

Reproductive tract infections in rural India – A population-based study

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ABSTRACT

Context: Reproductive tract infections (RTI) occupy the second position among public health problems. **Aims:** To find out the prevalence of RTI and its associated conditions among ever married women in the reproductive age group (15–49 years). **Settings and Design:** This cross-sectional study was conducted among 330 women in a rural area of Poonamallee block at Thiruvallur district in Tamil Nadu from August 2013 to January 2014. **Materials and Methods:** In this cross-sectional study, the selection of participants was done through cluster sampling and data on symptoms by questionnaires. **Statistical Analysis Used:** For descriptive prevalence, statistics was used. Using Chi-Square, categorical data were analyzed and using the odds ratio *P* value associations were assessed. **Results:** About 21% had anyone symptom of RTI. Occupation of women (OR2.0), occupation of spouse (OR1.9), anemia (OR 2.0), dysuria (OR51.5), burning micturition (OR15.9), frequency (OR3.3)/the urgency of urination (OR2.7), and incomplete urination (OR5.4)/defecation (OR3.6) were significantly associated with RTI. The prevalence rate of abnormal vaginal discharge was more (12%) than any other symptoms (each <4%) of RTIs. **Conclusions:** The prevalence of RTI was high. Moreover, women with dysuria, burning micturition, incomplete urination/defecation, frequency/the urgency of urination, and anemia are at a higher risk of developing RTI.

Keywords: Abnormal vaginal discharge, endogenous type of RTIs, reproductive age group women

Introduction

Among young women in developing countries, the universal public health problem is reproductive tract infections (RTIs) which occupy the second position in public health problems.^[1] RTIs lead to 17% of economic losses in these countries.^[2] RTIs are presently ignored as a significant health issue though it disturbs the social wellbeing of women during their most productive age.^[3] According to WHO estimates in 2008, globally 499 million new cases of RTIs occur annually among women in the reproductive age group.^[4] In India, one among four women in the reproductive

age group has any one type of RTIs^[5] and the annual incidence of RTI estimated is about 5%.^[6] Consequently, the prevalence rate of RTIs in various states of India was 19% to 71%.^[7]

Risk factors for RTIs include biological, sociodemographic, behavioral, and medical factors. Biotic factors are infectivity duration and other STDs presence; behavioral factors are lack of awareness about RTIs/barrier contraceptives, early onset of sexual activity and false beliefs; socio-demographic factors are young age, duration of marriage, education, employment, husband literacy, and socioeconomic status; and medical factors are lack of access to healthcare facilities.^[8]

Three types of RTIs are endogenous infections (overgrowth of microorganisms usually present in the genital tract of women); iatrogenic infections, associated with poorly performed procedures (unsafe abortion/poor delivery practices); and

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sexually transmitted diseases (STDs)/human immunodeficiency virus (HIV).^[9] In pelvic infections, about 85% are endogenous infections.^[10] During menstruation, pregnancy, and childbirth women are at risk of developing RTIs due to inborn physiological characteristics of the female reproductive tract.^[11]

The consequences of RTIs are infertility, pelvic inflammatory disease, ectopic pregnancy, intestinal obstruction, abortion, cervical cancer, HIV transmission, and marital disharmony.^[12] Although early detection and care prevent complications and reduce long-term sequel, a higher proportion of RTIs remains undiagnosed and untreated. About 70–80% of gynecological chlamydial infections are asymptomatic and unnoticed.^[13] Due to distressing consequences such as maternal and neonatal mortality and morbidity^[14] there is a need to study RTI.

Even though many studies have been conducted to determine the prevalence rate of RTIs, there is a lack of information about the association of RTI with certain conditions in a rural area. The present study was undertaken to fill this emptiness, which covers symptoms of RTIs comprehensively. This study was part of the primary research conducted to assess gynecological morbidity. The objective of this study is to find out the prevalence of RTIs, among ever married women of the reproductive age group in a rural population and to study the association between RTI and certain conditions.

Subjects and Methods

This study was made among rural ever married women in the reproductive age group (15–49 years), residing in Poonamallee block at Thiruvallur district in Tamil Nadu. In a previous study done among the rural women of the reproductive age group, the prevalence rate of gynecological morbidity was 39%.^[15] Twenty percent of this anticipated prevalence was fixed as the limit of accuracy with an alpha error of 5%, with a design effect of two for a cluster among 330 women, who were included in the sampling. Inclusion criteria comprised the participants who had signed the written consent and were residing in the study area for at least 6 months. Excluded participants were women who had aborted or delivered within 3 months of the date of the interview, antenatal women, known psychiatric women, bedridden women, transgender, and women who had a hysterectomy due to any cause. Data were collected for 6 months (August 2013 to January 2014).

The study area Poonamallee block had 106 villages with a total population of 165,100. This study was done with a two-stage cluster sampling method. Thirty clusters were selected by using PPS (probability proportionate to size), and 11 participants were selected from each cluster. For adopting a questionnaire, the Electronic Encyclopedia of Perinatal Data (EPPD) –Volume XV– Questionnaires in Gynecology was utilized. For this adaptation of the questionnaire, written permission was sought from Dr. Rupert Fawdry in October 2012. The Institutional Ethics Committee of Sri Ramachandra University approved this

study (12th June 2013). Each participant had signed in a written informed consent form. As per Prasad's classification (2010), socioeconomic status was classified. Anemia was diagnosed by clinical examination of the pallor of nail buds/conjunctiva/tongue, with or without dyspnoea/pedal edema.^[16] Presence of at least any one symptoms such as abnormal vaginal discharge, itching in and around genitalia, genital ulcer, lower abdomen pain (not related with bowel habits), inguinal swellings, dysuria, burning in genitals (persistently), dyspareunia (pain during sex), low backache, ulcer over the proclivencia (complete prolapsed uterus) were considered as symptoms of RTIs. During menstruation and childbirth, women are at risk of developing RTIs.^[11] Hence the presence of at least any one menstrual disorder and/or urinary and/or anal disorders and/or anemia were is considered as a risk condition for developing RTI.

Operational definitions -

Abnormal vaginal discharge ^[17]	Vaginal discharge with any of the following - smell/color change /excessive amount (if staining cloths)/irritation.
Oligomenorrhea ^[18]	Cycle length >35 days or duration <2 pads/day
Polymenorrhea ^[18]	Cycle length of five pads/day) and/or duration (>5 days)
Menorrhagia ^[18]	Regular cycles; excessive flow (>5 pads/day) and/or duration (>5 days)
Metrorrhagia ^[18]	Irregular cycles; excessive and/or duration (>5 days)
Secondary amenorrhea ^[19]	Absence of menstruation for three cycles
Stress incontinence ^[20]	Involuntary loss of urine during certain activities such as coughing, sneezing, laughing, or exercise.
Increased frequency of urination ^[20]	Urinating >eight times during day time
Incomplete urination ^[20]	Difficulty in emptying the bladder.
Dysuria ^[20]	Difficulty while passing urine.
Burning micturition ^[20]	Pain and/or burning sensation while passing urine.

Statistical analysis

Data were analyzed using SPSS version 16.0. to determine the mean age of subjects and for the prevalence rate of common symptoms of RTIs, descriptive statistics were used. Using Chi-Square categorical data were analyzed. Association between common symptoms of RTIs with sociodemographic factors and certain conditions were assessed by odds ratio and *P* value.

Results

Out of 340 women who were contacted, the study result was presented for 330 women. Respondent's mean age was 34.1 years. Among the 330 women, 201 (60.9%) of them had attended a minimum of 10 years of schooling and 35 (10.6%) had not attended the school at all. More than three fourth of women 258 (78.2%) were homemakers. About 25% of women belonged to the lower socioeconomic class (class IV and V). About 71% of women were using sanitary napkins during their menstruation. The prevalence of any one type of symptoms of RTIs among

study women was 68 (20.6%), (95% CI 16.5%–25.2%). Overall, women with only one symptom of RTIs were 41 (12.4%). About 9% of women had multiple signs of RTIs.

Table 1 shows that 39 women had abnormal vaginal discharge (11.8%). The prevalence of other symptoms of RTIs was less than 4%. Seven women had decubitus ulcer in proclivencia. Five women had compliant with dyspareunia (1.5%).

Table 2 shows that working women (OR2.0) and spouses of unskilled workers (OR1.9) had a higher risk for RTIs than homemakers and spouses of semiskilled or skilled workers. A significantly higher proportion of women with anemia (OR2.1), incomplete defecation (OR3.6), dysuria (OR51.5), burning micturition (OR15.9), incomplete urination (OR5.4), urgency (OR2.8), and increased the frequency of urination (OR3.3) had elevated the risk of developing RTIs than their counterpart. Among women with RTIs, 53 (79.1%) women had at least anyone pre-existing conditions such as menstrual disorders, urinary/anal disorders, and anemia and then encountered RTI.

As the prevalence rate of abnormal vaginal discharge was more (12%) than any other symptoms (<4%) of RTIs, subgroup analysis was done. Table 3 shows that abnormal vaginal discharge for women of age 35 and less was 5.1 times higher than women of the age of more than 35 years. Women with ≤15 years of married life were nearly four times at higher risk of having abnormal vaginal discharge than women with >15 years of married life. A higher proportion of women with any one of the menstrual disorders and incomplete defecation had suffered nearly 2.5 times more with abnormal vaginal discharge compared to their counterparts. Women with secondary amenorrhea had eight times, and dysuria had about six times more risk of developing abnormal vaginal discharge than women without these conditions.

Discussion

Among 330 ever married women of reproductive age group (15–49 years) in a rural area of Poonamallee block at Thiruvallur

Table 1: Prevalence of symptoms of RTIs

Symptoms	Frequency (%)# (n=330)	95% CI
Abnormal vaginal discharge	39 (11.8%)	8.7-15.6
Itching in and around genitalia	13 (3.9%)	2.2-6.5
Burning in genitals	13 (3.9%)	2.2-6.5
Dysuria	12 (3.6%)	2.0-6.1
Lower abdomen pain (Pelvic pain only)	10 (3.0%)	1.6-5.3
Decubitus ulcer in proclivencia	7 (2.1%)	0.9-4.2
Dyspareunia	5 (1.5%)	0.6-3.3
Genital ulcers	3 (0.9%)	0.2-2.5
Low back ache	2 (0.6%)	0.1-2.0
Inguinal swellings	0 (0.0%)	0.0-0.0

#Net percentage will not tally for 100 since women had multiple morbidities

district in Tamil Nadu, this cross-sectional study was made to assess their RTIs. Nearly 21% had at least any one type of RTIs, similar to a study done in Bangalore,^[21] where 29% had RTIs. The prevalence of abnormal vaginal discharge was more common than other symptoms of RTIs, like in Bangalore’s study. Very few (0.9%) women had genital ulcers and none complained of inguinal swellings in both these studies.

In the current study, higher proportion spouses of unskilled workers had suffered more from RTIs than spouses of semiskilled and skilled workers. This might be due to poor personal hygiene of their partners. The current study discloses that employed women had elevated odds of RTIs compared with homemakers was identical to a survey done in Tamil Nadu.^[22] This finding is similar to a study published recently in 2019 in India.^[23] The current study shows that other than occupational status, all other sociodemographic factors were insignificantly associated with RTIs like in Bangalore’s study.^[21]

RTI when cross-tabulated with the frequency of abortions, mode, and the number of deliveries and contraceptive usage exhibited no significant association. This could be due to the betterment of maternal and child health (MCH) care provided in Tamil Nadu. The present study revealed that the prevalence of genital ulcers was very less (0.9%) and no one had inguinal swellings, which proves symptoms of sexually transmitted/HIV type of RTIs were very less prevalent, similar to HIV prevalence (0.3%) in 2016 in India.^[24]

The association of anemia with RTI proved in this study is similar to a survey done by Ayoya *et al.*^[25] The present study shows 44.1% of women with incomplete defecation had RTIs. This could be attributed to microflora derived from the gut resulting in intermittent exacerbation of RTIs/abnormal vaginal discharge similar to a study done in 2011.^[26] In this present study, dysuria and burning micturition were significantly associated with RTI/abnormal vaginal discharge comparable to a study done in Iran in 2007. The current research also shows a significant association for increased frequency of urination and urgency with RTI but this association was insignificant in Iran’s study. This might be due to the minimal sample size in that study.^[27] Women with a history of incomplete urination were 5.1 times at a greater risk of developing RTIs in this study; the reason could be incomplete urination aggravate multiplication of microorganisms’ which was explained by Dutta.^[10]

In this study, it was found that among 330 women, a higher percentage of women (16%) had certain pre-existing conditions such as anyone menstrual disorder/urinary/anal disorders, and anemia, which constitutes an endogenous type of RTI. This type of RTI was higher than any other type of RTIs, which was similar to the one reported by Dutta.^[10] The same results were observed in another study done in China in 2019, where the prevalence of endogenous RTI was found to be 19.7% through laboratory testing.^[28] The result of the present study (16%) was identical to age-adjusted rates of endogenous infections of

Table 2: Association of Reproductive Tract Infections and specific conditions (n=330)

Variables		Total no of women	No of Women with RTI (n=68) n (%)	Odds ratio	95% CI	P
Age	≤35	200	46 (23.0)	1.466	0.833-2.579	0.1826
	>35 yrs	130	22 (16.9)			
Duration of married life	≤15 yrs	202	45 (22.3)	1.309	0.748-2.29	0.346
	>15 yrs	128	23 (18.0)			
Education of wife	<High school	129	31 (24.0)	1.402	0.818-2.403	0.218
	≥High school	201	37 (18.4)			
Occupation of wife	Workers	72	22 (30.6)	2.028	1.119-3.673	0.0183
	Homemakers	258	46 (17.8)			
Occupation of spouse (n=326)	Unemployed/Unskilled	131	36 (27.5)	1.930	1.126-3.31	0.0159
	Semiskilled/skilled/Others	195	32 (16.4)			
Anemia	Present	67	21 (31.3)	2.098	1.146-3.842	0.014
	Absent	263	47 (17.9)			
Incomplete defecation	Present	34	15 (44.1)	3.62	1.728-7.581	0.000
	Absent	296	53 (17.9)			
Dysuria [#]	Present	12	11 [#] (91.7)	51.46	6.512-406.7	0.000
	Absent	318	56 [#] (17.6)			
Burning micturition [#]	Present	13	10 [#] (76.9)	15.88	4.231-59.59	0.000
	Absent	317	55 [#] (17.4)			
Urgency of urination	Present	54	20 (37)	2.754	1.482-5.267	0.001
	Absent	276	48 (17.4)			
Increased frequency of urination	Present	41	17 (41.5)	3.306	1.656-6.597	0.001
	Absent	289	51 (17.6)			
Incomplete urination	Present	7	4 (57.1)	5.396	1.178-24.71	0.016
	Absent	323	64 (19.8)			
Delayed cycle	Present	6	2 (33.3)	1.955	0.3505-10.9	0.4366
	Absent	324	66 (20.4)			
Secondary Amenorrhoea	Present	6	3 (50.0)	3.985	0.7861-20.2	0.072
	Absent	324	65 (20.1)			

[#](n=67 or 65 due to the exclusion of the corresponding symptom in RTI)

Table 3: Association of abnormal vaginal discharge and specific conditions (n=330)

Variables		Total No of Women	No. of Women with abnormal vaginal discharge (%)	Odds ratio	95% CI	P
Age	≤35	200	34 (14.3)	5.120	1.947-13.47	0.000
	>35	130	5 (3.8)			
Duration of married life	≤15 yrs	202	33 (16.4)	3.97	1.614-9.77	0.000
	>15 yrs	128	6 (4.7)			
SE class	> III	81	11 (13.6)	1.240	0.587-2.619	0.572
	≤III	249	28 (11.2)			
Education	≥High school	201	27 (13.4)	1.513	0.737-3.106	0.258
	<High school	129	12 (9.3)			
Incomplete defecation	Present	34	8 (23.5)	2.63	1.096-6.312	0.026
	Absent	296	31 (10.5)			
Sec. Amenorrhoea	Present	6	3 (50)	8.0	1.556-41.13	0.003
Any one Menstrual Disorders	Present	148	24 (16.2)	2.155	1.086-4.277	0.026
	Absent	182	15 (8.2)			
Dysuria	Present	12	05 (41.6)	5.966	1.794-19.84	0.001
	Absent	318	34 (10.7)			

RTIs in China (17.6%). The age-adjusted rates of endogenous infections in Yinchuan and Urumchi cities were 18.8% and 21.9%, respectively.^[28]

The present study established that this type of endogenous RTI can be identified as endogenous infections (overgrowth

of microorganisms usually present in the genital tract of women), at the primary care level through screening by auxiliary health workers by validated questionnaires without laboratory testing. This was similar to a study done in Tanzania where the study revealed that no women reported RTIs during clinical consultation but 64% of women had disclosed symptoms on

direct questioning.^[29] This explained RTI could be diagnosed and managed by healthcare workers at the primary care level itself by questionnaires. In 2007 itself WHO integrated care of RTI into primary care.

The association of RTI with certain conditions such as anemia, dysuria, burning micturition, urgency, increased the frequency of urination, and incomplete urination/defecation was significant in the current study. As mentioned in epidemiology, all the associated factors need not be the causative factors,^[23] and these pre-existing conditions could favor the abnormal growth of microorganisms present in the genital tract, which constitutes an endogenous type of RTI. Proper medical care in time for women with those conditions could render RTI as nonpublic health problem from its second rank in public health problems. National Rural Health Machine (NRHM) launched RCH – I (reproductive and child health) program in India in 1992 itself, which consists of four components, of which prevention and management of RTI was one of the parts. This was integrated with other services at the primary care level in RCH phase II.^[30] This shows the importance of RTI at the fundamental healthcare level in India.

In this study, nearly 12% of women had abnormal vaginal discharge, analogous to an Indian survey in 2005, where 14% of women had it.^[31] Abnormal vaginal discharge was more among women aged 35 and less, identical to a study done in Andhra Pradesh. A higher proportion of women whose marital life was less than or equal to 15 years had suffered more from abnormal vaginal discharge than women with more than 15 years of marital experience. The reason might be they were in a sexually active group. In the present study, though napkin usage was negatively associated with abnormal vaginal discharge, a higher proportion of women with anyone menstrual disorder/secondary amenorrhea had suffered more from abnormal vaginal discharge than women without these conditions. This could be due to hormonal imbalance (estrogen level) causing alteration in the pH of vaginal secretion, which leads to the multiplication of microorganisms which was explained by Dutta.^[10]

Conclusion

The current study revealed that almost every fifth rural women in India had at least anyone symptom of RTIs (21%) which is very high; of whom the higher percentage of women (80%) had at least any one of the pre-existing conditions such as menstrual disorders, urinary/anal disorders, and anemia. These women developed RTI later.

Recommendations

Women should be educated about signs, cause, and impact of RTIs. Healthcare providers should be trained to early diagnose urinary and/or anal disorders and/or anemia among rural women effectively. If their pre-existing diseases are treated in time, nearly 80% of RTIs could be controlled, which requires health education and MCH (maternal and child health program) care training program.

Strength of the study

This is a community-based study, which comprehensively interviewed symptoms of RTIs and its associated risk factors. Previously no investigation has analyzed the association of RTIs and certain risk factors such as menstrual disorders, urinary/anal disorders, and anemia among reproductive age group women in rural India.

Limitations of the study

The prevalence of RTI was estimated based on the self-reported morbidity of women. The estimation might have been more or less than the actual values. Those women with morbidity were not examined clinically. Their medical records were incomplete/not available.

The relevance of the study

In the current study, the association between RTIs and certain risk factors such as dysuria, burning micturition, incomplete and increased frequency of urination, the urgency of urination, incomplete defecation, and anemia were significantly proved. Among all the sociodemographic factors, a significant association of occupational status with RTI was also established in this study. The present study shows that the prevalence of the endogenous type of RTIs (80%) was more common than any other kind of RTIs.

Key message

- Women who had dysuria, burning micturition, incomplete urination, increased frequency of urination, the urgency of urination, incomplete defecation, and anemia have a higher risk of developing RTIs, which constitute more prevalence of the endogenous type of RTIs (80%) than any other kind of RTIs.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Author's contribution

Dr. Vanitha has conceived an idea, designed methodology, and did datacollection, data analysis, and report writing. Dr. Anitha Rani.M has refined the research questionnaire, and edited manuscript, and Dr. Suresh contributed to data analysis.

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Conflicts of interest

There are no conflicts of interest.

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