นิพนธ์ต้นฉบับ

Hepatitis C virus antibody in blood donors.

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Anti-HCV seroprevalence was measured in blood donors at the National Blood Centre, Bangkok, during the period of January 1991 to December 1992. The method used for detecting anti-HCV was enzyme-linked immunosorbent (ELISA) using Abbotts HCV EIA (2nd generation). The results revealed that the age-adjusted seroprevalence rate of anti-HCV in male donors was 1.47 per cent in 1991 and 1.04 per cent in 1992. Although the rates in males were higher than in females, the differences were not statistically significant. It was found that new male donors showed the highest prevalence, i.e. 1.78 per cent and 1.58 per cent in 1991 and 1992, respectively, when compared with all donors and repeat donors of both sexes. Anti-HCV seroprevalence in new donors or first-time donors increased with increasing age. Young donors were less likely to be positive than the older donors. This study suggests that preventive measures against post-transfusion viral hepatitis C should be further continued, advocating routine blood screening of donors for the antibody to hepatitis C virus.

Key words : *Anti HCV , Blood donors, SEROPREVALENCE*

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ผลการตรวจภูมิคุ้มกันต่อไวรัสตับอักเสบบีในผู้บริจาคโลหิตระหว่างปี พ.ศ. 2534 และ 2535 โดยการตรวจวิธี ELISA ปรากฏผลว่าอัตราความชุก (ปรับมาตรฐานตามอายุ) ของ anti-HCV ในผู้บริจาคทั้งหมดที่เป็นชาย พบ 1.4% ในปี 2534 และ 1.04% ในปี 2535 โดยอัตรานี้จะสูงกว่าในผู้บริจาคหญิงโดยไม่แตกต่างกันอย่างมีนัยสำคัญทางสถิติ (P>.05) และพบว่าผู้บริจาคโลหิตใหม่ (ครั้งแรก) ที่เป็นชายมีอัตราความชุกของ anti-HCV = 1.78% ในปี 2534 และ 1.5% ในปี 2535 ซึ่งจัดว่าเป็นอัตราสูงสุดเมื่อเทียบ กับผู้บริจาคทั้งหมดและผู้บริจาคประจำ นอกจากนั้นในกลุ่มผู้บริจาคโลหิตใหม่จะพบมี anti-HCV เพิ่มขึ้นตามอายุ, โดยที่ผู้มีอายุน้อยพบมี anti-HCV ให้ผลบวกน้อยกว่ากลุ่มที่มีอายุมากกว่า ผลการศึกษานี้ แสดงว่ามีความจำเป็นต้องตรวจคัดกรอง anti-HCV ในโลหิตบริจาคทุกขวด

Hepatitis C virus appears to be responsible for most cases of parenterally transmitted non-A, non-B (NANB) hepatitis. The disease is found worldwide and appears to be almost as common in developed as in developing countries. The rate of infection is high in drug addicts, hemophiliacs, thalassemics, hemodialysis patients,(1) and in those with cryptogenic, alcoholic and autoimmune liver diseases. Hepatitis C virus is the main cause of post-transfusion hepatitis (PTH). Several studies have reported on the etiology of post-transfusion hepatitis. Arch et al. reported that 87% of post-tranfusion hepatitis was due to NANB.(2) Also in the study of Hoofnagle et al., the transmission of NANB hepatitis was 78%(3). In Thailand, Bruke and Snitbhan reported that the prevalence of NANB in acute hepatitis was 22%.(4) In another study, in Thailand NANB was reported as being the etiology of 64% of post-tranfusion hepatitis(5) cases. Punyagupta concluded that NANB was more common than hepatitis B virus in the etiology of post-transfusion hepatitis in Thailand.(6) Even though screening for hepatitis B antigen has been carried out, there has been no decrease in the incidence of post-transfusion hepatitis. As a preventive measure against viral hepatitis C, a new policy was adopted by the National Blood Centre (NBC), Thai Red Cross Society, in January 1991, advocating routine blood screening of donors for the antibody to hepatitis C virus (anti-HCV).

The purpose of this study was to study the prevalence of anti-hepatitis C virus in volunteer blood donors at the National Blood Centre.

Materials and methods

The study population comprised all volunteer blood donors at the National Blood Centre, Bangkok, during the period January 1991 to December 1992. A repository of 167,078 frozen serum samples in 1991 and 169,524 in 1992 were tested. Each sample was tested by enzyme-linked immunosorbent assay (ELISA) for antibodies to HCV using Abbotts HCV EIA (2^{nd} generation). The test is an in vitro qualitative enzyme immunoassay for the detection of antibody to hepatitis C virus (HCV) in human serum or plasma. Positive results were confirmed in the same serum samples, and repeatedly reactive samples were defined as truly positive.

Analysis and statistical methods

The qualitative data were calculated by percentage and ratio, whereas quantitative data were calculated by the average rate : e.g. the median value. Age-adjusted prevalence rates were calculated by direct adjustment of rates. The difference between age-adjusted prevalence rates by sex were tested by the student's t-test (proportion).

Study results

Anti-HCV seroprevalence (age-adjusted prevalence rate) of all donors was 1.47% in males and 1.23% in females in 1991 and 1.04% in males and .92% in females in 1992. The results showed that the prevalence in male donor was higher than that in female donors, with no statistically significant difference at $\alpha = .05$ ($P>.05$) in both years. Prevalence was highest in young male donors aged between 21 and 30 years, (1.64% in 1991 and 1.34% in 1992) when compared with those in the other age groups for each year.

The prevalence in female donors showed an increase with increasing age; young female donors were less likely to be positive than the older donors of both years (Table 1).

Table 1. Prevalence of anti-HCV (percent) in all blood donors by age & sex.

Age group (years of age)	1991 Males No.tested	%	1991 Females No.tested	%	1992 Male No.tested	%	1992 Female No.tested	%
< 20	15,622	1.08	7,188	.93	23,424	.75	11,694	.87
21-30	59,780	1.64	23,530	1.31	54,955	1.34	23,276	.85
31-40	27,728	1.42	11,063	1.24	25,318	.88	10,716	1.06
41-50	11,716	1.35	4,488	1.29	10,732	.65	4,237	1.11
51-60	4,366	1.10	1,126	1.60	3,858	.70	990	.40
>60	419	.95	52	.00	287	.35	37	5.41

Note : 1991 age-adjusted prevalence rate in males = 1.47%, in females = 1.23% (P>.05)
1992 age-adjusted prevalence rate in males = 1.04%, in females = .92% (P>.05)

New donors or first-time donors showed increased prevalence with increasing age for both sexes (Table 2). The highest prevalence rate was confined to the age group of those more than 60 years of age of both years except for female donors in 1991. The age-adjusted prevalence was 1.78% in males and 1.43% in females (1991) and 1.58% in males and 1.23% in females (1992). There was no statistically significant difference in prevalence between male and female donors of both years (P>.05)

Table 2. Age and sex distribution of new donors positive for anti-HCV.

Age group (years of age)	1991 Males No.tested	%	1991 Females No.tested	%	1992 Male No.tested	%	1992 Female No.tested	%
< 20	12,214	1.18	5,827	1.08	16,361	.87	8,674	1.01
21-30	29,263	1.99	12,833	1.52	26,145	2.00	11,441	1.24
31-40	6,250	1.81	4,152	1.54	5,015	1.85	3,393	1.74
41-50	1,678	2.26	1,322	1.51	1,405	1.57	1,002	2.50
51-60	416	1.92	283	2.83	325	1.85	198	1.52
>60	20	5.00	3	.00	11	9.09	7	14.29

Note : 1991 age-adjusted prevalence rate in males = 1.78, in females = 1.43%(P>.05)
1992 age-adjusted prevalence rate in males = 1.58%, in females = 1.23%(P>.05)

Anti-HCV seroprevalence in repeat donors of both sexes and in both years showed no increase with age. In 1991, the highest prevalence was 1.31% in the age group 31-40 years, while in females, it was 1.20% in the age group 41-50 years. There was lower prevalence in both sexes and in each age group in 1992 than in 1991. The age-adjusted prevalence rate of anti-HCV in males was 1.24% and 1.04% in females in 1991, and .70% in males and .58% in females, with no statistically significant difference between the sexes (Table 3).

Table 3. Age and sex distribution of repeat donors positive for anti-HCV.

	1991				1992			
Age group (years of age)	Males No.tested	%	Females No.tested	%	Male No.tested	%	Female No.tested	%
< 20	3,408	.73	1,361	.29	7,063	.47	3,020	.46
21-30	30,517	1.30	10,697	1.06	28,810	.75	11,835	.48
31-40	21,478	1.31	6,911	1.06	20,303	.64	7,323	.75
41-50	10,038	1.20	3,166	1.20	9,327	.51	3,235	.68
51-60	3,950	1.01	843	1.19	3,533	.59	792	.13
>60	399	.75	49	.00	276	.00	30	3.33

Note : 1991 age-adjusted prevalence rate in males = 1.24%, in memales = 1.04 %(P>.05)
1992 age-adjusted prevalence rate in males = .70%, in memales = .58 %(P>.05)

Table 4 shows a summary of age-adjusted prevalence rates (percent) of anti-HIV by sex in 1991 and 1992. New donors showed the highest prevalence rates in both sexes in 1991 and 1992 when commpared with total and repeat donors.

Table 4. Summary of age-adjusted prevalence rate (percent) of anti-HCV by types of donor and their sex.

	1991		1992	
Types of donors	Males	Females	Males	Females
All donors	1.47	1.23	1.04	.92
New donors	1.78	1.43	1.58	1.23
Repeat donors	1.24	1.04	.70	.58

The majority of those who were positive for anti-HCV were classified as working in general types of occupations which included owning one's business, being unemployed and being a housewife (females) in 1991 and 1992 (Table 5). For male donors, the second rank by occupation was government officials in both years (19.77% and 23.86%), where as that in females was employees (33.28, 29.79%). Donors who were accounted for an average of 12-17% of those positive for anti-HCV in both sexes of both years.

Table 5. Occupation of all blood donors positive for anti-HCV by sex (percent in pasethese).

Occupation	1991		1992	
	Males N (%)	Females N (%)	Males N (%)	Females N (%)
1. Students	213(11.69)	76(13.10)	142(11.53)	79(16.81)
2. Government	360(19.77)	60(10.34)	294(23.86)	34(7.23)
3. Employees	349(19.17)	193(33.28)	178(14.45)	140(29.79)
4. Monks	47(2.58)	2(.34)	39(3.17)	0(0.00)
5. General public*	852(46.79)	249(42.93)	579(46.99)	217(46.17)
Tatal	**1,821(100)**	**580(100)**	**1,232(100)**	**470(100)**

* Own their own business, housewives, unemployed.

Discussion

This study shows that anti-HCV seroprevalence in all blood donors was lower than 2% of both years. Such prevalence is very meaningful with regard to the ability to provide safe blood services. Punyakupta et al. found that 64% of PTH was caused by NANB and concluded that NANB is the major cause of PTH and more important than hepatitis B virus. Even though attempts to reduce PTH is have been focused on donor selection and HBsAg screening, there is no effect on PTH in Thailand.(6) The Lancet (August 5,1989.) published data on the prevalence of antibody to hepatitis C virus in the Netherlands, Spain and Germany, confirming a relationship between anti-HCV and transfusion non-A, non-B hepatitis.(7-9) In our study, the age-adjusted prevalence of anti-HCV in all male donors was 1.47% and 1.04% in1991 and 1992 respectively. In new male donors, the prevalence was highest at 1.78% and 1.58% in 1991 nad 1992 respectively when compared with all donors and repeat donors. In male repeat donors, it was 1.24% in 1991 and 0.70% in 1992. The result of this study shows higher seroprevalence rates for anti-HCV than those reported in Western countries. Kuhnl et al. studied the antibody to hepatitis C virus in German blood donors, the results of their study revealed that 0.28% of first-time donors 0.48% of repeat donors, 0.34% and 0.46% of those from rural and urban areas were positive. The highest seropositivity rate (0.79%) was found in central Germany.(10) The present study shows higher rates than that of German donors. Also Janot et al. reported that the prevalence of anti-HCV in France was 0.68%(11), while the prevalence in all blood donors in southern Italy was 1.38%.(12) In common with German and Spanish investigators, intravenous drug users were usually found to be anti-HCV positive. A significantly higher proportion of anti-HIV seropositive than of anti-HIV seronegative homosexual men were also found to be anti-HCV positive ($P<0.01$),suggesting the spread of HCV through refuel activity.(13,14) Also,Tanprasert et al. studied the possibility of the sexual transmission of hepatitis C by collecting data from 38,789 voluntary blood donors (first donation),of which 1.6% were found to be anti-HCV positive. Among those who were anti-HCV positive, 4.4% showed reactive VDRL and TPHA; 4.8% were HBsAg positive and 6.5% were anti-HIV reactive, suggesting that heterosexual transmission may play an important role in the spread of hepatitis C viral infection.(15)

In conclusion, HCV seroprevalence of all blood donors in our study was under 2%. It was higher in males than in females, and in the first-time donors than in repeat donors. The difference of the prevalence by sex was not statistically significant. HCV seroprevalence in new donors or first-time donors increased with increasing age, young donors are less likely to be positive than older donors.

Hepatitis C is an important cause of post-transfusion hepatitis, some of which may be due to sexual transmission of the virus. Even though the prevalence rate of anti-HCV is under 2%, preventive measures against post-transfusion viral hepatitis C are necessary for safe blood donation. The policy of advocating routine screening of blood donors for antibody to hepatitis C virus must be continued.

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