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ORIGINAL PAPER

Prevalence and Risk Factors Associated with Sexually Transmitted Diseases (STDs) in Sikkim

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Abstract The population of Sikkim is a unique blend of multi-tribal and metropolitan culture. However, till date, no data regarding prevalence of sexually transmitted diseases (henceforth abbreviated as STDs) among this population is available and hence requires attention. Hence the objective is to determine the prevalence of STDs in Sikkim and to describe associated risk factors. A cross-sectional study involving 'Questionnaire-based anonymous feedback system' was followed to collect data from 2,000 individuals across the society. The four most common STDs, gonorrhea, syphilis, chlamydia and HIV, were considered for the study. Total 69 (3.6 %) cases of STDs were found in 1,918 individuals was affected by at least one of the STDs, out of which 43 were males and 26 were females. Cases of gonorrhea, syphilis, chlamydiasis and HIV were 25, 22, 4 and 18 respectively. Out of total 69 cases of STDs, 20 individuals were also suffering from some kind of hepatitis. Addictions like alcoholism, smoking and drugs were also found in significant number, with 1,019 (>50 %) individuals with at least one of these addictions. Relative risk analysis indicates that gender-wise females are more vulnerable to STDs than males. The number of partners, addictions, especially alcohol and drug abuse, also contribute to STD cases. STDs act as a significant risk factor in transmitting some of the types of hepatitis. In such cases, females are more vulnerable than males. The results suggest that new community health programs are essential for both, HIV and non-HIV STDs in Sikkim.

Keywords Sikkim · Sexually transmitted diseases (STDs) · Risk factors · Addictions

Introduction

Sikkim is a small, remote, mountainous state, bound by the Tibetan Plateau in the north, the Chumbi Valley of Tibet and the Kingdom of Bhutan in the east, the Republic of Nepal in the west and Darjeeling district (West Bengal) in the south [1]. As per the 2011 census, its population is 607,688 with more than 20 % defined as tribal, and the density is 86 persons per sq. km. Nepali, Bhutia and Lepcha are the three main ethic groups of this society with many minor ethic groups such as Rai et al. [1]. Its geographical location has a very significant socio-cultural influence on its population. Most of the population (almost 60 %) is concentrated in the East district. The majority of the population has an urban lifestyle. Like any other urban lifestyle, high risk behaviors like addictions are seen in this population too [2–6]. Although polygamy has long been prevalent in some sections of the Sikkimese population [7], pre-marital and extra-marital sexual relationships exist here as in other urbanizing populations. Hence, as a cascading effect, sexually-transmitted diseases (STDs) cases may also increase rapidly. As per the District Level Household Survey-3 (DLHS-3) (2007–2008), almost 21.5 %

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Sikkimese women had symptoms of Reproductive Tract Infections (RTI)/sexually transmitted infections (STI). However, it does not deal the topic with any further details.

STDs affect more than 350 million people every year world-wide [8]. In India, accurate data regarding prevalence of STDs is not available [9]. The community-based STI/RTI prevalence study (2003) showed that over 6 % of the adult population in India suffered from one or more STD annually [9]. STDs are caused by more than 30 different organisms including bacteria, viruses, fungi and protozoa. If untreated, STDs may impair reproductive, maternal and new-born health and increase the likelihood of acquiring certain health complications including hepatitis (Hepatitis A/B/C/D) [10–13], HIV, miscarriages, premature and/or still births [14–17]. The official data focuses mainly on HIV cases and hence non-HIV STDs remain neglected (NFHS-3). The association of risk factors such as multiple partnerships with the prevalence of STDs, especially when coupled with unsafe sex, is already known [18–20]. Other factors such as smoking, alcohol and drug abuse may further promote such practices [21–26]. The baseline data of the prevalence of STDs (especially non-HIV) and the risk factors associated with STDs among Sikkimese population is not available. Therefore this preliminary study will analyze the prevalence of four major STDs and the associated risk factors in Sikkim.

Materials and Methods

Study Design

Cross sectional study based on Questionnaire-based anonymous feedback system (QAFS).

Institutional Approval for the Study

The approval of the Committee for Advance Studies and Research, Sikkim University was obtained prior to beginning of the study.

A detailed English questionnaire (Fig. 1) covering relevant aspects of the subject including demographics (gender, age), socio-economics (e.g., profession, income), dietary habits (e.g., vegetarian/non-vegetarian, fermented/non-fermented foods), physical activity, life-style behavior (e.g., addictions), living conditions (e.g., house type, sanitation), sexual activity (e.g., marital status, number of partners) and medical history (e.g., diseases, medication). The questionnaire considered only four major STDs prevalent in Sikkim, namely gonorrhea, syphilis, chlamydia and HIV, based on some earlier study [27].

Sampling

Stratified random sampling method was employed to collect samples. Random locations in Sikkim, in and around Gangtok, including villages, panchayats, markets, cinema halls, colleges, offices, schools, hotels, taxi stands, hydropower project, rehabilitation centre and hospitals were selected for sampling. Adequate care was taken to incorporate all strata of society with all individuals more than 15 years old. A total of 2,000 individuals (subjects) were interviewed for the study out of which 1918 valid/complete entries were used for analyses.

Respondents were explained the purpose of study (for sincere response), our affiliations (for credentials of study) and anonymous nature of questionnaire (for reliable answers). The questionnaire was administered by a team of M.Sc. and M.Phil. students to the participants in form of an interview and hence did not depend on the literacy status of the participant. As the questionnaire was in English, symptoms were described in Nepali/Hindi for those subjects who did not understand scientific or English terms. Symptoms were explained to respondents to identify the exact disease/ailment and then after confirmation were marked on questionnaire. Some local terms for particular diseases like Bhirange (Gonorrhoea), Phirang rog (Syphillis) were also used wherever possible.

Data Analysis

Definitions of the some of the variables considered are as follows:

Smokers

Participants who answered yes to smoking, irrespective of frequency/type/.

Alcoholics

Participants who answered yes to alcohol, irrespective of frequency and type including home-brewed.

Drug Abusers

Participants who answered yes to drugs (including local, ganja smoking).

No. of Sex Partners

Time line not considered and hence treated as no. of partners over life-time.

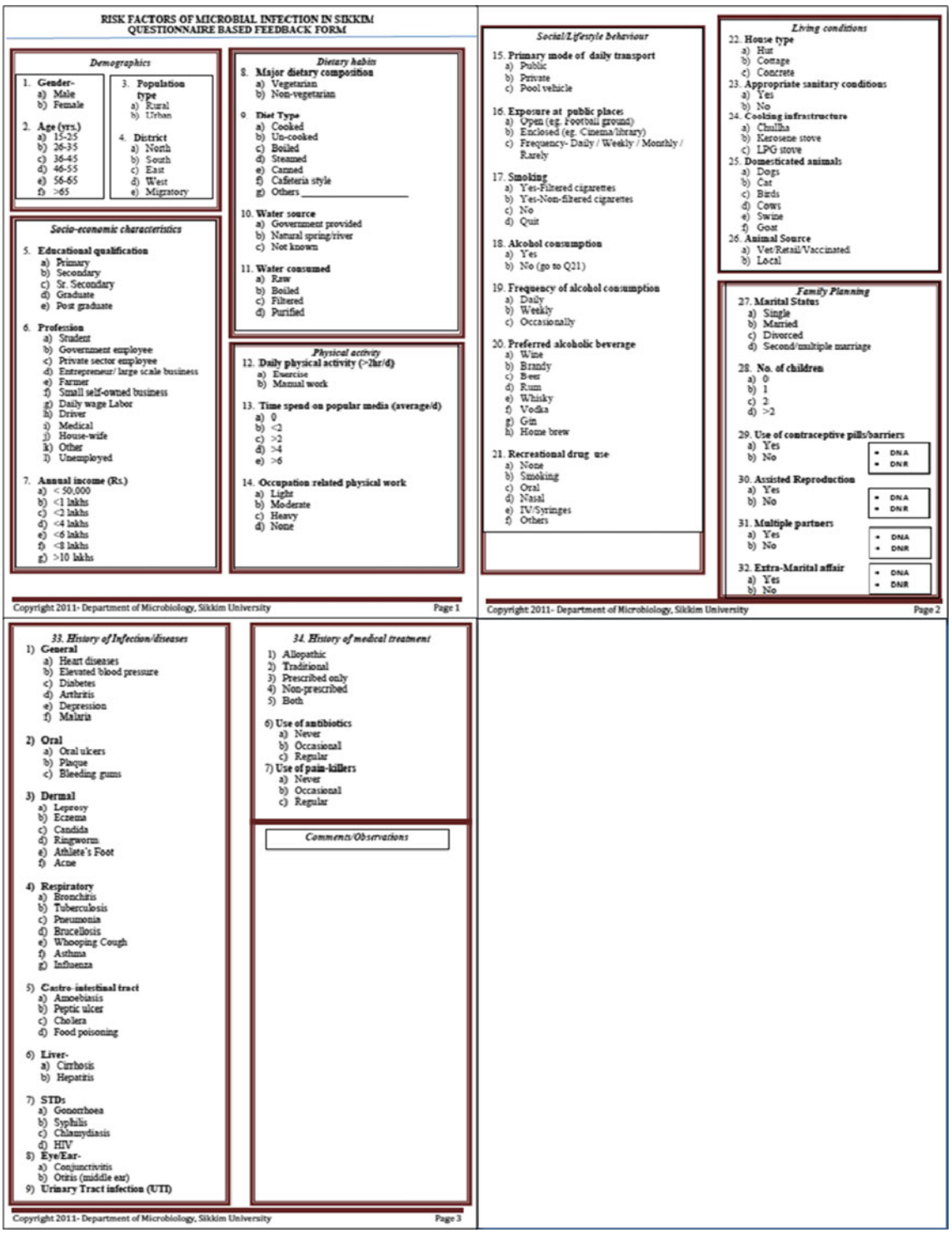

Fig. 1 Questionnaire used for the study

Data was converted into Microsoft Excel format (*.xls*) and used for analysis. Ambiguous entries (incomplete/doubtful/multiple answers) were not considered for analysis. For data analysis, two software packages, Microsoft Excel 2007 and Graphpad Prism 5, were used.

Statistical Analysis

Relative Risk analyses were carried out using online software "MEDCALC" (Version 12.2.1- © 1993–2012, MedCalc Software, Broekstraat 52, 9030 Mariakerke, Belgium).

Relative Risk Calculation

Exposed group	
Number with positive outcome:	a=
Number with negative outcome:	b=
Control group	
Number with positive outcome:	c=
Number with negative outcome:	d=

Relative risk = $[a / (a + b)] / [c / (c + d)]$

Criteria for Significance of Relative Risks

RR $\approx$ 1 means the association between exposure and disease unlikely to exist.
RR $>$ 1 means the increased risk of disease among those that have been exposed.
RR $<$ 1 means the decreased risk of disease among those that have been exposed.

Results

Out of total respondents, 1329 were male and 589 were female. The age group composition of respondents was 15–25 years (48 %), 26–35 years (32 %), 36–45 years (11 %), 46–55 years (5 %), 56–65 years (2 %) and more than 65 years (2 %). From 1918 respondents considered for analysis, 69 respondents reported at least one of the STDs, constituting 3.6 % of the total sample size, including two subjects with two STDs simultaneously. The distribution of STDs in these patients was gonorrhea 25 (36 % of total STDs), syphilis 22 (32 %), chlamydia 4 (6 %) and HIV 18 (26 %). There were no significant differences between rural and urban populations. The prevalence of gonorrhea, syphilis and Chlamydia was higher in males (83, 67 and 67 % respectively), but females were more vulnerable for HIV infections (65 %) (Table 1).

Respondents aged 15–25 years reported 50.8 % of the STDs with a further 32.3 % in the 26–35 years age group. Within each age group, the percent prevalence was, 15–25 years (3.58 %), 26–35 years (3.41 %), 36–45 years (2.78 %), 46–55 years (3.23 %), 56–65 years (2.17 %) and more than 65 years (4.76 %). Students were the largest group with 29 % of the STDs, followed by government employees (19 %) and drivers (13 %). If we see the percentage prevalence of STDs within each age group out of total number of individuals of that age group, it was found that all the three young age groups (15–25, 26–35 and 36–45 years), are contributing almost equally. Although the older age groups (46–55, 56–65 & >65 years) show more percentage prevalence within group, their numbers in survey as well as in the society are less.

Multiple partners were more common in the single/unmarried group. There were 28 cases of STDs with multiple sex partners and 29 cases in group with a single partner; the other 12 cases did not respond to this question.

Table 1 Prevalence of STDs and lifestyle habits in Sikkim

No.	Characters	Male	Female
1.	No. of participants	1,329	589
2.	Total STD positive	43	26
3.	Types of STDs		
	Gonorrhoea	20	05
	Syphilis	14	08
	Chlamydiasis	03	01
	HIV	06	12
4.	Marital status		
	Unmarried	723	361
	STD positive	22	17
	Married	571	213
	STD positive	21	9
5.	No. of Partners		
	Single partner	788	373
	STD positive	16	15
	Multiple partner	243	42
	STD positive	20	09
6.	Alcohol		
	Yes	657	171
	STD positive	29	15
	No	575	361
	STD positive	15	10
7.	Smoking		
	Yes	472	67
	STD positive	16	4
	No	834	511
	STD positive	27	22
8.	Drugs		
	Yes	156	48
	STD positive	8	5
	No	1,172	541
	STD positive	33	21
9.	Addictions		
	At least one	810	209
	STD positive	31	17
	None	518	380
	STD positive	11	10
10.	Hepatitis		
	Yes	64	32
	With STDs	8	12

Table 2 Statistical analysis of various risk factors for prevalence of STDs

No.	Criteria used	Relative risk	CI (95 %)	*Z* statistic	*P* value
1	Gender (Female vs. male)	1.3643	0.8466 to 2.1986	1.276	$P = 0.2019$
2	No. of sex partners (single vs. multiple)	3.9573	2.5136 to 6.2301	5.941	$P < 0.0001$
3	Alcohol (yes vs. no)	1.9896	1.2288 to 3.2214	2.798	$P = 0.0051$
4	Smoking (yes vs. no)	1.0193	0.6118 to 1.6980	0.073	$P = 0.9416$
5	Drugs (yes vs. no)	1.9505	1.0859 to 3.5035	2.236	$P = 0.0254$
6	Addictions (yes vs. no)	2.0165	1.2171 to 3.3410	2.723	$P = 0.0065$
7	STDs as a risk factor for hepatitis	7.0519	4.5874 to 10.8402	8.904	$P < 0.0001$

The prevalence of STDs was higher in alcoholics (5.36 %) and drug abusers (5.42 %) than in smokers (3.89 %) and lowest in non-addicts (2.34 %), the only group lower than the overall average. There were 96 cases of hepatitis (5 % of study) (sub-types not known), with 20 (21 %) of these also positive for STDs. These 20 patients represent 29 % of respondents with STDs (Table 2).

Discussion

The study on prevalence and risk factors associated with sexually transmitted diseases in Sikkim was quantitative in nature with deductive approach and for collection of data; a stratified random sampling technique was employed. For a population of 607, 688 people, 400 samples could have been sufficient, however considering the occurrence of STD in India is 6 %, the heterogeneous population of Sikkim and the number of variables included in the questionnaire, a larger sample of 1918 people was used to conduct this study.

The prevalence of STDs in Sikkim at 3.6 % appears lower than the Indian average of 6 %; however, this still indicates about 21000 patients with STDs in the state. Patients with STDs are more likely to be young, especially between 15 and 25 years-old, single, and students, with multiple partners and lower usage of barriers. This suggests that the prevalence may increase over the next 5–10 years. Importantly, the relationship between substance abuse (tobacco, alcohol, drugs) and STDs indicates that awareness programs on substance abuse could also decrease the incidence of STDs in Sikkim.

The gonococcal infections were found to be maximum in number, followed by syphilis, HIV and Chlamydia. As these diagnoses were based on symptoms, there are chances of under-reporting particular diseases, especially those which are asymptomatic sometimes. However, this limitation of the study needs to be rectified in future thorough studies.

Relative risk analysis for various risk factors clearly establishes that number of sex partners, addictions like alcohol and drugs indeed pose the risk of acquiring STDs. Among addictions, smoking does not appear to pose serious risk for getting STDs; however overall addictions (at least one of these) definitely pose a risk of getting STDs. The analysis also reveals that STDs act as a risk factor for acquiring hepatitis. Females seem to be at more risk of acquiring STDs than males. As far as number of sex partners is considered, more than 500 participants did not respond, hence leading to under-reporting of cases. However, given the social orientations of Indian population, such issues will always face problem in collecting genuine data.

Substance abuse and STDs may both be related to increased risk-taking in young adults [21–26], with an inverse age relationship. Substance abuse involving intoxication including alcohol intake and drug abuse may predispose more than stimulatory addiction such as smoking [28, 29].

The "A–B–C" approach [20] seems relevant for prevention of not only HIV but also non-HIV STDs. These three steps are 'A' for abstinence (or delay) in sexual activity, 'B' for being faithful to one partner and 'C' for use of condoms.

Females constitute a vulnerable group since STDs may lead to abortions, premature births or stillbirths and infertility [14] as well as mother to child transmission of infections such as HIV. Females are more efficiently infected by HIV than males [30].

Although the data regarding sub-types of hepatitis was not collected, it is a known fact that almost all the types of hepatitis including hepatitis A, B, C and D (not known about hepatitis E) can transmit through the sexual intercourse [10–13] and hence their chance of transmission increase in the presence of STDs. Therefore the co-prevalence of both in the current study may not merely be a coincidence, although not proven clinically/pathologically. To prevent this co-prevalence (if any), the treatment for STDs may be coupled with vaccination/treatment of hepatitis [12, 31, 32]. It also seems that women with STDs are more vulnerable as compared to males (with STDs) in acquiring hepatitis.

Sikkim remains a popular tourist destiny for Indian and foreign tourists, which could increase the risk of STD transmission [33, 34]. These risks are manageable if society is made well aware of the risks of STDs, to improve the health status while increasing tourism.

The young population of India is critical for the rapidly growing Indian economy [35]. Hence, it is imperative to keep this working population healthy. Although this study was carried out with stratified random sampling and is preliminary in nature, it gives an idea about the prevalence and risk factors for STDs in Sikkim. However, more detailed, higher level studies by epidemiologists must be carried out to establish the cause-effect relationships between various risk factors and prevalence of STDs. Thorough understanding of these relationships can help decision makers in designing the effective remedial measures to decrease the risk factors of STDs to improve the quality of life of people and also to capitalize the demographic dividend for the developmental process.

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