

A serosurvey for HTLV-I among high-risk populations and normal adults in Egypt

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SUMMARY

The prevalence of antibodies to human T-cell lymphotropic virus type I (HTLV-I) was determined in high-risk groups and normal adults in Egypt. Among 647 individuals tested, 6 (0·9%) were confirmed positive by western blot analysis. These included 2 (0·7%) of 279 drug addicts, 1 (3·3%) of 30 patients with sexually transmitted diseases, and 3 (2·2%) of 133 healthy individuals. Antibody was not detected in 47 blood recipients or 158 prostitutes. There was no correlation between sex or geographical location and HTLV-I infection. Fifty-three of the 647 sera (8%) were initially reactive by ELISA, but only 12 sera were repeatedly reactive. Since only 4 of these repeatedly reactive sera were confirmed by the western blot, the frequency of false positives using the DuPont screening ELISA was 1·2% (8/643). Two additional sera, confirmed positive by western blot, had been reactive, but not repeatedly, by ELISA. In comparison to the prevalence of HTLV-I antibody among risk groups in many parts of the world, the prevalence in Egypt was low.

INTRODUCTION

Human T lymphotropic virus type I (HTLV-I) was the first recognized human retrovirus and is associated with a malignancy (leukaemia) of mature lymphocytes [1]. It does not cause acquired immunodeficiency syndrome (AIDS) and is not associated with immunodeficiency or a known risk of developing AIDS [2]. Individuals whose sera contain antibodies to HTLV-I may have only a 2% risk of developing leukaemia [3], and an even smaller chance if acquired through blood transfusion [2]. However, the United States Food and Drug Administration has recommended that blood donated for transfusion be screened for antibodies to HTLV-I.

The prevalence of HTLV-I has been found to vary significantly in different parts of the world. As the aetiological agent responsible for adult T-cell leukaemia-lymphoma (ATLL), HTLV-I has also been associated with tropical

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spastic paraparesis (TSP) [4–6]. The prevalence of HTLV-I antibody is generally high in areas where ATLL cases are common, notably in Japan and the Caribbean [7–9]. In Okinawa, Japan, age-specific prevalence ranged from 2.2 to 31.5% with seropositivity increasing with age [10]. Additionally, clusters of infection have been identified from sera screened in the Caribbean (5.1%), West/Central Africa (10.0%), and Hawaii (11.2%) [11].

Risk determinants associated with the spread of HTLV-I are similar to those associated with other human retroviruses. Heterosexual contact, intravenous drug use, and postnatal infection, have all been implicated in transmission [12–14]. Familial clustering, suggestive of intrafamilial transmission, has been documented in Okinawa, Japan [15]. Also, blood products constitute a principal vehicle for HTLV-I transmission, with seroconversion rates of 63% in recipients of contaminated units [16]. In Kyushu, Japan, approximately 40000 units of blood were being transfused annually from HTLV-I antibody-positive donors with seroconversion among recipients estimated at 62% [17].

Only one study has been conducted to determine the prevalence of HTLV-I in Egypt. Data indicated that 2% of cases admitted to infectious disease clinics had antibodies to HTLV-I [9]. The prevalences in high-risk groups and normal individuals have not been determined. Therefore, our objective was to determine the prevalence of HTLV-I antibody in selected risk groups and healthy Egyptian residents in an attempt to identify risks associated with transmission.

MATERIALS AND METHODS

Blood was collected from 647 Egyptian residents during June 1987 through May 1988 in nine Governorates, geographically representative of Egypt. The subjects comprised five groups within Egypt: 47 recipients of blood and/or Factor VIII concentrates; 30 patients with sexually transmitted diseases; 279 drug addicts; 158 prostitutes; and 133 healthy adult male blood donors. The age of study participants ranged from 16 to 75 years with a mean of 30.85. The ratio of men to women was 2.5:1. A standardized questionnaire was used to obtain demographic data from each study participant.

All sera were screened by ELISA (DuPont, Wil. Del.) for antibodies to HTLV-I, in accordance with the guidelines recommended by the manufacturer. Specimens that were positive by ELISA were further analysed by western blot (Diagnostic Biotechnology, Singapore) for confirmation. Western blot positivity was defined by reactivity to p19, p24, and gp46 antigens.

RESULTS

Fifty-three of 647 sera were reactive at least once for HTLV-I by ELISA. Only 12 sera were repeatedly reactive. Antibodies to HTLV-I were confirmed by western blot for 6 of the 53 ELISA reactive sera but 2 of these reacted once only by ELISA. Therefore, only 4 of the 12 repeatedly reactive sera were confirmed: a false positivity frequency by ELISA of 1.2% (8/647). Overall confirmed seropositivity was 0.9% (6/647). All 6 sera reacted to at least p19, p24, and gp46, although 2 reacted weakly to gp46. In addition, 5 sera produced indeterminate results by western blot (reactivity to p19 or p24 only).

Table 1. *The prevalence of HTLV-I antibody among risk groups and normal adults in Egypt, June 1987–May 1988*

Group	Population screened				Seropositives		
	Male	Female	Total	Mean age	Total	%	Mean age
Blood recipients	38	9	47	32.15	0	0	N/A*
Normal males†	130	3	133	28.73	3	2.2	27.0
STD patients	20	10	30	34.80	1	3.3	27.0
Drug addicts	279	0	279	32.46	2	0.72	41.45
Prostitutes	0	158	158	31.83	0	0	N/A
Total	467	180	647	30.85	6	0.93	31.82

* N/A. Not applicable; † Blood donors.

The prevalence of HTLV-I antibody varied depending on the category of the study participants (Table 1). Seropositivity was highest among STD patients (3.3%), followed by healthy adults (2.2%), and drug addicts (0.72%). In contrast, antibody was not detected among 158 prostitutes or the 47 blood recipients. The mean age among seropositive individuals was 32 while the sex ratio of men to women was 5:1 (data not shown). The occurrence of positive cases was noted throughout the nine Governorates (data not shown) and hence evidence of clustering was not demonstrated.

DISCUSSION

The prevalence (0.9%) of confirmed HTLV-I antibody among all study participants from Egypt was low in comparison to data reported in Japan [7], the Caribbean [8] and certain populations in Papua New Guinea [18]. The prevalence rate appeared to be comparable to the 1.2% reported in Djibouti [19], but higher than the 0.08% for Somalia (unpublished observation). In other African countries the seroprevalence of HTLV-I varies from 0.2%, to being widespread [20]. However, true infection rates of HTLV-I may be even lower since serological tests cannot differentiate between HTLV-I and HTLV-II [2].

Four of our study groups were considered to represent the most likely populations at risk of infection with HTLV-I. However, the low prevalence demonstrated among the four risk groups would not appear to pose a health hazard to the general population. The absence of antibody among blood recipients and prostitutes is noteworthy, and is in contrast to the elevated rates found in these groups in the United States [21, 22]. In addition, our prevalence of 0.7% in drug addicts is minimal in comparison to the extremely high rates (49%) found in this group in the United States [23]. The prevalence of HTLV-I antibody (3.3%) in our STD population is similar to the 3% of patients attending STD clinics in Papua New Guinea [24]. Nevertheless, periodic surveys of specific risk populations appear warranted to monitor possible change in the prevalence of HTLV-I over time. The slightly high rate of apparent HTLV-I infection in normal males in our study is somewhat puzzling. However, the sample size was not large and in addition, 2 of the 3 positives were weakly positive, which introduces some uncertainty.

Although sensitivity of the ELISA for detection of HTLV-I antibody could not be evaluated in our study, the specificity was 99%. However, the chance of a repeatedly reactive sample being a true positive was only 25% (4/16). Western blot analysis is commonly performed after demonstration of repeatedly positive results by ELISA screening. However, 2 of the 6 persons who were confirmed HTLV-I positive by western blot were ELISA positive only once; the second ELISA test was negative, although optical density readings were somewhat high. Therefore, a significant proportion of antibody positive individuals would have been missed if the western blot had not been performed on all samples, even those which reacted, once only by ELISA. Similar observations have been noted by others [24, (Electro-Nucleonics Inc. Holland, pers. comm.)]. The false positivity rate for our screening test was 1.2%, which is significantly lower than the 10% found in sera from Papua New Guinea [25]. One third of our repeatedly reactive samples were confirmed by western blot, which is in contrast to the 3% confirmed in sera from Papua New Guinea [24].

In conclusion, we surveyed one normal and four risk groups in Egypt for antibodies to HTLV-I. Although a moderate number of ELISA reactors were found initially, only a small number were confirmed by the more specific western blot assay. The low prevalence of 0.9% is in contrast to the 2% prevalence previously reported from infectious disease clinic patients in Egypt [9], and lower than the rates in risk groups from endemic areas throughout the world. While HTLV-I does not appear to be a public health threat in Egypt, more surveys should be considered to monitor and further define the prevalence of this virus among populations at risk to infection.

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REFERENCES

1. Kuefler PR, Bunn PA. Adult T-cell leukemia/lymphoma. *Clin Haematol* 1986; **15**: 695–726.
2. MMWR. December 9, 1988, Vol. 37, pp. 736–40, 745–7.
3. Kondo T, Nonaka H, Miyamoto N, et al. Incidence of adult T-cell leukemia-lymphoma and its familial clustering. *Int J Cancer* 1985; **35**: 749–51.
4. Blattner WA, Takatsukid K, Gallo RC. Human T-cell leukemia-lymphoma virus and adult T-cell leukemia. *JAMA* 1983; **250**: 1074–80.
5. Gessain A, Barin F, Vernant JC, et al. Antibodies to human T-lymphotropic virus type-1 in patients with tropical spastic paraparesis. *Lancet* 1985; **ii**: 407–10.
6. Dalgleish A, Richardson J, Matutes E, et al. HTLV-I infection in tropical spastic paraparesis: lymphocyte culture and serologic response. *AIDS Res Hum Ret* 1988; **4**: 475–84.
7. Ratner L, Poiesz BJ. Leukemias associated with human T-cell lymphotropic virus type I in a non-endemic region. *Medicine* 1988; **67**: 401–21.

8. Matutes E, Dalglish AG, Weiss RA, et al. Studies in healthy HTLV-I carriers from the Caribbean. *Int J Cancer* 1986; **38**: 41–5.
9. Saxinger W, Blattner WA, Levine PH, et al. Human T-cell leukemia virus (HTLV-I) antibodies in Africa. *Science* 1984; **225**: 1473–6.
10. Blattner WA, Nomura A, Clark JW, et al. Modes of transmission and evidence for viral latency from studies of human T-cell lymphotropic virus type 1 in Japanese migrant populations. *Proc Natl Acad Sci USA* 1986; **83**: 4895–8.
11. Levine PH, Blattner WA, Clark J, et al. Geographic distribution of HTLV-I and identification of a high risk population. *Int J Cancer* 1988; **42**: 7–12.
12. Reeves WC, Saxinger C, Brenes MM, et al. Human T-cell lymphotropic virus type I (HTLV-I) seroepidemiology and risk factors in metropolitan Panama. *Am J Epidemiol* 1988; **127**: 532–9.
13. Robert-Guroff M, Weiss SH, Giron JA, et al. Prevalence of antibodies to HTLV-I, II, and III in intravenous drug abusers from an AIDS endemic region. *JAMA* 1986; **255**: 3133–7.
14. Ando Y, Nakano S, Saito K, et al. Prevention of HTLV-I transmission through the breast milk by a freeze-thawing process. *Jpn J Cancer Res* 1986; **77**: 974–7.
15. Kajiyama W, Kashiwagi S, Ikematsu H, et al. Intrafamilial transmission of adult T-cell leukemia virus. *J Inf Dis* 1986; **154**: 35–41.
16. Okochi K, Sato H, Hinuma Y. A retrospective study on transmission of adult T-cell leukemia virus by blood transfusion: seroconversion in recipients. *Vox Sang* 1984; **46**: 245–53.
17. Sandler SG. HTLV-I and II: new risks for recipients of blood transfusions. *JAMA* 1986; **256**: 10–11.
18. Yanagihara R, Jenkins CL, Alexander SS, et al. Human T lymphotropic virus type I infection in Papua New Guinea: high prevalence among the Hagahai confirmed by western analysis. *J Inf Dis* 1990; **162**: 649–54.
19. Fox E, Constantine NT, Abbatte EA, et al. Low prevalence of infection by human T-lymphotropic virus type-I in populations at risk for human immunodeficiency virus in Djibouti, East Africa. *Ann Inst Pasteur (Virol)* 1988; **138**: 443–7.
20. Rwandan HIV Seroprevalence Study Group. Nationwide community-based serological survey of HIV-1 and other human retrovirus infections in a central African country. *Lancet* 1989; **i**: 941–3.
21. Minamoto GY, Gold JWM, Scheinberg DA, et al. Infection with human T-cell leukemia virus type I in patients with leukemia. *N Engl J Med* 1988; **318**: 219–22.
22. Khabbaz RF, Darrow WW, Lairmore M, et al. Prevalence of antibody to HTLV-I among 1415 female prostitutes in the United States. IVth International Conference on AIDS, Stockholm, 12–16 June 1988: 270.
23. Weiss SH, Ginzburg HM, Saxinger WC, et al. Emerging high rates of human T-cell lymphotropic virus type I (HTLV-I) and HIV infection among U.S. drug abusers. IIIrd International Conference on AIDS, Washington, D.C., 1–5 June 1987: 211.
24. Currie B, Hinuma Y, Imai J, et al. HTLV-I antibodies in Papua New Guinea. *Lancet* 1989; **i**: 1137.
25. Weber JN, Banatvala N, Clayden S, et al. HTLV-I infection in Papua New Guinea: evidence for serologic false positivity. *J Inf Dis* 1989; **159**: 1025–8.