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TUBERCULOSIS PREVENTIVE TREATMENT IN HOUSEHOLD CONTACTS OF PULMONARY TUBERCULOSIS PATIENTS-A LONGITUDINAL STUDY IN A CITY.

Community Medicine

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ABSTRACT

India has highest rate of TB infection (TBI) in world. Aim was to estimate prevalence, sociodemographic profile and factors associated with tuberculosis preventive treatment (TPT) in household contacts (HHC) and its outcome. Tuberculosis unit were selected randomly and HHC were enrolled from the PHI (peripheral health institute). Sample size was calculated to be 94. Chi square test was applied and $p<0.05$ was considered statistically significant. Of 319 HHC, 281 evaluated for TPT, 38 not. Evaluation status was significantly associated with gender, socio-economic status, type of house, addiction and comorbidity. Of 281 evaluated HHC, 255 initiated on TPT, 26 not. Initiation status was significantly associated with age, type of family, type of house and addiction. Among initiated, 227 completed TPT, 28 did not. Completion status was significantly associated with religion and cross ventilation. Common reasons for not completing TPT included feeling healthy, side effects and busy with routine work.

KEYWORDS

Tuberculosis preventive treatment, Household contacts, Pulmonary tuberculosis.

INTRODUCTION

In 2022, tuberculosis (TB) continues to be a serious worldwide health concern. With over 10 million cases each year, TB is the second most common infectious agent-related fatality after COVID-19. [1] 51% of tuberculosis-positive household contacts had a diagnosis within a month, 75% within three months, 81% within six months, and 92% within a year following the diagnosis of the index case.[2]

The world's highest rate of tuberculosis infection (TBI) is found in India. Of those newly infected with TB, about 5% will experience active disease during the first two years of infection, and an additional 5% will experience active TB later in life.[3] The National Strategy Plan (NSP 2017–25) of India includes efforts under four pillars (Detect, Treat, Prevent, and Build) to abolish tuberculosis by 2025. The national expansion of TB preventive treatment (TPT) for high-risk populations is the main goal of the prevention initiatives.[4]

By using different effective regimens such as isoniazid (INH) monotherapy and combination medicines, tuberculosis preventative therapy (TPT) minimizes this risk by around 90%. [5] Assessment of risk and exclusion of active tuberculosis are prerequisites for eligibility for Tuberculosis Preventive Treatment (TPT). India's TB prevention policy, which aims to expedite the fall in TB incidence statewide, heavily relies on strengthening the TPT cascade of care. [7]

With this background present study was undertaken to estimate prevalence, sociodemographic profile and factors associated with tuberculosis preventive treatment and its outcome in household contacts of pulmonary tuberculosis patients.

MATERIALS AND METHODS

The present longitudinal study was carried out by randomly selecting tuberculosis unit and household contacts of pulmonary tuberculosis patients were enrolled from the PHI (peripheral health institute). Approval was obtained prior to the start of the study from the Institutional Ethics Committee of Medical College. Informed consent and assent were taken from household contacts. The study was conducted from September 2022 to August 2023. The sample size was calculated by using Cochran's formula. Considering prevalence of pulmonary tuberculosis as 222/1lakh population as per NFHS-5.[7] Calculated sample size was 94.A predesigned pretested structured questionnaire was used for data collection. The questionnaire included socio-demographic details of enrolled household contacts of pulmonary tuberculosis patients and evaluation status and tuberculosis preventive treatment details of all household contacts. Follow up visit was given depending on tuberculosis preventive treatment regimen either at end of 3 month or 6 month and data regarding outcome of tuberculosis preventive treatment was collected.

RESULTS AND DISCUSSIONS

Study was carried out in 319 household contacts of 94 sputum positive pulmonary tuberculosis patients.

The mean age of the household contacts was 30.01 years. About 23.2% household contacts belonged to age group of 21-30 years followed by 17.2% in the age group of 11-20 years & 16.3% belonged to age group of 31-40 years.53.9% of household contacts were female and 46.1% of household contacts were male.

57.7% household contacts belonged to the Muslim religion 24.5% of household contacts belonged to the Hindu religion, , 13.1% of household contacts belonged to the Buddhist religion and 4.1% household contacts belonged to the Christian religion.68.0% of household contacts were from nuclear family followed by 20.7% as three generation family, 36 (11.3%) household contacts belonged to the joint family.54.5% household contacts belonged to the lower middle class, followed by 37.9% who belonged to the middle. Only 7.2% household contacts were from the lower class, and none belonged to the upper class. About 27.6% household contacts were educated up to high school, 22.3% were illiterate, 17.2% were educated up to intermediate education, and 6.0% were graduates.

88.1% of household contacts lived in a pucca house, while 11.9% lived in a kutcha house.48.6% of household contacts lived in overcrowded conditions, while 51.4% did not.84.3% of household contacts had cross ventilation in their homes, while 15.7% did not.65.5% household contacts were unemployed, 15.4% were unskilled workers, 7.8% were skilled workers,6.3% were employed in clerical, shop, or farm work, 4.1% were semi-skilled workers.82.1% of household contacts had no addictions and 17.9% of household contacts had one or more addictions.86.8% of household contacts had no co- morbidities. and 42(13.2%) had one or more co-morbidities.

Table 1: Evaluation status of household contacts for TPT according to their socio-demographic variables

Variable	Categories	Evaluation status	Total	

Age			**Evaluated**	**Not evaluated**		χ^2=5.264 p=0.562
	<10		43(91.5)	4(8.5)	47(100)	
	11-20		46(83.6)	9(16.4)	55(100)	
	21-30		64(86.5)	10(13.5)	74(100)	
	31-40		46(88.5)	6(11.5)	52(100)	
	41-50		38(84.4)	7(15.6)	45(100)	
	51-60		28(93.3)	2(6.7)	30(100)	
	>60		16(100)	0(0.0)	16(100)	
	Total		281(88.1)	38(11.9)	319(100)	
Gender	Male		123(83.7)	24(16.3)	147(100)	χ^2=5.063 p=0.036*
	Female		158(91.9)	14(8.1)	172(100)	
	Total		281(88.1)	38(11.9)	(100)	
Education of HHC	Illiterate		63(88.7)	8(11.3)	71(100)	χ^2=8.721 p=0.150
	Primary school		36(87.8)	5(12.2)	41(100)	
	Middle school		41(91.1)	4(8.9)	45(100)	
	High school		71(80.7)	17(19.3)	88(100)	
	Intermediate/		51(92.7)	4(7.3)	55(100)	
	Graduate		19(100)	0(0.0)	19(100)	
	Total		281(88.1)	38(11.9)	319(100)	
Socioeconomic status	Upper		0(0.0)	0(0.0)	0(100)	χ^2=24.447 p=<0.001*
	Upper middle		1(100)	0(0.0)	1(100)	
	Lower middle		122(92.6)	9(7.4)	121(100)	
	Upper lower		155(89.1)	19(10.9)	174(100)	
	Lower		13(56.5)	10(43.5)	23(100)	
	Total		281(88.1)	38(11.9)	319(100)	
Religion	Hindu		72(92.3)	6(7.7)	78(100)	χ^2=4.432 p=0.266
	Muslim		157(85.3)	27(14.7)	184(100)	
	Buddhist		39(88.6)	5(11.4)	44(100)	
	Christian		13(100)	0(0.0)	13(100)	
	Total		281(88.1)	38(11.9)	(100)	
Type of family	Nuclear		191(88.0)	16(12.0)	217(100)	χ^2=0.627 p=0.772
	Joint		33(91.7)	3(8.3)	36(100)	
	Three generation		57(86.4)	9(13.6)	66(100)	
	Total		281(88.1)	38(11.9)	319(100)	
Occupation	Unemployed		187(89.5)	22(10.5)	209(100)	χ^2=3.312 p=0.608
	Unskilled		41(83.7)	8(16.3)	49(100)	
	Semiskilled		10(76.9)	3(23.1)	13(100)	
	Skilled worker		22(88.0)	3(12.0)	25(100)	
	Clerical, Shop, Farm		18(90.0)	2(10.0)	20(100)	
	Semi professional		3(100)	0(0.0)	3(100)	
	Total		281(88.1)	38(11.9)	(100)	
House	Kutcha		38(100.0)	0(0.0)	38(100)	χ^2=5.834 p=0.013*
	Pucca		243(88.6)	38(13.5)	281(100)	
	Total		281(88.1)	38(11.9)	319(100)	
overcrowding	Present		142(91.6)	13(8.4)	155(100)	χ^2=3.570 p=0.083
	Absent		139(84.8)	25(15.2)	164(100)	
	Total		281(88.1)	38(11.9)	319(100)	
Cross ventilation	Present		237(88.1)	32(11.9)	269(100)	χ^2=0.000 p=1
	Absent		44(88.0)	6(12.0)	50(100)	
	Total		281(88.1)	38(11.9)	319(100)	
Addiction	Yes	Alcohol	1(100)	0(0.0)	1(100)	χ^2=6.579 p=0.024*
		Alcohol/tobacco	1(100)	0(0.0)	1(100)	
		Smoking	8(57.1)	6(42.9)	14(100)	
		Tobacco	30(88.2)	8(11.8)	34(100)	
		Others	7(100)	0(0.0)	7(100)	
		Total	47(77.04)	14(22.96)	61(100)	
	No	None	234(89.3)	28(10.7)	262(100)	
		Total	281(88.1)	38(11.9)	319(100)	
Comorbidity	Yes	Diabetes	12(100)	0(0.0)	12(100)	χ^2=6.541 p=0.0064*
		Hypertension	12(100)	0(0.0)	12(100)	
		Hypertension/ Diabetes	11(100)	0(0.0)	11(100)	
		Hypertension/ischemic heart disease	3(100)	0(0.0)	3(100)	
		Asthma	1(100)	0(0.0)	1(100)	
		hypothyroidism	3(100)	0(0.0)	3(100)	
		Total	42(100)	0(0.0)	42(100)	
	No	None	239(86.3)	38(13.7)	277(100)	
		Total	281(88.1)	38(11.9)	319(100)	

Out of 319 household contacts, 281 were evaluated 38 were not evaluated. The evaluated household contacts were studied as follows:

The association between evaluation status and gender, socio-economic status, type of house, addiction, comorbidity was statistically significant.

Reasons for not evaluation for TPT:- The main reasons were "precautionary measures taken by patient & family (58%)" followed by "Feeling healthy" (32%), "Social stigma" (5%) and "Busy in routine work" (5%).

Table 2: Initiation status of TPT in household contacts according to their socio-demographic variables

Variable		**Initiated status**			
		Initiated	**Not initiated**	**Total**	
Age	<10	32(74.4)	11(25.6)	43(100)	χ^2=20.342 p=0.005*
	11-20	43(93.5)	3(6.5)	46(100)	
	21-30	57(89.1)	7(10.9)	64(100)	
	31-40	43(93.5)	3(6.5)	46(100)	
	41-50	38(100)	0(0.0)	38(100)	
	51-60	26(92.9)	2(7.1)	28(100)	
	>60	16(100)	0(0.0)	16(100)	
	Total	255(90.7)	26(9.3)	281(100)	
Gender	Male	112(91.1)	11(8.9)	123(100)	χ^2=0.025 p=1
	Female	143(90.5)	15(9.5)	158(100)	
	Total	255(90.7)	26(9.3)	281(100)	
Education of HHC	Illiterate	56(88.9)	7(11.1)	63(100)	χ^2=3.957 p=0.488
	Primary school	31(86.1)	5(13.9)	36(100)	
	Middle school	37(90.2)	4(9.8)	41(100)	
	High school	67(94.4)	4(5.6)	71(100)	
	Intermediate/	48(94.1)	3(5.9)	51(100)	
	Graduate	16(84.2)	3(15.8)	19(100)	
	Total	255(90.7)	26(9.3)	281(100)	
	Total	255(90.7)	26(9.3)	281(100)	
Socioeconomic status	Upper	0(0.0)	0(0.0)	(100)	χ^2=2.168 p=0.503
	Upper middle	1(100)	0(0.0)	1(100)	
	Lower middle	103(92.0)	9(8.0)	112(100)	
	Upper lower	138(89.0)	17(11.0)	155(100)	
	Lower	13(100)	0(0.0)	13(100)	
	Total	255(90.7)	26(9.3)	281(100)	
Religion	Hindu	61(84.7)	11(15.3)	72(100)	χ^2=5.036 p=0.221
	Muslim	145(92.4)	12(7.6)	157(100)	
	Buddhist	36(92.3)	3(7.7)	39(100)	
	Christian	13(100)	0(0.0)	13(100)	
	Total	255(90.7)	26(9.3)	281(100)	
Type of family	Nuclear	181(94.8)	10(5.2)	191(100)	χ2=19.981 p=<0.001*
	Joint	31(93.9)	2(6.1)	33(100)	
	Three generation	43(75.4)	14(24.6)	57(100)	
	Total	255(90.7)	26(9.3)	281(100)	
Occupation	Unemployed	168(89.8)	19(10.2)	187(100)	χ^2=1.815 p=0.976
	Unskilled	37(90.2)	4(9.8)	41(100)	
	Semiskilled	10(100)	0(0.0)	10(100)	
	Skilled worker	20(90.9)	2(9.1)	22(100)	
	Clerical, Shop, Farm	17(94.4)	1(5.6)	18(100)	
	Semi professional	3(100)	0(0.0)	3(100)	
	Total	255(90.7)	26(9.3)	281(100)	
House	Kutcha	38(100)	0(0.0)	38(100)	χ^2=4.480 p=0.032*
	Pucca	217(89.3)	26(10.7)	243(100)	
	Total	255(90.7)	26(9.3)	281(100)	
Overcrowding	Present	125(88.0)	17(12.0)	142(100)	χ^2=2.528 p=0.149
	Absent	130(93.5)	9(6.5)	139(100)	
	Total	255(90.7)	26(9.3)	281(100)	

Cross ventilation	Present		217(91.6)	20(8.4)	237(100)	χ^2=1.194 p=0.264
	Absent		38(86.4)	6(13.6)	44(100)	
	Total		255(90.7)	26(9.3)	281(100)	
Addiction	Yes	Alcohol	1(100)	0(0.0)	1(100)	χ^2=7.085 p=0.036*
		Alcohol/tobacco	1(100)	0(0.0)	1(100)	
		Smoking	6(75.0)	2(25.0)	8(100)	
		Tobacco	26(86.7)	4(13.3)	30(100)	
		Others	7(100)	0(0.0)	7(100)	
		Total	17(73.91)	6(26.09)	23(100)	
	No	None	214(91.5)	20(8.5)	234(100)	
		Total	255(90.7)	26(9.3)	281(100)	
Comorbidity	Yes	Diabetes	11(91.7)	1(8.3)	12(100)	χ^2=0.2618 p=0.8674
		Hypertension	12(100)	0(0.0)	12(100)	
		Hypertension/ Diabetes	9(81.8)	2(18.2)	11(100)	
		Hypertension/ischemic heart disease	3(100)	0(0.0)	3(100)	
		Asthma	1(100)	0(0.0)	1(100)	
		hypothyroidism	3(100)	0(0.0)	3(100)	
		Total	39(92.85)	3(7.15)	42(100)	
	No	None	216(90.4)	23(9.6)	239(100)	
		Total	255(90.7)	26(9.3)	281(100)	

Out of 281 household contacts, 255 were initiated on TPT 26 were not initiated. The Initiation status household contacts were studied as follows:

The association between initiation status and age, type of family, type of house, addiction was statistically significant.

Reasons for not initiation of TPT:- The main reasons were "Not serious about therapy" (34%), followed by "Feeling healthy" (31%), "Busy in routine work" (23%), "Precautionary measures taken by patient & family" (8%) and "Social stigma" (4%).

Table 3: Completion status of TPT in household contacts according to their socio-demographic variables

Variable		Completion status			
		Complete	Incomplete	Total	
Age	<10	28(87.5)	4(12.5)	32(100)	χ^2=3.352 p=0.809
	11-20	38(88.4)	5(11.6)	43(100)	
	21-30	50(87.7)	7(12.3)	57(100)	
	31-40	36(83.7)	7(16.3)	43(100)	
	41-50	36(94.7)	2(5.3)	38(100)	
	51-60	24(92.3)	2(2.9)	26(100)	
	>60	15(93.8)	2(7.7)	17(100)	
	Total	227(89.0)	28(11.0)	255(100)	
Gender	Male	103(92.0)	9(8.0)	112(100)	χ^2=1.772 p=0.227
	Female	124(86.7)	19(13.3)	143(100)	
	Total	227(89.0)	28(11.0)	255(100)	
Education of HHC	Illiterate	46(82.1)	10(17.9)	56(100)	χ^2=4.231 p=0.555
	Primary school	28(90.3)	3(9.7)	31(100)	
	Middle school	34(91.9)	3(8.1)	37(100)	
	High school	60(89.6)	7(10.4)	67(100)	
	Intermediate/	45(93.8)	3(6.2)	48(100)	
	Graduate	14(87.5)	2(12.5)	16(100)	
	Total	227(89.0)	28(11.0)	255(100)	
Education of Head of the family	Illiterate	30(88.2)	4(11.8)	34(100)	χ^2=4.220 p=0.574
	Primary	13(86.7)	2(13.3)	15(100)	
	Middle	39(95.1)	2(4.9)	41(100)	
	High	83(85.6)	14(14.4)	97(100)	
	intermediate	51(89.5)	6(10.5)	57(100)	
	Graduate	11(100)	0(0.0)	11(100)	
	Total	227(89.0)	28(11.0)	255(100)	
Occupation	Unemployed	22(88.0)	3(12.0)	25(100)	χ^2=16.924
	Unskilled	56(80.0)	14(20.0)	71(100)	
	Semiskilled	15(100)	0(0.0)	15(100)	p=0.002*
	Skilled worker	32(97.0)	1(3.0)	33(100)	
	Clerical, Shop ,Farm	55(84.6)	10(15.4)	65(100)	
	Semi professional	47(100)	0(0.0)	47(100)	
	Total	227(89.0)	28(11.0)	255(100)	
Socioeconomic status	Upper	0(0.0)	0(0.0)	0(100)	χ^2=5.600 p=0.176
	Upper middle	1(100)	0(0.0)	1(100)	
	Lower middle	93(90.3)	10(9.7)	103(100)	
	Upper lower	124(89.9)	14(10.1)	138(100)	
	Lower	9(69.2)	4(30.8)	13(100)	
	Total	227(89.0)	28(11.0)	255(100)	
Religion	Hindu	50(82.0)	11(18.0)	61(100)	χ^2=9.820 p=0.020*
	Muslim	135(93.1)	11(6.9)	145(100)	
	Buddhist	29(80.6)	7(19.4)	36(100)	
	Christian	13(100)	0(0.0)	13(100)	
	Total	227(89.0)	28(11.0)	255(100)	
Type of family	Nuclear	158(87.3)	23(12.7)	181(100)	χ^2=2.368 p=0.334
	Joint	28(90.3)	3(9.7)	31(100)	
	Three generation	41(95.3)	2(4.7)	43(100)	
	Total	227(89.0)	28(11.0)	255(100)	
Occupation	Unemployed	148(88.1)	20(11.9)	168(100)	χ^2=2.955 p=0.727
	Unskilled	33(89.2)	4(10.8)	37(100)	
	Semiskilled	9(90.0)	1(10.0)	10(100)	
	Skilled worker	17(85.0)	3(15.0)	20(100)	
	Clerical, Shop, Farm	17(100)	0(0.0)	17(100)	
	Semi professional	3(100)	0(0.0)	3(100)	
	Total	227(89.0)	28(11.0)	255(100)	
House	Kutcha	32(84.2)	6(15.8)	38(100)	χ^2=1.057 p=0.395
	Pucca	195(89.9)	22(10.1)	217(100)	
	Total	227(89.0)	28(11.0)	255(100)	
Overcrowding	Present	107(85.6)	18(14.4)	125(100)	χ^2=2.933 p=0.109
	Absent	120(92.3)	10(7.7)	130(100)	
	Total	227(89.0)	28(11.0)	255(100)	
Cross ventilation	Present	201(92.6)	16(7.4)	217(100)	χ^2=19.384 p=<0.001*
	Absent	26(68.4)	12(31.6)	38(100)	
	Total	227(89.0)	28(11.0)	255(100)	
Addiction	Yes	Alcohol	1(100)	0(0.0)	1(100)	χ^2=1.855 p=0.277
		Alcohol/tobacco	1(100)	0(0.0)	1(100)	
		Smoking	6(100)	0(0.0)	6(100)	
		Tobacco	19(73.1)	7(26.9)	26(100)	
		Others	7(100)	0(0.0)	7(100)	
		Total	34(82.92)	7(17.08)	41(100)	
	No	None	193(90.2)	21(9.8)	214(100)	
		Total	227(89.0)	28(11.0)	255(100)	
Comorbidity	Yes	Diabetes	11(100)	0(0.0)	11(100)	χ^2=0.4376 p=0.999
		Hypertension	10(83.3)	2(16.7)	12(100)	
		Hypertension/ Diabetes	7(77.8)	2(22.2)	9(100)	
		Hypertension/ischemic heart disease	3(100)	0(0.0)	3(100)	
		Asthma	1(100)	0(0.0)	1(100)	
		hypothyroidism	3(100)	0(0.0)	3(100)	
		Total	35(89.74)	4(10.26)	39(100)	
	No	None	192(88.9)	24(11.1)	216(100)	
		Total	227(89.0)	28(11.0)	255(100)	

Out of 255 household contacts, 227 completed TPT and 28 not completed TPT. The completion status of household contacts were studied as follows:

The association between completion status and religion, cross ventilation was statistically significant

Reasons for not completion of TPT:- The reasons given by 28 household contacts were as follows: The main reasons were "Patient feeling healthy household contact discontinued TPT", (43%),

followed by "Side effect" (18%), "Busy in routine work" (18%), "Social stigma" (18%) and "Not serious about therapy" (3%)

CONCLUSION

Among the household contacts of TB patients, 88.68% were evaluated for TPT, while 11.92% were not. Of those evaluated, 90.74% initiated TPT, while 9.26% did not. Out of those who initiated TPT, 80.01% completed it, while 10.99% did not.

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