Published in final edited form as:

Transfus Med. 2010 December ; 20(6): 414–420. doi:10.1111/j.1365-3148.2010.01032.x.

Risk factors for chronic hepatitis B virus infection among blood donors in Bangalore, India

Latha Jagannathan¹, Mrinalini Chaturvedi¹, Sanjana Mudaliar¹, Theodore Kamaladoss¹, Megan Rice², and Edward L. Murphy³

¹Rotary TTK Blood Bank, Bangalore Medical Services Trust, Bangalore, India

²Harvard University School of Public Health, Boston MA

³University of California San Francisco, CA; Blood Systems Research Institute, San Francisco, CA

Abstract

Objectives and Aim—We performed a study of HBV risk factors among blood donors in Bangalore, India.

Background—Hepatitis B virus infection is prevalent in India and poses a potential risk of transmission by blood transfusion, but studies of risk factors for hepatitis B surface antigen (HBsAg) carriage among Indian blood donors are lacking.

Methods/Materials—Using a case-cohort design, we enrolled 71 cases with repeatedly reactive HBsAg results and a cohort of 212 contemporaneous blood donors with unknown HBsAg status. Questionnaire data were analyzed using multivariable logistic regression.

Results—In our multivariate analysis controlling for age, HBsAg positivity was associated with repeat donor status (OR = 0.34, 95% CI 0.17–0.71 vs. first-time donor status), residence outside of Bangalore and Hosur (rural areas) (OR = 15.66, 95% CI 3.60–68.07 vs Bangalore residence), having been a customer at a local barber shop (OR = 4.07, 95% CI 2.06–8.03), close contact with a person who had jaundice (OR = 13.64, 95% CI 3.71–50.24), and cigarette smoking (OR=3.25, 95% CI 1.39–7.60).

Conclusion—In addition to recognized demographic risk factors, associations with patronage of local barbers and contact with jaundiced individuals suggest behavioral risk factors that could be adopted as exclusionary criteria for blood donation in India.

INTRODUCTION

Recently, India has made significant improvements in its blood safety system to reduce transfusion transmitted infection (TTI) rates, including eliminating paid blood donors and increasing the proportion of voluntary blood donors.¹ While research indicates that volunteer donors in India have lower TTI marker rates than replacement donors,^{1,2} inconsistent pre-donation donor exclusion procedures throughout the country contribute to higher TTI rates than might be achieved through a more rigorous screening for history of risk behaviours and risk factors during the donor selection process.

Hepatitis B virus (HBV) infection is highly prevalent in India, with approximately 2.4% (95% CI: 2.2%–2.7%) of the non-tribal population testing positive for HBsAg.³ Several

studies have examined HBV risk factors in both clinic patients and the general population of the country. Kurien et al. found that among residents of Tamil Nadu, India, HBsAg was significantly associated with family history of exposure to hepatitis (odds ratio (OR)=1.4), use of disposable needles during injection (OR=0.5) in men, and smoking (OR=3.0) in women.⁴ Another study of STD clinic patients in Pune, India found that tattooing (OR=1.64) was associated with presence of core antibody. In addition, a history of being a commercial sex worker (adjusted odds ratio (aOR) = 12.45) and a history of a genital ulcer (aOR=1.70) were associated with a positive anti-HBc antibody test.⁵ Among the Nicobarese tribe in India, Murhekar et al. found past history of hospital admission, intramuscular injections, and number of HBsAg carriers in the residence as behavioral risk factors for HBV.⁶

There is a paucity of literature on HBV risk factors among blood donors in India, but studies of blood donors elsewhere in Southeast Asia provide insight into potential HBV risk factors in this population subgroup. Akhtar et al. found that among male volunteer blood donors in Karachi, Pakistan, HBsAg+ donors had significantly higher odds than HBsAg- donors of having received dental treatment from an unqualified dental care provider (OR=9.8), one to five (OR=3.3) or more than five injections (OR=1.4) during the last five years, injection with a glass syringe (OR=9.4) and injury resulting in bleeding during shaving from a barber (OR=2.3).⁷ Among volunteer blood donors in Thailand, Nuchprayoon and Chumnijarakij found that behavioral risk factors for HBsAg included sharing of nail clippers, used blades and tooth brushes among family members, especially among males, and sharing of used blades in barber shops among males.⁸

Though these studies in other populations provide inferences on potential risk factors in Indian blood donors, we are unaware of any studies to date that have examined HBV risk factors specifically among blood donors in India. Data on HBV risk factors specific to this population are needed to guide development of effective risk behavior screening questionnaires. We therefore performed a case-cohort study of blood donors at the Rotary TTK Blood Bank in Bangalore, India to assess risk factors for HBV among this population.

MATERIALS AND METHODS

Setting

We studied blood donors at the Rotary TTK Blood Bank in Bangalore India. Bangalore is located in south central India (see map) and is an area of recent technological development and moderate socioeconomic status compared to the rest of India, although substantial poverty remains. The Rotary TTK blood bank was established by the Rotary Club of Bangalore and the TTK group of companies as a non-profit trust in February 1984. It provides blood collection and distribution, laboratory, training and research services to the medical community of Bangalore. A large proportion of the blood bank's voluntary blood donors collections are accomplished via mobile "camps" at information technology companies in Bangalore and the industrial area of Hosur, about one hour's drive from Bangalore in the neighboring state of Tamil Nadu.

Study Design and Subjects

We used a case-cohort study design to examine behavioral factors associated with HBV infection among blood donors at the Rotary TTK Blood Bank in Bangalore India. This variation on the case-control design, also known as the case-base study, is useful when exposure prevalence information is available on only a sample of the source population.^{9,10} Statistical methods for relative risk estimates for this type of study have been developed by Miettinen.¹¹

Eligible cases were defined as all individuals who donated blood between April 2003 and March 2006 and were sero-positive for hepatitis B surface antigen (HBsAg). HBsAg sero-positive donors were contacted by telephone or e-mail and notified of their HBsAg status. These individuals were asked to come to the blood bank for test result disclosure counseling and follow-up, and if they presented, were asked to participate in the study. Donors who gave informed consent to participate in the study were asked to complete a self-administered questionnaire on potential demographic and behavioral risk factors. A comparison group of donors with unknown HBsAg status was sampled at mobile blood donation camps held at industries and universities between April 2003 and March 2006. Most collections at our center were at similar sites. We aimed for a ratio of three comparison subjects to each HBsAg positive in order to maximize statistical power. The comparison donor group data was collected with an anonymous, self-administered questionnaire at the time of blood donation at mobile camps, so questionnaire data could not be linked with HBsAg testing data performed later at the blood bank laboratory.

Laboratory methods

Blood samples collected from donors were tested for HBsAg according to operational blood bank policy using an alternate EIA strategy. During the time of the study, the blood center used either the Hepalisa (J. Mitra & Co, Pvt. Ltd, New Delhi, India) or the Hepanostika (Biomerieux SA, Lyon, France) EIA assays for initial screening. All samples that were initially reactive for HBsAg were tested a second time using the same EIA kit. Samples that were repeat reactive on the first EIA were each tested by two different HBsAg ELISA kits (Abbott Laboratories, Abbott Park, IL and Ortho Clinical Diagnostics, Raritan, NJ). Donors whose samples were reactive on at least one of these alternate assays (therefore by a total of two out of three manufacturers including the screening EIA) were identified as HBsAg positive. Due to cost and availability, HBsAg neutralization, anti-hepatitis B core (anti-HBc) and HBV DNA testing were not performed during the study period. Although confirmatory testing could not be performed, the specificity of the alternate EIA strategy is expected to be greater than the 95% to 99% specificity of a single HBsAg EIA assay.¹²

Statistical analysis

The study population was described by tabulating univariate frequencies of demographic variables. Socio-economic status was categorized based upon donor income as follows: low (less than 5000 rupees per month); middle (5000 to 10,000 rupees per month) and high (more than 10,000 rupees per month). Pearson chi-square tests were performed for each of the demographic and behavioral characteristics to assess significant differences between HBsAg+ and HBsAg- donors. Fisher's exact chi-square tests were used when cell sizes were less than five. We first analyzed the major risk factor variables using the case-cohort adjustment of Miettinen and found that the estimated relative risk approximated the odds ratio derived from a traditional case-control analysis, with the odds ratio being the more conservative estimate.¹¹ Thereafter, we used logistic regression models to examine univariate and multivariate associations between HBsAg status as the dependent variable and demographic and behavioral risk factors as independent variables.

All demographic and behavioral risk factors with p values less than 0.1 in univariate logistic regression models were included in the "first" logistic regression model. Replacement donor status was eliminated from the multivariate logistic model since the confidence interval for the estimate was very wide (95% CI: 9.928, 794.76), indicating that the adequate cell size assumption for logistic regression was violated. Variables not significant in the multivariate model ($p > .1$) were removed to produce the most parsimonious model, as indicated by using the likelihood ratio test. All behavioral risk factor variables in this model (jaundice contact, current smoker, and barber) were tested for interaction with age, but the addition of these

interaction terms did not improve the model fit, and so they were omitted from the final model. The results of the univariate and multivariate logistic models were expressed as odd ratios (OR) or adjusted odds ratios (aOR) with 95 percent confidence intervals (CI). All analyses were performed using SAS statistical software (version 9.1, Cary, NC).

RESULTS

From 333 blood donors who tested positive for HBsAg between April 2003 and March 2006 (prevalence of 0.94% among all donations), 91 came to the blood bank for counseling and follow-up, 18 declined to participate in the study and 73 (22% of all HBsAg positives) consented to participate in the study. A total of 244 comparison donors of unknown HBsAg status were enrolled during the same time period from among 293 randomly selected donors at blood drives approached at the same locations from which the HBsAg positives were drawn. We excluded 34 subjects due to small numbers, including 30 female donors (2 HBsAg+ and 28 HBsAg-) and four male donors over 45 years of age (4 HBsAg-), yielding 71 cases and 212 comparison subjects. Demographic characteristics of the subjects are presented in Table 1. Ninety-four percent of participants were voluntary donors, 84 percent resided in Bangalore, and 62 percent were between the ages of 18 and 25 versus 47% for all donors at the center. There were differences between HBsAg+ and HBsAg- subjects on several demographic and blood donation characteristics, including age, socioeconomic status, place of residence, voluntary vs. replacement donor, and first-time vs. repeat donor status.

Data on behavioral risk factors according to HBsAg status, with unadjusted odds ratios, are shown in Table 2. HBsAg positive cases had significantly higher unadjusted odds of having a body piercing, having a tattoo, shaving at a barber's saloon, having contact with someone with jaundice, smoking, consuming alcohol, having sex with multiple partners, paying for sex, and donating blood to be tested for HIV/AIDS.

Adjusted odds ratios (aOR) and 95 percent confidence intervals (95% CI's) are shown in Table 3. In the final multivariate model adjusting for age, repeat donor status (aOR=.34, 95% CI 0.17-0.71) and residence outside of Bangalore (aOR=15.66, 95% CI 3.60-68.07) were significantly associated with HBsAg status. Behavioral risk factors that were significantly associated with HBsAg status included contact with someone with jaundice (aOR=13.64, 95% CI 3.71-50.24), being shaved by a barber (aOR=4.07, 95% CI 2.06-8.03), and cigarette smoking (aOR=3.25, 95% CI 1.39-7.60). Other behavioral risk factors that were associated with HBsAg in the univariate analysis (see Table 2) were no longer significant after controlling for other covariates, and were excluded from the final model. Interactions between age and behavioral risk factors were not significant and therefore were not included in the final multivariate model.

DISCUSSION

We found several plausible demographic and behavioral risk factors to be associated with HBsAg status among blood donors in India. First-time donor status and contact with a jaundiced person are previously recognized risk factors for HBV infection. On the other hand, associations with place of residence and patronage of local barbers are novel findings for India and may have relevance for blood safety and public health.

Previous studies have found shaving at a barber to be a significant risk factor for HBV among various populations, including blood donors and gastroenterology clinic patients in Karachi, Pakistan as well as blood donors in Thailand.^{7,8,13} HBV is known to be easily transmitted by percutaneous injury, such as needlesticks. Therefore, being shaved by a

barber is a biologically plausible risk factor, especially if the barber's razors are not properly cleaned between patrons. This may be the case for barbers in India who may have limited facilities for hygiene because they work in small shops or even on the street.

We were surprised to find that donors living outside of Bangalore or Hosur had more than 15 times the odds of being HBsAg positive than donors from Bangalore while adjusting for other factors. We are not aware of recognized high prevalence areas for HBV in the Bangalore region, although a higher frequency of percutaneous exposure could be more common in rural areas. Further investigation of geography-specific lifestyle issues is needed to understand what might explain this increased risk for HBV. In addition, smoking was found to be associated with HBsAg status, particularly when replacement donor status was removed from the model due to the wide confidence interval. The relationship between smoking and HBsAg status could be explained by sharing cigarettes, but we think this is unlikely in our relatively higher socioeconomic blood donors. Alternatively, cigarette smokers may engage in other risk behaviors, although we did not detect associations with alcohol consumption or sexual promiscuity. We feel that it is more likely that the smoking-HBV association may be confounded by other unmeasured or poorly measured biological risks for HBsAg.

Although not significant in the logistic regression model, several risk factors were significant in the univariate analysis including socioeconomic status, body piercing, having a tattoo, consuming alcohol, having sex with multiple partners, and paying for sex. Some of these parenteral, behavioral and sexual risk factors are biologically plausible and have been found in previous studies to be associated with HBsAg status.^{5-7,8} It is also conceivable that previous reports may have been due to confounding, as we did not detect an association between these variables and HBV after controlling for likely confounders such as age, gender and socioeconomic status by exclusion and multivariate analysis.

Risk factors detected, for example sharing at a barber, may be used in the development of donor risk behavior questionnaires for use in India. Donor deferral based on risk behavior assessment is a routine part of blood donor screening in the United States and the United Kingdom, yet in India donor screening procedures are not uniform across blood centers. Few centers in India utilize individual risk behavior questionnaires. For example, at the Rotary-TTK Blood Bank in Bangalore, India donor suitability criteria are described in a group setting during large blood drives and ineligible donors are asked to self-exclude. While donors who indicate they have recently had jaundice are deferred for one year and donors who have had tattoos or blood transfusions are deferred for six months, most centers do not include other behavioral risk factors as exclusion or deferral criteria. For example, most blood centers do not ask donors questions regarding risky sexual behaviors, such as sex with multiple partners or paying for sex. Local blood bank personnel realize the need for an individual donor screening questionnaire. However, behavioral risk factors for Hepatitis B virus (HBV) infection and other TTIs in blood donors in India are not well studied.

Strengths of the study include its setting among healthy blood donors, especially young volunteer donors representative of demographics currently being recruited to replace family replacement donors in India. In addition to defining HBV risk factors for these donors, the study may also provide better estimates of HBV risk factors in the general population than studies performed in clinic or hospital settings. We used a sensitive and specific testing for HBsAg, so misclassification of the infection status is unlikely. Finally, we used an extensive questionnaire to elicit behavioral risk factors.

There are several potential limitations of our study. First, there may have been associations between risk factors and HBsAg status that we were unable to detect due to inadequate

statistical power engendered by our moderate sample size. Second, there is the potential for recall bias on sensitive behaviors such as sexual habits and drug use in HbsAg+ versus HbsAg- subjects. Third, only 73 of the 333 potentially eligible HBsAg seropositives came in for counseling at the blood center and consented to participate in the study, compared to 244 of 293 approached in the comparison group. If the participating cases are not representative of all eligible HBsAg+ cases, selection bias could have amplified or obscured true risk factors in our study. Fourth, residual confounding may account for some of the observed associations in this observational study, as mentioned above. Fifth, the lack of HBsAg neutralization, anti-HBc and HBV DNA testing limited the biological classification of subjects as previously resolved, occult HBV infection, etc. Finally, we excluded women and men older than 45 because of their small number, and therefore the results of our study may not be applicable to those donors. However these groups represent a small proportion of donors in Bangalore and probably elsewhere in India.

In conclusion, these data suggest that several demographic and behavioral risk factors are associated with HBsAg status among blood donors in Bangalore India. Our results may be useful in the development of individual, pre-donation questionnaires to defer risky persons from blood donation. However, our small study also emphasizes the need for further epidemiologic research and training in the domain of blood safety in India. Our group plans to examine risk factors among blood donors in Bangalore India for other TTIs, including HIV and HCV. We also hope further research is conducted among blood donors throughout other regions of India in order to fully understand risk factors among donors in India.

Acknowledgments

We acknowledge the technical support of the following personnel: Siddappa, Joyce Marscline and Mercy Mathew. We also thank Susan Yuen for assistance in manuscript preparation

Funding: Supported by a grant from Blood Systems Research Institute and by a Mid-Career Investigator Award (K24-HL-75036) from the National Heart, Lung and Blood Institute to Dr. Murphy.

References

1. Sharma RR, Cheema R, Vajpayee M, Rao U, Kumar S, Marwaha N, Agnihotri SK. Prevalence of markers of transfusion transmissible diseases in voluntary and replacement blood donors. *Natl Med J India*. 2004; 17:19–21. [PubMed: 15115227]
2. Singh B, Kataria SP, Gupta R. Infectious markers in blood donors of East Delhi: prevalence and trends. *Indian J Pathol Microbiol*. 2004; 47:477–9. [PubMed: 16295370]
3. Batham A, Narula D, Toteja T, Sreenivas V, Puliyel JM. Sytematic review and meta-analysis of prevalence of hepatitis B in India. *Indian Pediatr*. 2007; 44:663–74. [PubMed: 17921555]
4. Kurien T, Thyagarajan SP, Jeyaseelan L, Peedicayil A, Rajendran P, Sivaram S, Hansdak SG, Renu G, Krishnamurthy P, Sudhakar K, Varghese JC. Community prevalence of hepatitis B infection and modes of transmission in Tamil Nadu, India. *Indian J Med Res*. 2005; 121:670–5. [PubMed: 15937371]
5. Risbud A, Mehendale S, Basu S, Kulkarni S, Walimbe A, Arankalle V, Gangakhedkar R, Divekar A, Bollinger R, Gadkari D, Paranjape R. Prevalence and incidence of hepatitis B virus infection in STD clinic attendees in Pune, India. *Sex Transm Infect*. 2002; 78:169–73. [PubMed: 12238646]
6. Murhekar MV, Murhekar KM, Arankalle VA, Sehgal SC. Epidemiology of hepatitis B infection among the Nicobarese--a mongoloid tribe of the Andaman and Nicobar Islands, India. *Epidemiol Infect*. 2002; 128:465–71. [PubMed: 12113491]
7. Akhtar S, Younus M, Adil S, Hassan F, Jafri SH. Epidemiologic study of chronic hepatitis B virus infection in male volunteer blood donors in Karachi, Pakistan. *BMC Gastroenterol*. 2005; 5:26. [PubMed: 16086833]

8. Nuchprayoon T, Chumnijarakij T. Risk factors for hepatitis B carrier status among blood donors of the National Blood Center, Thai Red Cross Society. *Southeast Asian J Trop Med Public Health*. 1992; 23:246–53. [PubMed: 1439976]
9. Kupper LL, McMichael AJ, Spirtas R. A hybrid epidemiology study design useful in estimating relative risk. *J Am Stat Assoc*. 1975; 70:524–8.
10. Wacholder S, McLaughlin JK, Silverman DT, Mandel JS. Selection of controls in case-control studies. I, II, III. *Am J Epidemiol*. 1992; 135:1019–50.
11. Miettinen O. Design options in epidemiologic research. An update. *Scand J Work Environ Health*. 1982; 8(Suppl 1):7–14. [PubMed: 6980462]
12. Scheiblaue H, El-Nageh M, Diaz S, Nick S, Zeichhardt H, Grunert HP, Prince A. Performance evaluation of 70 hepatitis B virus (HBV) surface antigen (HBsAg) assays from around the world by a geographically diverse panel with an array of HBV genotypes and HBsAg subtypes. *Vox Sang*. 98:403–14. [PubMed: 20412171]
13. Shazi L, Abbas Z. Comparison of risk factors for hepatitis B and C in patients visiting a gastroenterology clinic. *J Coll Physicians Surg Pak*. 2006; 16:104–7. [PubMed: 16499801]

Figure 1.

Table 1

Demographic characteristics of the study population, by HBsAg status

	HBsAg–		HBsAg +	
All Subjects	212		71	
Age				
18-25	143	(68%)	31	(44%)
26-35	54	(26%)	35	(49%)
36-45	15	(7%)	5	(7%)
Socioeconomic Status				
High	73	(34%)	36	(51%)
Middle	127	(60%)	29	(41%)
Low	12	(6%)	6	(9%)
Education				
Post graduate	52	(25%)	16	(23%)
Graduate	124	(59%)	38	(54%)
Less than graduate	36	(17%)	17	(24%)
Residence				
Bangalore	178	(84%)	60	(85%)
Hosur	31	(15%)	1	(1%)
Other	3	(1%)	10	(14%)
Marital Status				
Never	153	(72%)	46	(65%)
Married	54	(26%)	25	(35%)
Divorced/Separated	5	(2%)	0	(0%)
First Time vs Repeat Donor				
First time	72	(34%)	37	(52%)
Repeat	140	(66%)	34	(48%)
Voluntary vs Replacement Donor				
Voluntary	211	(100%)	56	(79%)
Replacement	1	(1%)	15	(21%)

Table 2
Behavioral risk factors by HBsAg status. Number (%) admitting risk behavior, with unadjusted odds ratios and 95% confidence intervals

	HBsAg ⁻ N=212	HBsAg ⁺ N=71	OR	95%CI
Transfusion				
Ever	4 (1.9)	1 (1.4)	0.74	3.03 7.21
IV drugs				
Ever	3 (1.4)	1 (1.4)	1.00	0.10 9.72
IV drips				
Ever	18 (8.5)	9 (12.7)	1.57	0.67 3.66
Surgery				
Ever	19 (9)	9 (12.7)	1.48	0.64 3.43
Dental				
Ever	40 (18.9)	21 (29.6)	1.81	0.98 3.34
Hospital				
Ever	5 (2.4)	4 (5.6)	2.47	0.65 9.48
Per Rectal exam				
Ever	4 (1.9)	1 (1.4)	0.74	0.08 6.76
Invasive Investigation				
Ever	1 (0.5)	1 (1.4)	3.01	0.19 48.83
Needle stick				
Ever	8 (3.8)	3 (4.2)	1.13	0.29 4.36
Body piercing				
Ever	2 (0.9)	8 (11.3)	13.33	2.76 64.40
Tattoo				
Ever	1 (0.5)	3 (4.2)	9.30	0.95 90.80
Barber				
Ever	49 (23.1)	42 (59.2)	4.82	2.72 8.52
Jaundice				
Ever	29 (13.7)	10 (14.1)	1.04	0.48 2.25
Contact with Jaundice				
Ever	4 (1.9)	18 (25.4)	17.66	5.74 54.38

	HBsAg ⁻	HBsAg ⁺	OR	95%CI
Ulcer				
Ever	0 (0)	2 (2.8)	N/A	
Genito-Urinary Infection				
Ever	7 (3.3)	2 (2.8)	0.85	0.17 4.18
Bacterial Infection (non-respiratory)				
Yes	4 (1.9)	0 (0)	N/A	
Weight loss				
Yes	4 (1.9)	1 (1.4)	0.74	0.08 6.76
HIV tested				
Positive	0 (0)	1 (1.4)	N/A	
HBsAg tested				
Positive	0 (0)	5 (7)	N/A	
HCV tested				
Positive	0 (0)	0 (0)	N/A	
Smoking				
Yes	26 (12.3)	19 (26.8)	2.61	1.34 5.09
Consumes Alcohol				
Yes	44 (20.8)	25 (35.2)	2.08	1.15 3.74
Test seeking				
Yes	1 (0.5)	3 (4.2)	9.30	0.95 90.80
Met HIV+ person				
Yes	0 (0)	1 (1.4)	N/A	
Multipartner sex				
Ever	5 (2.4)	8 (11.3)	5.26	1.66 16.64
Pay for sex				
Ever	0 (0)	5 (7)	N/A	
Paid for sex				
Ever	0 (0)	0 (0)	N/A	
MSM				
Ever	1 (0.5)	1 (1.4)	3.01	0.19 48.83
Sex with whom				

	HBsAg ⁻	HBsAg ⁺	OR	95%CI
Prostitute	0 (0)	4 (44.4)	N/A	
Casual Partner	5 (100)	5 (55.6)	3.14	0.76 12.97
Condom Use				
Ever	3 (60)	6 (66.7)	1.33	0.14 12.82

N/A: odds ratio could not be calculated due to zero cells.

Table 3
Results of the Final Logistic Regression Model

Explanatory Variable	Adjusted Odds Ratios	95% Confidence Interval
Age (26-45 vs 18-25)	3.60	(1.76, 7.39)
Repeat donor (repeat vs first time)	0.34	(0.17, 0.71)
Residence (Hosur vs Bangalore)	0.19	(0.02, 1.48)
Residence (Outside vs Bangalore)	15.66	(3.60, 68.07)
Barber	4.07	(2.06, 8.03)
Jaundice Contact	13.64	(3.71, 50.24)
Smoker	3.25	(1.39, 7.60)