



Case control study of STI patients and its associated risk factors

Rakesh Kumar Saroj^{*1}, K H V SS Narsimha Murthy², Manoj Kumar³, Avadhesh Kumar⁴

ABSTRACT

Background

A sexually transmitted infection (STI), also known as sexually transmitted disease (STD) or venereal disease (VD), is an illness that has a significant probability of transmission between humans by means of human sexual behavior, including vaginal intercourse, oral sex, and anal sex.

Methods

We performed a hospital-based, case-control study of 50 patients with STI/STD disease and 100 control patients were suffering from either another disease or attendant of patients. Chi-square and Multivariate logistic regression models were used for case-control comparisons.

Results

There is significant association was observed between the age of subject and study groups [Chi-square= 7.669 and p-value= 0.022]. There is significant association was observed between the gender and study groups [Chi-square=6.528, p-value=0.011]. 69.3% subjects were married out of which 28.8% belongs to cases and 71.2% belongs to controls. There is significant association was observed between per capita income and study groups [Chi-square=8.997, p-value=0.012]. There is significant association was observed between history of migration and study groups. [Chi-square=9.617, p-value=0.003]. Odds ratio between the STI/STD status and who had history of migration is 3.087 taking who had no history of migration. Odds ratio between the SIT/STD and type of family is 2.279 taking nuclear family. Odds ratio between the STI/STD and who had history of alcohol intake is 17.538. ROC Curve is drawn of total score to screen the STI/STD cases. The sensitivity of the test indicates that 96% of patients with a STI/STD have a positive diagnosis test and the specificity of the test indicates that 73% of patients with no STI/STD have a negative diagnosis test. Positive predictive value and 66% and Negative predictive value 97% along with 82.6% diagnostics accuracy.

Conclusions

The two most effecting cause of STI/STD are found are History of migration with 78% variation and history of alcohol intake with 31%.

Keywords: STI/STD, ROC Curve, Sensitivity, Specificity, Odds Ratio, Multivariate Logistic Regression

INTRODUCTION

Sexually transmitted infections (also known as STIs, or STDs for 'sexually transmitted diseases,' or VD for

'venereal diseases') are infections that are commonly/have a high probability of being spread from person to person through unprotected intimate contact. STIs can affect boys and girls of all ages and

GJMEDPH 2016; Vol. 5, issue 5

¹PhD Scholar, Department of Kayachikitsa, IMS – BHU, Varanasi

²Associate Professor, Department of Kayachikitsa, IMS – BHU, Varanasi

³Statistician, CCMG, Jamia Millia Islamia, New Delhi

⁴PhD Scholar, Department of Community Medicine, IMS – BHU, Varanasi

*Corresponding Author:

Rakesh Kumar Saroj

PhD Scholar

Department of Kayachikitsa, IMS – BHU, Varanasi, India

rakeshsaro@gmail.com

Telephone No.: 9454196475

Conflict of Interest—none

Funding—none

backgrounds who are engaging in sexual contact, including vaginal intercourse, oral sex, and anal sex. STIs can also be transmitted via the sharing of IV drug needles after their use by an infected person as well as through childbirth or breastfeeding. STI and STD are sometimes used interchangeably. More recently, the term STI has been used rather than STD (especially in the medical sector). The reason for this is that many people are infected but may not have had the infection show symptoms or turn into a disease. Being infected does not mean you feel sick or start to show signs of a disease. However, person may still, in fact, be infected, contagious and carrying the potential of a disease. Although all STDs are preceded by STIs, not all STIs result in the development of STDs. For instance, about 90% of women who are infected with human papillomavirus (HPV) clear their infections within two years. Only women with persistent infections are at risk for developing the disease – cervical cancer. (This does not address the strains of HPV which cause genital warts.) It is important to remember it is not necessary to have a disease or any symptoms at all, in order to be contagious.

As per 2002-03 ICMR study, the programme estimates occurrence of 30 million episodes of STI/RTI every year in the country. NACO target is to manage 70 lakh episodes of STI/RTI in 2014-15, of that the programme achieved 41.17 (59%) lakhs by the end of October, 2014. Many people who are infected with STIs that have not yet progressed to STDs have gone on to infect other people. One must also remember that, technically, all of this is medical jargon. It will take a lot of education to separate the two in the minds of the public. Most of the time, people don't know they are infected with an STI until they start showing symptoms of disease. Yet, it is still pertinent they are tested frequently because of the risks of transmission noted above. While the term STD has been around a long time (way back when, it was called venereal disease – named after Venus, the goddess of love), STI is becoming increasingly popular. Some people think this newer term helps minimize stigma around these illnesses; it's less harsh to talk about an infection as opposed to a disease. However, many people still don't know what

STI refers to. STDs are Sexually Transmitted Diseases while STIs are Sexually Transmitted Infections.

STIs are transmitted through sexual activity (vaginal, oral, & anal) and as a result of the infection, these STIs can become STDs overtime. This process is dependent on numerous factors: genetics, immunity, environment, individual make-up, continual exposure, treatment, the possibility of multiple STIs, continual sexual activity without protection. Sexually transmitted diseases or STDs often are silent, meaning there are no symptoms. Especially in a woman, may not notice any symptoms until you have developed serious complications. A drip or discharge from the penis, urethra, vagina, or anus. The color may be white, yellow, green, or gray. The discharge may be blood-streaked, and it may or may not have a strong odor. In addition, the direct physical, psychological and social consequences of STIs have a major impact on quality of life and are a prime indicator of the quality of global sexual and reproductive health care little progress in reducing the global burden of sexually transmitted infections: Despite the availability of several simple, cheap and cost-effective interventions to combat STIs, little progress has been made. An estimated 499 million new cases of curable STIs occurred in 2008, suggesting no improvement over the 2005 estimate of 448 million cases. STIs other than HIV have been overshadowed in recent years by the heightened public-health focus on HIV treatment, despite the strong association between STIs and HIV acquisition. In addition, stigmatization of sexual health issues has led to lack of political will and neglect of STI services in many countries. Many high income countries have developed quality services for diagnosis and treatment of STIs. Low and middle income countries lag far behind. Yet, with renewed energy and commitment, opportunities are available to jump-start STI-control efforts in low and middle income countries and integrate STI care into existing primary health-care, reproductive-health and HIV services.

REVIEW AND LITERATURE

Sexually transmitted infections (STIs) are a loosely defined constellation of infections and syndromes that are epidemiologically heterogeneous but all of which are almost always or at least often transmitted

sexually. They show various trends in different parts of the country. During the past decade, there is overwhelming evidence that both ulcerative and non-ulcerative STIs promote HIV transmission by augmenting Human immunodeficiency virus (HIV) infectiousness and susceptibility. However, changes in social behavior have altered the pattern of STIs, with certain STIs getting stabilized and certain others showing downhill trend.

As per statistics released by sexually transmitted infections and Reproductive tract infections (STI/RTI) are an important public health problem in India. A countrywide Rapid Assessment Survey (RAS) indicates that 12% of female clients and 6% of male clients attend the PHC OPD for complaints related to STI/RTI. The 2002 ICMR multi center community prevalence study of STI/RTI has shown that 5% to 6% of sexually active adult population is suffering from STI/RTI. Individuals with STI/RTI have a significantly higher chance of acquiring and transmitting HIV. Studying the origin of STIs helps us to learn the political, economic and moral conditions that led to the disease. Genital herpes, which was recognized as a venereal disease as late as in 1966, is presently the most common STD in parts of India. Others like bacterial vaginosis are being recognized more often than ever and accounts for majority of infection (26%) among women attending reproductive health clinic in New Delhi in 2000. A major recent advance in STI prevention is the early success of a prophylactic, monovalent human papillomavirus (HPV) type 16 vaccine; HPV vaccines may be able to help prevent genital and anal cancers in the foreseeable future. Researchers are evaluating multivalent vaccines for preventing moderate to severe cervical dysplasia as well. Other advances include easier episodic treatment of genital herpes and the use of suppressive therapy to reduce the transmission of genital herpes to regular partners. In a related development, a prophylactic vaccine against herpes simplex virus type 2 (HSV-2) has shown limited efficacy in that it has proved partly effective for HSV-sero-negative women, but not for men or herpes simplex virus type 1 (HSV-1) sero-positive women. Prevention successes of the recent past include STI sequelae, such as pelvic inflammatory disease and cervical cancer.

A randomized controlled trial showed that selective screening of women for Chlamydia trachomatis is significantly reduced the incidence of pelvic inflammatory disease. Widespread implementation of syndromic management as an approach to STI case management has apparently had a considerable effect on the epidemiology of STIs, particularly in resource-poor settings (King Holmes and Michael Alary, personal communication, May 15, 2003). In our society, especially in rural areas, males are common visitors to the STI clinic than the females who are generally traced as a contact.

This difference in presentation may probably be due to the asymptomatic nature of infections in females, less degree of freedom to women to go outdoors, lower awareness among women of need for availing medical facilities, or their frequent consultation in gynecological clinics instead of STI clinics.

MATERIAL AND METHODS

The present study has been conducted to undertake the status of STI/STD in Varanasi or Banaras (also known as Kashi) is located in the middle Ganga valley of north India, in Eastern part of the state of Uttar Pradesh. Sir Sunderlal Hospital was laid down in 1924 by His Highness Late Prabhu Narayan Singh, the then Kashi Naresh. It derived its name from Sir Sunderlal Ji, the first Vice Chancellor of Banaras Hindu University. Sir Sunderlal Hospital has continuously grown and reached to the present status of 1200 bedded modern hospital for Ayurveda and Modern Medicine disciplines. This growth of the hospital has been exponential and being maintained looking into the needs of the society (Academically, Research wise, as well as in terms of Patient Care). Period of study: The study was carried out from December 2014 to April 2015. Type of study: Cross sectional case control design is adopted. Eligible Study Cases and controls: All the patients who were suffering from any STI/STD are taken as cases and all the controls were suffering from either another disease or attendant of patients.

DATA COLLECTION METHODS AND TECHNIQUES

The survey is conducted to take primary data. So, first a structured schedule was developed. The sampling technique used was Simple Random

Sampling during data collection. Sample size comes out 50 in cases and 100 in controls which is rounded by 50 and 100 respectively. Socio-Demographic variables like sex, age, marital status, economical status, family size, type of family, migration status, per capita income and alcoholic status were collected through based on structured questionnaire. The data have been coded and ended into software named as SPSS 16.0 package (Statistical package for Social Sciences) and then the complete analysis was carried out. The interpretation and results of data were presented in the tabular form showing numbers (frequency) and percentages as well in graphical form, for example bar diagram. This has been derived by using by statistical tools, available in SPSS.

Per-Capita Income: It is defined as

$$\text{PCI} = \frac{\text{Total annual income}}{\text{Total No. of family member}}$$

OBSERVATIONS AND DISCUSSIONS

The table 1 shows the finding of STI/STD status with the several socio demographic variables such as age, gender, marital status, family type, family size, and per capita monthly income, age at marriage, history of migration, history of alcohol intake, and history of international travelling.

53.3% subjects were in the age group of less than 30, out of which 41.2% belongs to cases as compared to 58.8% in controls, 26.7% cases were in age group 31 to 40 years out of which 32.5% belongs to cases and 67.5% belongs to controls and 20% cases were in the age group greater than 40 years out of which 13.3% belongs to cases and 86.7% belongs to controls. There is significant association was observed between the age of subject and study groups [Chi-square= 7.669 and p-value= 0.022]. 55.3% subjects were male out of which 42.2% belongs to cases and 57.8% belongs to controls and 44.7% subjects were females out of which 22.4% belongs to cases and

77.6% belongs to controls. There is significant association was observed between the gender and study groups [Chi-square=6.528, p-value=0.011].

69.3% subjects were married out of which 28.8% belongs to cases and 71.2% belongs to controls. And 44.7% subjects were unmarried out of which 22.4% belongs to cases and 77.6% belongs to controls. There is insignificant association was observed between marital status and study groups [Chi-square=3.073, p-value=0.08].

According to per capita income, 41.3% of total subjects were in the category of less than 1500 rupees per month out of which 46.8% belongs to cases and 53.2% belongs to controls, 38.7% were in category of 1500-5000 rupees per month out of which 25.9% belongs to cases and 74.1% belongs to cases and 20% of total subjects were in the category of greater than 5000 rupees per month out of which 20% belongs to cases and 80% belongs to controls. There is significant association was observed between per capita income and study groups [Chi-square=8.997, p-value=0.012].

26.7% of total subjects had history of migration out of which 52.5% belongs to cases and 47.5% belongs to controls and 73.3% of total subjects had no history of migration out of which 26.4% belongs to cases and 73.6% belongs to controls. There is significant association was observed between per capita income and study groups. [Chi-square=9.617, p-value=0.003].

According to type of family, 47.3% total subjects were from joint family out of which 23.9% belongs to cases and 76.1% belongs to controls and 52.7% were from nuclear family out of which 41.8% belongs to cases and 58.2% belongs to controls. There is significant association was observed between per capita income and study groups [Chi-square=5.349, p-value=0.021].

Table 1 Socio Demographic Variables

Risk Factors	Groups		Total	Chi-square value	P value
	Cases	Controls			
Age group(in years)					
<30	33(41.2)	47(58.8)	80(53.3)	7.669	0.0057
31-40	13(32.5)	27(67.5)	40(26.7)		
>40	4(13.3)	26(86.7)	30(20.0)		
Gender					
Male	35(42.2)	48(57.8)	83(53.3)	6.528	0.011
Female	15(22.4)	52(77.6)	67(44.7)		
Age at marriage(in years)					
<18	9(24.3)	28(75.7)	37(34.9)	0.962	0.618
18-22	9(26.5)	25(73.7)	34(32.1)		
>22	12(34.3)	23(65.7)	35(33.0)		
Marital status					
Married	30(28.8)	74(71.2)	104(69.3)	3.073	0.08
Unmarried	20(43.5)	26(56.5)	46(30.7)		
Per capita income(in rupees)					
<1500	29(46.8)	33(53.2)	62(41.3)	8.997	0.012
1501-5000	15(25.9)	43(74.1)	58(38.7)		
>5000	6(20.0)	24(80.0)	30(20.0)		
History of Migration					
Yes	21(52.5)	19(47.5)	40(26.7)	9.617	0.003
No	29(26.4)	81(73.6)	110(73.3)		
Type of family					
Joint	17(23.9)	54(76.1)	71(47.3)	5.349	0.021
Nuclear	33(41.8)	46(58.2)	79(52.7)		
History of International travel					
Yes	3(75.0)	1(25.0)	4(2.7)	3.211	0.073
No	47(32.2)	99(67.8)	146(97.3)		
History of Alcoholism					
Yes	24(81.8)	5(17.2)	29(19.3)	39.52	0.073
No	26(21.5)	95(78.5)	121(80.7)		
Family size					
1-4	19(27.1)	51(72.9)	70(46.7)	3.789	0.15
5-8	23(43.4)	30(56.6)	53(35.3)		
>8	8(29.6)	19(70.4)	27(18)		

The table 2 shows the findings of odds ratio with different characteristics Odds ratio between the STI/STD status and male is 2.258 taking female as a reference that is the risk of STI/STD among male is 2.528 times higher than that of female but the 95% CI is [1.229 - 5.198]. The value of R² shows only 6% variation of STI/STD is explained through gender. Odds ratio between the STI/STD status and age group is 4.564 for age group less than 30 years and

3.310 for age group 31 to 40 years taking greater than 40 years as a reference that is the risk of STI/STD among first two category is higher than that of last category and the 95% CI is [3.388 - 117.290] and [1.625 63.160] respectively. The findings suggest the 4.5 times higher risk among the subjects having age less than 30 years as compare to age greater 40 years. According to only 8% variation of STI/STD is explained through age of subject. Odds ratio

between the STI/STD status and who had history of migration is 3.087 taking who had no history of migration as reference that is the risk of STI/STD among migrated category is 3.087 times higher than that of never migrated category and the 95% CI is [1.456 - 6.546] and The value of R^2 is 0.78 that is these independent variables explain 78% variation of the STI/STD status. Odds ratio between the STI/STD and type of family is 2.279 taking nuclear family as reference that is the risk of developing STI/STD among joint family is 2.279 times higher than that of nuclear family and the 95% CI is [1.126 - 4.612].

The value of R^2 is 0.049 that is these independent variables explain 5% variation of the STI/STD status. Odds ratio between the STI/STD and who had history of alcohol intake is 17.538 taking who had no history of alcohol intake category as reference that is the risk of STI/STD among alcoholic is 17.538 times higher than that of who had no history of alcohol intake and the 95% CI is [6.097 - 50.454]. The value of R^2 is 0.313 that is these independent variables explain 31.3% variation of STI/STD.

Table 2 Odds Ratio for various Socio-Demographic Variables with Different Characteristics

Risk Factor	Odds ratio	Confidence interval		R^2
		Lower	Upper	
Age group				
<30	4.564	3.388	7.29	0.077
31-40	3.13	1.625	3.16	
>40	1			
Gender				
Male	2.528	1.229	5.198	0.06
Female	1			
Per Capita Income				
<1500	3.515	1.262	9.79	0.08
1501-5000	1.395	0.478	4.07	
>5000	1			
Migration				
Yes	3.087	1.456	6.546	0.78
No	1			
Type of Family				
Joint	2.279	1.126	4.612	0.049
Nuclear	1			
Alcoholism				
Yes	17.538	6.097	50.454	0.313
No	1			

The total score of a subject is calculated by summing the odds ratio of significant independent variables. ROC Curve is drawn of total score to screen the STI/STD cases. The sensitivity of the test indicates that 96% of patients with a STI/STD have a positive diagnosis test and the specificity of the test indicates that 73% of patients with no STI/STD have a negative

diagnosis test. Positive predictive value 66% and Negative predictive value 97% along with 82.6% diagnostics accuracy; this indicates that 66% of patients who had a positive diagnosis test had a STD/STI and 97% who had a negative diagnosis test did not have a STI/STD.

Table 3 2x2 Table for Distribution of Study Subjects According to Case and Controls

	Cases	Controls	Total
Positive	50 (a)	26 (b)	76
Negative	2 (c)	72 (d)	74
Total	52	98	150

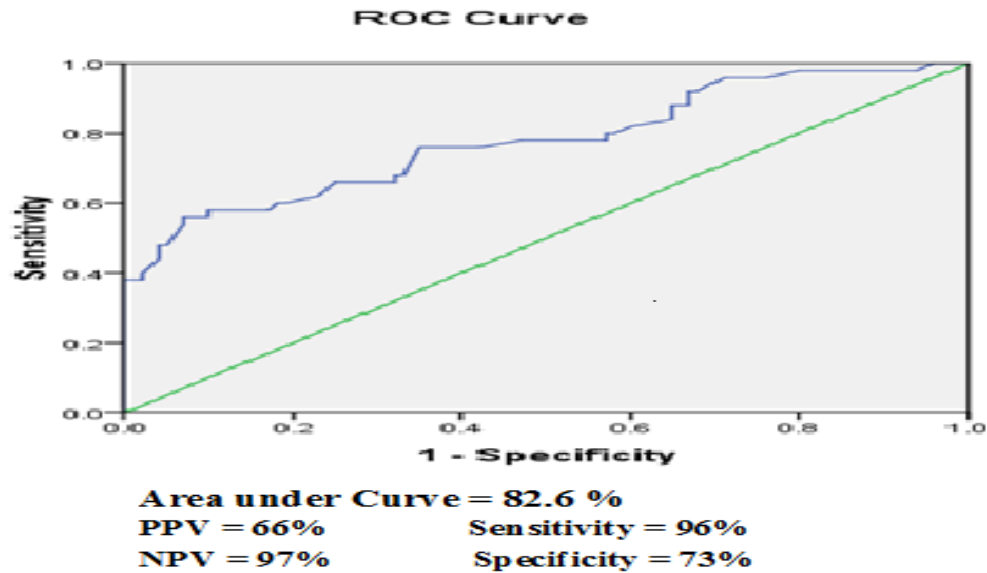


Fig 1 ROC Curve for Case Control Data

SUMMARY AND CONCLUSION

The topic "Case –Control study of STI Patients and its associated risk factors" is based on the analysis and interpretation of the data collected from the patients and their attendant of SSLH, BHU Varanasi. On the basis of collected data we conclude that:-Percentage of STI/STD patients in younger age group is higher than elder age group. Number of males is greater in comparison of female suffering from STI/STD. Percentages of patients suffering from STI/STD are greater in late marriages in comparison of early marriages. Numbers of subjects are higher in unmarried group. Peoples belongs to low income group are more likely to suffering from STI/STD in contrast of higher income group. Number of subjects are higher in the group those who had history of migration. The two most effecting cause of STI/STD are found are History of migration with 78% variation and history of alcohol intake with 31%. In this study showed that 66% of patients who had a positive diagnosis test had a STD/STI and 97% who had a negative diagnosis test did not have a STI/STD. This

study had certain limitations; this was a cross-sectional and center-based study, therefore results from analysis cannot be generalized. Also, the study was based on the assumption that the participants responded honestly and to the best of their knowledge and ability. Other limitation includes the fact that no information was collected on sexual behaviors such as number of sex partners, condom use, and type of sex. These would have helped to assess the risk factors further.

REFERENCES

1. Book of Preventive and social medicine by K.Park
2. Book of Epidemiology by Leon Gordis
3. Ho GY, Bierman R, Beardsley L, Chang CJ, Burk RD. National history of cervicovaginal papillomavirus in young women. N Engl J Med. 1998; 338 (7):423-428. Available at: <http://content.nejm.org/cgi/reprint/338/7/423.pdf>. Accessed September 29, 2005.
4. Centers for Disease Control and Prevention. Genital HPV Infection Fact Sheet. Atlanta, GA: Centers for Disease Control and Prevention, US Dept of Health

- and Human Services; May 2004. Available at <http://www.cdc.gov/sti/HPV/hpv.pdf>. Accessed September 26, 2005. Authored by: Kate Hendricks, MD, MPH&TM
5. Kilmarx P. Acquired immunodeficiency syndrome. In: Heymann DL, editor. Control of communicable diseases manual, 19th Edition. Washington, D.C.: APHA Press; 2008.
 6. CDC. Late HIV Testing—34 States, 1996–2005. *MMWR* 2009; 58(24):661-5.
 7. RA Weis and RW Wrangham. From Pan to pandemic. *Nature* 1999; 397:385-6.
 8. http://upsacs.in/StaticPages/sti_about.aspx
 9. http://www.naco.gov.in/upload/2015%20MSLNS/Annual%20report%20_NACO_2014-15.pdf
 10. Marks, G., Crepaz, N., Senterfitt, J., Janssen, R., Meta-Analysis of High-Risk Sexual Behavior in Persons Aware and Unaware They are Infected with HIV in the United States: Implications for HIV Prevention Programs. *Journal of Acquired Immune Deficiency Syndromes*. 2005; 39(4):446-453.
 11. Gaur, A.H., Dominguez, K.L., Kalish, M.L., Rivera-Hernandez, D., et al. Practice of Feeding Premasticated Food to Infants: A Potential Risk Factor for HIV Transmission. *Pediatrics*. 2009; 124:658-666.
 12. Vidmar, L., Poljak, M., Tomazic, J., Seme, K., Klavs, I. Transmission of HIV-1 by human bite. *Lancet*. 1996; 347:1762–1763.
 13. CDC. Human immunodeficiency virus transmission in household settings-United States. *MMWR* 1994; 43 (19):347-356
 14. Carey, Lytle, & Cyr. Implications of laboratory tests of condom integrity. *Sexually Transmitted Diseases* 1999; 6(4):216-20.