

## Sexually transmitted viral infections in various population groups in Mogadishu, Somalia

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**SUMMARY** The prevalence of serum antibodies to human immunodeficiency virus (HIV), herpes simplex virus (HSV), and cytomegalovirus (CMV) and of hepatitis B virus (HBV) markers was investigated in different population groups, including prostitutes, in Mogadishu, Somalia.

Hepatitis B surface antigen (HBsAg) was detected in 37% of pregnant women, 4% of neonates, 22% of educated women, and 20% of prostitutes. No significant difference between the groups was observed for HBV. In contrast to figures reported from South East Asia, the prevalence of hepatitis B e antigen (HBeAg) was 18% in prostitutes and only 3% in all other HBsAg positive subjects.

The prevalence of antibodies to HSV (100%) and CMV (90%) was very high, but antibodies against HIV were not detected in any of 471 sera. As the routes of transmission for HBV and HIV infections are considered to be similar, HIV will probably spread rapidly in Somalia once this virus has been introduced into the country.

Human immunodeficiency virus (HIV), earlier named LAV/HTLV-III, probably has an important role in Africa as causing a sexually transmitted disease (STD), but information is only available from a limited number of populations and countries.<sup>1</sup> Other viral infections that have been associated with sexual transmission are hepatitis B (HBV), herpes simplex type 2 (HSV 2), cytomegalovirus (CMV), and human papillomavirus (HPV).

The prevalence of HBV infections in a society is proportional to the extent of the infectious reservoir and to the routes and possibilities of transmission. The prevalence of HBV carriers varies in different parts of the world and is much higher in developing countries (5% to 20%) than in the developed world (0.1 to 0.6%).<sup>2</sup>

CMV and HSV are ubiquitous, and HSV 2 causes an STD with an increasing impact in developed countries. The isolation of CMV from semen and cervical

secretions has pointed to the possibility of sexual transmission of this virus.<sup>3</sup>

Several studies have shown a high prevalence of antibodies to HIV in sera from inhabitants of some parts of Africa, such as Zaire,<sup>4,5</sup> Uganda,<sup>6</sup> Rwanda,<sup>7</sup> and Kenya.<sup>8</sup> The main route of transmission between people in Africa has been shown to be by heterosexual intercourse, and the ratio of men to women infected is close to 1:1.<sup>4,9,10</sup>

Infectious diseases constitute a public health problem in Somalia. STDs, however, receive lower priority than programmes to control other infectious diseases. The prevalence of infections with HIV, HBV, CMV, or HSV in Somalia has not been reported.

The aim of the present study was to investigate the prevalence of hepatitis B markers and antibodies to HIV, HSV, and CMV in various groups of women in Mogadishu, Somalia and, by including a group of prostitutes, to try to evaluate the role of these viruses as causes of STDs. A group of newborn babies was also included, and additional patient groups were included to study antibodies to HIV. The prevalence of infections with human papillomavirus (HPV) could not be investigated as no serological tests for this virus are available.

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## Patients and methods

### STUDY POPULATION

The population of Somalia is about 5.5 million people, half of whom are nomads and the rest comprise farmers, villagers, and city people. The capital city, Mogadishu, with a population of about 800 000, is situated in the south, on the coast of the Indian Ocean.

This study was carried out in Mogadishu, in July and August 1985 and January 1986. A total of 242 serum samples were collected from three different groups of women aged 14 to 48. Venous samples were collected from 75 pregnant women attending the department of obstetrics and gynecology, Banadir Hospital, Mogadishu, between 8 am and 2 pm all days of the week, except Fridays, during the study period. The mean age of these women was 25 (range 16 to 38). Eighty two women (66 (81%) of whom had a higher education and included physicians, nurses, university students, and administrative staff) volunteered to participate in the study. The mean age in this group was 23 (range 15 to 40) and two of them were pregnant. Sera were collected from 85 professional prostitutes, mean age 23 (range 14 to 48). These women had recently been detained in a military camp for a special programme arranged by the government concerning behaviour and health improvement. In addition, cord blood samples were obtained from 43 of the newborn babies.

Questions were asked according to a standardised protocol. Details included age, marital status, occupation, number of pregnancies, history of hepatitis, whether circumcised, and number of clients and foreign sexual contacts of the prostitutes. Of the 55 prostitutes who answered this question, 10 had had foreign clients. These 55 women had a mean of 14 (range one to 105) sexual partners a week. The mean age and range for the pregnant women and educated women whose sera were examined for HBV was 25 (16 to 38) and 23 (15 to 40), respectively. All women were circumcised. Informed consent was obtained from the participants.

A further 186 sera were included in the study for HIV antibody testing; 33 from children six months to 10 years old attending the Banadir Hospital, three from men attending the STD clinic, 23 from male health care workers, and 127 from inpatients and outpatients (69 men, 58 women aged 15 to 60) at the department of internal medicine of the General Hospital and at the Forlanini Hospital, a hospital for patients with tuberculosis. Hence, a total of 471 sera were analysed for antibodies to HIV.

Because of the difficulties in obtaining sufficient blood samples from pregnant women, educated women, and newborn babies, the number of sera

Table 1 Number of subjects tested for antibodies to human immunodeficiency virus (HIV), herpes simplex virus (HSV), hepatitis B virus (HBV), and cytomegalovirus (CMV)

Groups	HIV*	HSV	HBV	CMV
Pregnant women	75	56	52	56
Newborn babies	43	30	26	30
Educated women	82	57	55	57
Female prostitutes	85	85	85	85

\*An additional 186 patients were tested for antibodies to HIV.

tested in the different serological tests varied (table 1).

### METHODS

The collected blood samples were cooled to 4°C and brought to the university laboratory on the same day. The sera were stored at -20°C until transported to Stockholm in a cooling box. Each serum was divided into aliquots for the different tests on arrival at the National Bacteriological Laboratory (NBL) and then stored at -20°C. Tests for detecting HBV markers, CMV, and HSV were performed at the Department of Virology, Karolinska Hospital, and tests for antibodies to HIV were carried out at the NBL.

#### Detecting HBV markers

All sera were tested for hepatitis B surface antigen (HBsAg) by radioimmunoassay (AUSRIA II, Abbott Laboratories, North Chicago). All sera with more than 5000 counts per minute (cpm) were retested, and results for sera with 5000 cpm or fewer were confirmed by a neutralisation test.<sup>11</sup> Antibodies to HBsAg (anti-HBs) and to hepatitis B core antigen (HBcAg) (anti-HBc) were measured by radioimmunoassay using Ausab and Corab (Abbott Laboratories). All sera positive for HBsAg were also tested for hepatitis B e antigen (HBeAg) and antibodies to HBeAg (anti-HBe) by enzymeimmunoassay (Abbott Laboratories). The instructions of the manufacturers were followed in performing the tests and in calculating the results.

#### Detecting antibodies to HSV and CMV

Antibodies to HSV and CMV were analysed by an enzyme linked immunosorbent assay (ELISA). CMV IgG antibodies were measured against a nuclear CMV antigen<sup>12</sup> and HSV IgG antibodies against a solubilised membrane HSV 1 antigen that also cross reacted with type 2 antibodies.<sup>12</sup>

#### Detecting antibodies to HIV

Antibodies to HIV were analysed with two different test kits, both based on an ELISA; Vironostica Anti-HTLV-III (Organon Teknika) and HTLV-III EIA (Abbott Laboratories). Western blot was used for confirmation as described previously.<sup>13</sup>

## STATISTICAL ANALYSIS

Descriptive statistics and correlation analysis with the  $\chi^2$  test were performed using the computer programme, Quest (University of Umeå, Sweden).

## Results

Hepatitis B virus markers were found in as many as 84% to 89% of the women in the three groups (table 2) and in 73% of the neonates. Slightly more than half of the subject had antibodies to surface or core antigens (either in combination or one or the other alone), which was a sign of resolved past infection. A high proportion of the women were carriers of HBV, as shown by the presence of HBsAg in 20% to 37% of the sera tested. In contrast, only one of the babies was HBsAg positive, as was his mother.

The pregnant women had the highest rate of HBsAg positivity, but the differences between the three groups were not significant. No difference in prevalence of HBV markers could be shown in women aged under 20 compared with those over 20, and no age group showed a prevalence that differed significantly from that of other age groups. In this study we did not find that marital status, occupation, or number of pregnancies influenced the prevalence of hepatitis B markers.

Table 3 shows the prevalence of HBeAg and anti-HBe in 49 subjects with HBsAg. HBeAg was found in one (8%) of 12 educated women with HBsAg and in three (18%) of the 17 HBsAg positive prostitutes. Anti-HBe positivity ranged from 29% to 100% of those with HBsAg. Of the overall 49 HBsAg positive subjects, 16 lacked HBeAg and anti-HBe markers.

Table 4 shows the prevalence of CMV and HSV IgG antibodies, which ranged from 90% to 99% for CMV, whereas all of each group of the study population had HSV IgG antibodies.

All 471 samples were negative for antibodies to HIV in both tests, though at the first run 24 of the sample showed a low grade positivity with the test from Abbott. When retested, however, they were all negative, a finding which was confirmed by western blot testing.

Table 3 Hepatitis e antigen (HBeAg) and antibody to HBeAg (anti-HBe) in 49 people with hepatitis B surface antigen (HBsAg) from Mogadishu, Somalia

Groups	No	No (%) positive for	
		HBeAg	Anti-HBe
Pregnant women	19	0	13 (68)
Newborn babies	1	0	1 (100)
Educated women	12	1 (8)	10 (83)
Female prostitutes	17	3 (18)	5 (29)

## Discussion

The 23% (49/218) prevalence of HBsAg found in the study population is one of the highest in the world. The overall HBV infection rate was 85% (185/218), which is comparable with the results from neighbouring African countries.<sup>14-16</sup> In Ethiopia 5% of children aged under 15 and 12% of those who were older were found to be chronic carriers.<sup>14</sup> A study from Kenya also showed that the prevalence of HBsAg in blood donors was 14%.<sup>15</sup>

How is HBV transmitted in this society? In a population where there is a high carrier rate, polygamy is prevalent, and there are large numbers of prostitutes, sexual contact could be thought to be one important mode of transmission of HBV. We did not, however, find an increased prevalence of HBV markers in prostitutes, and it is apparent that sexual transmission is not a major route. In contrast, 58% of the prostitutes had syphilis compared with only 3% of the pregnant women.<sup>17</sup> It seems reasonable to assume that in this population HBV infections are mainly acquired before the age of 15, as we found no differences between the prevalence in various age groups. This finding agrees with reports from the Gambia,<sup>19</sup> south west Africa,<sup>20</sup> and Ethiopia.<sup>14</sup>

Although a large proportion of the pregnant women carried HBsAg, none were infectious as none had HBeAg. In contrast, vertical transmission from HBeAg positive mothers occurs in 90% in South East Asia.<sup>21</sup> In Africa horizontal transmission is more likely to occur within the family and is favoured by

Table 2 Hepatitis B virus (HBV) markers in four study groups in Mogadishu, Somalia

Groups	No	No (%) with HBV markers			
		HBsAg	Anti-HBs	Anti-HBc	Total
Pregnant women	52	19 (37)	22 (42)	3 (6)	44 (85)
Newborn babies*	26	1 (4)	12 (46)	6 (23)	19 (73)
Educated women	55	12 (22)	22 (40)	12 (22)	46 (84)
Female prostitutes	85	17 (20)	45 (53)	14 (16)	76 (89)

\*Sera were not available for all tests from both mother and baby.

HBsAg = hepatitis B surface antigen; anti-HBs = antibody to HBsAg; anti-HBc = antibody to hepatitis B core antigen.

Table 4 Antibodies to cytomegalovirus (CMV) and herpes simplex virus (HSV) IgG in four study groups from Mogadishu, Somalia

Groups	No	No (%) positive for	
		CMV IgG	HSV IgG
Pregnant women	56	55 (99)	56 (100)
Newborn babies	30	27 (90)	30 (100)
Educated women	57	55 (97)	57 (100)
Female prostitutes	85	83 (98)	85 (100)

low socioeconomic conditions and certain cultural practices, such as circumcision and scarification. Further prospective investigations are required to assess the age at which HBV infection is acquired and the possible routes of transmission.

CMV and HSV occur throughout the world, and low socioeconomic conditions and overcrowding seem to favour their transmission.<sup>3</sup> In this study the prevalence of antibodies to CMV (97%, 220/228) and HSV (100%) was higher than in a developed country like Sweden, which has a 70% prevalence of CMV.<sup>22</sup> On the other hand, our results are comparable with the high prevalence found in a serological survey in Uganda and Tanzania.<sup>3</sup>

Although none of the population studied had antibodies against HIV, further investigations about HIV antibodies are important. As HIV constitutes a problem in a neighbouring country, Kenya, it is probably only a matter of time before this infection is also introduced into Somalia. As the routes of transmission for HBV and HIV infections are considered to be similar, we expect a rapid spread of HIV infection in Somalia once this virus has been introduced into the country (if this is not already the case). Continuous screening of inhabitants of Mogadishu and other cities in Somalia for HIV antibodies is therefore urgent and should include blood donors, risk groups such as prostitutes, and patients attending the STD clinic. This surveillance programme might be undertaken with the financial aid of international support organisations. To prevent the infection from becoming endemic, strong and effective preventive measures should be applied by the health authorities as early as possible. These measures should include the education of both public and health staff about the risk of acquiring HIV.

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