoticed and untreated even if they spread infection to the urethra of the sex partners. However, screening for pharyngeal and rectal infections continues to be less common than the screening for urethral infection among MSM.

Centers for Disease Control and Prevention (CDC) now recommends gonorrhoea and chlamydia screening tests for sexually active MSM atleast annually.

It is important to identify MSM population as most of them are bisexual than homosexuals. They play a major role in spread of STIs in a vast majority of partners. Only few Indian studies are available regarding the pattern of STI among MSM.

In this study, efforts have been made to analyze the **Prevalence of gonorrhoea among men having sex with men (MSM) attending STI clinic in a tertiary care center in South India.**

REVIEW OF LITERATURE

REVIEW OF LITERATURE

HOMOSEXUALITY

Men having sex with men (MSM) is a term first described in the middle of 1980s to describe men who have sex with other men, but do not necessarily share the same sexual orientation, sexual identity or gender identity.

Biological sexuality refers to the genetic determinants of sexual expression. *Gender* refers to the social traits and characteristics associated with each biological sex. Biological men who adopt gender traits generally associated with women and vice versa, or individuals who feel they are "trapped in the wrong body," are frequently referred to as transgender persons.

Sexual orientation refers to the affectional and/or erotic disposition to the same and/or opposite sex. The terms which are commonly used to refer to sexual orientation are homosexual, heterosexual and bisexual.

Sexual self-identification refers to the way people choose to describe themselves in terms of their sexual orientation. Words like "gay," "lesbian," "straight," and others are used for self-identification.

The term MSM is often used to describe male homosexual behavior in a way that is inclusive of the different terms that males may use to identify themselves, while engaging in same-sex practices.

The recent phenomenon of African American MSM who do not self-identify as gay, stating that they are "*on the down-low," or DL*, has been noted in other racial/ethnic communities. This term **"*on the down-low," or DL,*** has been defined as the term referring to men who have sex with other men in secret while maintaining heterosexual relations for public consumption. Williams quoted that "above all, men on the down-low (DL) do not think of themselves, much less present themselves as gay."[5]

The prevalence of male homosexual behavior in modern, industrialized societies has been estimated as ranging from 1% to 10%, depending on the sampling interval (e.g., lifetime experience vs. recent contact, or only measuring activities undertaken as an adult) and the behaviors that are considered (e.g., is arousal without physical contact included?).[6,7] Estimates of recent sexual behaviors of adults suggest that 3–7% of men had a homosexual experience within the past year.[8]

ETIOLOGY OF MALE HOMOSEXUAL BEHAVIOR

Two fundamental theories have been posited to explain the etiology of sexual orientation are[9]

1. Essentialism and
2. Social constructionism

Essentialism originated with Plato, whose proponents posited that the world is constituted by a finite number of unchanging forms. Modern essentialism implies a belief that certain phenomena are natural, inevitable, universal, and biologically determined.

By contrast, social constructionism asserts that reality is ordered by society and everyday reality is shared, with common views of reality becoming institutionalized. Knowledge may be institutionalized within subgroups or at the level of society. *Essentialist theories* underlie many studies that have attempted to find the biological origins of homosexuality.[10]

Bailey and Pillard[11] studied identical twin brothers and sisters and found that they have a 52–48% concordance rate of homosexuality; yet, since this observation did not demonstrate 100% concordance, other factors must also be involved. Few studies have focused on birth order, suggesting that gay men are more often born later than their male siblings.

According to Cantor et al, each additional brother increases the odds of homosexuality by approximately 33%.[12]

Social Constructionism theorizes that sexuality is not expressed identically in all times and cultures, concluding that sexuality is created by culture that defines some relationships as sexual and creates behavioral scripts.[13]

Queer Theory[14] questioned the very idea of identity and its grounds for looking at sexuality and sexual orientation and assumed that sexual orientation provided a common ground for a group of people that shared such orientation, as well as other aspects of their personality and lives. Queer theorists criticized the essentialist idea of the self as a basic and stable entity and posited that sex, gender, and sexual orientation evolve over life.

HOMOSEXUALITY AND HOMOSEXUAL ORIENTATION

"Homosexual" can be described according to

- ***person's sexual behavior*** - a person who predominantly have sex with same gender
- ***person's sexual preference*** - a person who predominantly have sexual desire towards the same sex.
- ***person's sexual identity*** - a person whose sexual life style is related to same sexual behaviour and same sexual desire. Males who adopt a homosexual identity are often referred to as gay while females who adopt a homosexual identity are referred to as lesbian.

In the Indian subcontinent, the most prominent groups are:

- **HIJRAS**

  They usually dress as women and are often referred as transgendered MSM.

- **KOTHIS**

  They adopt a feminine lifestyle.

- **PANTHIS**

  These are men who have insertive sex with Kothis.

PREVALENCE OF MALE HOMOSEXUALITY

In several western countries, large population surveys of adult sexual behavior have revealed that the percentage of males and females who identify as gay, bisexual or lesbian is small.

The Australian Study of health and relationships found that only 1.6% of men identified as homosexual.[15] These figures correlates well with the similar studies done in other western countries. The Australian study was reported that 8.6% of men had experienced same-sex attraction or some sexual experience with another male.[15] In other parts of the world, and particularly in Asia and Southeast Asia, the true prevalence of same-sex sexual behavior is unknown.

The population-based studies have suggested that the prevalence of male–male sexual activity in Asia is similar to or higher than that established for the Western countries. AmfAR's 2006 report 'Treat Asia' comments wryly "Asia has more than enough male–male sex to fuel an (HIV) epidemic."

HOMOSEXUALITY AND CLINICAL PRACTISE

Homosexual desire and behavior exert an influence on the health of those affected which can have far reaching effects both for the individual and the public health. The link between youth suicide and homosexuality particularly in young men is now well established.[16]

A young adolescent who reaches the puberty, discovers that his sexual desires are directed towards members of the same sex can find this as a troubling and isolating experience.

When he lives in a family and a culture where the homosexual behavior is regarded as abnormal or even evil, the effects on that young person's mental, physical and sexual health may be serious and even life threatening.

In that case, they have to resort either to a life of repression where their true sexual desires and needs are never met, or a double life— which allow the individual some sexual relief usually in anonymous associations with like-minded men.

These two either sexual repression or a double life can place strains on people which can be barely tolerable and may result in substance abuse or poor health.

SEXUAL PRACTICES AND TRANSMISSION OF STIs

Men who have sex with men who are involved in high risk sexual practices are at risk of acquiring STIs, particularly HIV. The majority of studies that document these behaviors tend to follow large cohorts of MSM periodically and infer from participant reports of sexual behaviors, the relative transmission risks among the men who become newly infected. Thus, precise estimates of risk per contact are generally not feasible.

Risk per contact of acquiring HIV for an unprotected anal intercourse with a known HIV-infected partner was found to be 8.2/1000 for ano-receptive intercourse and 0.6/1000 for ano- insertive intercourse.[17]

The relative risks of HIV transmission with partners whose status is unknown will reflect the background HIV prevalence in specific communities and cultural milieus.

RISK FACTORS FOR HIGH PREVALENCE OF STIs IN MSM

BIOLOGICAL FACTORS

1. Men possess a penis which is a penetrative organ
2. Transmission occurs through infected semen
3. Highly receptive columnar epithelium which is involved in men who have sex with men
    - Anorectal squamo-columnar junction
    - Rectal mucosa

- Oropharyngeal mucosa
- Urethral mucosa
- Inner aspect of prepuce

SOCIAL FACTORS

1. Myths about the male to male sex – e.g., many men believe that sex with men is safer
2. Rare usage of condom
3. Social stigma which directly discourages the open relationship between two men and also indirectly encourages the multiple causal partners

REASONS FOR POOR CONTROL OF STIS IN MEN WHO SEX WITH MEN (MSM)

PATIENT RELATED

1. Lack of self-esteem
2. Guilt and shame
3. Decreased health seeking behavior
4. Fear of consequences of self-disclosure
5. Improper sexual history

CLINICIAN RELATED

1. Moralistic and judgemental approach
2. Uncertain feelings about MSM
3. Irrational fear of contamination
4. Improper swabbing of anatomical sites

STD TRENDS AMONG MSM

Among MSM, the incidence of STDs initially declined with the advent of the AIDS epidemic as they increasingly practiced safer sex.[18] But since late 1990s STI rates have markedly increased in urban centers in the industrialized nations. Studies have suggested that combination of factors are involved for the increased prevalence, including the perception, with the widespread availability of ART that HIV infection is not as dire as at the outset of the AIDS epidemic, lack of engagement with current prevention messages, the increasing popularity of drugs (methamphetamines, volatile nitrates, known as poppers, and erectile dysfunction drugs) in some subgroups,[19] and the current generation of young MSM who did not witness the devastation of AIDS in the 1980s.

CDC surveillance studies have suggested that recent increases in sexually transmitted infections have been most pronounced among MSM from communities of color, but the secular trends demonstrate STD increases among all subgroups of MSM, independent of race/ethnicity or geographic location.

STIs in Men Who Have Sex with Men

The incidence of many STDs in men who have sex with men (MSM) – including syphilis and antimicrobial-resistant gonorrhoea is greater than that reported in heterosexual men and women. In addition to the negative effects of untreated STDs, elevated disease burden is of concern because it may indicate high risk for subsequent HIV transmission.

In India, high prevalence of HIV is seen in MSMs than the general population (7.3 vs 0.36%, respectively), with varying estimates according to region and subpopulation of MSM.[20] For example, in Tamil Nadu, MSM recruited for testing by peer referral and the married MSM subpopulation in the study had a HIV prevalence of 8 percent and 14 percent respectively.[21]

In Mumbai, male sex workers had a prevalence rate of 33 percent,[22] those recruited from two clinics had a prevalence rate of 17 percent[3] and men seeking services at a voluntary counseling and testing center (VCTC) had a prevalence rate of 12.5 percent.[23]

Additionally, HIV Sentinel Surveillance and National AIDS Control Organization (NACO) surveys estimate HIV prevalence among MSM in India was 5 to 17 percent.[24]

In a study conducted among MSM in Mumbai and Hyderabad showed that 13.6 % had gonorrhoea and 5.1 % had Chlamydial infection.[25] In another clinic based study from Mumbai showed that 20% of MSMs were diagnosed with a clinical STI.[3]

In a study conducted among MSM from Pune, 5.8 % had syphilis, 21.5 % had a genital ulcer disease and 4.3 % had gonorrhoea.[26] In general, the prevalence of STIs appear to be high among MSM.

Since STIs can often be asymptomatic, MSM should be considered for routine screening of STIs, even in the absence of any physical complaints or symptoms.

In the United States, the Centers for Disease Control recommends[27] that the following screening tests should be performed atleast annually for sexually active MSM, including those with HIV infection:

- HIV serology
- Syphilis serology
- A test for urethral infection† with *Neisseria gonorrhoeae* and *Chlamydia trachomatis* in men who have had insertive intercourse
- A test for rectal infection† with *Neisseria gonorrhoeae* and *Chlamydia trachomatis* in men who have engaged in receptive anal intercourse
- A test for pharyngeal infection† with *Neisseria gonorrhoeae* in men who have had receptive oral intercourse. Testing for *C. trachomatis* pharyngeal infection is not recommended.

† Regardless of condom use during exposure.

Commercially available Nucleic acid Amplifications tests (NAATs) have not been approved by FDA for pharyngeal and rectal gonococcal infections, but it can be used by laboratories that have validated its own NAAT.

All MSM should be screened for HBsAg to detect chronic Hepatitis B viral infection. It is necessary to prevent transmission to others.[28] Hepatitis B and Hepatitis C viral screening should be done among the drug abusers.

GONORRHOEA

HISTORY OF GONORRHOEA

Gonorrhoea is one of the commonest sexually transmitted disease of humans. The Book of Leviticus describes a person with urethral discharge. Hippocrates wrote extensively about gonorrhoea in the fourth and fifth centuries B.C. He called acute gonorrhoea as "strangury" and understood that it resulted from "the pleasures of Venus."

Galen coined the word *gonorrhoea (gono=seed; rrhoea=flow),* by which he meant "flow of semen." Guillaume de Salicit (13th Century AD) may have been the first to describe the venereal nature by attributing the disease to the impurities retained under the male prepuce after contact with an unclean female.

The term "clap" for gonorrhoea first appeared in print in 1378. Great surgeons such as Ambroise Paré (sixteenth century) and John Hunter (eighteenth century) considered syphilis and gonorrhoea to be different manifestations of a single disease.

Distinction between these diseases was first clearly achieved by Philippe Ricord, but the real understanding was only achieved after Neisser's description of *N. gonorrhoeae* in 1879. In 1882, Leistikow and Loeffler grew the organism in vitro on culture media of blood serum and gelatin.

EPIDEMIOLOGY OF GONORRHOEA

Gonorrhoea is the second most prevalent bacterial STD globally and has remained a major public health concern worldwide.

During 2016–2017, the rate of reported cases of gonorrhoea in the United states were increased by 18.6 percent.[29] In 2017, a total of 555,608 cases of gonorrhoea with yielding rate of 171.9 cases per 100,000 population were reported in the United States.[29]

The rate of reported gonococcus cases among males was higher than the females in 2017.[29] During 2016–2017, the gonorrhoea rate among males and females were increased by 19.3% and 17.8% respectively.[29]

The magnitude of the increased rate of infection among males suggest that either increased transmission of infection or increased case ascertainment (e.g., through increased extra-genital screening) among bisexual, and other men who have sex with men (MSM).

In 2017, the rate of reported cases of gonorrhoea were high among adolescents and young adults.[29] In 2017, the highest rate of gonorrhoea among males and females were observed among the age group of 20–24 years.[29]

BIOLOGY OF NEISSERIA GONORRHOEAE

Neisseria gonorrhoeae is a Gram-negative, intracellular, aerobic, capnophilic, non-flagellated, non sporulating, oxidase and catalase producing coccus.

In microscopy, N. gonorrhoeae is typically observed in pairs (diplococci) with adjacent sides concave, i.e., appears in a characteristic kidney or coffee bean morphology.

Neisseria gonorrhoeae is a fastidious organism and requires nutritionally enriched culture medium for in vitro growth. The bacterium can only utilize glucose, lactate or pyruvate as carbon source that is used in the species-verifying carbohydrate utilization test in which N. gonorrhoeae only degrades glucose (not maltose, fructose, sucrose or lactose).

Human is the only natural host for N. gonorrhoeae, which survives poorly outside the human body due to its sensitivity to extreme temperatures, desiccation, oxidation and toxic substances. Ideal in vitro growth is obtained at 35–37°C in a 4–6% CO2 atmosphere at a pH of about 6.5–7.5.[30]

MOLECULAR STRUCTURES OF N. GONORRHOEAE

Cell Wall and Outer Membrane

The cell wall consists of a Gram-negative bilayered outer membrane (phospholipids, LOS, and proteins) overlying a relatively thin peptidoglycan layer (in the periplasm) containing N-acetyl glucosamine, N-acetyl muramic acid, glutamic acid, diaminopimelic acid, and alanine. The bilayered inner membrane (cytoplasmic membrane) envelops the

colloidal system of cytoplasm composed of organic and inorganic solutes dispersed in a viscous solution.[30]

Lipooligosaccharide

The LOS consists of a lipid A moiety, which confines the endotoxic activity eliciting a host immune response. The LOS is involved in adhesion, invasion, and toxicity of host epithelial cells. LOS is a target for bactericidal and chemotactic antibodies. However, sialylation of the LOS increases the antigenic variation and affects the invasion of epithelial cells, inhibits bactericidal activities of antibodies against PorB, LOS, and Opa proteins, phagocytosis of neutrophils, and complement activation by factor H binding, and may consequently result in serum resistance.[30]

Pili

Pili are hair-like appendages, composed of thousands of pilin (PilE) protein sub-units associated with the initial adhesion to human epithelial cells. They promote virulence by preventing neutrophilic phagocytosis, and mature pili or at least the major subunit of the pilus fibre, PilE, and PilC are essential for a high-level transformation of exogenous DNA.[30]

Porin Protein

PorB (previously named major or principal outer membrane protein (MOMP/POMP), Protein I (P.I), or Por) is universally present in the outer membrane. PorB is a target for bactericidal opsonic antibodies. It also comprises the ability to translocate

into the cell membrane of eukaryotic cells and induce apoptosis of target cells. It is involved in Opa-mediated and also Opa-independent invasion of epithelial cells, mediates evasion of complement dependent bactericidal activities, and interferes with the activation, degranulation, and phagocytosis of neutrophils.

Opacity Protein

The outer membrane opacity (Opa) proteins, previously named as heat-modifiable proteins or Protein II (P.II) facilitate intimate attachment between gonococci within culture colonies, and attachment to and invasion of epithelial cells and neutrophils of the host. The Opa proteins contribute to colony opacity when cultured on specific media.[31] Antigenic variation occurs because of variable expression of the different Opa genes.

STRAIN TYPING

For epidemiologic studies, it is useful to differentiate one strain from another. Several techniques have been developed that can be used successfully for this purpose

Auxotyping

The auxotyping was described in 1973 for characterization of N. gonorrhoeae. Auxotyping divides strains into auxotypes based on their divergent nutritional requirements for amino acids, purines, pyrimidines, and vitamins.

For example, a strain unable to grow without arginine was described as Arg–. The Arg– Hyx– (hypoxanthine–) Ura– (uracil–), or AHU–, auxotype typically was associated with multiple other properties, including resistance to killing by normal human serum,

propensity for causing asymptomatic male urethral infection; increased likelihood for causing bacteremia.[32] The auxotyping technique is not widely used in clinical laboratories today.

Serotyping

The serotyping is based on monoclonal antibodies which are specific for epitopes present on the outer membrane protein I (P.I, or Por).[33] Por has two serogroups: PI.A and PI.B, each of which is an allelic form of the *porB* gene. Monoclonal antibodies against PI.A strains and PI.B strains can be used to subdivide each serogroups into different serovars (e.g., P.IA-6, P.IB-1)

Antimicrobial susceptibilities

Another method to strain type gonococci is based on antimicrobial susceptibilities. This may be employed as an adjunct to the *porB* genotyping scheme, but by itself it is of little use.

Genotyping

Although it is impractical to undertake full genomic sequencing, it is possible to use various tools of molecular biology to rapidly assess differences in DNA sequences. O*pa*-based PCR primers can be used to generate DNA from *opa* genes. These were then subjected to restriction enzyme digestion, and the resultant pattern of restriction fragment length polymorphisms (RFLP) was used to compare identities of strains.[34]

PATHOGENESIS OF GONORRHOEA

N. gonorrhoeae has a predilection for non-ciliated columnar and cuboidal epithelium in adults. After the bacterium enters into the urogenital tract of the host, it adheres to the mucosal cells initially by means of pili, and then the outer membrane proteins, in particular, Opa proteins, but also iC3b, LOS, OmpA, and PorB facilitate an intimate adhesion and subsequent internalization and transcytosis.

Simultaneously with the attachment, gonococcal LOS (endotoxin) also inhibits ciliary motility and damages proximate ciliated cells. Following adherence, the organism is pinocytosed by the epithelial cells where it replicates.

Intracellularly, the organisms are resistant to immune attack. Gonococcal invasion is mediated also by the outer membrane PorB protein. After adherence, the PorB protein is translocated from the bacterial cell membrane to the epithelial cell membrane. The PorB1a protein is more effectively transferred into the epithelial membranes compared to PorB1b.

Epithelial cell damage is mediated by release of certain enzymes like phospholipase and peptidase or due to LOS and peptidoglycan (both comprising endotoxic activity).[30,35]

The organisms are then exocytosed into the submucosa where they elicit an inflammatory response which is followed by release of purulent exudates into the lumen.

CLINICAL MANIFESTATIONS OF SYMPTOMATIC GONORRHOEA

ACUTE UROGENITAL GONORRHOEA IN MEN

The most common presentation of gonococcal infection in men is acute anterior urethritis with an incubation period ranges between 1 and 14 days.

The predominant symptoms are urethral discharge or dysuria. The discharge appears to be profuse and frankly purulent within 24 hours of onset.[36,37] Erythema and edema of the urethral meatus can be associated with gonococcal urethritis.

The spontaneous resolution can occur over a period of several weeks without treatment. Before the advent of effective antibiotics, 95% of untreated patients with gonococcal urethritis became asymptomatic within 6 months duration.[36]

If appropriate treatment is not initiated, posterior urethritis may ensue in approximately 10–14 days, which presents as frequency of micturition, urgency, occasional strangury, painful erection and rarely tenesmus.

Complications of gonococcal urethritis include

- Epididymitis
- Prostatitis
- Seminal vesiculitis
- Infections of Tyson’s and Cowper’s glands.

ACUTE UROGENITAL GONORRHOEA IN WOMEN

Endocervical canal serves as an important reservoir for gonococcal infection in women. The incubation period for women is more variable than in men, but most of them develop symptoms within 10 days of onset.[38]

The most common clinical presentation in women are vaginal discharge, dysuria, menorrhagia and intermenstrual uterine bleeding. The intensity of the infection may range from minimal to severe.

Physical examination may show cervical changes that include cervical discharge, changes in the zone of ectopy like erythema and edema, cervical erosions and bleeding.[39]

Urethral discharge often goes unnoticed in females. Purulent discharge may be expressed by massaging the urethra from above downwards through the anterior vaginal wall.

Endocervicitis may result in blockade of the cervical glands and formation of retention cysts or Nabothian follicles that protrude into the vaginal portion of cervix. Infection of the periurethral (Skene's) gland or Bartholin's gland ducts is also common.

ANORECTAL GONORRHOEA

The rectal mucosa is a frequent site of infection in homosexual men which constitutes 40% prior to recognition of the HIV epidemic.[40-42] The rectal mucosal involvement is also seen in 35–50% of women with gonococcal cervicitis. Approximately in 5% of women, rectal mucosa is the only site of gonococal infection.[42]

Among MSM, rectal gonorrhoea is due to direct inoculation through receptive rectal intercourse. In contrast, most rectal infections in women occur without acknowledged rectal sexual contact and are assumed to result from perineal contamination with infected cervical secretions.

The rectal gonococcal infection may presents with symptoms of minimal anal pruritus, mucopurulent discharge or scanty rectal bleeding, and symptoms of overt proctitis.[43]

Sometimes erythema and abnormal discharge can be seen on physical examination of the anus. Anoscopy can reveal erythema, edema and mucoid or purulent exudate.

In a study of MSM in 1993 and 1994, rectal infection was documented in 26 (25%) of 105 men infected at any anatomic site.[44] In MSM, rectal gonorrhoea is associated with overt proctitis which is contrast to asymptomatic rectal gonorrhoea in women.

PHARYNGEAL GONORRHOEA

Oropharyngeal infection has been reported in about 3–7% of heterosexual men with gonorrhoea, 10–25% of infected MSM and 10–20% of infected women. Oropharynx is the sole site of infection in approximately 5% of cases.[43,45]

The pharyngeal infection is commonly acquired by orogenital contact. The symptoms are usually absent or mild in 90% of cases, although in a few instances, acute pharyngitis or tonsillitis may occur associated with fever and cervical lymphadenopathy.

Pharyngeal gonococcal infection may be considered as a risk factor for developing Disseminated Gonococcal Infection (DGI).[46]

The transmission of pharyngeal gonorrhoea to sex partners has been thought to be inefficient and relatively rare. However, in one study, 17 (26%) of 66 MSM with urethral gonorrhoea acknowledged insertive oral sex but not insertive anal sex in the preceding 2 months and insertive oral sex was independently associated with urethral gonorrhoea (odds ratio of 4.4, 95% confidence interval of 1.4, 9.4).[44]

Thus, pharyngeal infections may now be an important source of urethral gonorrhoea in MSM.

UNCOMPLICATED INFECTION OF OTHER SITES

Gonococcal conjunctivitis is rare in adults; it is most often seen in patients with concomitant anogenital gonorrhoea, presumably due to autoinoculation.[47] The condition may vary from asymptomatic or mild infection to severe forms resulting in corneal ulceration and panophthalmitis.

Primary cutaneous infection with *N. gonorrhoeae* has been reported rarely and usually presents as a localized ulcer of the genitals, perineum and finger.[48,49]

Gonococcal infection of a congenitally patent median raphe duct of the penis is an uncommon but well-documented occurrence.[49]

COMPLICATED GONOCOCCAL INFECTIONS

LOCAL COMPLICATIONS IN MEN

In men, before the advent of effective antibiotic therapy, epididymitis was seen in up to 20% of infected patients.[36]

Patients with acute epididymitis tend to present with unilateral testicular pain and swelling, along with overt urethritis.

The patient may develop urethral strictures and fistulae leading to "watercan perineum". Other local complications like chronic littritis, cowperitis, prostatitis, seminal vesiculitis or epididymitis can occur.

Penile lymphangitis, sometimes associated with regional lymphadenitis, is an uncommon minor complication of gonococcal urethritis, as penile edema ("bull-headed clap").

LOCAL COMPLICATIONS IN WOMEN

Pelvic inflammatory disease

In women with acute gonococcal infection, 10–20% of patients are associated with pelvic inflammatory disease.[50,51]

The symptoms of gonococcal salpingitis are lower abdominal pain, menstrual abnormalities, pain during sexual intercourse and intermenstrual bleeding.

Acute febrile illness is more common with gonococcal salpingitis than nongonococcal salpingitis (74 vs. 22).[52]

Apart from PID, Bartholin's gland abscess can occur commonly as a complication in women with gonococcal infection. *N. gonorrhoeae* was isolated from the Bartholin's gland ducts of 52 (28%) of 183 women with urogenital gonorrhoea, 10 of whom (6%) had enlargement and tenderness of the gland.[53]

SYSTEMIC COMPLICATIONS:

DISSEMINATED GONOCOCCAL INFECTION (DGI)

Disseminated gonococcal infection is the most common systemic complication of acute gonorrhoea. It can manifest as acute arthritis dermatitis syndrome. The syndrome has been estimated to occur in 0.5–3% of untreated patients.[54]

DGI is considered more common in females, and male to female ratio of 1:4 has been reported.[55]

DGI results from gonococcal bacteremia and is most often manifested by acute arthritis, tenosynovitis, dermatitis, or a combination of these findings.

Based on culture characteristics, patients with clinical manifestations of DGI are classified into proven, probable, and possible cases.[56]

- ✓ *Proven DGI*: Individuals with positive cultures from blood, joint fluid or skin lesions are considered to have proven DGI and constitute less than 50% of cases.
- ✓ *Probable DGI*: Patients with negative cultures from distant sites but with proven infection of the urogenital tract, anorectal tract or the pharynx are considered probable DGI cases and constitute the majority of cases.
- ✓ *Possible DGI*: Individuals presenting with the characteristic findings of DGI but with negative cultures are referred to as having possible DGI.

The characteristic clinical findings include suppurative arthritis and skin lesions. Overt arthritis occurs in 30–40% of patients with DGI.[54,56] It is a purulent asymmetric polyarthritis presenting with, severe joint pain and swelling, erythema, and limitation of movement. It predominantly affects the wrist, ankle, knee, and the metacarpophalangeal joints. It leads to destruction of the articular surfaces, narrowing of the joint space and ankylosis.

Aspiration of the synovial joint fluid usually reveals leukocyte count of 30,000–80,000 PMNL/mm3 (average 40,000 PMNL/ mm3) and gonococci may be demonstrated on microscopy and culture.

Gonococcal dermatitis is usually the presenting feature of DGI constitutes 59–77% of cases. It presents as tender, necrotic pustules with irregular hemorrhagic border and erythematous base, involving the distal aspect of the limbs overlying the small joints, palms, and soles but sparing the scalp, face, and mouth. It resolve in 3–4 days with residual brownish discoloration. The rash is associated with high-grade fever, arthralgia, and tenosynovitis.

Gonococci can be occasionally demonstrated in cultures from skin lesions and more frequently by immunofluorescent staining methods.

Complications of DGI include cardiac, meningeal, hepatic and eye involvement. Endocarditis occurs in approximately 1–3% of the patients with DGI.[57] Death may occur as a result of cardiac failure.[58]

LABORATORY DIAGNOSIS

Stained smears

The presumptive diagnosis of gonorrhoea by identification of characteristic intracellular Gram-negative diplococci within PMNLs in Gram-stained smears remains the mainstay in many clinical settings, particularly for patients with the signs and symptoms of gonorrhoea.

However, the method is only sufficient to provide a definitive diagnosis (presence or absence of infection) for urethral gonorrhoea in symptomatic men (specificity [99%] and sensitivity [95%]).

In asymptomatic men, due to the substantially lower sensitivity (30–50%), a negative Gram stain of a urethral smear is not sufficient for excluding the possibility of gonorrhoea. This is also true for Gram stain of pharyngeal specimens, and rectal specimens (40–60% sensitivity in blindly obtained specimens). This is in particular with oropharynx which results in false positivity due to presence of oral commensals like N. lactamica, N. flavescens, N. subflava, N. cinerea.

In some settings, methylene blue staining of smears can be used, which is simple, rapid, and useful method with lower specificity.[58]

Culture

It has been considered as the gold standard method for diagnosis of gonorrhoea due to its high specificity (100%) and also high sensitivity (80- >95%).

Importantly, culture of N. gonorrhoea is the only diagnostic method that allows testing of antimicrobial susceptibility, which is essential to monitor the emergence of resistance to current therapies.

A selective culture medium, ideally combined with a non-selective medium, should be used. Many effective selective culture media have been developed, such as

- Modified Thayer–Martin (MTM)
- Martin–Lewis (ML)
- New York City (NYC) and
- GC-Lect (GC–L) medium, which are composed of GC agar base or equivalent media supplemented with growth factors and antimicrobial agents to inhibit growth of other bacteria or fungi.

These selective media commonly include vancomycin, colistin, nystatin and trimethoprim (VCNT) to inhibit Gram-positive bacteria, nongonococcal Gram-negative bacteria, fungi, and swarming Proteus species, respectively.

Furthermore, appropriate species verification of N. gonorrhoeae should be performed, including identification of Gram-negative diplococci in microscopy, rapid oxidase production, carbohydrate utilization test, rapid biochemical or chromogenic enzyme substrate tests, co-agglutination test, immunofluorescence assay or molecular test (NAH test or NAAT).[59-61]

The sites to be cultured in men also depend on sexual orientation and the anatomic sites exposed. For symptomatic heterosexual men, culture of urethral exudate alone is usually sufficient, but pharyngeal cultures may be useful for men with pharyngitis who have performed cunnilingus with a woman known to have gonorrhoea.[62]

Among MSM, the rectum is infected almost as frequently as the urethra, although the actual yield depends on patients' specific sexual practices.[63] Isolated pharyngeal infection occurs in about 5% of infected homosexual men.[44,63]

Thus, in screening asymptomatic MSM for whom all three sites are potentially exposed, anorectal culture gives the highest yield, and pharyngeal cultures are desirable.

Non-culture Diagnostic tests

More recently, nucleic acid amplification tests (NAATs) are more sensitive and specific than culture techniques for diagnosis of gonococcal infection. However, NAAT is not licensed by any regulatory body for detection of N. gonorrhoeae in rectal, pharyngeal, and conjunctival specimens.

As a group, commercially available NAATs are more sensitive than culture for gonorrhoea diagnosis and specificities are nearly as high as for culture. No commercial NAAT is licensed by any regulatory body for detection of N. gonorrhoeae in rectal, pharyngeal, and conjunctival specimens.

Many of the gonococcal NAATs have been shown to cross-react with other non-gonococcal Neisseria species (e.g., N. cinerea, N. flavescens, N. lactamica, N. subflava, and N. meningitides) particularly oropharynx, and may result in false positivity.

It is also important to keep in mind that the results of the NAATs must be interpreted carefully in the context of diagnosis, due to the fact that N. gonorrhoeae DNA, which usually is eliminated 2–3 days after successful treatment, may in rare cases be present in specimens for up to 2–3 weeks.[59,64]

These molecular tests (NAH tests or NAATs) cannot provide antimicrobial susceptibility results. Other disadvantages with NAATs include the need for expensive equipment and diagnostic reagents, appropriate laboratory facilities and training, and the risk of contamination by previously amplified nucleic acid.

Collection of clinical specimens

Urethral exudate from men may be obtained by passage of a small swab 2–4 cm into the urethra[65] or by collecting the first 15–30 mL of voided urine.[66,67] Although the latter method obviates the discomfort of passing a urethral swab or loop, collection and culture

of urine are time consuming and require prompt processing for culture because the urine from some individuals is rapidly bactericidal for *N. gonorrhoeae*.[68]

Anorectal specimens from patients without symptoms of proctitis may be obtained by blindly passing a swab 2–3 cm into the anal canal, using lateral pressure to avoid entering any fecal mass. If gross fecal contamination of the swab occurs, it should be discarded and another specimen obtained. For symptomatic patients, anorectal specimens should be obtained under direct vision using proctoscopy, which increases the sensitivity of the smear.[69]

Pharyngeal specimens are obtained by swabbing the posterior pharynx, including the tonsillar areas and faucial pillars.

SEROLOGIC DIAGNOSIS

It is based on detection of antibodies to *N. gonorrhoeae* or it products. The methods which are commonly used are complement fixation, immunoprecipitation, immunofluorescence, agglutination assay, ELISA. Many of these methods have proved useful for studies of the immune response and pathogenesis of gonorrhoea. However, most reported serodiagnostic tests have sensitivities of about 70% and specificities of about 80% for patients with uncomplicated gonorrhoea and thus are not useful for screening, case finding, or diagnosis or other clinical purposes.

DRUG TREATMENT AND RESISTANCE IN N. GONORRHOEAE

History

In pre antibiotic era, therapies such as urethral astringents, soundings, and mechanical devices were used for treatment of gonorrhoea. In regard to chemical therapies, injection of mercury via the urinary meatus was used before urethral irrigation with potassium permanganate solution and the widely used silver nitrate were introduced in the late 1800s.[70]

Protargol (a colloidal silver compound) was introduced in 1897, and it rapidly replaced silver nitrate. Protargol was used mainly until the introduction of the first antimicrobial drug, sulfonamides in 1936.[70] However, within 6–8 years, most of the patients developed resistant to sulfonamides.

Penicillins

The introduction of penicillin for treatment of gonorrhoea in 1943 led to virtual abandonment of sulfonamides and single, low-dose treatment with penicillin became the standard treatment.

Remarkable cure rates were achieved, however, within 10–15 years a steady decrease in the penicillin susceptibility resulting in clinical treatment failures was observed. This gradual decrease in penicillin susceptibility was due to the sequential accumulation of chromosomal resistance mutations.

In 1976, two types of Beta lactamase encoding plasmids, originating in Asia and Africa, causing high level penicillin resistance were reported in N. gonorrhoeae.[71] For instance, surveillance data from the USA in 1989 reported significant and sustained resistance to all the penicillins, and these were no longer recommended.[72]

Tetracyclines

Tetracyclines have been important and effective antimicrobial agents in the treatment of several STDs, and previously these were also used for treatment of gonorrhoea in many countries. However, both chromosomally and plasmid mediated resistance have emerged and spread rapidly.

Fluoroquinolones

Fluoroquinolones became popular and proved effective as first line treatment from the mid-1980s or early-1990s. They were also effective in eradicating anorectal and pharyngeal infection, and safe in individuals allergic to betalactam antimicrobials.

However, it is contraindicated for use in children and pregnancy. Ciprofloxacin has been the most widely used fluoroquinolone, but also ofloxacin has been commonly administered in many countries. Unfortunately, clinically resistant strains emerged, at present time, the level of fluoroquinolone resistance is high in most countries worldwide.

Spectinomycin

Spectinomycin (an aminocyclitol) played a central role in the control of gonococcal infection following emergence of PPNG and high-level chromosomally mediated penicillin resistance. It was shown effective in 98.2% of uncomplicated urogenital and anorectal gonococcal infections.[73]

It is given in a dosage of single intramuscular [IM] injection of 2 gm. It is also safe in pregnancy. However, spectinomycin has poor efficacy against pharyngeal infection. At present time spectinomycin resistance is rare worldwide. Unfortunately, spectinomycin is not available in many settings worldwide.

Azithromycin

Azithromycin is a relatively new macrolide has shown effective cure rates for urethral and endocervical gonorrhoea of 96.5% for a 1 g dose and 99% for a 2 g dose using single dose azithromycin therapy. Furthermore, it has cured 97.9% cases of oropharyngeal infection and 97.1% cases of anorectal infection.[74]

However, several studies have documented treatment failures using 1 g of azithromycin and emergence of resistance with low dose.[75] Due to this concern regarding rapid emergence of resistance, first line use of azithromycin as sole antimicrobial therapy for gonorrhoea has never been recommended.

Cephalosporins

Extended-spectrum cephalosporins have proved highly efficacious for treatment of urogenital, anorectal and pharyngeal gonorrhoea worldwide. The injectable ceftriaxone or oral cefixime are the most potent and usually recommended for treatment of gonorrhoea.

Ceftriaxone, is currently the most potent gonorrhoea antimicrobial for a single dose regimen because of its high intrinsic potency, long half-life (6–9 hours) and lack of resistance.

The cure rate of ceftriaxone for uncomplicated urethral and rectal gonorrhoea and for pharyngeal gonorrhoea was found to be 99.2 percent and 98.9 percent respectively.[73]

The main drawback with ceftriaxone is its high cost and parenteral mode of administration.

Cefixime has been shown to be nearly as effective as the injectable ceftriaxone against uncomplicated urogenital and anorectal gonorrhoea.

The cure rate of cefixime for uncomplicated urethral and rectal gonorrhoea and for pharyngeal gonorrhoea was found to be 97.5 percent and 92.3 percent respectively.[73]

Cefixime treatment failures have been verified in Japan since several years and recently the first clinical failures were confirmed in Europe. Previously, only three cases of treatment failures of pharyngeal gonorrhoea using ceftriaxone have been verified.

This is particularly worrisome as ceftriaxone is the last remaining option for empirical first-line treatment of gonorrhoea. N. gonorrhoeae seems to be evolving into a true "superbug" and gonorrhoea may become untreatable in certain circumstances.

DUAL THERAPY FOR GONOCOCCAL INFECTIONS

Dual combination antibiotics are used to improve the effectiveness of the treatment and to reduce the drug resistance. The most commonly used combination is cephalosporins along with azithromycin.

Azithromycin is preferred over doxycycline due to high compliance, ease of administration as a single dose and increased resistance to tetracycline.[76]

According to the Sexually Transmitted Diseases Treatment Guidelines, CDC 2015[76]

Uncomplicated urethral, cervical and rectal gonococcal infections

- Recommended regimens

  Injection Ceftriaxone 250 mg single intramuscular (IM) dose

  PLUS

  Oral Azithromycin 1 gm single oral dose

- Alternative Regimens

If ceftriaxone is not available:

Oral Cefixime 400 mg single dose

PLUS

Oral Azithromycin 1 gm single dose

Uncomplicated pharyngeal gonococcal infections

- Recommended Regimen

Injection Ceftriaxone 250 mg IM single dose

PLUS

Oral Azithromycin 1 gm single dose

For pregnant women and HIV – same treatment regimen should be considered.

Gonococcal Conjunctivitis

- *Recommended Regimen*

Injection Ceftriaxone 1 gm IM single dose

PLUS

Oral Azithromycin 1 gm single dose

DISSEMINATED GONOCOCCAL INFECTION

Treatment of Arthritis-Dermatitis Syndrome

- *Recommended Regimen*

  Injection Ceftriaxone 1 gm IM or IV every 24 hours

  PLUS

  Oral Azithromycin 1 gm single dose

- *Alternative Regimens*

  Injection Cefotaxime 1 gm IV every 8 hours

  OR

  Injection Ceftizoxime 1 gm IV every 8 hours

  PLUS

  Oral Azithromycin 1 gm single dose

Treatment of Gonococcal Meningitis and Endocarditis

- *Recommended Regimen*

  Injection Ceftriaxone 1–2 gm IV every 12–24 hours

  PLUS

  Oral Azithromycin 1 gm single dose

Ophthalmia Neonatorum

Injection Ceftriaxone 25–50 mg/kg IM or IV, not to exceed 125 mg in a single dose

Ophthalmia Neonatorum prophylaxis

At birth, Erythromycin ophthalmic ointment 0.5% single application in each eye

Other treatment considerations

To reduce the transmission of disease, patients should be advised to have sexual abstinence for 7 days following the treatment and until all sexual partners are treated adequately.[76] Patients with gonococcal infection should also be screened for other infections like chlamydia, syphilis, and HIV.

Follow-Up

Patients treated with alternative regimen for pharyngeal gononoccal infection should be offered a test of cure using either culture or NAAT after 14 days of treatment. This test of cure is not needed for patients with uncomplicated urethral or rectal gonococcal infections who are treated with alternative regimens.

Management of Sex Partners

All sex partners should be evaluated and treated with dual presumptive treatment if their last sexual contact with the patient was within 60 days before onset of symptoms or diagnosis of gonococcal infection.[76]

MOLECULAR MECHANISMS FOR RESISTANCE TO RELEVANT ANTIMICROBIALS IN N. GONORRHOEAE

Penicillin Resistance

1. Chromosomally Mediated Resistance

Gonococcal strains that require ≥2 mg/L of penicillin for inhibition and do not produce beta lactamase are designated as chromosomally mediated penicillin resistant N. gonorrhoeae (CMRNG). This type of resistance is caused by mutations at multiple loci, including

- penA (mutations cause a decreased affinity of penicillin for its lethal target, the penicillin binding protein 2 [PBP2]),
- mtrR promoter or coding region (mutations cause an overexpression of the MtrCDE efflux pump, which actively pumps the antimicrobial out of the cell), and

- porB1b (the “penB” resistance determinant that causes a decreased intake of antimicrobial through the porin PorB)
- ponA causes a decreased affinity of penicillin for the encoded PBP1 (second target for penicillin)
- penC (pilQ2) mutation in the pilQ gene, which encodes the secretin PilQ of the type IV pilin, inhibits the entry of penicillin in the bacterial cell and further decrease the susceptibility to penicillin.

2. Plasmid-Mediated Resistance

The high-level resistance to penicillin in PPNG is attributed to the production of the enzyme beta lactamase (penicillinase) via single-step acquisition of beta lactamase encoding plasmids.

Fluoroquinolone Resistance

The high-level resistance in quinolone-resistant N. gonorrhoeae (QRNG) is due to cumulative effect of multiple mutations in specific regions (quinolone resistance determining regions [QRDR]) of the gyrA and parC genes that encode the subunits GyrA and ParC of the target enzymes DNA gyrase and topoisomerase IV, respectively.

Spectinomycin Resistance

Specific single nucleotide polymorphisms (SNPs) in the 16S rRNA gene, which result in a decreased affinity of spectinomycin for its 16S rRNA target, mediate high-level resistance to spectinomycin.

Macrolide Resistance

Resistance to azithromycin and/or erythromycin can be caused by mutations in the

- mtrR promoter or coding sequence (result in an overexpression of the MtrCDE efflux pump)
- mef (A) encoded efflux pump (enhances the efflux of macrolides),
- erm genes encoding 23S rRNA methylases (modify the ribosomal target), or
- specific SNPs encoding 23S rRNA (reduce the affinity of the macrolide for its ribosomal target).

Cephalosporin: Decreased Susceptibility and Resistance

The decreased susceptibility and resistance to extended-spectrum cephalosporins in N. gonorrhoeae are chromosomally mediated, and the mechanisms are similar to the mechanisms causing chromosomally mediated resistance to penicillins.

The most common mechanism in N. gonorrhoeae for decreased susceptibility or resistance to extended-spectrum cephalosporins is penA alteration, i.e., acquisition of a penA mosaic allele or A501 alterations in PBP2

Factor X, an additional, non-transformable resistance determinant exists may contribute to development of resistance.[77]

Each of the currently recommended treatment regimens has specific advantages and disadvantages that should be used to individualize therapy for gonorrhoea.

Finally, particularly in settings such as public clinics where large numbers of patients are treated and funds are limited, cost considerations may lead to choice of one agent over another.

AIMS & OBJECTIVES

AIMS AND OBJECTIVES

To determine the prevalence of oropharyngeal, urethral and rectal gonorrhoea among the men who have sex with men (MSM) attending STD OP at a tertiary care centre.

To analyze the risk factors associated with prevalence of gonococcus among the men who have sex with men (MSM)

MATERIALS & METHODS

MATERIALS AND METHODS

PLACE OF STUDY:

Department of Venereology

Govt. Stanley Medical College & Hospital, Chennai.

TYPE OF STUDY:

Facility based cross sectional study

STUDY POPULATION:

Asymptomatic male patients with history of having sex with men attending the STI clinic

DURATION:

1year [February 2018 – January 2019]

SAMPLE SIZE: 100

Sample size was calculated from the study Faiza Ali et al[78] in the Journal of Family Medicine and Disease Prevention, 2016 using OpenEpi v3.01 with prevalence of gonorrhoea infection being 23.30% with absolute precision of 10% and confidence interval of 95%. Final sample size was estimated to be 100.

INCLUSION CRITERIA

1. Men having sex with men
2. Bisexual
3. Age >18years
4. Patients willing to give informed consent
5. Patients who have not taken antibiotics in past 3 months

EXCLUSION CRITERIA

1. Age < 18 years
2. Patient not willing to sign informed consent

DATA COLLECTION:

The details of the patients were collected using the pre designed proforma.

PROCEDURE:

After screening the patients who fulfill the inclusion criteria, the patients were explained about the procedure in the regional language and an informed written consent was obtained.

For obtaining oropharyngeal specimen, sterile swab is introduced into the oral cavity, swabbing both the tonsillar pillars and the posterior pharyngeal wall. [Figure.6.1]

For urethral specimen, sterile swab is introduced into the urethra for about 1-2 cm and gently rotate the swab in one direction for a minimum of 10 seconds. [Figure.6.2]

For collecting rectal specimen, proctoscope is lubricated with lignocaine jelly and inserted into the anal canal and the sterile swab is passed into the rectum for about 4 to 5 cm and specimen is collected without fecal contamination. [Figure.6.3]

The collected specimens are immediately plated into the Modified Thayer-Martin medium and the plate is kept into the candle jar and transported immediately to the microbiology laboratory for incubation at 37°C for up to 72 hours. The second swab is smeared into the glass slide for gram staining and sent for microbiological examination.

The culture positive for gonococcal colonies were subjected to gram stain, carbohydrate utilization test, oxidase and catalase test [Figure.6.4, 6.5, 6.7, 6.8]. All participants were also screened for syphilis, HIV, HbsAg and Anti-HCV as a routine.

STATISTICAL ANALYSIS:

Collected data were entered in MS excel and checked for consistency and analyzed using SPSS version 16. Continuous variables were summarized as mean and standard deviation or median and interquartile range depending on the distribution of data. Categorical variables were summarized as proportions. For categorical variables, Chi square test was done to see association between socio-demographic profile and gonococcal infection. For continuous variables, independent t test were done to see association. P value less than 0.05 were considered to be statistically significant.

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OBSERVATION & RESULTS

OBSERVATION AND RESULTS

DEMOGRAPHIC PROFILE

AGE

Out of 100 cases, most commonly observed age group in this study was 21-30 years (45%), followed by age group of 31-40 years (44%), greater than 40 years (6%) and less than 20 years (5%). The minimum and maximum age was found to be 18 years and 53 years respectively. (Table.5.1)

Table.5.1: Age distribution among the study participants

Age (years)	Percentage (%)
< 20	5
21 – 30	45
31 – 40	44
> 40	6
TOTAL	100

EDUCATIONAL STATUS

Out of the total 100 patients, 35 had completed secondary school education (6^{th} to 10^{th} standard), 28 patients had completed higher secondary education (11^{th} and 12^{th}standard) and 37 patients had completed degree. (Table.5.2)

Table.5.2: Educational status among the study participants

Educational status	Percentage (%)
Secondary education (6^{th} to 10^{th} standard)	35
Higher Secondary education (11^{th} and 12^{th} standard)	28
Degree	37
TOTAL	100

OCCUPATION

Out of 100 patients, 27% were working in private company, followed by 12% who were male sex workers (MSW), 9% were drivers, 7% were security, 7% were unemployed, 6% were hotel workers, 4% were students and 3% were tailor. Others constitute 25% which include painter, electrician, water supplier, metro worker etc., [Table.5.3]

Table.5.3: Occupation details among the study participants

Occupation	Percentage (%)
Private company	27
Male sex worker (MSW)	12
Driver	9
Security	7
Hotel worker	6
Unemployed	7
Student	4
Tailor	3
Others	25
TOTAL	100

MARITAL STATUS

Out of 100 study participants, 19% were married and 81% were unmarried. [Chart.5.1]

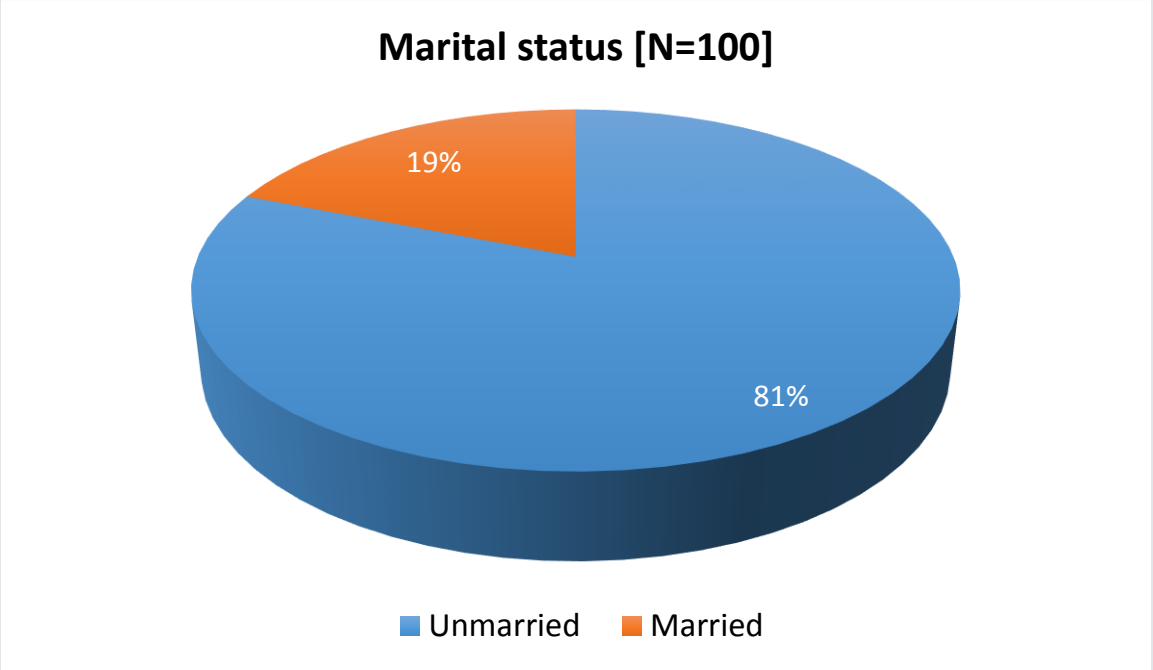

Chart.5.1 shows the marital status among the study participants

SUBSTANCE ABUSE PROFILE

Out of 100, 31 patients gave history of both smoking and alcoholism, 27 patients gave history of alcoholism and 16 patients gave history of smoking and no one had history of intravenous drug abuse. [Chart.5.2]

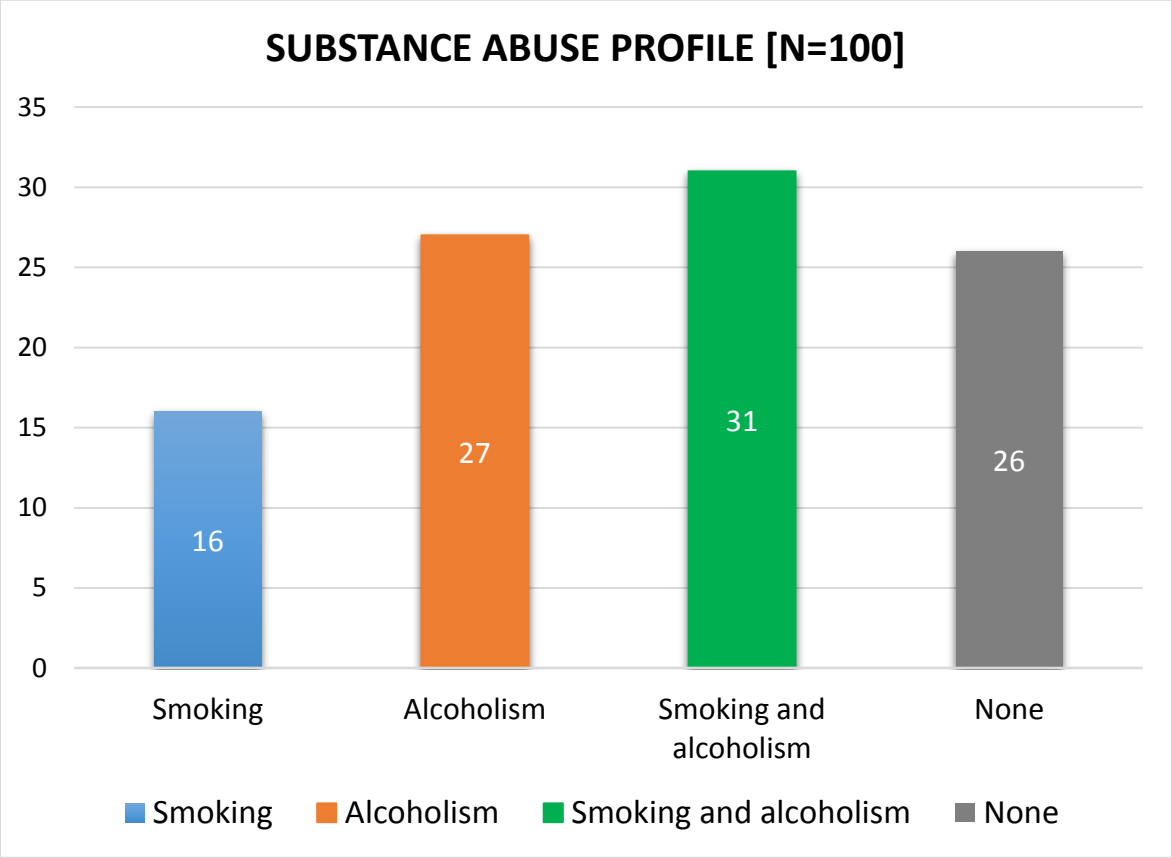

Chart.5.2 shows the substance abuse profile among the study participants

SEXUAL BEHAVIOUR PROFILE

The onset of exposure of MSM activity was found to be most common in the age group of 15-20 years which was seen in 49% of patients, followed by 31% of patients in age group of 21-25 years, 13% of patients in 26-30 years and 6% belonged to age >30 years. In this study, 1 patient had first exposure at the age of 14 years. [Table.5.4]

Table.5.4: Initial exposure of MSM activity among the study participants

Age at onset of MSM activity (Years)	Percentage (%)
< 15	1
15-20	49
21-25	31
26-30	13
>30	6
TOTAL	100

In this study, 50% of patients had 5-10 years of duration of MSM activity, followed by 28% had duration of less than 5 years and 22% had duration of more than 10 years. [Table.5.5].

Table.5.5: Duration of MSM activity among the study participants	
Duration of MSM activity [YEARS]	**Percentage (%)**
< 5 years	28
5-10 years	50
>15 years	22
TOTAL	100

Most of the patients (83%) in this study had three or more number of partners. [Chart.5.3]

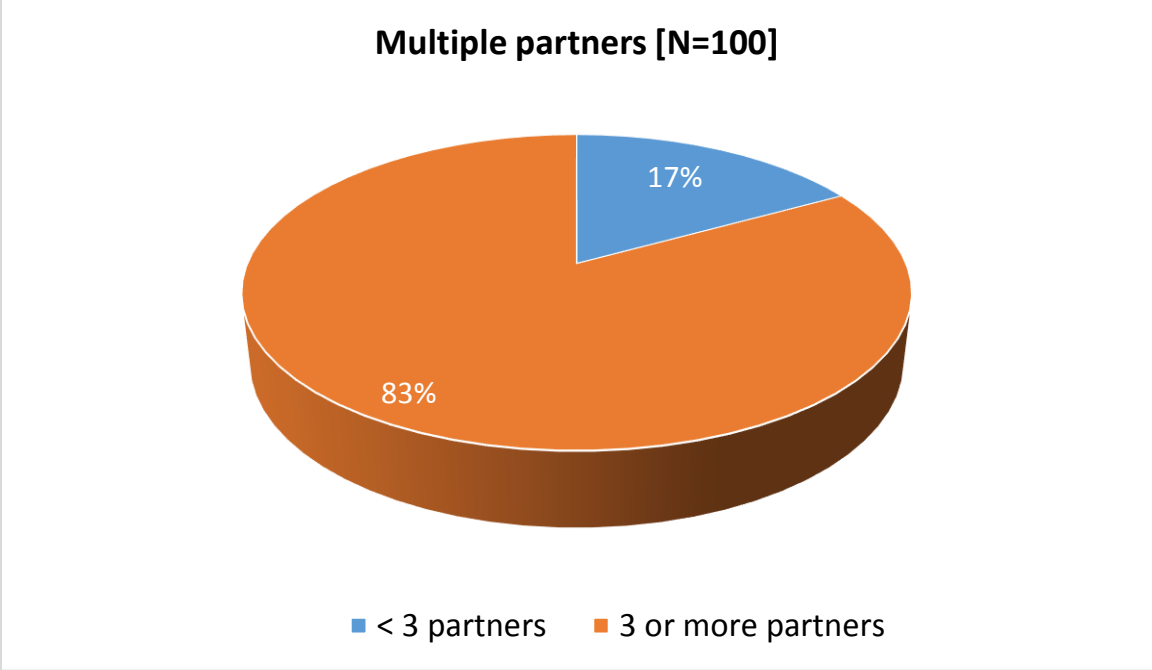

Chart.5.3 shows the details of number of partners among the study participants

In this study, 56% of patients had recent contact between 1 week and 1 month, followed by 28% of patients had recent contact within a week and 18% of patients had contact between 1 month and 3 months. [Table.5.6]

Table.5.6: Recent sexual contact details among the study participants

Recent sexual contact	**Percentage (%)**
< 1 week	28
1 week – 1 month	56
1 month – 3 months	18
TOTAL	100

CONDOM USAGE

In this study, only 20% of patients had used condom regularly during sexual exposure. More than half (57%) had used condom occasionally but not regularly and 23% of patients had never used condom during the sexual exposure with their partners. [Chart.5.4]

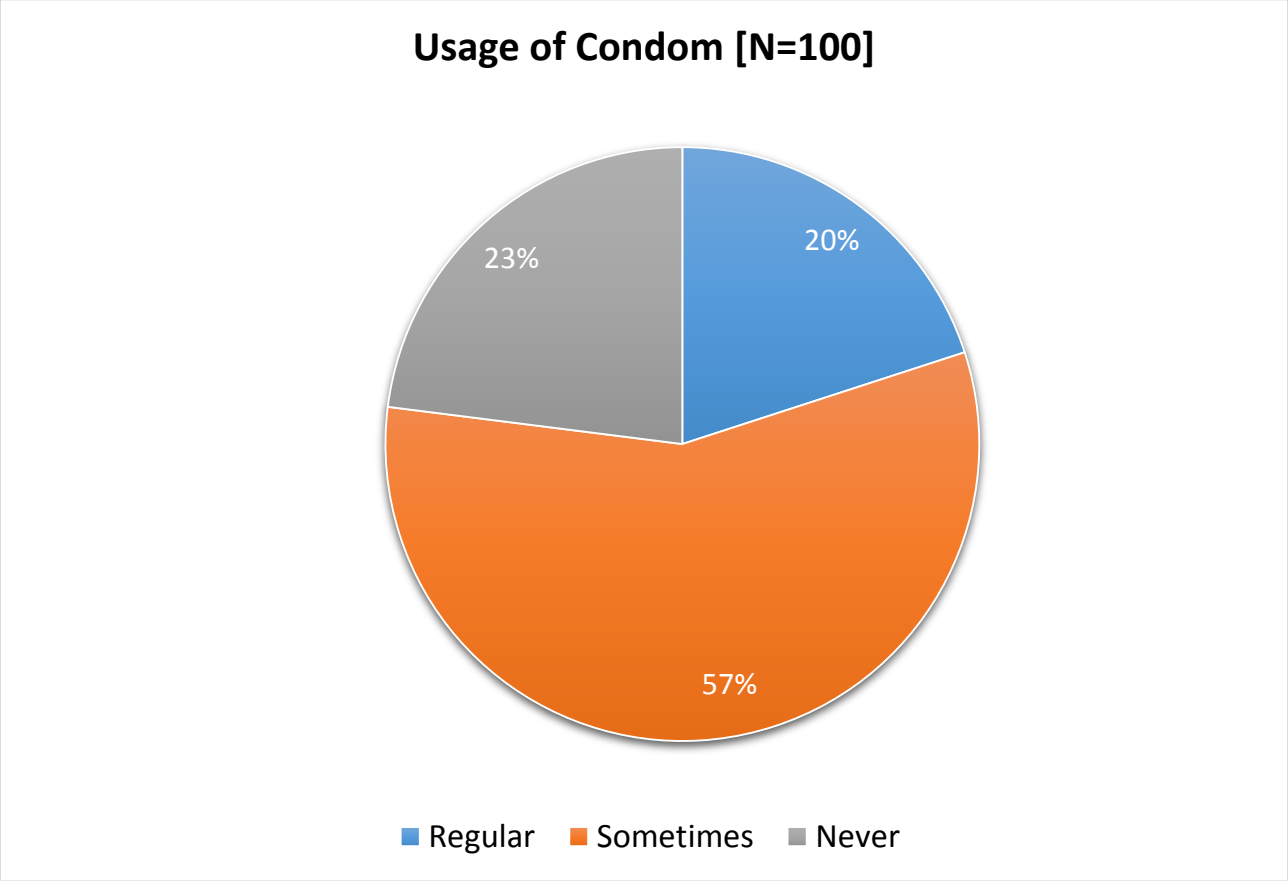

Chart.5.4 shows the details of condom usage among the study participants

PATTERN OF SEXUAL INTERCOURSE

In this study, the most common mode of sexual intercourse was oro-receptive which was 59%, followed by oro-insertive which was seen in 54%, ano-receptive was seen in 47% and ano-insertive which was seen in 45%. [Chart.5.5]

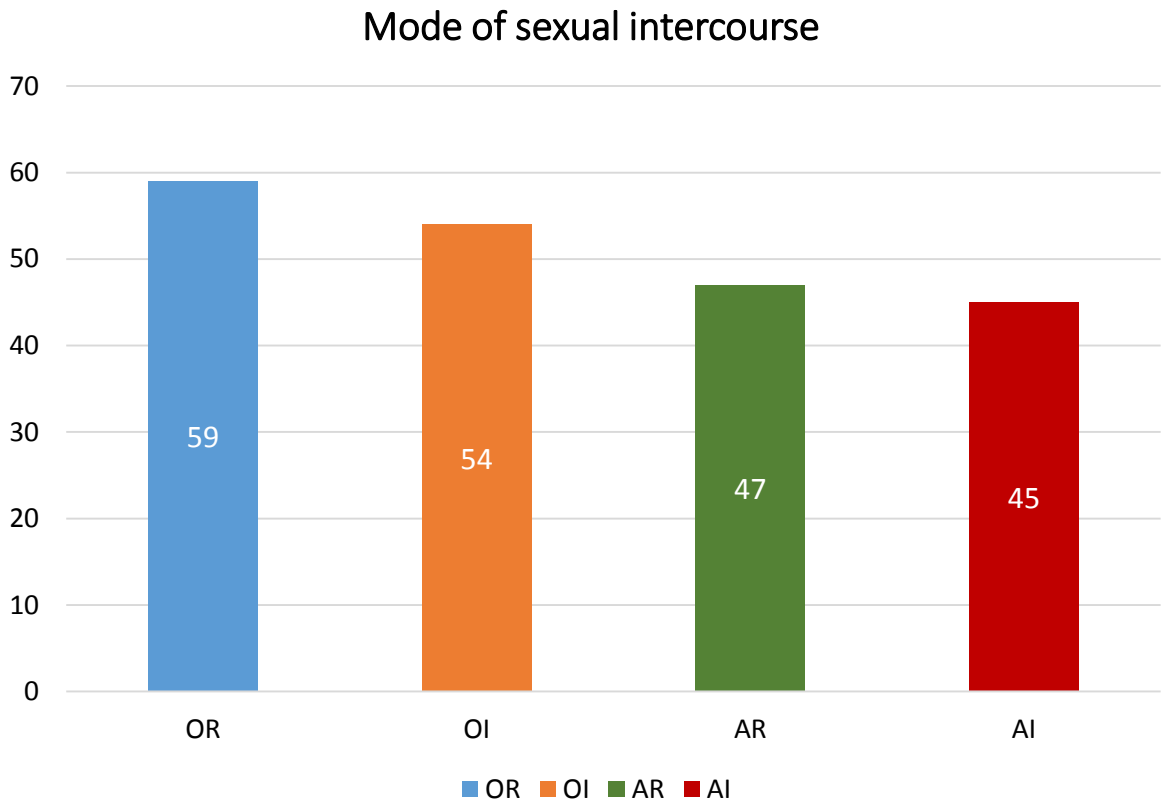

Chart.5.5 shows the pattern of sexual intercourse among the study participants.

[OR- Ororeceptive, OI- Oroinsertive, AR – Anoreceptive, AI- Anoinsertive.]

TYPE OF CONTACT

Almost more than half of patients (56%) in this study practice both oral and anal sexual intercourse, followed by 31% practice only oral intercourse and 13% practice only anal intercourse. [Chart.5.6]

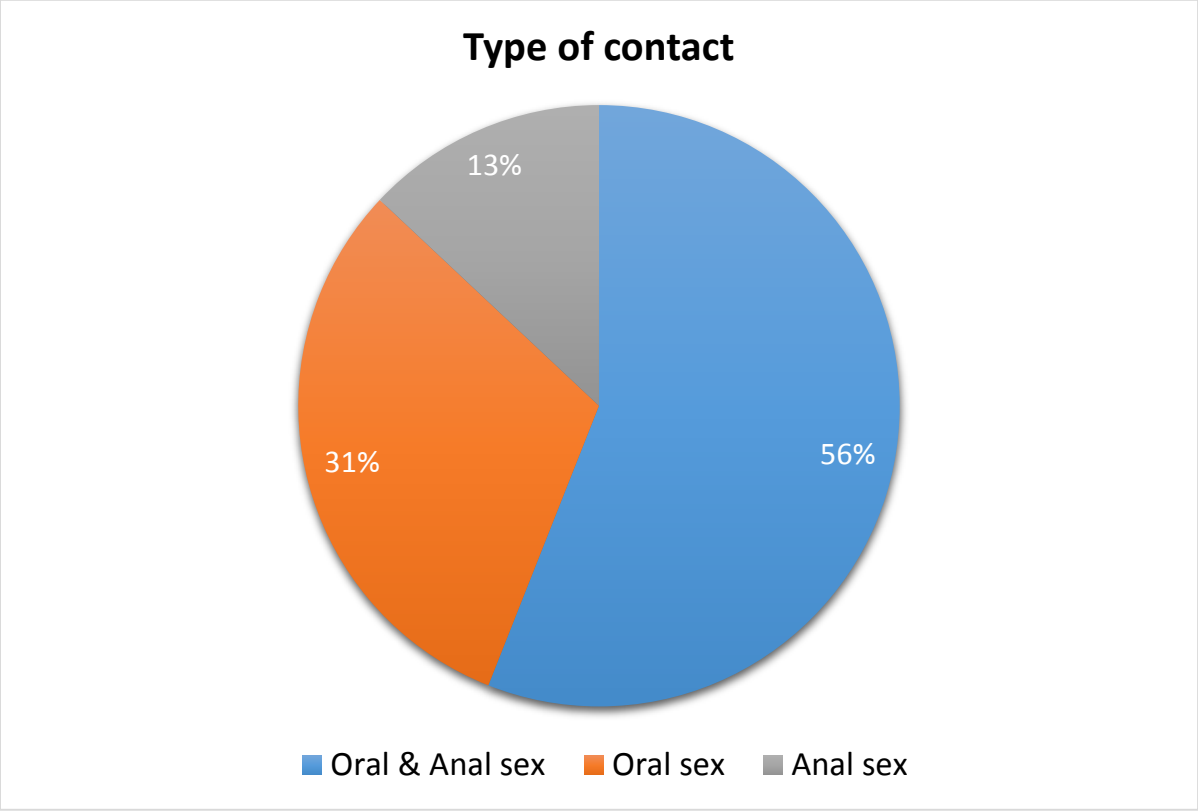

Chart.5.6 shows type of contact among the study participants

GRAM STAINING FOR GONOCOCCI

Out of 100 cases, 6 cases showed positive for Gram negative diplococci in oropharyngeal swab and 5 cases showed positive for Gram negative diplococci in rectal swab. None showed positive for urethral swab. [Chart.5.7 and Figure 6.4, 6.5]

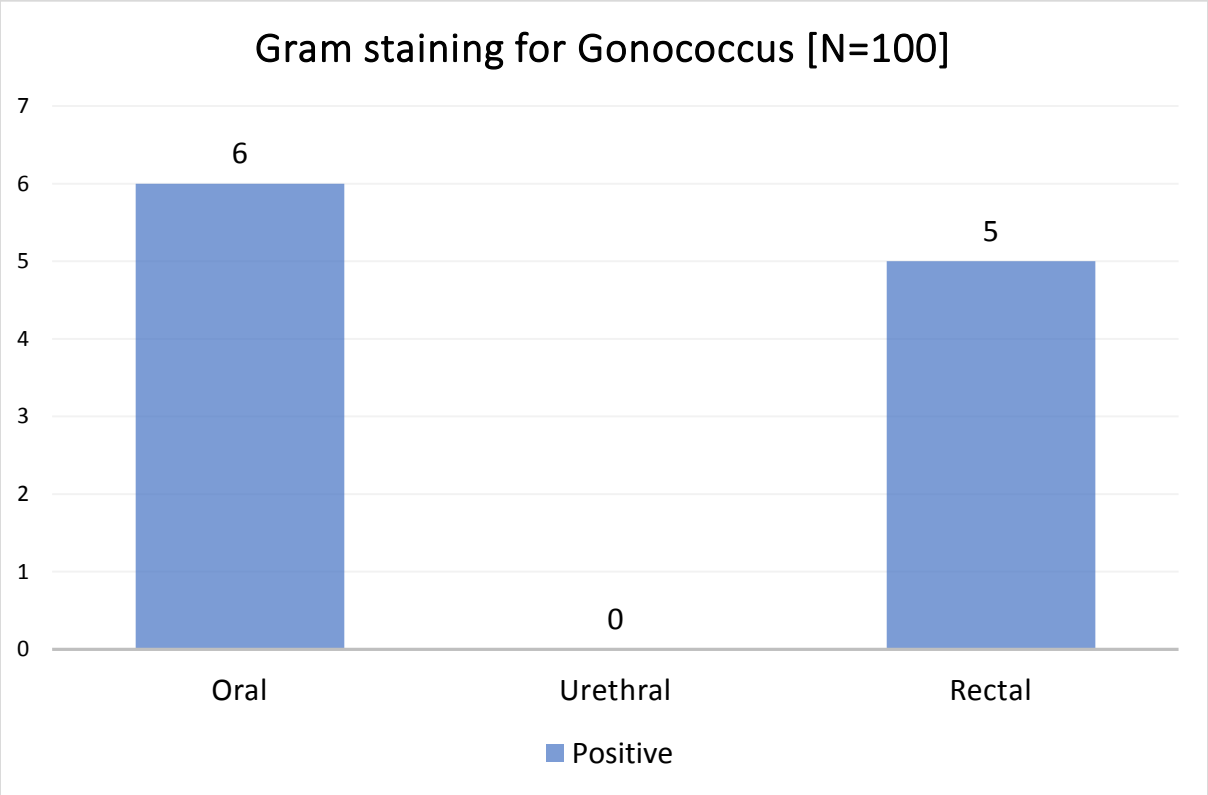

Chart.5.7 shows the positive gram staining for gonococci among the study participants

CULTURE FOR GONOCOCCUS

Out of 100 cases, 2 cases showed culture positive for Gonococci in oropharyngeal swab, one case showed culture positive in urethral swab and 3 cases showed culture positive in rectal swab. [Chart.5.8, 6.6]

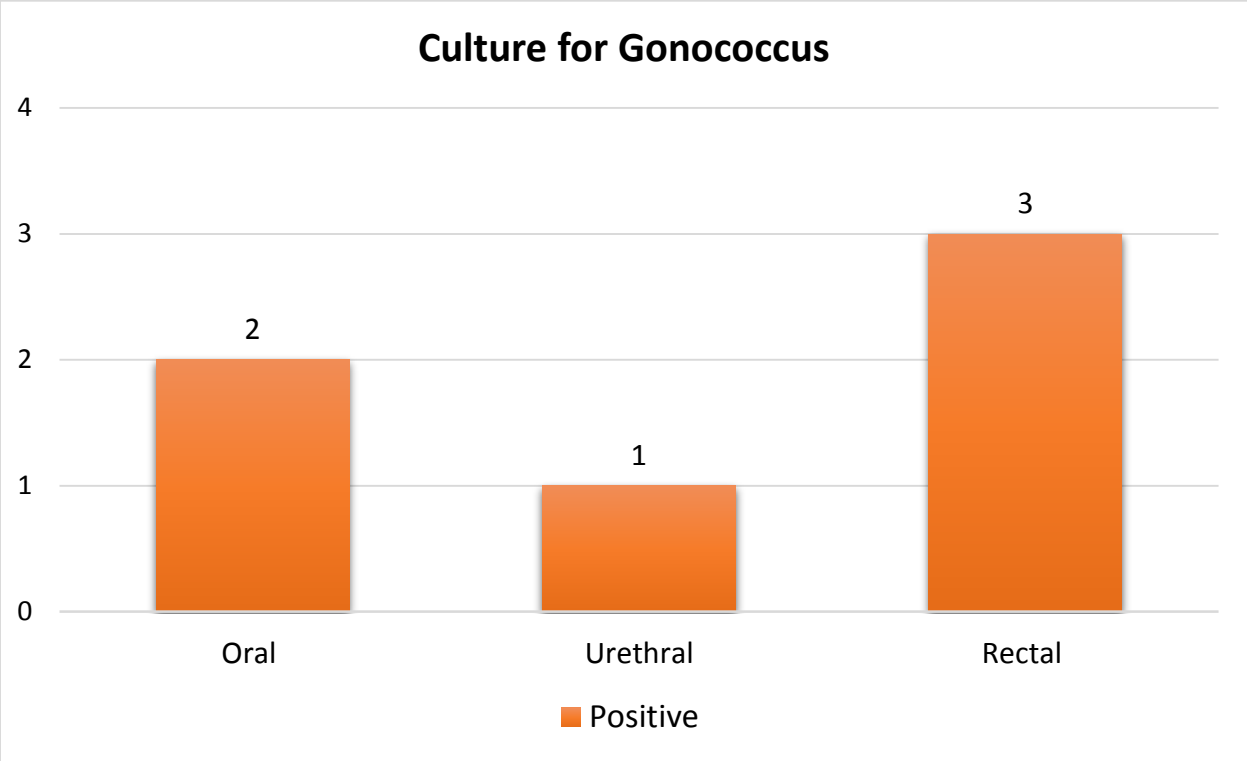

Chart.5.8 shows the positive culture for gonococci in oral, urethral and rectal swab among the study participants

OTHER STIs

Out of 100 cases enrolled in this study, 6 cases gave previous history of STIs which include 4 cases of genital herpes and 2 cases of syphilis. [Chart.5.9]

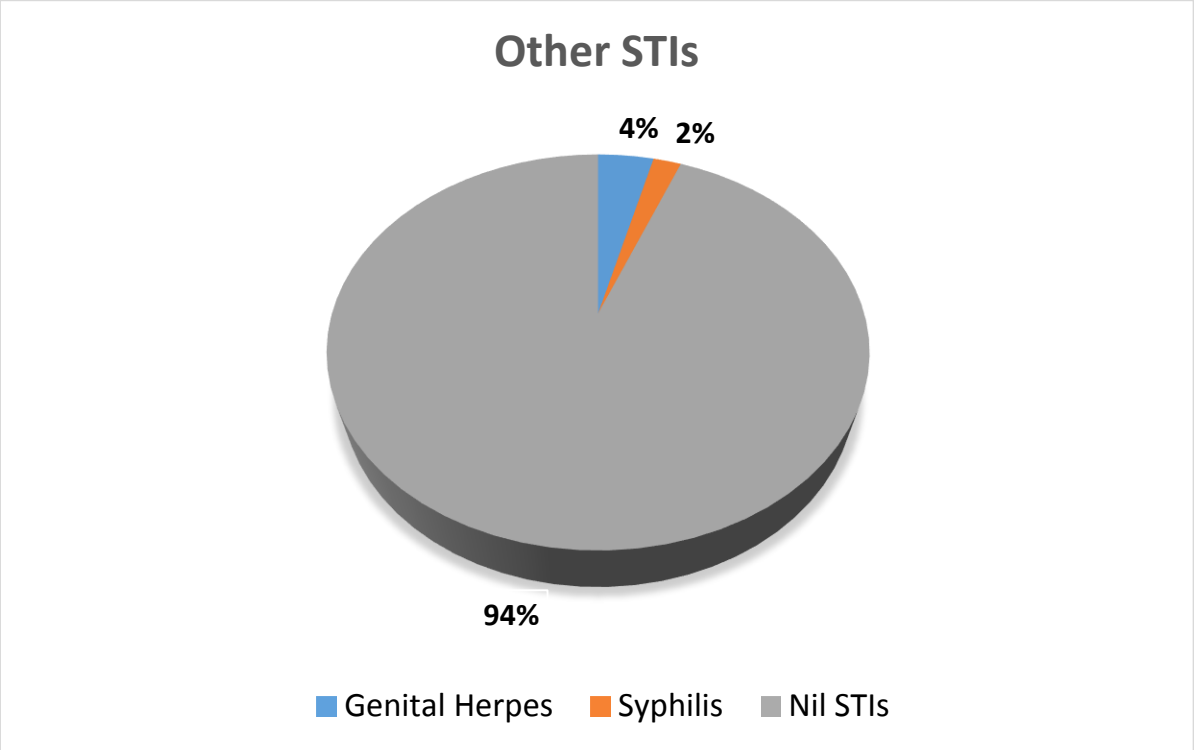

Chart.5.9 shows the other previous STIs observed among the study participants

ASSOCIATION BETWEEN SELECTED SOCIODEMOGRAPHIC FACTORS AND GONORRHOEA

In this study, the prevalence of asymptomatic gonorrhoea is more common in the patients who have completed secondary education (6th to 10th standard) and least in patients who have completed degree. [Table.5.7]

Table.5.7: Association of education status and prevalence of gonococcus among the study participants (N=100)

Education	**Total participants**	**Patients without gonorrhoea N=94 (%)**	**Patients with gonorrhoea N=6**	**Pearson chi^2**	**P value**
Secondary	35	31 (88.57)	4 (11.42)	7.0637	0.070
Higher secondary	28	27 (96.43)	1 (3.57)		
Graduate	37	36 (97.30)	1 (2.70)		
TOTAL	100	94 (94.00)	6 (6.00)		

The prevalence of asymptomatic gonorrhoea is more common in the patients who are employed than unemployed. [Table.5.8]

Table.5.8: Association of employment and prevalence of gonococcus among the study participants (N=100)

Occupation	**Total participants**	**Patients without gonorrhoea N=94 (%)**	**Patients with gonorrhoea N=6 (%)**	**Pearson chi^2**	**P value**
Unemployed	12	12 (100.00)	0 (0.00)	0.8704	0.351
Employed	88	82 (93.18)	6 (6.82)		
TOTAL	100	94 (94.00)	6 (6.00)		

The prevalence of asymptomatic gonorrhoea was more common among patients not using condom which is statistically significant (P value <0.05). [Table.5.9]

Table.5.9: Association of condom and prevalence of gonococcus among the study participants (N=100)					
Condom	**Total participants**	**Patients without gonorrhoea N=94 (%)**	**Patients with gonorrhoea N=6 (%)**	**Pearson chi^2**	**P value**
No	23	18 (78.26)	5 (21.74)	13.1196	0.000
Yes	77	76 (98.70)	1 (1.30)		
TOTAL	100	94 (94.00)	6 (6.00)		

The prevalence of asymptomatic gonorrhoea was more common among unmarried individuals than married individuals. [Table.5.10]

Table.5.10: Association of marital status and prevalence of gonococcus among the study participants (N=100)					
Marital status	**Total participants**	**Patients without gonorrhoea N=94 (%)**	**Patients with gonorrhoea N=6 (%)**	**Pearson chi^2**	**P value**
Unmarried	81	76 (93.83)	5 (6.17)	0.0226	0.881
Married	19	18 (94.74)	1 (5.26)		
TOTAL	100	94 (94.00)	6 (6.00)		

The prevalence of asymptomatic gonococcus were associated with smoking and alcoholism. [Table.5.11]

Table.5.11: Association of substance abuse and prevalence of gonococcus among the study participants (N=100)

Substance abuse	**Total participants**	**Patients without gonorrhoea N=94 (%)**	**Patients with gonorrhoea N=6 (%)**	**Pearson chi^2**	**P value**
Smoking					
No	53	50 (94.34)	3 (5.66)	0.0231	0.879
Yes	47	44 (93.62)	3 (6.38)		
TOTAL	100	94 (94.00)	6 (6.00)		
Alcohol					
No	42	39 (92.86)	3 (7.14)	0.1677	0.682
Yes	58	55 (94.83)	3 (5.17)		
TOTAL	100	94 (94.00)	6 (6.00)		

The prevalence of asymptomatic gonococcus were commonly associated with individuals having multiple partners. [Table.5.12]

Table.5.12: Association of multiple partners and prevalence of gonococcus among the study participants (N=100)

Multiple partners (>3)	**Total participants**	**Patients without gonorrhoea N=94 (%)**	**Patients with gonorrhoea N=6 (%)**	**Pearson chi^2**	**P value**
No	17	17 (100.00)	0 (0.00)	1.3074	0.253
Yes	83	77 (92.77)	6 (7.23)		
TOTAL	100	94 (94.00)	6 (6.00)		

The prevalence of asymptomatic gonococcus were most commonly associated with anoreceptive intercourse followed by ororeceptive intercourse and least in individuals practicing oroinsertive intercourse. [Table.5.13]

Table.5.13: Association of type of sexual contact and prevalence of gonococcus among the study participants (N=100)

Type of contact	**Total participants**	**Patients without gonorrhoea N=94 (%)**	**Patients with gonorrhoea N=6 (%)**	**Pearson chi^2**	**P value**
ORO-RECEPTIVE					
No	41	39 (95.12)	2 (4.88)	0.1551	0.694
Yes	59	55 (93.22)	4 (6.78)		
ORO-INSERTIVE					
No	46	43 (93.48)	3 (6.52)	0.0411	0.839
Yes	54	51 (94.44)	3 (5.56)		
ANO-INSERTIVE					
No	55	52 (94.55)	3 (5.45)	0.0645	0.800
Yes	45	42 (93.33)	3 (6.67)		
ANO-RECEPTIVE					
No	53	52 (98.11)	1 (1.89)	3.3827	0.066
Yes	47	42 (89.36)	5 (10.64)		

CLINICAL PHOTOGRAPHS

CLINICAL PHOTOGRAPHS

Figure.6.1 shows the specimen collection for oropharyngeal swab

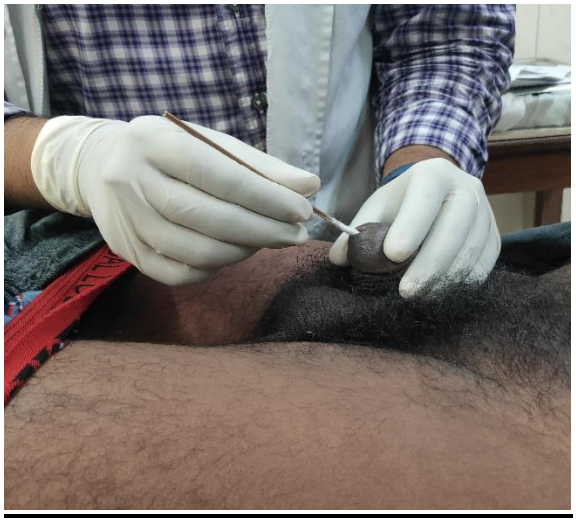

Figure.6.2 shows the specimen collection for urethral swab

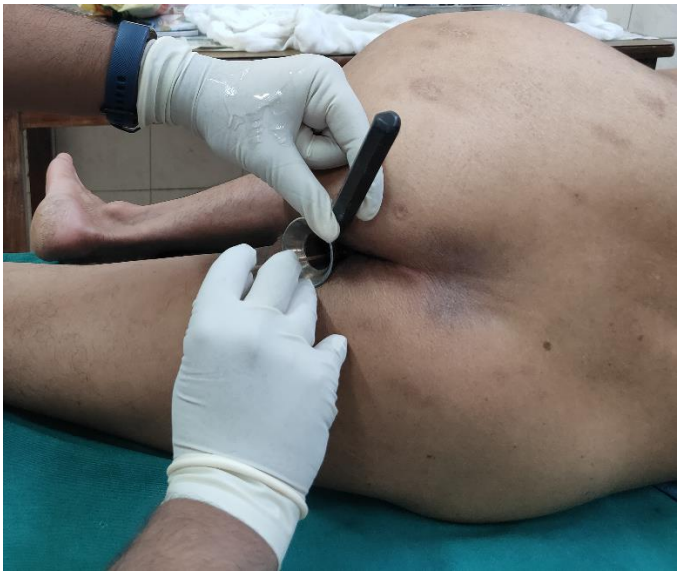

Figure.6.3 shows the specimen collection for rectal swab

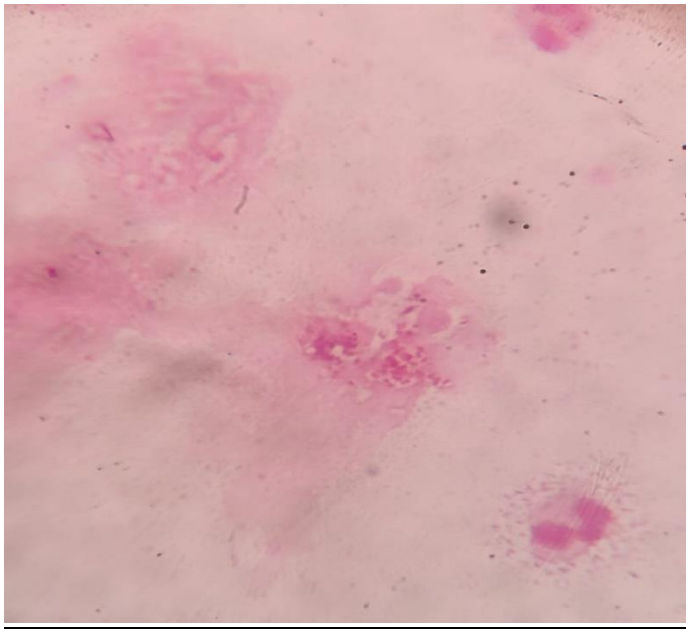

Figure.6.4: Gram stain shows Gram negative diplococci

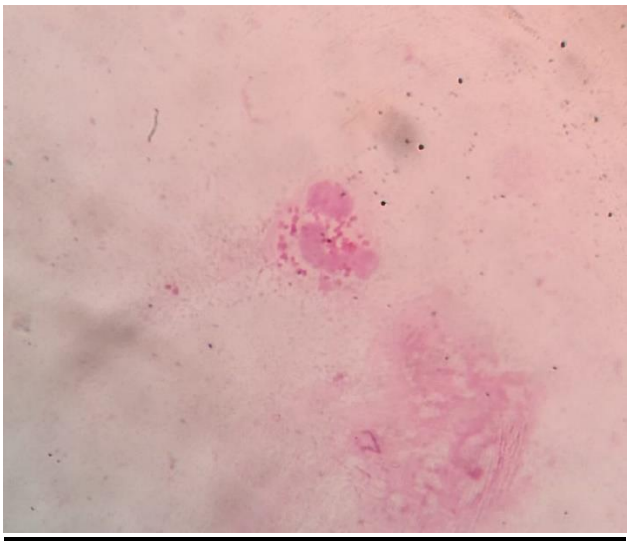

Figure.6.5: Gram stain shows Gram negative diplococci

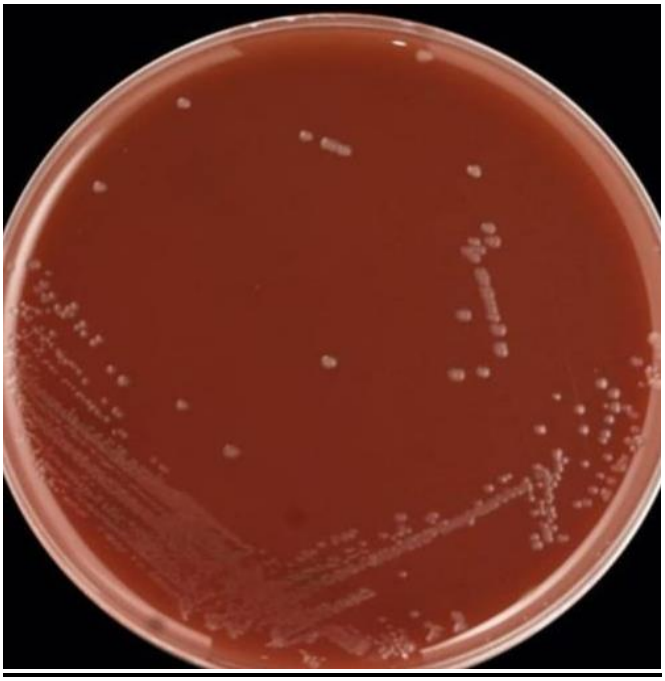

Figure.6.6: Small pinpoint white smooth translucent raised convex colonies seen on Modified Thayer Martin medium

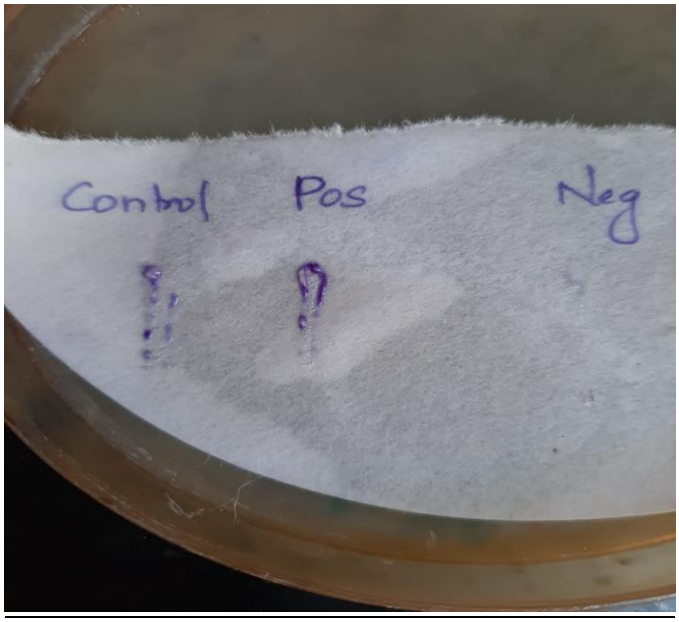

Figure.6.7: Oxidase test showing oxidase positive

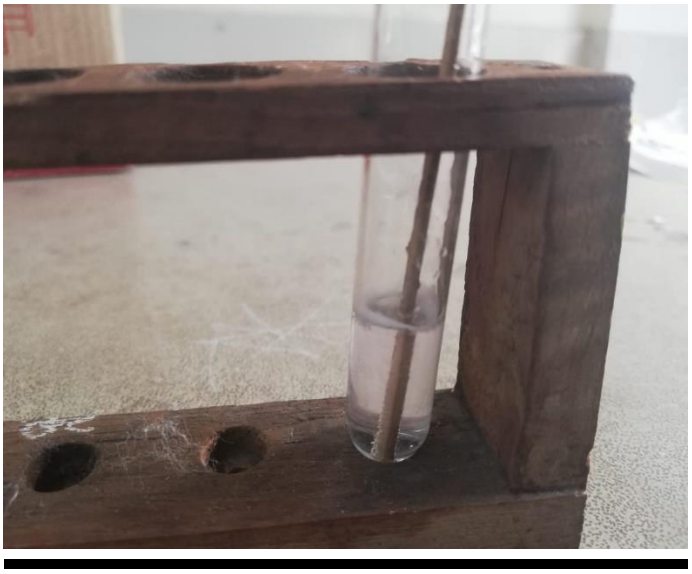

Figure.6.8: Catalase test showing positive effervescence

DISCUSSION

DISCUSSION

DEMOGRAPHIC PROFILE OF STUDY PARTICIPANTS

Age

Out of 100 study participants of MSM enrolled in this study, the most commonly observed age group was 21-30 years (45%), followed by age group of 31-40 years (44%). [Table.5.1]

In a study conducted by Faiza et al,[78] where the most common age group was 18-25 years and a study by Jiddou et al,[79] where the mean age was 29 years which were concordance with this study.

The increased transmission of STIs were observed in this age group because of lack of awareness and protection against STIs, high risk sexual practices like unprotected oral and anal sex.

Education status

Out of total 100, 35% had completed secondary school education (6^{th} to 10^{th} standard), 28% had completed higher secondary education (11^{th} and 12^{th}standard) and 37% had completed degree. [Table.5.2] A study by Faiza et al showed that 23.5% had completed high school education which is concordance with this study.[78] In this study, the prevalence of asymptomatic gonorrhoea is more common in the patients with low education status. This in turn signifies that the education plays a major role in creating public awareness regarding STIs and its prevention.

Occupation

Out of 100, 27% were working in private company, followed by 12% who were male sex workers (MSW), 9% were drivers, 7% were security, 7% were unemployed and 6% were hotel workers. Remaining were students, tailor, painter, electrician, water supplier, metro worker. [Table.5.3]

In this study, more than a quarter (27%) were working in a private sector this might be due to higher awareness and accessibility to health care services among educated patients.

Prajapati et al[80] study showed that 7.2% of the MSMs were reported to be male sex worker. They are most vulnerable group to transmit STIs and HIV among their sexual partners. A survey among male college students in Chennai showed that 7 percent of students had their first sexual experience with another male.[81]

Marital status

Out of 100 study participants, 19% were married and 81% were unmarried. [Chart.5.1] The prevalence of asymptomatic gonorrhoea in this study was more common among unmarried individuals than married individuals.

A study by Raja ram et al, reported that 58.4% MSMs observed were unmarried and 39.9% MSMs were married.[82] The MSMs who were married can serve as a bridge population in transmitting STIs to their female partners.

Substance abuse

In this study, 58% were alcoholic and 47% were smokers. [Chart.5.2] A study by Salve et al reported that 48% of MSM were alcoholics.[83]

The consistent relationship of alcoholism with high risk sexual behavior as well as transmission of STIs has been established by various studies in different parts of the world.

The consumption of alcohol impairs the judgment during sexual intercourse and reduces the likelihood of condom usage.[84]

SEXUAL BEHAVIOUR PROFILE

Onset of sexual activity

In this study, the onset of exposure of MSM activity was found to be most common in the age group of 15-20 years which was 49%. [Table.5.4]

A study by Prajapati et al, reported that 74.6% MSM had their first sexual exposure in the age group of 10-19 years.[80]

Early sexual exposure can be associated with risk of having multiple sexual partners and increased vulnerability to acquisition of STIs.

In this study, 56% of patients had recent contact between 1 week and 1 month, followed by 28% of patients had recent contact within a week and 18% of patients had contact between 1 month and 3 months.

Multiple partners

In this study, 83% of study participants had three or more multiple partners. [Chart.5.3] The prevalence of asymptomatic gonococcus was most commonly seen among those who had multiple partners.

In a study conducted by Slurink et al among MSM, 36.2% reported four to nine partners and 32.3% reported more than 10 partners.[85] Various studies also reported that the increasing number of partners consistently correlates with inconsistent condom use and increased high risk behaviour. High rate of partner change is associated with increased risk of transmission of STIs, including those with a relatively shorter infectious period.

Condom usage

In this study, only 20% of patients had used condom regularly during sexual exposure. More than half (57%) had used condom occasionally but not regularly and 23% of patients had never used condom during the sexual exposure with their partners. [Chart.5.4] The prevalence of asymptomatic gonococcus was more common among patients without using condom which was statistically significant (P value <0.05).

In 2016, a study by Prabahar et al reported that only 7.16% MSM patients gave history of consistent condom usage.[86] According to a study, consistent condom usage is associated with younger age, few reported partners and those who less likely to report usage of alcohol.[87]

PATTERN OF SEXUAL INTERCOURSE

In this study, the most common pattern of sexual intercourse was oro-receptive which was 59%, followed by oro-insertive which was 54%, ano-receptive which was 47% and ano-insertive which was 45%. [Chart.5.5]

Almost more than half of patients (56%) in this study practice both oral and anal sexual intercourse, followed by 31% practice only oral intercourse and 13% practice only anal intercourse. As the risk of acquiring HIV through oral contact is less, most of the men who engage in oral sex believes that practicing oral sex is safe.

PREVALENCE OF GONOCOCCUS

In this study, the total prevalence of asymptomatic gonococcus among the MSM was 6%. The prevalence of asymptomatic oropharyngeal, urethral and rectal gonococcus were 2%, 1% and 3% respectively. [Chart.5.8]

In a study conducted by Faiza Ali et al,[78] the total prevalence of gonococcus was 23.30%. The prevalence of oropharyngeal, urethral and rectal gonococcus were 13.11%, 4.13% and 12.14% respectively. This study further states that based on urine testing alone would have missed 82.3% of gonococcal infections. Both pharyngeal and rectal testing diagnosed most of the gonococcal infections.

A study conducted in San Francisco among MSM, found that 64% of gonococcal infections would be missed if they were screened only for urethral infections.[88]

In a study conducted by Marcus et al, the prevalence of oropharyngeal, urethral and rectal gonococcus were 5%, 0.4% and 3.6% respectively.[89] This study also report that screening only for urethral infection would have missed 83.8% of gonococcal infections. Screening of rectum and pharynx would have missed only 9.8% of gonococcal infections. This further states that screening of rectum and pharynx is a more effective strategy for case detection.

A study conducted by Vandana et al, reported that the prevalence of pharyngeal gonococcus was 1.09%.[90] Another study by Jiddou et al reported that the prevalence of pharyngeal gonococcus was 10.9%.[79]

CDC now recommends annual screening for urethral, pharyngeal and rectal infection with N. gonorrhoea who had insertive and receptive (oral and anal) intercourse. More frequent screening at 3-6 month interval is indicated for MSM having multiple partners.

OTHER STIs

Out of 100 cases enrolled in this study, 6 cases gave previous history of STIs which include 4 cases of genital herpes and 2 cases of syphilis. [Chart.5.9] A study by Taru Garg et al[91] and Jiddou et al[79] reported that most common STIs observed among MSM was syphilis.

SUMMARY

SUMMARY

In this study of prevalence of gonorrhoea among men having sex with men (MSM) attending STI clinic in a tertiary care center in South India, the prevalence of asymptomatic oropharyngeal, urethral and rectal gonococcus were 2%, 1% and 3% respectively.

- Out of 100 cases, most commonly observed age group in this study was 21-30 years (45%), followed by age group of 31-40 years (44%).
- Out of total 100, 35 patients had completed secondary school education, 28 patients had completed higher secondary education and 37 patients had completed degree.
- Out of 100, 27% were working in private company, followed by 12% were male sex workers (MSW), 9% were drivers, 7% were security and unemployed, 6% were hotel workers.
- Out of 100 cases enrolled in this study, 19% were married and 81% were unmarried.
- Out of 100, 58 patients were alcoholic and 47 were smokers and no one had history of intravenous drug abuse.
- The onset of exposure of MSM activity was found to be most common in the age group of 15-20 years which was 49%, followed by 21-25 years which was 31%.
- In this study, 50% patients had 5-10 years of duration of MSM activity, followed by 28% had duration of less than 5 years and 22% had duration of more than 10 years.
- Most of the patients (87%) in this study had three or more number of partners.

- In this study, 56% of patients had recent contact between 1 week and 1 month, followed by 28% of patients had recent contact within a week and 18% of patients had contact between 1 month and 3 months.
- In this study, only 20% of patients had used condom regularly during sexual exposure. More than half (57%) had used condom occasionally but not regularly and 23% of patients had never used condom.
- In this study, the most common pattern of sexual intercourse was oro-receptive which was 59%, followed by oro-insertive which was 54%, ano-receptive which was 47% and ano-insertive which was 45%.
- Almost more than half of patients (56%) in this study practice both oral and anal sexual intercourse, followed by 31% practice only oral intercourse and 13% practice only anal intercourse.
- Out of 100 cases enrolled in this study most common previous STIs observed were genital herpes 4% followed by syphilis 2%.
- Out of 100 cases, gram staining showed Gram negative diplococci in 6 cases in oropharyngeal swab, 5 cases in rectal swab and none for urethral swab.
- Out of 100 cases, 2 cases showed culture positive for Gonococci in oropharyngeal swab, 3 cases showed culture positive in rectal swab and one case showed culture positive for urethral swab.

CONCLUSION

CONCLUSION

- In this study of prevalence of gonorrhoea among men having sex with men (MSM) attending STI clinic in a tertiary care center in South India, the total prevalence of asymptomatic gonococcus among the MSM was found to be 6%
- The prevalence of asymptomatic oropharyngeal, urethral and rectal gonococcus were 2%, 1% and 3% respectively
- Risk factors associated with prevalence of gonococcus among MSM were found to be low education status, unmarried, substance abuse, early onset of MSM activity, multiple partners and inconsistent condom usage
- As there is a recent increase in the trend of MSM activity among the young population, more awareness to be created towards the safe sexual practices and consistent condom usage.
- It was found that the prevalence of asymptomatic gonococcal infections at nongenital sites are high among the MSM.
- Most of the non-genital gonococcal infections are often asymptomatic and they may serve as an important reservoir for transmission of infection.
- Genital screening alone leaves many of the MSM with untreated STIs and under-estimates the infection burden.

- Our finding highlights the need of screening for pharyngeal and rectal gonococcal infection when there is a history of oro-genital and ano-genital exposure.
- This study further supports the CDC STD screening guidelines for MSM, and it is recommended that all MSM should be screened for gonococcal infections atleast annually and every 3-6 months in patients with high risk behavior.

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PROFORMA

STD NO:

AGE /SEX:

ADDRESS:

OCCUPATION:

PHONE NO:

SOCIO-ECONOMIC STATUS:

EDUCATION:

COMPLAINTS OF:

PAST H/O:

MARITAL STATUS:

SEXUAL HISTORY:

Recent exposure:

Type of contact:

Sexually active how long:

Condom usage:

Partner notification:

CONTACT HISTORY:

TREATMENT HISTORY:

PERSONAL HISTORY:

GENERAL EXAMINATION:

GENITAL EXAMINATION:

EXAMINATION OF SKIN:

EXAMINATION OF MUCOSA:

DIAGNOSIS:

INVESTIGATIONS:

SAMPLE	GRAM STAINING	CULTURE
THROAT SWAB		
URETHRAL SWAB		
RECTAL SWAB		

ICTC:

RPR:

HbsAg:

Anti-HCV:

CONSENT FORM

Mr:

Age:

Address:

Phone:

I undersigned Mr ……..

have been explained about the need for gonococcus screening using culture and gram staining. I have been explained about the procedure, being done to investigate the possibility of asymptomatic gonorrhoea in my regional language. I am also aware that the test is only a diagnostic tests.The possible side effects are explained. I have been explained that this study will be performed by …….. I further state that I have carefully read and understood all the information provided in this form and with full conscious mind I hereby give my consent for the said investigation with its risks involved.

Signature of the Patients/Thumb impression:

Witness:

Name:

Signature:

Date:

PATIENT INFORMATION MODULE

You are being invited to be a subject in this study.

Before you participate in this study, I am giving following details about this trial, which include the aims, methodology, intervention, possible side effects, if any.

Men attending STI clinic will be included in this study. A detailed clinical history will be taken following a standardized Proforma. A clinical examination and relevant investigation will be done.

The result arising from this study will be analyzed and used for academic purposes. You will be given clear instructions at every step and you are free to ask/clarify any doubts. Your identity remains confidential. You are free to withdraw from the trial at any point of time, without any prior notice and/or without any medical or legal implications.

I request you to volunteer for this study.

Thanking You

Investigator's Sign

Patient's Sign:

Name:

ANTI-PLAGIARISM CERTIFICATE

URKUND

Urkund Analysis Result

Analysed Document: Prevalence of Gonorrhea among Men having Sex with Men (MSM) attending STI clinic in a tertiary care center in South India – facility based cross sectional study.docx (D57182143)
Submitted: 10/17/2019 3:31:00 PM
Submitted By: venki19592@gmail.com
Significance: 1 %

Sources included in the report:

pliagrism 1.docx (D42088153)
PREVALENCE OF SEXUALLY TRANSMITTED INFECTIONS AMONG MEN HAVING SEX WITH MEN {MSM} ATTENDING TERTIARY HEALTH CARE CENTRE, NORTH CHENNAI.docx (D31253526)
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2946686/

Instances where selected sources appear:

4

ETHICAL COMMITTEE APPROVAL FORM

GOVERNMENT STANLEY MEDICAL COLLEGE& HOSPITAL,CHENNAI -01
INSTITUTIONAL ETHICS COMMITTEE

Title of the Work : PREVALENCE OF GONORRHEA AMONG MEN HAVING SEX WITH MEN (MSM) ATTENDING STI CLINIC IN A TERTIARY CARE CENTER IN SOUTH INDIA – FACILITY BASED CROSS SECTIONAL STUDY

Principal Investigator : DR. VENKATESH Y,

Designation : I YR MD DVL,
Department : Department of DERMALOGY,
Govt. Stanley Medical College.

The request for an approval from the Institutional Ethical Committee (IEC) was considered on the IEC meeting held on 21.12.2017 at the Council Hall, Stanley Medical College, Chennai-1 at 10am.

The members of the Committee, the secretary and the Chairman are pleased to approve the proposed work mentioned above, submitted by the principal investigator.

The Principal investigator and their team are directed to adhere to the guidelines given below:

1. You should inform the IEC in case of changes in study procedure, site investigator investigation or guide or any other changes.
2. You should not deviate from the area of the work for which you applied for ethical clearance.
3. You should inform the IEC immediately, in case of any adverse events or serious adverse reaction.
4. You should abide to the rules and regulation of the institution(s).
5. You should complete the work within the specified period and if any extension of time is required, you should apply for permission again and do the work
6. You should submit the summary of the work to the ethical committee on completion of the work.

22/1/18
MEMBER SECRETARY,
IEC, SMC, CHENNAI

MEMBER SECRETARY
ETHICAL COMMITTEE,
STANLEY MEDICAL COLLEGE
CHENNAI-600 001.

MASTER CHART

S.No	Age	Edu	Occu	MS	PVD	Smoking	Alcohol	IVD	Jaundice	BT	onset of e	MSM acti	multiple p	Recent	Condom	OR	OI	AI	AR	Diagnosis	HIV	RPR	TPHA	HbsAg	Anti HCV	Gr oral	Gr urethra	Gr rectal	Cul oral	Cul urethr	Cul rectal
1	34	10th	Tv shwrm	Md	no	no	no	no	no	no	20	14	yes	1 day	no	no	yes	yes	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	positive	negative	negative	positive
2	20	bcom 2n	student	Unmd	no	no	no	no	no	no	15	5	no	1 day	no	yes	no	yes	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative
3	53	8th	hotel mas	Unmd	no	yes	yes	no	no	no	20	33	yes	3 days	yes	yes	no	no	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative
4	27	12th	server	Unmd	no	yes	yes	no	no	no	17	10	yes	1 week	no	no	no	yes	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative
5	32	12th	MSW	Unmd	no	no	no	no	no	no	20	12	yes	10 days	yes	yes	no	no	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative
6	46	10th	security	Md	herpes	yes	yes	no	no	no	26	20	yes	10 days	sometime	yes	yes	yes	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative
7	35	9th	mechanic	Unmd	no	yes	yes	no	no	no	25	10	yes	2 days	sometime	no	no	yes	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative
8	33	12th	peon	Unmd	no	yes	yes	no	no	no	18	15	yes	2 weeks	yes (5)	no	yes	no	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative
9	36	10th	MSW	Unmd	no	yes	yes	no	no	no	16	20	yes	1 day	regular	yes	no	no	yes	screening	Neg	Neg	not done	Neg	Neg	positive	negative	negative	positive	negative	negative
10	37	diploma	hotel mar	Unmd	no	no	yes	no	no	no	27	10	yes	1 month	regular	no	yes	yes	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative
11	34	Mcom	MNC	Md	no	no	yes	no	no	no	24	10	yes	1 month	sometime	yes	no	no	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative
12	30	12th	MSW	Unmd	no	yes	yes	no	no	no	27	3	yes	2 weeks	regular	yes	no	no	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative
13	21	8th	metro wo	Unmd	no	no	yes	no	no	no	16	5	no	1 month	no	yes	no	no	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative
14	20	12th	server	unmd	syphilis	no	yes	no	no	no	17	3	yes	1 day	no	no	yes	no	no	screening	Neg	1;2	Positive	Neg	Neg	negative	negative	negative	negative	negative	negative
15	28	8th	MSW	Unmd	no	no	yes	no	no	no	18	10	no	5 days	sometime	no	no	no	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative
16	28	graduate	unemploy	Unmd	no	no	no	no	no	no	23	5	yes	1 month	regular	yes	yes	yes	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative
17	42	12th	tailor	Md	no	yes	yes	no	no	no	19	23	yes	1 week	sometime	yes	no	no	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative
18	42	8th	MSW	Md	no	no	no	no	no	no	34	8	yes	2 mon	regular	yes	yes	yes	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative
19	34	10th	tailor	Md	no	no	no	no	no	no	14	20	yes	1 week	regular	yes	no	yes	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative
20	34	10th	MSW	Unmd	no	no	yes	no	no	no	23	7	yes	1 month	sometime	yes	no	no	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative
21	40	8th	coolie	Md	no	yes	yes	no	no	no	25	15	yes	3 mon	sometime	no	yes	yes	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative
22	26	graduate	company	Unmd	no	yes	yes	no	no	no	23	3	no	1 month	sometime	no	yes	yes	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative
23	30	graduate	company	Unmd	no	no	no	no	no	no	29	1	yes	2 mon	sometime	no	yes	no	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative
24	23	graduate	engineer	Unmd	no	no	no	no	no	no	19	4	no	1 month	regular	no	yes	yes	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative
25	42	9th	security	Md	no	no	no	no	no	no	18	24	yes	3 month	sometime	yes	no	no	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative
26	48	10th	security	Unmd	no	yes	yes	no	no	no	28	20	yes	1 day	no	no	yes	yes	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	positive	negative
27	22	graduate	company	Unmd	herpes	no	no	no	no	no	17	5	no	1 month	sometime	yes	no	yes	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative
28	24	12th	MSW	Unmd	no	yes	yes	no	no	no	16	8	yes	2 mon	sometime	yes	no	no	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative
29	25	graduate	company	Unmd	no	yes	no	no	no	no	15	10	yes	10 days	regular	yes	no	yes	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative
30	25	graduate	company	Unmd	syphilis	no	yes	no	no	no	19	6	yes	2 weeks	sometime	no	yes	yes	no	screening	Neg	1;1	Positive	Neg	Neg	negative	negative	negative	negative	negative	negative

MASTER CHART (CONT.)

31	23	graduate	company	Unmd	no	no	no	no	no	no	16	7	yes	3 month	sometime	yes	no	no	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
32	36	8th	coolie	Unmd	no	yes	yes	no	no	no	28	8	yes	3 mon	no	no	yes	yes	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
33	28	10th	driver	Md	no	no	no	no	no	no	17	9	yes	10 days	sometime	no	yes	yes	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
34	39	8th	coolie	Unmd	no	no	no	no	no	no	33	6	yes	1 week	no	yes	no	no	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
35	18	10th	steel worl	Unmd	no	no	no	no	no	no	17	1	no	1 month	sometime	yes	no	no	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
36	25	8th	painter	Md	no	no	no	no	no	no	19	6	yes	1 month	sometime	yes	no	no	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
37	40	10th	unemploy	Unmd	no	yes	yes	no	no	no	30	10	yes	5 mon	no	yes	yes	yes	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
38	38	8th	cine field	Unmd	no	yes	yes	no	no	no	18	20	yes	1 day	sometime	yes	no	no	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
39	38	10th	electriciar	Unmd	no	no	no	no	no	no	30	8	yes	4 days	no	yes	yes	yes	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	positive	negative	negative	positive	
40	34	8th	coolie	Unmd	no	no	no	no	no	no	24	10	yes	1 week	sometime	yes	no	no	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
41	32	graduate	marketing	Unmd	no	no	yes	no	no	no	16	18	yes	2 weeks	regular	no	yes	no	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
42	30	graduate	logistics	Unmd	no	no	no	no	no	no	24	6	yes	1 week	sometime	yes	no	yes	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
43	33	graduate	NGO	Unmd	no	yes	yes	no	no	no	29	14	yes	1 month	sometime	no	yes	no	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
44	33	12th	NGO	Unmd	no	no	no	no	no	no	23	10	yes	1 day	sometime	yes	yes	no	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
45	31	12th	security	Unmd	no	no	no	no	no	no	27	5	yes	4 days	no	no	yes	no	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
46	33	graduate	call centre	Unmd	no	no	yes	no	no	no	17	15	yes	3 days	no	yes	no	no	no	screening	Neg	Neg	not done	Neg	Neg	positive	negative	negative	positive	negative	negative	
47	32	10th	lorry drive	Md	no	yes	yes	no	no	no	25	7	yes	1 month	sometime	yes	yes	no	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
48	33	10th	MSW	Unmd	no	no	yes	no	no	no	20	13	yes	1 day	sometime	yes	no	no	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
49	35	12th	beautician	Unmd	no	no	yes	no	no	no	32	3	yes	2 days	sometime	yes	no	no	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	positive	negative	negative	negative	
50	28	9th	corporatic	Unmd	no	no	yes	no	no	no	18	10	yes	1 month	regular	yes	no	yes	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
51	37	12th	NGO	Unmd	no	no	yes	no	no	no	22	15	yes	3 days	regular	yes	yes	no	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
52	45	10th	tailor	Md	no	yes	no	no	no	no	20	25	yes	1 month	regular	yes	yes	yes	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
53	27	graduate	call centre	Unmd	no	no	yes	no	no	no	17	10	yes	2 days	sometime	yes	no	no	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
54	36	12th	iyer	Unmd	no	no	no	no	no	no	16	20	yes	1 month	sometime	yes	no	no	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
55	22	graduate	business	Unmd	no	yes	no	no	no	no	18	4	no	2 month	sometime	no	yes	no	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
56	34	6th	ironing	Md	no	yes	yes	no	no	no	28	6	yes	5 days	no	no	yes	yes	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
57	36	8th	driver	Md	no	yes	yes	no	no	no	23	13	yes	6 days	sometime	yes	yes	no	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
58	23	10th	coolie	Unmd	no	no	no	no	no	no	16	7	yes	3 days	sometime	yes	no	no	yes	screening	Neg	Neg	not done	Neg	Neg	positive	negative	negative	negative	negative	negative	negative
59	20	10th	house kee	Unmd	no	no	no	no	no	no	17	3	no	10 days	no	yes	yes	no	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
60	36	10th	company	Unmd	no	no	no	no	no	no	34	2	yes	5 days	regular	no	no	no	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
61	34	12th	water sup	Unmd	no	no	yes	no	no	no	32	2	yes	2 mon	sometime	no	yes	no	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
62	33	12th	security	Md	no	yes	yes	no	no	no	31	2	yes	1 month	sometime	yes	no	yes	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
63	28	10th	security	Unmd	no	yes	yes	no	no	no	18	10	yes	1 month	sometime	no	no	no	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
64	25	graduate	company	Unmd	no	no	yes	no	no	no	19	6	yes	3 days	sometime	no	yes	yes	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
65	28	12th	driver	Unmd	no	yes	no	no	no	no	20	8	yes	4 days	sometime	yes	yes	no	no	screening	Neg	Neg	not done	Neg	Neg	positive	negative	negative	negative	negative	negative	
66	35	10th	driver	Unmd	no	no	yes	no	no	no	19	16	yes	1 week	no	no	no	yes	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
67	18	12th	student	Unmd	no	no	yes	no	no	no	16	2	no	2 weeks	sometime	no	yes	no	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
68	26	graduate	company	Unmd	no	yes	no	no	no	no	22	4	yes	1 month	sometime	no	no	yes	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
69	23	graduate	unemploy	Unmd	no	yes	no	no	no	no	19	4	yes	2 month	sometime	yes	yes	no	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
70	29	12th	driver	Unmd	no	yes	yes	no	no	no	21	8	yes	1 week	sometime	no	no	yes	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative

MASTER CHART (CONT.)

71	19	10th	server	Unmd	no	no	no	no	no	no	18	1	no	1 month	no	yes	yes	no	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
72	25	graduate	unemploy	Unmd	no	yes	no	no	no	no	21	4	yes	2 mon	sometime	no	yes	yes	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
73	31	graduate	company	Md	herpes	yes	yes	no	no	no	23	8	yes	3 months	regular	no	no	yes	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
74	27	graduate	company	Unmd	no	no	yes	no	no	no	21	6	yes	1 month	regular	no	yes	yes	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
75	36	12th	security	Unmd	no	no	yes	no	no	no	26	10	yes	3 months	sometime	yes	no	no	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
76	28	12th	MSW	Unmd	no	yes	yes	no	no	no	23	5	yes	10 days	sometime	yes	yes	yes	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
77	21	graduate	student	Unmd	no	no	yes	no	no	no	19	2	no	4 days	sometime	no	yes	yes	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
78	23	12th	driver	Unmd	no	no	yes	no	no	no	19	4	yes	1 week	sometime	no	no	yes	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
79	27	graduate	metro wo	Unmd	no	no	yes	no	no	no	19	8	yes	1 week	sometime	no	yes	no	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
80	32	graduate	company	Md	no	yes	yes	no	no	no	21	11	yes	3 weeks	sometime	no	yes	yes	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
81	26	12th	driver	Unmd	no	yes	no	no	no	no	19	7	yes	10 days	no	yes	no	no	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
82	23	12th	metro wo	Unmd	no	yes	no	no	no	no	21	2	yes	2 weeks	no	yes	no	no	yes	screening	Neg	Neg	not done	Neg	Neg	positive	negative	positive	negative	negative	positive
83	29	graduate	company	Unmd	no	yes	no	no	no	no	21	8	yes	3 weeks	sometime	no	no	yes	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
84	21	graduate	student	Unmd	no	yes	no	no	no	no	19	2	no	1 month	no	yes	yes	no	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
85	24	graduate	call centre	Unmd	no	yes	yes	no	no	no	20	4	yes	1 week	sometime	yes	yes	no	no	screening	Neg	Neg	not done	Neg	Neg	positive	negative	negative	negative	negative	negative	negative
86	29	12th	driver	Unmd	no	yes	no	no	no	no	23	6	yes	2 weeks	sometime	no	yes	yes	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
87	31	12th	MSW	Unmd	no	yes	yes	no	no	no	27	5	yes	5 days	regular	no	no	yes	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	positive	negative	negative	negative	negative
88	22	12th	unemploy	Unmd	no	yes	yes	no	no	no	21	1	no	1 month	sometime	yes	yes	no	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
89	32	graduate	company	Unmd	no	yes	yes	no	no	no	25	7	yes	4 days	sometime	no	no	yes	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
90	29	graduate	MSW	Unmd	no	yes	no	no	no	no	25	4	yes	1 week	regular	yes	yes	yes	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
91	26	graduate	unemploy	Unmd	no	no	no	no	no	no	21	5	yes	2 weeks	regular	yes	yes	no	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
92	31	12th	server	Md	no	yes	no	no	no	no	27	4	yes	5 days	no	yes	no	no	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
93	35	10th	painter	Md	no	no	yes	no	no	no	25	10	yes	2 months	no	yes	yes	no	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
94	27	graduate	call centre	Unmd	no	no	yes	no	no	no	23	4	yes	1 month	sometime	no	yes	yes	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
95	30	graduate	company	Unmd	no	yes	no	no	no	no	22	8	yes	1 week	sometime	yes	yes	yes	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
96	28	12th	driver	Unmd	no	yes	yes	no	no	no	21	7	yes	2 weeks	sometime	yes	yes	no	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
97	24	graduate	company	Unmd	no	no	yes	no	no	no	20	4	no	3 weeks	regular	no	yes	yes	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
98	21	graduate	unemploy	Unmd	no	yes	no	no	no	no	19	2	no	1 month	no	yes	yes	no	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
99	23	graduate	unemploy	Unmd	no	no	yes	no	no	no	20	3	no	2 months	no	yes	yes	no	no	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative
100	25	12th	MSW	Unmd	herpes	yes	yes	no	no	no	20	5	yes	5 days	regular	yes	yes	yes	yes	screening	Neg	Neg	not done	Neg	Neg	negative	negative	negative	negative	negative	negative	negative

KEY TO MASTER CHART

Edu – Education

Occ – Occupation

Md – Married

Unmd – Unmarried

MSW – Male Sex Worker

PVD – Previous Venereal Disease

MSM – Men who have sex with men

OR – Oro receptive

OI – Oro insertive

AI – Ano insertive

AR – Ano receptive

Gr – Gram staining

Cul – Culture

Neg – Negative