

# Seroprevalence of HIV, hepatitis B infections and syphilis among street dwellers in Gondar city, Northwest Ethiopia

Feleke Moges<sup>1</sup>, Yenew Kebede<sup>1</sup>, Afework Kasso<sup>1</sup>, Andargachew Mulu<sup>1</sup>, Moges Tiruneh<sup>1</sup>, Getu Degu<sup>2</sup>, Solomon Adugna<sup>3</sup>, Atinaf Alem<sup>4</sup>, Fisha Wale<sup>4</sup>

## Abstract

**Background:** Seroprevalence of HIV, HBV infections and syphilis are well established in different segments of Ethiopian population but there are no such estimates in street dwellers.

**Objective:** To assess seroprevalence of HIV, HBV and syphilis among street dwellers.

**Methods:** A cross sectional study was conducted from April to August 2004 involving street dwellers in Gondar city, Northwest Ethiopia. Data on socio-demographic characteristics and sexual behaviors were collected using a structured questionnaire. Sera were tested for the presence of HIV antibodies using an enzyme linked immunosorbent assay, Hepatitis B Virus infection was assessed by an immunochromatographic test. Syphilis serology was examined using rapid plasma reagin and *Treponema pallidum* haemagglutination tests.

**Results:** Of the total 404 street dwellers enrolled in the study, 72.8% were males and 27.2% were females. Among the females 10% responded that they had been sexually abused. Seroprevalence of HIV was 6.9%. The prevalence in females (11.8%) was significantly higher than that in males (5.1%) (OR=2.5, 95% CI, 1.1-5.8, P=0.02). The highest prevalence of HIV was observed in the age group of 26-35 years. HIV seropositivity was significantly correlated with the number of sexual partners ( $p < 0.0001$ ). Antibodies against *Treponema pallidum* were detected in 10.9% of the subjects. Syphilis serology also correlated with the number of sexual partners (OR=5.9, 95%CI 2.3-15.6, P=0.0001). Of the 302 street dwellers examined for the presence of HBsAg, 33 (10.9%) were found positive. Seropositivity for HBsAg was higher in females (28.9%) than that in males (8.3%) (OR=4.5 95%CI 1.8-11.0 P=0.001).

**Conclusion:** The data indicated high prevalence of HIV, HBV and syphilis among street dwellers in Gondar city. Intensified prevention activities targeting this population will have paramount importance in halting spread of the infections. [*Ethiop.J.Health Dev.* 2006;20(3):160-165]

## Introduction

Sexually transmitted infections (STIs) represent a major public health problem in developing countries, including Ethiopia. Millions of people suffer from them due to lack of access to appropriate care, poor nutrition and adverse living conditions (1).

HIV/AIDS has been spreading at an alarming rate world wide. It has been estimated that at the end of 2002, 42 million people were infected by HIV/AIDS and the majority of these cases were found in sub-Saharan Africa (2). Ethiopia is among the highly affected countries in the region with national adult prevalence rate of 4.4% being as high as 12.6% in urban and as low as 2.6% in rural areas (3).

Hepatitis B virus (HBV) is known to be highly infectious and associated with long term morbidity and mortality due to complications like cirrhosis, portal hypertension and hepato-cellular carcinoma. It is estimated that, world wide more than 2 billion people have been infected by HBV and 350 million people have chronic infection (4). The virus is highly contagious and relatively easy to be transmitted from one infected individual to another by blood-to blood contact, during birth, unprotected sex, and

by sharing needles and has a relatively higher prevalence in the tropics (5).

Syphilis is a systemic disease caused by *Treponema pallidum* which can be spread by sexual contact, blood transfusion and via vertical transmission (6). In sub-Saharan Africa, it remains an important cause of morbidity. Its prevalence among pregnant women varied from 0.24% in Burkina Faso (7) to 3% in Kenya (8) and 12.8% in Tanzania (9). In Ethiopia, the few previous studies conducted on the subject showed a prevalence of syphilis among pregnant women, ranging from 2.2% to 27% in different parts of the county (10, 11, 12, 13).

HIV, HBV infections and syphilis constitute a huge health and economic burden for developing countries. The importance of STIs has been more widely recognized in the advent of the HIV/AIDS epidemic, and consequently there are good evidences that the control of STIs can contribute a great deal to the reduction of HIV-transmission (14).

Epidemiological data on the seroprevalence of STIs in street dwellers is very scarce in Ethiopia. This study was therefore aimed at determining sexual behaviors and seroprevalence of HIV, HBV infections and syphilis

<sup>1</sup>Department of Microbiology and Parasitology, College of Medicine and Health Sciences, University of Gondar. P.O. Box 196, Gondar, Ethiopia; <sup>2</sup>Department of Community Health, College of Medicine and Health Sciences, University of Gondar; <sup>3</sup>Department of Biochemistry, College of Medicine and Health Sciences, University of Gondar; <sup>4</sup>Amhara Regional State Health Research Laboratory, Bahir Dar

among street dwellers in Gondar city. The information generated from this study is expected to help in designing control strategies on HIV/AIDS and other STIs in street dwellers in the country as a whole.

## Methods

**Study population and area:** This was a cross-sectional study conducted from April to August 2004 involving street dwellers in Gondar city, Northwest Ethiopia. The study subjects were selected randomly from the various sites where the street dwellers reside. Ethical clearance was obtained from the Research and Publication Office of Gondar University and written informed consent was sought from each participant.

**Data collection:** Data on socio-demographic variables and sexual behavior were collected using a pre-tested and structured questionnaire. After pre-test counseling, venous blood was aseptically collected from each of the study participants. Sera were separated by centrifugation and kept at -20°C until used.

**Laboratory investigation:** Serum was tested for the presence of HIV antibodies using enzyme-linked immunosorbent assays (ELISA) (Vironostica HIV-Uniform II plus O, Organon Tekninka, Boxtel, the Netherlands). Hepatitis B infection was assessed using HEXAGON HBsAg (Immunochromatographic 1-step test) following the manufacturer's instructions. Rapid Plasma Reagin (RPR) slide agglutination test (Becton Dickinson, Microbiology system Cockeysville, Maryland, USA) and *Treponema pallidum* Hemagglutination Assay (TPHA) were employed to diagnose syphilis. The results of HIV serology were communicated to the study participants after post test counseling by trained counselors. Appropriate chemotherapy was given for the study participants who were diagnosed for treatable health problems such as intestinal parasites and others during the course of the study.

**Data and statistical analyses:** Data were entered and analyzed using EPI-info 2000 Statistical Software. Odds ratio (OR) and 95% confidence interval (CI) were used to measure the strength of association, and a P value of less than 0.05 was considered significant.

## Results

A total of 404 street dwellers aged 8-58 (median age of 20) years were included from the different sites of Gondar town, Northwest Ethiopia. 294 of these (72.8%) were males and 110 (27.2%) were females. Two hundred twenty eight (56.5%) of the study subjects were illiterate. One hundred-two (25.3%) responded that they had only one sexual partner, 127 (31.4%) had two or more, while 175 (43.3%) had no history of sexual exposure. Among the female subjects included in the study, 10% responded that they had been sexually abused.

The HIV seroprevalence in this study population was found to be 6.9%. The prevalence in females (11.8%) was also significantly higher than that in males (5.1%) (OR=2.5, 95% CI, 1.1-5.8  $P=0.02$ ) (Table 1). Among the different age groups, the highest prevalence of HIV infection was observed in age group of 26-35 years. There was no HIV-positive case in the age group of less than 15 years and above 45 years (Table 1). All of the HIV-seropositive individuals except one had a history of sexual exposure. Seropositivity correlated with the number of sexual partners, in that individuals with more than one sexual partner were at increasingly greater risk of HIV infection ( $p<0.0001$ ) (Table-2).

Among the 404 subjects tested for the presence of antibodies against *Treponema pallidum*, 44 (10.9%) were found positive. The males seem to be more affected than females, although it was not statistically significant ( $P=0.3$ , Table 1). All seropositive individuals by RPR were also confirmed to be positive by a more specific test - TPHA. Seropositivity for syphilis increased with age but there was no significant association with the educational status of the study subjects (Table 1). Syphilis seropositivity correlated with the number of sexual partners (OR=5.9, 95%CI, 2.3-15.6,  $P=0.0001$ ) (Table 2).

Of the 302 street dwellers examined 33 (10.9%) were found to be positive for HBsAg. The 28.9% prevalence in females was significantly higher than the 8.3% prevalence in males (OR=4.5, 95%CI 1.8-11.0  $P=0.001$ ). The seroprevalence of HBsAg consistently increased with an increase in age (Table 1). However, there was no significant association between HBV infection and the number of sexual partners. Similar to HIV infection and syphilis, educational status was not a factor for HBV infection in this specific population.

Reported condom use in this study was not significantly associated with reduced risk of HIV/AIDS, HBV and syphilis infection (Table 2). The prevalence of HBV infection and syphilis were significantly higher among HIV-positive individuals (Table 3).

There was also an interest to investigate the impact of selected socio-demographic variables using the multivariate logistic regression method. Accordingly, only three of the variables (age, sexual exposure and number of partners) remained to be significantly and independently associated with the outcome variable (HIV seropositivity/negativity). In this analysis, it was found that age had a negative impact on the outcome variable with an Odds Ratio of 0.94 (95% C.I., 0.90 - 0.97). Those street dwellers who were exposed to sexual intercourse were at a higher risk of acquiring HIV infection than those who did not have such exposure (OR = 23,  $P=0.002$ ). Moreover, street dwellers with only one, and two and above sexual partners were about 18 (OR= 18,

$P=0.005$ ) and 29 (OR=29,  $P=0.001$ ) times more likely to be infected than those who did not have any sexual partners, respectively. In general, the findings from the multivariate logistic regression are more or less similar to that of the bivariate analysis.

### Discussion

In this study, the HIV sero-prevalence among street dwellers in Gondar city was found to be 6.9%. This was higher than the national adult prevalence for the year 2003 which was estimated as 4.4% but lower than the urban prevalence of 12.6% (2). The proportion of females who were found to be seropositive for HIV infection (11.8%) was twice higher than males (5.8%). This was in line other reports indicating a higher prevalence of HIV in females than males (15). The condition is multifactorial and may related to increased vulnerable of females to HIV infection due to biological, social and economic disadvantages related to their gender (16).

Age specific HIV infection prevalence was particularly higher in the age group between 26-35 years. This was in line with reports from military recruits in rural Ethiopia which showed a higher prevalence of HIV in the age group of 25-29 years (17). The result was different from national reports which show the peak age for HIV infections to start from as early as 15-19 age range in females and 20-24 in males (3). This is still plausible because most of the street dwellers in Gondar city came from rural areas where background prevalence of HIV infection is relatively low. This was also substantiated by the finding in this study which shows that only 48.3% of the study subjects in the age group of 15-25 years had a history of sexual exposure as compared to 97.4% of the individuals in the age group of 26-35 years.

We have identified a high prevalence of syphilis in street dwellers (10.9%). This was much higher than reports on street dwellers in Brazil (3%) (19) and reports on blood donors (4.8% in 1991 to 9.2% in 1993) (20) and cataract patients (4.6%) (21) in Gondar. However, it was lower when compared with a 28.8% prevalence among factory workers in Addis (22) and a 12.8% prevalence among healthy blood donors in Gondar in 1995 (23).

The seroprevalence rate for syphilis was highly associated with HIV infection (OR= 4.6 95% CI 1.8-11.8  $P=0.001$ ). This was in agreement with results previously reported elsewhere (24, 25, 26). This may be because syphilis agents may increase the susceptibility of subjects for HIV infection, probably through the increased incidence of genital ulcer (25). The detection and treatment of syphilis might be of help in limiting the spread of HIV.

The seroprevalence rate for HBsAg was 10.9% in the street dwellers. This was lower than its prevalence in blood donors from Gondar (14.4%) (23) but higher than that reported in blood donors in Addis Ababa and street dwellers from Brazil (27, 28). The prevalence was higher in females than in males. In this study HBV seropositivity was higher among HIV-positive subjects than HIV-negative ones' (OR= 5.2 95% CI 1.9-14.0  $P=0.001$ ). This association was not shown in blood donors' (23) and cataract patients (21) in Gondar but is in agreement with similar findings in Nigeria, Brazil and immigrants from Ethiopia (26, 29, 30, 31). HIV infection has several effects on HBV infection and is associated with approximately a threefold increase in the development of persistent hepatitis B surface antigenemia (32). This may have accounted for the higher prevalence of HBsAg among the HIV infected patients.

Similar to the findings of another study (27), the seroprevalence of HBV infection increased with age. The prevalence of HBV which is greater than or equal to 8% is considered to be endemic (33). The 10.9% prevalence of HBV in this study showed that HBV infection is endemic in this population. The seroprevalence HBV infection did not show any correlation with the number of sexual partners. This may indicate that the epidemiology and transmission of HBV infection follows a different route.

The prevalence of HIV infection and syphilis correlated with the number of sexual partners. In addition, all HIV positive cases except one and 84.1% of all subjects that were seropositive for syphilis had a history of sexual exposure. One may conclude that the transmission of HIV and syphilis in this population, therefore, takes place mainly through sexual contact with an infected person. However, the reported use of condom was not significantly associated with reduced prevalence of HIV infection and syphilis. This may be indicative of the gap in knowledge on the appropriate use of condoms. In fact, the assessment in this study showed that there is a considerable gap in knowledge of street dwellers about HIV/AIDS.

In conclusion, this study showed a high prevalence of HIV, HBV and syphilis infection and risky sexual behavior among a heterogeneous group of children, men and women who lead their daily lives as street dwellers in Gondar city, Northwest Ethiopia. Health education geared towards prevention and control of HIV and sexually transmitted infections should also include this population.

Table 1: Seroprevalence of HIV, HBV and syphilis infections among street dwellers in relation to socio-demographic characteristics in Gondar city, Northwest Ethiopia, April-August 2004.

Variables	HIV+ (%)	OR (95%CI)	P value	HBsAg+ (%)	OR (95%CI)	P value	Syphilis+ (%)	OR (95%CI)	P value
<b>Sex</b>									
Male	15/294 (5.1)	1		22/264 (8.3)	1		35/294 (11.9)	1	
Female	13/110 (11.8)	2.5 (1.1-5.8)	0.02	11/38 (28.9)	4.5 (1.8-11.0)	0.001	9/110 (8.2)	0.7 (0.3-1.5)	0.3
<b>Age</b>									
<14	0/39 (0)	1		0/34 (0)	1		1/39 (2.6)	1	
15-25	13/261 (5.0)	2.1 (0.3-43.0)	0.7	21/207 (10.2)	3.7 (0.5-7.7)	0.3	19/261 (7.3)	3.0 (0.4-6.2)	0.5
26-35	12/77 (15.6)	3.6 (1.5-8.5)	0.001	8/46 (17.4)	2.0 (0.7-5.0)	0.1	17/77 (22.1)	3.5 (1.7-7.4)	0.001
36-45	3/22 (13.6)	2.3 (0.5-8.9)	0.2	3/12 (25.0)	2.9 (0.6-12.6)	0.1	4/22 (18.2)	1.9 (0.5-6.4)	0.3
>45	0/5 (0)	0.1 (0.0-16.4)	0.7	1/3 (33.3)	4.2 (0.0-61.1)	0.3	3/5 (60.0)	13.1 (1.7-115.1)	0.01
<b>Education</b>									
Grade 7-12	4/68 (7.9)	1		4/52 (7.7)	1		6/68 (8.8)	1	
Grade 1-6	4/108 (3.7)	0.6 (0.1-3.1)	0.5	3/93 (3.2)	0.4 (0.1-2.2)	0.2	14/108 (13.0)	1.5 (0.5-4.8)	0.4
Illiterate	20/228 (8.8)	1.5 (0.5-5.5)	0.2	26/157 (16.6)	2.4 (0.7-8.5)	0.1	24/228 (10.5)	1.2 (0.5-3.5)	0.7

Table 2: Seroprevalence of HIV, HBV infections and syphilis in relation to sexual behavior of street dwellers in Gondar city, Northwest Ethiopia, April-August, 2004

Character	HIV+ (%)	OR (95% CI)	P-value	HBsAg+ (%)	OR (95% CI)	P-value	Syphilis+ (%)	OR (95% CI)	P-value
<b>Sexual exposure</b>									
No <sup>R</sup>	11/175 (0.6)	1		11/146 (7.5)	1		71/175 (4.0)	1	
Yes	27/229 (11.8)	23.3 (3.3-46.8)	0.0001	22/156 (14.1)	2.0 (0.9-4.6)	0.07	37 (229 (16.2)	4.6 (1.9-11.7)	0.0001
<b>No. of sexual partners</b>									
None <sup>R</sup>	11/175 (0.6)	1		11/146 (7.5)	1		71/175 (4.0)	1	
1	10/102 (9.8)	2.1 (2.5-4.9)	0.0002	10/65 (15.4)	2.2 (0.8-6.1)	0.8	12/102 (11.8)	3.2 (1.1-9.4)	0.01
>2	17/127 (13.4)	6.4 (5.2-9.6)	<0.0001	12/91 (13.2)	1.8 (0.7-4.8)	0.2	25/127 (19.7)	5.9 (2.3-15.6)	0.0001
<b>Use of condom</b>									
Yes <sup>R</sup>	9/89 (10.1)	1		7/75 (9.3)	1		15/89 (16.9)	1	
No	18/138 (13.1)	1.3 (0.5-3.4)	0.5	15/79 (19.0)	2.3 (0.8-6.6)	0.09	22/138 (15.9)	0.9 (0.4-2.0)	0.9

R= Reference group

**Table 3: Seroprevalence of HBV infection and Syphilis among HIV seropositive and negative street dwellers in Gondar city, Northwest Ethiopia, April-August, 2004.**

HIV-serostatus	HBsAg positive (%)	OR (95% CI)	P-value	Syphilis positive (%)	OR (95% CI)	P-value
Negative	24/275 (8.7)	1		35/376 (9.3)	1	
Positive	9/27 (33.3)	5.2 (1.9-14.0)	<0.0001	9/28 (32.1)	4.6 (1.8-1.8)	0.001
Total	33/302 (10.9)			44/404 (10.9)		

#### Acknowledgment

We would like to acknowledge the University of Gondar, and its research and publication office for the financial support. We are also grateful to Jemal Ali, Belay Anagaw, and Bewket Mengesha for their technical assistance during the laboratory work.

#### References

- World Health Organization (WHO). Guideline for the Management of Sexually Transmitted Infections. Revised Version. WHO, Geneva, Switzerland, 2003.
- UNAIDS/WHO. Joint United Nations Programme on HIV/AIDS, 2002.
- Ministry of Health. AIDS in Ethiopia, MOH, Addis Ababa, 2004.
- Drosten C, Nippraschk T, Manegold C, Meisel H, Brixner V, Roth WK, Apedjinov A, Gunther S. Prevalence of Hepatitis B virus DNA in anti-HBC-positive /HBsAg- negative sera correlates with HCV but not HIV serostatus. *J Clin Virol.* 2004;29:59-68.
- Finlayson MDC, Hayes PC, Simpson KJ. Diseases of the liver and biliary system: Hepatitis. In: C Haslett, ER Chilvers, JAA Hunter (eds), Davidson's principles and practice of medicine. Churchill Living stone, London 1999. P 706-715.
- Murray P., Rosenthal K., Kobayashi G., Pfaller M. *Medical Microbiology.* 4<sup>th</sup> ed. Mosby company, St. Louis. 2002. P. 379-380.
- Seroprevalence of syphilis among women attending urban antenatal clinics in Burkina Faso, 1995-8. The DITRAME Study Group. *Diminution de la Transmission mere-enfant.* *Sex Transm Infect.* 2000; 76: 314-6.
- Effect of a syphilis control programme on pregnancy outcome in Nairobi, Kenya. *Sex Transm Infect.* 2000;76(2): 117-21.
- Risk factors for active syphilis and TPHA seroconversion in a rural African population. *Sex Transm Infect.* 2001; 77(1): 37-45.
- Duncan M.E, Gerard T, Andree P., Letebirhan M., Peter L.P. Jon Petal. Prevalence and significance of sexual transmitted disease among Ethiopian women attending ANC in Addis Ababa. *Ethiop J Health Dev.* 1995; 9: 31-40.
- Seroprevalence of syphilis amongst pregnant women attending antenatal clinics in a rural hospital in North West Ethiopia. *Genitourin Med.* 1995; 71:347-50.
- Prevalence of syphilis in pregnancy in Addis Ababa. *East Afr Med J.* 2000; 77: 212-6.
- Mekonnen Z, Tegbaru B, Meless H. Seroprevalence of syphilis and HIV-1 among pregnant women attending antenatal clinic in Jimma Hospital, Southwest Ethiopia. *Ethiop J Health Sci.* 2002; 12: 81-89.
- Mayaud P, Mabey D. Approches to the control of sexually transmitted infections in developing countries: Old problems and modern challenges. *Sex Transm Infect* 2004 80:174-182.
- Kebede D, Aklilu M, Sanders E. The HIV epidemic and the state of its surveillance in Ethiopia. *Ethiop Med J.* 2000; 38: 283-302. National AIDS control Program. AIDS Case Surveillance in Ethiopia, Ministry of Health, April 1994, Addis Ababa, Ethiopia.
- Berc M, Sunada R. Women and AIDS: Social economic and political factors that increase risk for women. Great Britain, Scot. print LTD 1993.
- Yigeremu A, Schaap Ab, Girmatchew M. Asheber N, Birke D, Dawit W. HIV prevalence in 72 000 urban and rural male army recruits, Ethiopia. *AIDS.* 2003;17:1835-1840.
- Proceedings of the XII<sup>th</sup> Annual Conference of the Ethiopian Public Health Association. Nov. 2001, Addis Ababa, Ethiopia.
- Pinto JA, Ruff AJ, Paiva JV, Antunes CM, Adams IK, Hasey NA, Greco DB. HIV risk behaviour and medical status of underprivileged youth in Belo Horizonte, Brazil. *J Adolesc Health.* 1994; 15:179-185.
- Assefa A, Rahlenbeck S, Molla K, Alemu S. Seroprevalence of HIV-1 and Syphilis antibodies in blood donors in Gondar, Ethiopia, 1989-1993. *J Acquir Immune Defic Syndr.* 1994; 12:1282-1285.
- Kassu A, Mekonnen A, Bekele A, Abseno N, Moges F, Wondmikun Y, Ota F. HIV and syphilis infection among elderly people in northwest Ethiopia. *Japanese Journal of Infectious Diseases.* 2004; 57:264-267.
- Sahilu T, de Wit T.R, Tsegaye A, Mekonen Y, Beyene A, Hailu B, Coutinho R A, Fontanet A. Low incidence of syphilis among factory workers in Ethiopia: effect of an intervention based on education and counseling. *Sex Transm Infect.* 2002;78:123-126.
- Rahlenbeck SI, Yohannes G, Molla K, Reifen R, Assefa A. Infection with HIV, Syphilis and hepatitis B in Ethiopia: A survey in blood donors. *Int J STD AIDS.* 1997; 8: 261-4.

24. Yogini P. Seroprevalence of HIV, HBV, HCV and Syphilis in blood donors. *Indian J Med Sciences* 2004; 58:306-307.
25. WA. Lynn, S. Lightman. Syphilis and HIV: A dangerous combination. *Lancet Infect Dis.* 2004; 4:456-466.
26. ML.Alkan, S.Maayan, I·Belmarker, Y. Arbeli, N.Mani, F.Ben-Yshai. Serological Markers for hepatitis B and treponemal infection among HIV carriers from Ethiopia. *Isr. J Med Sci* 1993; 29:390-392.
27. Abebe A., Nokes D.J., Dejene A., Enquselassie F., Messele T., Cutts F.T. Seroepidemiology of hepatitis B virus in Addis Ababa, Ethiopia: Transmission patterns and vaccine control. *Epidemiology and infection.* 2003;131:757-770.
28. Porto SOB, Cardoso DDP, Queiroz DAO, Rosa H, Andrade ALSS, Zicker F, et.al. Prevalence and risk factors for HBV infection among street youth in central Brazil. *J Adolesc Health.* 1994; 15: 577-581.
29. Uneke CJ, Ogbu O, Inyama PU, Anyanwu GI, Njoku MO, Idoko JH. Prevalence of hepatitis B surface antigen among blood donors and human immunodeficiency virus infected patients in Jos, Nigeria. *Mem Inst Oswaldo Cruz, Rio de Janeiro* 2005; 100:13-16.
30. Treitinger A, Spada C, Ferreira LA, Neto MS, Verdi JC, de Oliveria OV, Vander Sander SM, Abdalla DS. Hepatitis B and Hepatitis C prevalence among blood donors and HIV-1 infected patients in Florianopolis, Brazil. *Braz J Infect Dis.* 2004; .4: 192-196.
31. C. Cernescu, F. Matusa, C. Antipa S. Ruta. The evaluation of hepatitis B virus infection in children with symptomatic AIDS. *Rev. Roum Virol.* 1992; 43: 7-11.
32. Fauci AS; Lane HC. Human immunodeficiency virus (HIV) disease: AIDS and related disorders. In AS Fauci, E. Braunwald, KJ Isselbacher (eds). *Harrison's Principles of internal Medicine.* Vol.1 14<sup>th</sup> ed., Mc-Graw-Hill, New-York, P.718-724.
33. Juszyk J. Clinical course and consequence of hepatitis B infection. *Vaccine.* 2000. 18 Supp. 1. S23-25.