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Delays Among Pulmonary Tuberculosis Patients Under Revised National Tuberculosis Control Programme In North India

KEYWORDS: Pulmonary tuberculosis, RNTCP, delays

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ABSTRACT ***Background****: Delay in diagnosis of tuberculosis causes spread of infection in the community. Such delay may occur at the level of the patient or at the level of the health system. It is important to identify and address these factors in order to achieve the goal of the RNTCP (Revised National Tuberculosis Control Programme).*

Objectives*: To find the extent of delay in diagnosis and treatment of tuberculosis patients and to identify the various correlates for the delay.*

Methods*: A cross-sectional survey of 500 (31.8%) new smear-positive pulmonary tuberculosis patients out of 1573 who registered during this period of study. All 17 Designated Microscopic Centres (DMC) under RNTCP in Chandigarh (a Union Territory, in the northern part of India) were included.*

Results: *There were 314 (62.8%) male and 186 (37.2%) female patients. Mean and median of age (years) were 31.74 ±13.24 and 28 respectively. Mean and median of patient delay (in days) were 14.52 ± 10.74 and 12 respectively. Considering ≥30 days as patient's delay, 97 (19.4%) patients delayed in seeking health care treatment from HCP (Health Care Practitioner). Considering >7 days as health system delay (diagnosis delay + treatment delay), 427 (85.4%) patients had health system delay. Mean health system delay (days) was 17.98 ± 11.10 and median was 16 days.*

Conclusion: *The results of this study suggest that, there is a need to increase awareness in the community about tuberculosis symptoms, with more focus among migratory population. There should be collaboration between government and private practitioner for effective referral.*

INTRODUCTION

Pulmonary tuberculosis is a major public health problem and it is the main cause of death due to infectious diseases among adult population, especially in developing countries.[1]

The latest estimates included is that globally there were 9 million new TB cases including 1.1 million cases among people living with HIV (Human Immunodeficiency Virus) and 1.5 million TB deaths (1.14 million among HIV-negative people and 0.36 million HIV-associated TB deaths) in 2013.[2] In 2012, out of the estimated global annual incidence of 8.6 million TB cases, 2.3 million were estimated to have occurred in India.[3]

Early detection of infectious cases, followed by appropriate and timely treatment, is essential for successful control of morbidity and mortality due to tuberculosis. Delay in diagnosis of tuberculosis causes spread of infection in the community, increases patient expenditure and are associated with a higher risk of mortality as well.[1]Such delay may occur at the level of the patient called as patient delay or at the level of the health system called as health system delay. Factors contributing to these delays are numerous and it is important to identify and address these factors in order to achieve the goal of the RNTCP.[4]

Only few studies[5-8] pertaining to above concept have been done in India and only one in North India[9]. Therefore, this study was conceived with the objectives to find the extent of delay in diagnosis and treatment of tuberculosis patients and to identify the major factors and their contribution for the delay, whether it is patient or system.

MATERIAL AND METHODS

A cross-sectional survey of new smear-positive pulmonary tuberculosis patients was conducted for a period of one and a half year, from January 2013 to June 2014, in Chandigarh, a Union Territory, which is also the capital of Punjab and Haryana situated in the northern part of India. All 17 Designated Microscopic Centres (DMC) under RNTCP in Chandigarh were included after taking permission from District T.B. officer and a sample of 500 patients was taken, which was calculated after taking into consideration that 69% patients delayed in seeking treatment as available in the existing literature [6] in Indian setup at 95 % confidence coefficient and 5% permissible error.

Proportional sampling technique was used to select consecutive smear-positive pulmonary tuberculosis patients from each DMC, based on the previous year incidence rate. A pre structured questionnaire was specially designed in regional context, by reviewing the relevant literature [4, 6-11]. Patients were interviewed during their intensive phase

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of treatment to reduce recall bias.

Written informed consent was obtained from the respondents. The study was undertaken after approval of protocol by Research and Institutional Ethics committee.

Operational definitions

Patient delay: time interval between date of onset of symptom and presentation to a professional health care provider (HCP)

Health care system delay: time interval between the date of first presentation of patients to a professional health provider and initiation of anti- tuberculosis treatment.

Treatment delay: time interval between tuberculosis diagnosis and initiation of anti-tuberculosis drugs.

Total delay: time interval from the onset of illness until the initiation of anti-tuberculosis drugs.

Acceptable delay limits: [8]

Maximum acceptable patient delay = 30 days, maximum acceptable health system delay = 7 days. **Hence, total acceptable delay = 37 days.**

Statistical analysis

Characteristics of Pulmonary Tuberculosis patients delaying and non-delaying was compared by using statistical tests of significance like the Normal test and Chi-square test was used for testing association of different characteristics and analyzing risk factors of delays in treatment. Relative risk estimates along with their 95% confidence interval was used for investigating risk factors of diagnostic and treatment delays. Logistic regression model was also used for estimating the probability of delay. Latest version of SPSS statistical software was used for data entry and analysis.

RESULTS

A total of 500 new smear-positive tuberculosis patients out of 1573 who registered during this period were included from 17 DMCs. There were 314 (62.8%) male and 186 (37.2%) female. Mean, median and range of age (years) were 31.74 ±13.24, 28 and 65 (15-80) respectively. Majority of the patients (150, 30%) belonged to the age group of 26-35 years [Figure 1].

Socio-demographic profile of patients is shown in table 1.

Relation of socio-demographic profile with various delays is as follows [Table 2] :

Patient delay

Mean, median and range of patient delay (in days) were 14.52 ± 10.74, 12 and 1-45 respectively. Considering ≥30 days as patient's delay, 97 (19.4%) patients delayed in seeking health care treatment from HCP.

Health system delay

Considering >7 days as health system delay (diagnosis delay + treatment delay), 427 (85.4%) patients had health system delay. Mean health system delay (days) was 17.98 ± 11.10 and median was 16 days.

Total delay

Considering >37 days as total delay, 145(29%) patients had total delay from onset of symptom to the start of treatment. Mean, median and range of total delay (days) was 32.5±11.38, 31 and 77 (5-82) respectively.

On the basis of logistic regression analysis, patients; who were illiterate, from places other than Chandigarh and residing beyond 1 km from health facility were all found at significantly higher risk of having patient delay. Risk factor for health system delay was present in patients, who were living in nuclear family, who had more than one health seeking encounter (with HCP) and took more than ½ hr to reach nearest health facility. When the risk factors for total delay were analysed, illiterate individuals having more than one health seeking encounters, availing private health facility and who had to wait > 15 min were at significantly higher risk of total delay.

DISCUSSION

The finding of present study was that the majority of the patients (30%) belonged to age group 26-35yr, similar results were found in study done by Sarpal[10] in Chandigarh while in study done by Uplekar[11] in Maharashtra, majority of patients (80%) were in the age group 15-45 years.

Males (314, 62.8%) outnumbered females (186, 37.2%) in the present study. Similar results were found in various studies.[6,7,9,12,13,14] But the results were in contrast to the multi-country study done by WHO[4] where it was slightly more in females than males (male to female ratio being 1:1.02).

Quarter of the patient in our study were illiterate similar to study done in Himachal Pradesh by Thakur[9] (25%) and in Maharashtra by Nimbarte[7] (26.5%). But the results were in contrast to the study done by Goel[8] in Karnataka and Hussen[15] in Ethiopia where 73 % and 73.6 % patients were illiterate respectively. In the current study, 51.8 % patients were from urban area whereas in a study done in Maharashtra by Nimbarte[7] 40.7 % patients were from urban area. But another study done in Afghanistan by Sabawoon[16] only 1.6% patients were from urban area. The present study found that only 8.4% patients were from rural area while the results differed to various other studies done in India [8,9] and Ethiopia[15,17] where the percentage of rural patients varied from 56.1 % to 91.4 %.

Patient delay (≥30 days)

The mean patient delay (SD), observed in our study was 14.53 (10.74), which was in contrast to the multi-country study done by WHO, where the mean patient delay (SD) was observed to be quite high ranging from 24.3 to 69 days (37.2 - 76.98).

In the present study, patient delay of ≥ 30 days was observed in 97 (19.4%) patients, which is comparable to a study done by Goel[8] in Karnataka (17.3%). While very high numbers of patients delayed in seeking care in studies conducted by Rajeshwari[6] in Tamil Nadu, Nimbarte[7] in Maharashtra, and Demissie[18] in Ethiopia, where they waited for one month or more (ranging 29-58%) to seek healthcare.

In the present study, ≥30 days delay in seeking health care was slightly higher among male than that in female (19.7 % male vs 18.8 % female) while in contrast to the study done by Rajeshwari[6] in Tamil Nadu, where male (32%) outnumbered female (23%).

About one third (31.1%) illiterate patients in the present study delayed in seeking treatment. Educational status was found to be significantly associated with patient delay. **(χ^2=20.05, p-value=0.001)**. Similar results were evident in study done by Nimbarte[7] in Maharashtra and Rajeshwari[6]

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in Tamil Nadu where longer patient delay was associated with illiteracy. However, in a study done by Selvam[19] in Tamil Nadu the delay (≥28 days) was not associated with literacy.

The occupation was not significantly associated with patient delay in the current study. Similar results were observed in study done by Selvam[19] in Tamil Nadu, while the results were in contrast to the study done by Nimbarte[7] in Maharashtra, where longer patient delay was associated with patient's employment.

Maximum patient delay (38.1%) was found among rural patients in our study. The place of residence was significantly associated with delay (χ^2=**11.072, p-value=0.004**). Similar results were found by Lawn[20] in Ghana and Cambanis[21] in Ethiopia, while the results were in contrast to the study done by Rajeshwari[6], Thakur[9] and Nimbarte[7] where it was not significantly associated with patient delay.

In our study, marital status was not significantly associated with delay, similar results were evident in study done by Thakur[9] and Long[22].

It was observed in the present study, that the maximum patient delay was present in patients i.e. 25 (47.2%) residing ≥ 3 km from the nearest health facility. The patient's residence distance from nearest health facility was found to be significantly associated with patient delay **(χ^2= 36.44, p-value= 0.000)**. Similar results were evident from the study done by Rajeshwari[6] in Tamil Nadu (34%) and Kaur[23] in Chandigarh with patient residing >2 km and within 1-3 km respectively from health facility. But Yimer[24] and two other studies[12,15] found that distance of health facility > 10 km was significantly associated with patient delay.

In the present study, patient delay was more in those patients who went to traditional healer (47.7%) and chemists (32.8%) with the onset of symptoms then to the physicians (6.5%). Health seeking behaviour was significantly associated with patient delay in our study **(χ^2= 71.388, p-value= 0.000)**. Similar results were evident in the study done by Yimer[24] in Ethiopia where patients that initially visited non-formal health care providers and those who self-treated themselves had longer median patient delay compared to those who went directly to the first medical provider (*Mann-Whitney test; $P < 0.001$*).

Health care system delay (>7days)

Mean health system delay in the present study was 17.98 ± 11.10 days, while in a multi-country study done by WHO[4], it ranged from 5 ± 7.05 in Iraq to 90.7 ± 33.5 days in Pakistan.

Median health system delay in our study was 16 days, which was comparable to the study done by Jurcev-Savicevic[25] in Croatia where median health system delay was 15 days, while in a multi-country study done by WHO[4], it ranged from 02 in Iraq to 87 in Pakistan. The study done in Karnataka by Goel[8], mean health system delay was quite high i.e. 54.5 days compared to ours.

In the present study, health system delay of > 7 days was present in all the patients consulting private practitioner first. Consulting private practitioner with the onset of symptoms initially was associated with health system delay in several studies [4,7,11,19,26,27]

Number of health seeking encounter was significantly associated with health system delay in the current study (χ^2= **11.50, p-value=0.003)**. The mean numbers of health care provider visited before diagnosis in our study were 1.66 ± 0.8 and the median was 1. The results are comparable to study done by WHO[4] in Yemen (1.6, 1.0), Syrian Arab republic (1.7, 1.0) and Egypt (1.8, 1.0). But differed to that of study done in Islamic republic of Iran (0.8, 2.0) and Pakistan (5.2, 5.0).[4] Also, the contrasting results were found in study done in Ghana by Lawn[20] and in Thailand by Rojpibulstit[26] where mean was 4.2 and 3.3 respectively.

In the present study, distance from the nearest health facility was significantly associated with health system delay (χ^2= 9.225, p-value=0.009). Similar results were found in study done by Rajeshwari[6] in Tamil Nadu (>2km) and Selvam[19] in Tamil Nadu (≥ 5 km).

Total delay (>37 days)

Mean total delay in our study was 32.5 ± 11.38 days, while in study done by Thakur[9] in Himachal Pradesh, Rajeshwari[6] in Tamil Nadu and Demissie[18] in Ethiopia it was 48, 60 and 88 days respectively. In the present study, median total delay was 31 days, while in several other studies it ranged from 36-80 days [8,9,12,18,19,24]. The total delay in the present study was more in male patients (31.8%), while in several other studies[27-31] total delay was more in female patients. Students had maximum total delay (36.5%) in the present study, while in a study done by WHO[4] in Egypt, being student was a protective factor.

In the present study, maximum total delay was seen in patients seeking initial care from chemists (44.8%), similar results were found in study done by Thakur[9] in Himachal Pradesh, Huong[29] in Vietnam and by WHO[4] in Syrian Arab Republic and Somalia, where patients who sought care from non-specialized individuals as the first action for their symptoms had longer patient delay.

In was observed in the present study, that the maximum total delay was found in patients seeking treatment from private practitioner with the onset of symptoms, the results were similar to the study done by Selvam[19] in Tamil Nadu, Thakur[9] in Himachal Pradesh and Huong[29] in Vietnam.

In our study, majority of patients (46.9%) having ≥3 health seeking encounters (HCP) had total delay (>37 days), similar results were found in study done by Thakur[9] in Himachal Pradesh and by WHO[4] in Egypt, Pakistan and Syrian Arab Republic, where visit to more than one health care provider before diagnosis was a significant risk factor.

SUMMARY AND CONCLUSION

As the both patient and total delay were higher among illiterate, therefore to reduce the delay in seeking treatment from health facility, efforts should be made on increasing awareness in the community about tuberculosis symptoms through health education, to motivate them to approach to health care facility at an early stage. Especially, the tuberculosis patients should be the target group to raise the awareness, as they are aware of both the symptoms of tuberculosis and the facilities being provided. However, as the tuberculosis is highly stigmatized disease, awareness should be raised about tuberculosis that it becomes non-infectious after

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two weeks of treatment (sputum-smear negative).

As the patient approach private practitioner initially because of their busy schedule in working hours, confidence in getting cured and accessibility, effective collaboration between government and private practitioner should be developed for referral by involving private practitioner in RNTCP.

As the patient delay was higher among patients from places outside Chandigarh, more focus needs to be given among migratory population, especially among low income groups and contacts; to suspect tuberculosis. Traditional healers and chemists should be educated about symptoms of tuberculosis, so that they can identify and refer them to government health facility for sputum examination at the earliest.

Emphasis on active screening for TB patients, rather than waiting for patients to present at public health facilities is to be done, as the patients who were residing more than 1 km from nearest health facility had patient delay and those who took > ½ hr to reach nearest health facility had health system delay.

Table 1: Distribution of patients according to socio-demographic profile (N=500)

Characteristics	Grades	Number of patients	%
Education Status	Illiterate	122	24.4
	Primary (Standard 1-5)	102	20.4
	Middle school (Standard 6-8)	89	17.8
	High School (Standard 9-10)	68	13.6
	Secondary (Standard 11-12)	83	16.6
	Graduate	32	6.4
	Post graduate	04	0.8
Occupation	Clerical/workers	168	33.6
	Housewife	123	24.6
	Unemployed	82	16.4
	Technical/professional	64	12.8
	Student	63	12.6
Family income in Rs (monthly)	<3,000	07	1.4
	3000-4999	90	18.0
	5000-7999	246	49.2
	8000-9999	100	20.0
	10,000-14,999	41	8.2
	15,000-19,999	13	2.6
	>20,000	03	0.6
Place of Residence	Urban	259	51.8
	Slum	199	39.8
	Rural	42	8.4
Religion	Hindu	407	81.4
	Sikh	47	9.4
	Muslim	46	9.2
Marital Status	Married	286	57.2
	Single	208	41.6
	Widow/Widower	06	1.2
Type of Family	Nuclear	407	81.4
	Joint	55	11.0
	Other	38	7.6
Native	Outside chandigarh	358	71.6
	Chandigarh	142	28.4
Number of household members	1	04	0.8
	2	15	3.0
	3	49	9.8
	4	204	40.8
	5	152	30.4
	>5	76	15.2
Number of rooms	1	154	30.8
	2	291	58.2
	3	44	8.8
	>3	11	2.2

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Table 2: Distribution of patients according to socio-demographic profile and various delays (N=500)

Socio-demographic characteristics		Patient delay (≥ 30 Days)					χ^2	p-value	Health system delay (> 7 Days)				χ^2	p-value	Total delay (>37 days)				χ^2	P-value
N		Yes	%	No	%				Yes	%	No	%			Yes	%	No	%	7.336		
Educational level	Illiterate	122	38	31.1	84	**20.05**			107	87.7	15	2.914			36	29.5	86				
	Primary	102	12	11.8	90				87	85.3	15				25	24.5	77				
	Middle school	89	9	10.1	80	68.9			74	83.1	15	12.3			21	23.6	68				
	High school	68	14	20.6	54				61	89.7	07				25	36.8	43				
	Secondary	83	16	19.3	67	88.2			69	83.1	14	14.7			29	34.9	54				
	Graduate/Post graduates	36	8	22.2	24	89.9	0.001*		29	80.6	07	16.9	0.713		09	28.1	23	70.5	0.291		
						79.4						10.3						75.5		
						80.7						16.9						76.4		
						66.8						19.4						63.2		
																		65.1		
																		71.9		
Occupation	Technical/ professional	64	16	25.0	48	75			57	89.1	7	10.9			20	31.3	44	68.8		
	Clerical/workers	168	30	17.9	138	82.1	3.590	0.464	140	83.3	28	16.7	6.415	0.170	50	29.8	118	70.2	4.986	0.289
	Student	63	10	15.9	53	84.1			54	85.7	9	14.3			23	36.5	40	63.5		
	Unemployed	82	13	15.9	69	84.1			76	92.7	6	7.3			25	30.5	57	69.5		
	Housewife	123	28	22.8	95	77.2			100	81.3	23	18.7			27	22.0	96	78.0		
Family income in Rs (monthly)	< 5000	97	19	19.6	78	80.4			85	87.6	12	12.4			24	24.7	73	75.3		
	5000-7999	246	46	18.7	200	81.3	0.637	0.887	207	84.1	39	15.9	0.955	0.812	75	30.5	171	69.5	2.582	0.460
	8000-9999	100	22	22.0	78	78.0			85	85.0	15	15.0			26	26.0	74	74.0		
	≥10,000	57	10	17.5	47	82.5			50	87.7	07	12.3			20	35.1	37	64.9		
Residence	Rural	42	16	38.1	26	61.9			38	90.5	4	9.5			15	35.7	27	64.3		
	Slum	199	39	19.6	160	80.4	11.072	0.004*	171	85.9	28	14.1	1.227	0.541	49	24.6	150	75.4	3.422	0.181
	Urban	259	42	16.2	217	83.8			218	84.2	41	15.8			81	31.3	178	68.7		
Religion	Sikh	47	13	27.7	34	72.3			44	93.6	3	6.4			15	31.9	32	68.1		
	Muslim	46	9	19.6	37	80.4	2.298	0.317	35	76.1	11	23.9	5.749	0.056	119	29.2	288	70.8	0.783	0.676
	Hindu	407	75	18.4	332	81.6			348	85.5	59	14.5			11	23.9	35	76.1		
Marital status	Married	286	58	20.3	228	79.7	0.331	0.56	251	87.8	35	12.2	2.991	0.083	67	31.3	147	68.7	0.968	0.325
	Single/widowed	214	39	18.2	175	81.8			176	82.2	38	17.8			78	27.3	208	72.7		
Type of family	Joint	55	11	20.0	44	80			41	74.5	14	22.5			17	30.9	38	69.1		
	Nuclear	407	77	18.9	330	81.1	0.519	0.771	359	88.2	48	11.8	14.042	0.001	116	28.5	291	71.5	0.269	0.874
	Other	38	09	23.7	29	76.3			27	71.1	11	28.9			12	31.6	26	68.4		
Native	Chandigarh	358	14	9.9	128	90.1			126	88.7	16	11.3			44	31.0	98	69.0		
	Outside-Chandigarh	142	83	23.2	275	76.8	11.454	0.001*	301	84.1	57	15.9	1.766	0.184	101	28.2	257	71.8	0.380	0.538

Table 3: Distribution of patients according to patient's characteristics and various delays (N=500)

Characteristics N=500		Patient delay (≥ 30 Days)					χ^2	P value	Health system delay (> 7 Days)				χ^2	P value	Total delay (> 37 Days)				χ^2	P value
		Yes	%	No	%			Yes	%	No	%			Yes	%	No	%			
Gender	Male	314	62	19.7	252	80.3	0.064	0.80	271	86.3	43	13.7	0.555	0.456	100	31.8	214	68.2	3.323	0.068
	Female	186	35	18.8	151	81.2			156	83.9	30	16.1			45	24.2	141	75.8		
Age	15-17	33	1	3.0	32	97.0			31	93.9	2	6.1			10	30.3	23	69.7		
	18-21	98	23	23.5	75	76.7			79	80.6	19	19.4			34	34.7	64	65.3		
	22-25	71	12	16.9	59	83.1			60	84.5	11	15.5			21	29.6	50	70.4		
	26-35	150	27	18.0	123	82.0			129	86.0	21	14.0			39	26	111	74		
	36-49	85	16	18.8	69	81.2			76	89.4	9	10.6			22	25.9	63	74.1		
	50-59	35	9	25.7	26	74.3			28	80.0	7	20.0			11	31.4	24	68.6		
	60 and above	28	9	32.1	19	67.9			24	85.7	4	14.3			8	28.6	20	71.4		
Health seeking behaviour	Traditional medicine	65	31	47.7	34	52.3			53	81.5	12	18.5			24	36.9	41	63.1		
	Drug stores	116	38	32.8	78	67.2	71.388	0.000	99	85.3	17	14.7	3.352	0.341	52	44.8	64	55.2	26.469	0.000
	Self medication	118	15	12.7	103	87.3			97	82.2	21	17.8			31	26.3	87	73.7		
	HCP	201	13	6.5	188	93.5			178	88.6	23	11.4			38	18.9	163	81.1		
Health facility first consulted	Public/ chest hospital	22	8	36.4	14	63.6			15	68.2	7	31.8			5	22.7	17	77.3		
	Private practice	125	26	20.8	99	79.2	4.858	0.182	125	100	0	0			71	56.8	54	43.2	64.92	0.000
	DMC	263	48	18.3	215	81.7			221	84	42	16			57	21.7	206	78.3		
	TU	90	15	16.7	75	83.3			66	73.3	24	26.7			12	13.3	78	86.7		

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Time to reach nearest health facility	<1/2 hr	482	90	18.7	392	81.3	4.536	0.033	414	85.9	68	14.1	2.601	0.107	137	28.4	345	71.6	2.163	0.141
	½-1 hr	18	07	38.9	11	61.1			13	72.2	05	27.8			08	44.4	10	55.6		
Distance from nearest health facility	1	153	14	9.2	139	90.8	36.44	0.000	120	78.4	33	21.6	9.225	0.009	26	17.0	127	83.0	33.22	0.000
	2	294	58	19.7	236	80.3			262	89.1	32	10.9			88	29.9	206	70.1		
	≥3	53	25	47.1	28	52.9			45	84.9	08	15.1			31	58.5	22	41.5		
Number of health seeking encounters	1	265	41	15.5	224	84.5	8.223	0.016	213	80.4	52	19.6	11.50	0.003	43	16.2	222	83.8	45.22	0.000
	2	154	32	20.8	122	79.2			141	91.6	13	8.4			64	41.6	90	58.4		
	≥3	81	24	29.6	57	70.4			73	90.1	8	9.9			38	46.9	43	53.1		
Previous exposure to TB patient	Yes	68	13	19.1	55	80.9	0.004	0.949	53	77.9	15	22.1	3.512	0.061	21	30.9	47	69.1	0.135	0.713
	No	432	84	19.4	348	80.6			374	86.6	58	13.4			124	28.7	308	71.3		
History of smoking	Quit smoking	73	16	21.9	57	78.1	0.791	0.673	33	82.5	07	17.5	0.592	0.742	24	32.9	49	67.1	3.141	0.208
	Never	387	75	19.4	312	80.6			333	86.0	54	14.0			114	29.5	273	70.5		
	Current smoker	40	06	15.0	34	85.0			61	83.6	12	16.4			07	17.5	33	82.5		

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