

Psychiatric Distress, Drug Use, and HIV Viral Load Suppression in Russia

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Abstract To explore the influence of psychiatric distress and substance use on viral load suppression in HIV-infected patients taking ART we analyzed socio-demographic characteristics, CD4+ cells count and viral loads, the Symptom Check List-90 and the Addiction Severity Index of 75 patients who had taken ART for at least 6 month. Using viral load data as the marker of ART success, we divided the sample into two groups. Comparison of the groups showed that education, marriage, and female gender are predictors of optimal viral load suppression. Overall results failed to demonstrate substance use and psychiatric distress as predictors of viral load suppression.

Resumen Analizamos características sociodemográficas, recuento de células CD4, y carga viral, el Cuestionario de los 90 Síntomas (Symptom Check list-90) y el Índice De Severidad De Adicción de 75 pacientes que habían tomado TAR por lo menos por 6 meses para examinar la influencia de la angustia psiquiátrica y el consumo de sustancias en la supresión de la carga viral en pacientes infectados que toman TAR. Utilizando datos de la carga viral como el marcador de adherencia al TAR, dividimos la muestra en dos grupos. La comparación de los grupos mostró que la naves de educación, estado civil, y el sexo femenino son indicadores de la supresión óptima de la carga viral. En términos generales, los resultados no pudieron demostrar

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que el consumo de sustancias y la angustia psiquiátrica son indicadores de la supresión de la carga viral.

Keywords ART adherence · HIV viral load · Substance use · Psychiatric distress symptoms

Introduction

Of the 1.5 million people in Eastern Europe and Central Asia living with HIV, 69 % are in the Russian Federation [1]. A total of 907,607 HIV infections have been officially reported in Russia through December 2014 [2]. One of the most HIV-affected regions of the Russian Federation is the city of Saint-Petersburg (976.1 per 100 thousand) with 51,552 registered cases of HIV infection [2].

Introduction of antiretroviral therapy (ART) into clinical practice and consequent viral load suppression, leading to improved clinical and immunological status of the patients, has transformed HIV infection from a terminal disease into a chronic and controlled one.

In the context of rapidly expanding access to ART, optimal and long-term systematic adherence remains a significant public health and clinical goal since long-term adherence is essential for the successful sustained HIV viral load suppression, preventing the emergence of acquired resistance, and reducing by more than 90 % the chances of HIV transmission to others [3].

In addition to evaluation of CD4+ cells and clinical response to therapy, the level of the HIV viral load is a key indicator of the ART efficacy. Therefore, viral load determination is commonly used in clinical practice nowadays as a biological marker of adherence to HIV treatment and the efficacy of ART.

Studies have demonstrated that psychiatric distress and substance use exert negative influences on the patients ART success [4]. However, psychiatric distress symptoms and substance use, as predictors of ART efficacy among Russian patients have been relatively poor researched by scientific community.

In this regard, our goal was to explore the impact of psychiatric distress symptoms and substance use on the viral load suppression in the HIV-infected patients receiving ART in Saint-Petersburg, Russia.

Methods

The study was conducted between January 2013 and February 2014 at the St. Petersburg Center for Prevention and Control of AIDS and Infectious Diseases (AIDS Center), Russia. The Yale University and St. Petersburg

AIDS Center institutional review boards approved the consent form and study protocol, and the study was carried out in accordance with the Declaration of Helsinki. Study participants gave written informed consent and were paid 450 rubles (~US \$13 at the time of the study) for the time spent completing study assessments and for travel costs.

Patients

Direct care providers working at the AIDS Center identified potential participants aged ≥ 18 who had been receiving ART for at least 6 month and were deemed capable of informed consent, and referred them for participation. Anyone presenting as a potential participant who gave evidence of incoherence, disorientation, alcohol intoxication, or drug narcotization during the screening questions was excluded. At this stage, seven individuals were excluded from the study. The patients enrolled represent a convenience sample. Random selection was not used due to difficulties recruiting sufficient numbers of participants. The structured interview was conducted by an AIDS Center specially trained addiction psychiatrist.

Interview Data

The interview and assessment battery collected socio-demographic data (gender, age, education, marital status, and monthly income of respondents) and used the Addiction Severity Index (ASI) and Symptom Check List 90 Revised (SCL-90-R) questionnaire for assessment of the problems associated with the substance use as well as indicators of the patient's mental health. Each patient was interviewed for 60–80 min.

The ASI is used for comprehensive evaluation of health, psychological and social statuses of people who use psychoactive substances [5]. The ASI is a semi-structured interview assessing both lifetime and recent (30 days prior to treatment entry) events and behaviors in seven domains (Medical, Employment, Drug Use, Alcohol Use, Legal, Family/Social, and Psychiatric). In order to conduct analysis of the results obtained, special algorithms are used to calculate indicators of dependence for each section of the questionnaire. The composite scores in each section range from 0 (no problems) to 1 (severe problems).

The SCL-90-R questionnaire is used to screen psychiatric distress symptoms (complaints) [6]. SCL-90-R is a tool for determining the actual and current psychological symptomatic status comprising 90 questions. Scores are awarded to each of the questions on a scale of 0 to 4, where 0—"not at all" and 4—"extremely". The scores obtained by us using SCL-90-R scales were compared with the results of the studies of the general Russian population and

patients with neuroses, which was attributed to a lack of HIV-infected control group [7].

Clinical Data

The most recent data on the CD4+ cells count and the viral load level within the 6 months period preceding the inclusion into the study from patients chart reviews were used to evaluate the clinical characteristics of the respondents. Viral load served as a primary biological marker of ART adherence and the threshold for a detectable level was 50 copies/ml. The patients were divided into two groups based on the viral load level: patients with detectable viral load (Detectable VL) and patients with suppressed viral load (Suppressed VL).

Statistical Methods

The analysis of the differences between the two groups with respect to socio-demographic and clinical characteristics was carried out using χ^2 test for independence and Fisher's exact test (for small sample sizes in contingency tables). Student's *t* test was used for comparison of the groups with respect to ASI and SCL-90-R scores. In order to address the moderating effect of gender, the analysis was repeated comparing the male and female participants. The level of significance was set at 0.05. All statistical calculations were performed using R version 3.0.2.

Results

The 75 study participants were almost equally distributed by gender—49 % of males and 51 % of females. The mean age of the patients was 35.9 ± 9.9 years. Socio-demographic characteristics of the patients are provided in Table 1. Thus, 22 % of the respondents had completed tertiary education and 30 % of the respondents were officially married at the time of the study.

According to the ASI scores obtained in the total sample of patients (Table 1), the most serious problems encountered over the past 30 days were in the “Employment” and “Medical status” domains. The average score for the “Employment” section was 0.67 (maximum score almost equaled 1); the score for the “Medical status” section was 0.47, while the average scores for the other sections were relatively low (at the range 0.04–0.28).

The analysis of questions covering “substance abuse history” revealed high levels of substance use. Alcohol was consumed by 60 % of the respondents in the 30-day period preceding the interview and injectable drugs by 28 % of the respondents.

It should be emphasized that the global severity index (GSI) under the SCL-90-R questionnaire for the investigated sample of patients was found to be 0.82, which significantly exceeds the average value for the general Russian population (0.51), and with respect to severity approaches the score obtained for the patients with neuroses prior to treatment (1.29).

As a result of the distribution of the patients according to the viral load level, 29 patients were included in the group with Detectable VL and 46 patients—in the group with Suppressed VL. The average viral load in the patients with Detectable VL was determined to be $85,813 \pm 226,798$ copies/ml. A significantly higher CD4+ cell count was reported in the patients with Suppressed VL than with Detectable VL (411 ± 217 vs. 289 ± 217 cells/ μ l, respectively, $p = 0.021$, $t = -2.37$, $df = 60$).

It was noted that the patients with Detectable VL and Suppressed VL differed with respect to such socio-demographic characteristics as gender, marital status, and the level of education (Table 1). The group of patients with Suppressed VL contained significantly more females (67 vs. 24 %, $p < 0.001$, $\chi^2 = 11.64$). A higher proportion of the officially married respondents was identified in this group (40 vs. 14 %, $p = 0.04$, $\chi^2 = 4.35$). The level of their education was significantly higher than in the patients with Detectable VL (34 vs. 7 %, $p = 0.03$, $\chi^2 = 4.55$). No difference in income level between the two groups was identified.

The analysis of the answers to the questions contained in the Symptom Check List 90 Revised (SCL-90-R) questionnaire provided by the respondents demonstrated no statistically significant differences between the investigated groups of patients (Table 1).

The differences between the groups of the respondents with respect to ASI scores were identified only for two sections of the questionnaire, “Legal status” and “Family history”. The severity of the “legal problems” was more pronounced in the patients with Detectable VL (0.13 vs. 0.05, $p = 0.03$, $t = 2.23$, $df = 40$), whereas the “Family history” problems were more significant in the group with Suppressed VL (0.32 vs. 0.21, $p = 0.004$, $t = -2.99$, $df = 68$).

It is important to mention that the severity of the problems in the “Family history” domain was higher among females in both groups. Thus, the average score in the total sample of patients was 0.36 for females, whereas it was 0.21 for males ($p < 0.001$, $t = -4.3$, $df = 70$). With allowance for the fact that females predominated in the group of patients with Suppressed VL, the differences with respect to this section of the questionnaire between the groups can be attributed to gender.

ASI scores revealed no differences between the groups with respect to the substance use (0.02 and 0.06,

Table 1 Socio-demographic characteristics of study population, ASI, SCL-90-R

Variables	Detectable VL n = 29	Suppressed VL n = 46	Total N = 75	p value	t test (* χ^2)
Age	34.4 (SD = 5.13)	37.5 (SD = 11.92)	35.9 (SD = 9.9)	0.123	-1.56 (df = 66)
Gender					
Male	22 (76 %)	15 (33 %)	37 (49 %)	<0.001	*11.64 (df = 1)
Female	7 (24 %)	31 (67 %)	38 (51 %)		
Marital status					
Not officially married	25 (86 %)	28 (60 %)	53 (70 %)	0.04	*4.35 (df = 1)
Officially married	4 (14 %)	18 (40 %)	22 (30 %)		
Education					
Pre-university level	27 (93 %)	32 (69 %)	59 (78 %)	0.03	*4.55 (df = 1)
University level	2 (7 %)	14 (34 %)	16 (22 %)		
Income					
<25,000 rubles	20 (69 %)	33 (72 %)	53 (71 %)	1	*0 (df = 1)
>25,000 rubles	9 (31 %)	13 (28 %)	22 (29 %)		
CD4+ count, cells/ml	289 (SD = 217)	411 (SD = 217)	364 (SD = 224)	0.021	-2.37 (df = 60)
Viral load, copies/ml	85,813 (SD = 226,798)	21 (SD = 18)	33,194 (SD = 145,712)	0.05	2.03 (df = 28)
ASI					
Medical status	0.46 (SD = 0.29)	0.47 (SD = 0.36)	0.47 (SD = 0.33)	0.93	-0.09 (df = 68)
Employment	0.64 (SD = 0.22)	0.67 (SD = 0.21)	0.67 (SD = 0.21)	0.49	-0.69 (df = 59)
Alcohol	0.14 (SD = 0.21)	0.08 (SD = 0.13)	0.10 (SD = 0.17)	0.21	1.28 (df = 41)
Drugs	0.06 (SD = 0.09)	0.02 (SD = 0.07)	0.04 (SD = 0.08)	0.06	1.96 (df = 49)
Legal status	0.13 (SD = 0.18)	0.05 (SD = 0.11)	0.08 (SD = 0.15)	0.03	2.23 (df = 40)
Family history	0.22 (SD = 0.14)	0.33 (SD = 0.17)	0.28 (SD = 0.16)	0.004	-2.99 (df = 68)
Psychiatric status	0.15 (SD = 0.19)	0.21 (SD = 0.21)	0.19 (SD = 0.21)	0.18	-1.37 (df = 65)
SCL-90-R					
Summary	68.3 (SD = 53.5)	76.9 (SD = 60.4)	73.6 (SD = 57.6)	0.52	-0.65 (df = 65)
Somatization	0.93 (SD = 0.84)	1.08 (SD = 0.91)	1.02 (SD = 0.88)	0.46	-0.74 (df = 63)
Obsessive compulsive	0.82 (SD = 0.56)	0.94 (SD = 0.79)	0.89 (SD = 0.71)	0.43	-0.79 (df = 72)
Interpersonal sensitivity	0.93 (SD = 0.95)	0.92 (SD = 0.78)	0.92 (SD = 0.85)	0.96	0.04 (df = 51)
Depression	0.93 (SD = 0.72)	1.01 (SD = 0.81)	0.98 (SD = 0.77)	0.67	-0.43 (df = 65)
Anxiety	0.62 (SD = 0.65)	0.77 (SD = 0.78)	0.72 (SD = 0.73)	0.37	-0.90 (df = 67)
Hostility	0.65 (SD = 0.63)	0.73 (SD = 0.68)	0.70 (SD = 0.66)	0.60	-0.53 (df = 63)

Table 1 continued

Variables	Detectable VL n = 29	Suppressed VL n = 46	Total N = 75	p value	t test (* χ^2)
Phobic anxiety	0.33 (SD = 0.53)	0.52 (SD = 0.63)	0.45 (SD = 0.59)	0.19	−1.34 (df = 67)
Paranoid ideation	0.64 (SD = 0.58)	0.77 (SD = 0.66)	0.72 (SD = 0.63)	0.38	−0.88 (df = 65)
Psychoticism	0.54 (SD = 0.45)	0.59 (SD = 0.70)	0.57 (SD = 0.61)	0.71	−0.38 (df = 73)
Additional items	0.96 (SD = 0.84)	0.98 (SD = 0.86)	0.97 (SD = 0.85)	0.90	−0.13 (df = 61)
GSI	0.76 (SD = 0.59)	0.86 (SD = 0.67)	0.82 (SD = 0.64)	0.52	−0.65 (df = 65)
PSDI	1.57 (SD = 0.51)	1.73 (SD = 0.58)	1.67 (SD = 0.55)	0.23	−1.22 (df = 65)
PST	39.1 (SD = 20.9)	40.2 (SD = 23.4)	39.8 (SD = 22.3)	0.84	−0.20 (df = 65)

The last column includes values of t-statistics for continuous variables or χ^2 -statistics (marked with *) for several categorical variables

Statistically significant values are in bold

SD standard deviation

respectively, $p = 0.06$, $t = 1.96$, $df = 49$). However, there were differences in the lifetime use of several drugs. Those in the Detectable VL group had significantly more lifetime years of methadone use (2.7 and 1.6 years, respectively, $p = 0.05$, $t = 2.02$, $df = 30$; for those ever used methadone, $n = 36$) and marijuana use (6.9 and 3.4 years, respectively, $p = 0.02$, $t = 2.41$, $df = 36$; for those ever used marijuana, $n = 45$).

Discussion

A number of studies have demonstrated that substance use is a predictor of low level of adherence to ART [8]. In this regard, the results of the meta-analysis of 38 studies (involving 14,960 patients) conducted by Malta et al. in 2010 are of particular interest. The authors suggested that the assertion that the HIV-infected patients who actively use psychoactive substances are less adherent to treatment does not always hold true [9]. The results of the study conducted by us may serve as a confirmation of this thesis: substance use does not affect the main indicator of therapy success—the viral load suppression with allowance for the features of the investigated sample. It can be assumed that the latter may be attributed to the difference in the distribution of males and females within the groups [67 % of females in the group with Suppressed VL vs. 24 % in the group with Detectable VL; $p < 0.001$, $\chi^2 = 11.64$]. However, no statistically significant differences were identified upon comparison of males and females with respect to substance use.

Perhaps ART adherence among those patients who had used psychoactive substances over the past few years increased under the influence of a range of factors, including reduction in the toxicity of contemporary ART regimens and decreased pill burden [9].

The ASI scores in our sample, other than those obtained for “Legal status” and “Family history” sections, were not predictive of suppression of HIV viral load. The differences with respect to ASI scores between the respondents with Detectable VL and Suppressed VL may be attributed to the differences in the gender composition of the groups. Composite scores for the “Family history” section were higher in the group with Suppressed VL only because the group was dominated by female respondents. Conversely, composite scores for the “Legal status” section were higher in the group with Detectable VL because of the male predominance.

Comparison of the results obtained for the “Legal status” section in males and for the “Family history” section in females of between groups based on viral load revealed no statistically significant differences. Overall, these data indicate that the females in the investigated sample were more adherent to ART, which resulted in the clinically significant suppression of viral load.

Limitations

This study has several limitations. Firstly, from a statistical point of view, the sample size may have limited statistical power to detect certain associations as significant.

Secondly, the study population was a convenience sample and therefore selection bias is also a possibility. The fact that the interview was conducted by an AIDS Center physician constitutes the third limitation in that the desire of the patients to create favorable impressions could lead to distortion of the responses and therefore to potential underestimation of certain ASI composite scores, including the level of substance use. Survival bias also could affect the study results: those who are still in care are more likely to enter the study.

Conclusions

It is important to note that in the study population, which constitutes a convenience sample, 38 % patients had detectable viral load despite receiving ART. Since detectable virus facilitates transmission and increases chances of treatment failure [10] it is necessary to focus additional efforts to improve the effectiveness of ART in the Russian HIV care system.

A number of psychiatric distress symptoms were reported in patients, whose frequency and severity significantly exceeded those reported in the general Russian population [7]. With respect to severity, these symptoms corresponded to the scores obtained when the Symptom Check List 90 Revised questionnaire was administered among patients with neuroses. Also, high levels of substance use (primarily alcohol) were reported in both investigated groups. However, these results do not enable one to identify substance use or certain psychiatric distress symptoms as predictors of viral load suppression.

An important finding of the study is that HIV-positive males in the Russian population, in contrast to patients in North American countries AIDS care facilities [11, 12] are less adherent to the HIV treatment. These findings support the need for differentiated, multi-disciplinary approach to the process of establishing, maintaining, and improving ART adherence among males and females in the Russian medical practice.

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