Epidemiol. Infect. (2007), **135**, 549–554. © 2006 Cambridge University Press
doi:10.1017/S0950268806007242 Printed in the United Kingdom

Hepatitis A virus infection in people of South Asian origin in England and Wales: analysis of laboratory reports between 1992 and 2004

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(*Accepted 19 July 2006; first published online 26 September 2006*)

SUMMARY

The aim of the study was to determine whether rates of hepatitis A infection are higher in people of South Asian origin compared to the general population, to look for evidence of spread to the general population, and to identify ways to improve preventive strategies. Routine laboratory reports of hepatitis A infection in England and Wales in 1992–2004 were analysed. Study participants were patients with confirmed hepatitis A infection reported to the Health Protection Agency by the diagnosing laboratory. Nam Pehchan software was used to identify patients of South Asian ethnicity. Main outcome measures were comparison of incidence of hepatitis A in South Asian and non-South Asian groups, by age and region. Rates of infection were significantly higher in the South Asian group compared to the non-South Asian group (rate ratio 2·68, 95% confidence interval 2·07–3·47). Patients in the South Asian group had a younger age distribution. Travel was an important risk factor with 85% of those of South Asian origin acquiring their infection abroad, most frequently in the Indian subcontinent, compared to less than one third of those in other groups. Health-care professionals should ensure that all travellers to high-risk countries are protected by hepatitis A vaccination. Targeted information campaigns may be indicated in regions of the United Kingdom for people in South Asian minority ethnic groups.

INTRODUCTION

Development of effective disease control requires wider determinants of health inequalities to be addressed, such as differences in epidemiology of hepatitis A by ethnic group [1–4] International travel to high-incidence countries has grown rapidly [5, 6]. This leads to risk of infection in the traveller and their contacts when the traveller returns home, as the majority of the UK population is now susceptible to hepatitis A [7]. The risk may be especially high for individuals who live or were born in low-endemicity areas and who visit friends or relatives living in high-incidence countries [8, 9]. In The Netherlands, an annual epidemic of hepatitis A in the late summer was attributed to infection that was acquired abroad in children whose parents were from Morocco, resulting in subsequent transmission to non-travelling children and then to susceptible adults [8]. Similarly, a Swedish study observed that children of 'foreign origin' acquired hepatitis A when visiting their native countries during holidays or when they had relatives visiting them from abroad [10]. Hepatitis A is often asymptomatic in children [11] and they may shed the virus longer than adults [12]. While children may be the reservoir of infection, adults incur most of the burden of disease, as severity of infection increases with age.

Laboratory surveillance data include names, which can be used to identify people from South

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Asian minority ethnic groups in England and Wales. This provided the opportunity to examine whether higher rates of hepatitis A occur in people of South Asian origin, to determine if similar patterns of transmission are occurring as observed in other countries, and to identify possible target groups for vaccination.

METHODS

Data were collated from around 300 participating laboratories by the former Public Health Laboratory Service (data from 1992 to 31 March 2003) and the Health Protection Agency (HPA) (2003–2004). A laboratory-confirmed case is defined as someone who has IgM antibody to hepatitis A virus. Names, when reported, are held temporarily on the laboratory surveillance database in agreement with guidance on confidential patient information and Caldicott guidelines [13]. The Health Protection Agency has approval under Section 60 of the Health and Social Care Act to process confidential patient information for the purposes of monitoring the efficacy and safety of vaccination programmes (http://www.legislation.hmso.gov.uk/si/si2002/20021438.htm).

All laboratory-confirmed reports of hepatitis A infection from 1 January 1992 to 31 December 2004 were extracted. Information on date of specimen, name, age, sex, geographical region of diagnosis, travel history, country of travel, sexual exposure and injecting drug use, were also extracted.

Ethnicity is not routinely reported, and was assigned using 'Nam Pehchan' software based on names held in the database. The software assigns ethnicity (South Asian or other ethnicity), likely religious origins and language of individuals identified as being South Asian based on name stem [14]. Data were coded as South Asian (SA), Non-South Asian (NSA) or where name was absent, unknown ethnicity (NK). South Asian relates to an individual originating from the Indian subcontinent. Age- and regional and ethnicity-specific population data based on 2001 census data were obtained from the ONS, available online (http://www.statistics.gov.uk/STATBASE/Expodata/Spreadsheets/D7666.xls). Population estimates for the South Asian ethnic group comprised Indian, Pakistani and Bangladeshi groups. We assumed that cases with no name and hence undetermined ethnicity had a similar distribution of ethnicity to cases with derived ethnicity. Cases were therefore adjusted to account for the proportion of reports with no name to calculate ethnicity-specific rates. The average annual age- and regional specific rates per 100 000 for South Asian and non-South Asian were calculated using estimated 2001 population as ethnicity-specific data were not available for the entire period of interest. Data were analysed using Microsoft Excel 2000 (Microsoft Corp., Redmond, WA, USA) and STATA version 7 (StataCorp, College Station, TX, USA).

RESULTS

A total of 25 546 laboratory reports of hepatitis A infection were received at the HPA from 1992 to 2004 in England and Wales. The number of reports decreased from 6762 in 1992 to an average of approximately 1000 reports since 1996.

Overall, 72·6% (17 820/24 546) of reports included name, however, the proportion of reports with name decreased dramatically over time; 95·5% of reports (6459/6762) in 1995 compared to 3·9% (23/579) in 2004. Of those reports with name, 9·8% (1752/17 820) were identified as having a name of South Asian origin. The majority of South Asians were of Moslem religious origin (1404/1752), followed by Sikh (131/1730). Individuals of Moslem religious origin and of Urdu linguistic origin accounted for 54·7% (958/1752) of all reports with South Asian name.

The age of the cases increased over time from a median of 22 in 1992 to 32 in 2004. The age distribution also differed significantly according to ethnic status ($\chi^2 = 1{\cdot}3 \times 10^3$, $P < 0{\cdot}001$). The distribution of ages in the South Asian ethnic group was skewed towards the younger age groups, with a single peak in the 5–9 years age group (27·6%, 483/1752). In contrast, the age distribution of non-South Asians was bimodal, with peaks existing in the 5–9 years age group (12·1%, 1948/16 068) and 25–29 years age group (14·6%, 2353/16 068). The age distribution of individuals with unknown ethnicity was similar to that of the non-South Asians (Fig.). After stratifying by age, the average annual rates per 100 000 were significantly higher in the South Asians compared non-South Asians in individuals aged <24 years and also in those aged >60 years. Rates were significantly higher in non-South Asians compared to South Asians in the 25–44 years age groups (Table 1).

Marked variation of the proportion of reports with name existed regionally, ranging from 11·6% of reports with name in Wales (151/1296), to 86·4% (1544/1787) of reports in the North East region.

https://doi.org/10.1017/S0950268806007242 Published online by Cambridge University Press

Table 1. *Average annual age-specific rates per 100 000 population by ethnic group*

Age group (yr)	South Asian		Other ethnicity		RR (95% CI)	No name (*n*)	Total (*n*)	Rate
	n	Rate	*n*	Rate				
<1	6	1·67	29	0·53	3·16 (1·31–7·61)	10	45	0·56
1–4	161	11·22	395	1·80	6·22 (5·18–7·47)	198	754	2·34
5–9	483	28·00	1948	6·60	4·24 (3·83–4·68)	676	3107	7·23
10–14	404	23·25	1558	5·09	4·56 (4·09–5·09)	534	2496	5·61
15–19	225	12·10	1343	4·71	2·56 (2·23–2·95)	588	2156	5·15
20–24	175	9·35	2089	7·57	1·23 (1·05–1·44)	1024	3288	8·10
25–29	102	5·59	2353	7·69	0·72 (0·59–0·88)	948	3403	7·62
30–34	39	2·30	1880	5·24	0·43 (0·31–0·60)	776	2695	5·20
35–39	25	1·91	1137	3·05	0·62 (0·42–0·93)	471	1633	3·07
40–44	13	1·02	773	2·33	0·43 (0·25–0·75)	303	1089	2·29
45–49	18	1·57	621	2·07	0·75 (0·47–1·20)	233	872	2·04
50–54	4	0·51	385	1·16	0·43 (0·16–1·17)	208	597	1·28
55–59	3	0·54	255	0·93	0·58 (0·18–1·82)	160	418	1·09
60–64	11	1·88	213	0·91	2·06 (1·12–3·78)	101	325	0·98
⩾65	18	1·77	556	0·72	2·46 (1·54–3·94)	380	954	0·88
Unknown	65	—	533	—		116	714	—
Total	1752	9·13	16 068	3·40	2·68 (2·07–3·47)	6726	24 546	3·63

RR, Rate ratio; CI, confidence interval.

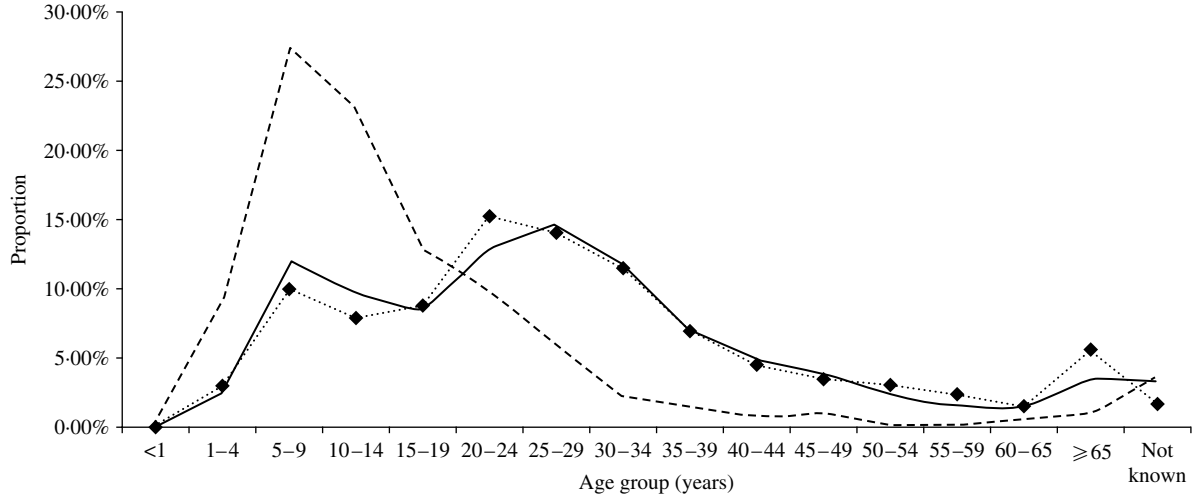

Fig. Age distribution of cases of HAV infection by ethnic group. ····◆····, Unknown ethnicity; ——, other ethnicity; – – –, South Asian.

Rates of infection in the South Asian group were higher than non-South Asians in all regions in England and Wales, although the proportion of South Asians varied across regions. The highest rates in South Asians were observed in the North West (17·4/100 000), West Midlands (14·4/100 000), South East (13·0/100 000) and South West (12·1/100 000) regions.

In total 1·8% (437/24 546) of reports reported injecting drug use as the route of acquisition; 1·3% reported injecting drug use in non-South Asians (212/16 086), compared to 0·2% South Asian (4/1752) and 3·3% (221/6726) of reports with unknown ethnicity ($\chi^2 = 15{\cdot}7$, $P < 0{\cdot}001$). A total of 1·1% (271/24 546) reported sex between men as the route of transmission, of these, two (0·1%) were in South Asians, 215 (1·3%) non-South Asians, and 54 (0·8%) in unknown ethnicity ($\chi^2 = 29{\cdot}4$, $P < 0{\cdot}001$).

Overall, of those reports with information on travel, 40·0% (2053/5130) of individuals had acquired

https://doi.org/10.1017/S0950268806007242 Published online by Cambridge University Press

Table 2. *Cases of HAV infection by ethnic group and travel history*

	Ethnicity							
	Other ethnicity		South Asian		No name		Total	
WHO regions	*n*	%*	*n*	%*	*n*	%*	*n*	%*
Abroad country unspecified	199	17	69	11·8	207	63·9	475	23·1
Africa	144	13	14	2·4	7	2·2	165	8·0
Americas	89	8	4	0·7	3	0·9	96	4·7
Eastern Mediterranean region	113	10	14	2·4	10	3·1	137	6·7
Europe	356	31	8	1·4	21	6·5	385	18·8
Indian subcontinent	172	15	470	80·5	71	21·9	713	34·7
South-East Asia	21	2	1	0·2	3	0·9	25	1·2
Western Pacific region	51	4	4	0·7	2	0·6	57	2·8
Total acquired abroad†	1145	28·4	584	85·6	324	77·7	2053	40·0
Infection not acquired abroad	2886		98		93		3077	
No information	12 037		1070		6309		19 416	
Total infections	16 068		1752		6726		24 546	

* Relates to the % of those acquired abroad.
† % of those with information on travel history.

infection abroad with the proportion increasing over time (Fig.). However, the proportion of cases who had acquired their infection abroad significantly differed according to ethnic group ($\chi^2 = 821{\cdot}6$, $P < 0{\cdot}001$). In total, 85·6% (584/682) of South Asians had acquired infection abroad compared to 28·4% (1145/4031) of non-South Asians. The Indian subcontinent accounted for the greatest proportion of reports acquired abroad in the South Asian group, and Europe for the non-South Asian group (Table 2).

The trends by month of report show a marked seasonal pattern during the first 4 years (1992–1995) in South Asian and non-South Asian groups with peaks in July and October of each year (data not shown). The same pattern occurred in cases acquired in the United Kingdom but was less marked amongst travel-associated cases. After 1996 no consistent seasonal pattern is observed.

DISCUSSION

Principal findings

We have identified important differences in the epidemiology of hepatitis A in people from South Asian minority ethnic groups. An overall rate of 10·1/100 000 occurred in the South Asian group compared to 3·7/100 000 in the non-South Asian group (rate ratio 2·7). Rates reached nearly 20/100 000 in one region, just below the rate for which a routine childhood vaccination programme has been recommended in the United States [15]. Marked differences in the age distributions were observed with patients from South Asian minority ethnic groups having a younger age distribution than those from non-South Asian and unknown ethnic groups. The majority (85%) had acquired their infection abroad, mainly in the Indian subcontinent. Before 1996, trends in cases acquired in the United Kingdom did appear to coincide with those in travel-acquired cases, suggesting that some spread from such cases may occur. After 1996, however, three major increases in UK-acquired cases occurred, in association with documented outbreaks in homosexuals and IDUs, and did not correlate with any increase in travel-acquired infections [12]. Therefore, unlike other countries [8, 9, 11] there is no compelling evidence that cases in ethnic minority travellers have led to large-scale transmission of the infection to the general population of the United Kingdom. Intermittent introduction of hepatitis A by travellers may nevertheless be important for maintaining persistence of hepatitis A in the United Kingdom.

Strengths and weaknesses of the study

We combined different data collected for different purposes and this risks introducing bias. Surveillance of hepatitis A by laboratory diagnosis is highly specific for hepatitis A and reporting provides information from nearly all laboratories in England and Wales, although completeness of reporting in some

regions is poorer than others. Also, anicteric infection is more frequent in children, and is often undiagnosed, so laboratory reporting may be less sensitive in children. The number of infections per year fell considerably during the period, and so the annual risks currently are likely to be lower than the average for the period of study. Travel history and names were incompletely recorded, both of which may have varied systematically by ethnic group. Reported cases may not be representative if certain risk groups are systematically excluded from the reporting system because of differences in health service provision or health-seeking behaviour of some groups. Socioeconomic status is an important confounding factor which was not included.

We made the assumption that the distribution of ethnic group was the same in those with and without names, but we do not know to what extent this is correct. The age distribution of cases in those with no name is closer to that of the non-South Asian distribution in the Figure; if a smaller proportion than expected of cases with no name is South Asian then the risks for the South Asian group would be overestimated. We also used 2001 census data, from around two thirds of the way through the time period under study, to estimate denominators. Recent demographic trends vary in different ethnic groups; the South Asian population has shown a bigger increase than the rest of the population in most age groups, but particularly in older ones. This increasing trend means that the South Asian population in 2001 is greater than in 1992–2000 and lower than 2002–2004. Consequently the risk would have been underestimated for 1992–2000 and overestimated for the shorter period of 2001–2004, with the balance of time periods probably in favour of an overall underestimate. Comparing South Asian with all other ethnic groups, changes in the numbers of children in the primary-school age groups we identified to be at highest risk of infection are less marked than other age groups, so this aspect may be of less concern.

South Asian ethnicity was assigned using a computer program, while for population denominators this was assigned by self-reporting of ethnicity. This may have resulted in an over- or underestimate of rate based on the sensitivity and specificity of each method. None of these factors are likely to explain the main findings, however, and travel seems to be the dominant explanation. Travellers who are visiting friends and family may be at greater risk of infection compared with those staying in hotels because they spend more time in rural areas, in close contact with children, and in an environment where exposure to hepatitis A is very likely. They may also spend longer periods away compared to other travellers; the average length of stay in India is 1 month, compared to an average 10 days for other destinations (international passenger survey available online: http://www.statistics.gov.uk/downloads/theme_transport/tt2003web.pdf). The implication is that their infection may not be reported if it they have recovered by the time they return, and hence there may be a bias towards underestimating the risk associated with such travel.

Whatever the biases, which undoubtedly exist in the analysis, they are not likely to negate an increased risk; this is reflected most simply by considering that around 10% of the cases occur in people we identified as South Asian, while this group comprises around 5% of the population.

Comparison with other studies

In contrast to the studies in The Netherlands and Sweden, we found no evidence of transmission from children who had travelled to people who had not based on inspection of patterns of seasonality. This may indicate that health services take effective control measures such as vaccination of contacts to prevent spread as soon as cases are reported.

Hepatitis A may be undiagnosed in children because they are less likely to develop jaundice. The rate ratio of South Asian to non-South Asian increases from 2·7 (95% CI 2·55–2·82) to 3·0 (95% CI 2·89–3·12) if we adjust for age-specific asymptomatic infection rates of 30% in children aged <6 years compared to 70% for older cases [16]. The younger age distribution of reports in those from South Asian minority ethnic groups may reflect their younger population structure or lower risk of infection in adults who are already immune because they were born in highly endemic areas. A small seroprevalence study in England suggested however that a higher seroprevalence in children from one minority ethnic group results from being born abroad rather than increased transmission at home [17].

Implications for clinicians and policy makers

The risk of disease may be greater in travellers to South Asia now because a greater and greater

https://doi.org/10.1017/S0950268806007242 Published online by Cambridge University Press

proportion of British people from South Asian ethnic minorities was born and grew up in the United Kingdom, and is likely to be susceptible to hepatitis A infection. These data underline the importance of targeting people from South Asian minority groups with travel advice about the risks of acquiring hepatitis A when visiting friends and family in highly endemic countries. Travel-related cases represent a failure of the health services to protect individuals, since the vaccine is free and has been readily available for some time. Although some of the regional variations may reflect differences in reporting, and differences in vaccine uptake, these are not likely to account for the degree of variation observed. Are South Asian travellers not consulting their GPs prior to travel, or are the GPs failing to recognize the need to immunize? Either way, targeted information campaigns may be indicated in many regions of the United Kingdom to promote travel health for South Asian minority ethnic groups. This may be logistically challenging but should be at least as feasible as other selective programmes such as those for BCG and hepatitis B. Equity is the main issue; overall a minority of cases occurs in the South Asian populations, but the relative risk of infection is high.

We were able to assign individuals to South Asian minority ethnic groups because laboratory reporting has included patient names. The declining quality of surveillance data makes it unlikely that this approach will be possible in future. Furthermore, other minority ethnic groups cannot be identified by this method. While routine infectious disease surveillance cannot identify minority ethnic groups, inequalities in health will occur without being detected. This would not be accepted in other areas of health care. Public bodies may be in breach of the Race Relations Amendment Act of 2001 if they are unable to serve minority ethnic groups appropriately, and should take steps to ensure that the patient's ethnic group is captured by routine surveillance systems and that strategies are in place to redress any inequalities in health that are identified.

ACKNOWLEDGEMENTS

The authors thank Dr Mary Ramsay.

DECLARATION OF INTEREST

None.

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