DENTAL BELIEFS IN HIV+ PATIENTS WITH DIFFERENT ORAL HEALTH CARE NEEDS

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ABSTRACT
The aim of this work was to assess the score variation of scales 1 and 2 of the DCBS (Dental Coping Beliefs Scale) of beliefs on oral health regarding oral health needs, clinical progression of the viral infection, medical care needs, age and gender in HIV+ patients. The DCBS was randomly administered to 102 HIV+ patients at the “Juan A. Fernandez Hospital”, Buenos Aires, Argentina. For each of the 29 items, patients indicated their responses on a five point scale ranging from “strongly disagree” to “strongly agree”. Oral health needs were assessed through the CCITN (Community Caries Index of Treatment Need) and the CPITN (Community Periodontal Index of Treatment Need). Data on CD4 cell count, pharyngeal-esophageal candidiasis, tuberculosis, pneumonia and hospitalization because of HIV-related opportunistic diseases were recorded. A linear regression model was built in which the number of items reporting wrong dental beliefs was the dependent variable and the remaining variables were independent. Altogether 65.7% were male (36.0 ± 0.87 y.o.) and 34.3% were female (36.11 ± 1.21 y.o.) patients. The eight independent variables were significant for the model (F(8,93) = 93.20, p < 0.05; R = 0.80). The estimated parameters were all positive except for CD4 cell counts. The results demonstrate that the DCBS was useful to identify HIV+ patients as a caries and periodontal disease risk group because of their wrong dental beliefs and suggests the need of dental education interventions.

Key words: HIV, dental caries, oral health, health status, health behavior.

PRECONCEPTOS SOBRE SALUD BUCAL DE PACIENTES VIH+ CON DIFERENTES NECESIDADES DE TRATAMIENTO ODONTOLOGICO

RESUMEN
El propósito de este trabajo fue evaluar la variación del puntaje registrado para las subescalas 1 y 2 de la escala de creencias relativas a la salud bucal (DCBS) en relación a la necesidad de tratamiento odontológico, la progresión clínica de la infección viral, la necesidad de tratamiento médico, la edad y el género de pacientes VIH+. El cuestionario correspondiente a la DCBS se administró aleatoriamente a 102 pacientes VIH+ concurrentes al Hospital Juan A. Fernandez, Buenos Aires, Argentina. Para cada una de las 29 proposiciones de las subescalas 1 y 2 de la DCBS los pacientes indicaron su parecer en una escala tipo Likert de 5 grados que iban desde “completamente en desacuerdo” hasta “completamente de acuerdo”. La necesidad de tratamiento odontológico se determinó a través del Indice de Necesidad de Tratamiento de Caries de la Comunidad (INTCC) y del Indice de Necesidad de Tratamiento Periodontal de la Comunidad (INTPC). De la historia clínica médica de cada paciente se recabaron datos correspondientes al recuento de linfocitos T CD4, episodios de candidiasis faringoesofágica, tuberculosis, neumonía y hospitalización a raíz de enfermedades oportunistas afines a la infección por el VIH. Se construyó un modelo de regresión lineal tomando como variable dependiente el número de proposiciones que reflejaban creencias erróneas sobre salud bucal mientras que las restantes variables en estudio se tomaron como independientes. El 65.7% de los pacientes en estudio correspondió a pacientes de género masculino (36.0 ± 0.87 años de edad) y el 34.3% restante a pacientes de género femenino (36.11 ± 1.21 años de edad). Las ocho variables independientes resultaron significativas para el modelo lineal (F(8,93) = 93.20, p < 0.05; R = 0.80). Los parámetros estimados para el modelo resultaron positivos excepto para el recuento de linfocitos T CD4. Los resultados indican que la DCBS resulta un instrumento útil para identificar a los pacientes VIH+ como un grupo de riesgo de caries y enfermedad periodontal dadas las creencias erróneas sobre salud bucal que poseen y sugieren la necesidad de intervenciones educativas de salud bucal en estos pacientes.

Palabras clave: VIH, caries dental, salud bucal, estado de salud, conducta de salud.
INTRODUCTION
HIV+ patients are considered a caries risk group\textsuperscript{1,2} and caries prevalence is associated with the use of sweetened liquid medicines and carbohydrate-enriched diets\textsuperscript{3}, low adherence to oral health programs\textsuperscript{4} and low salivary flow rate\textsuperscript{5}. Several authors have reported a significantly higher dental and periodontal treatment need in HIV+ patients\textsuperscript{6-9}. However, little is known about dental beliefs of HIV+ patients on the development of dental caries and periodontal disease. For instance, the influence of the viral infection on oral health self-care has not been studied yet. The Dental Coping Beliefs Scale\textsuperscript{10} (DCBS) was designed to evaluate misconceptions or wrong beliefs about dental disease and was found to be useful in measuring cognitive changes following oral hygiene interventions\textsuperscript{11}. The DCBS consists of 44 items grouped in 4 sets. The set labeled internal locus of control (scale 1) comprises 15 items about the role of the patient as a directly responsible individual for oral health, whereas the set labeled external locus of control (scale 2) includes 14 items about the role of the dentist in the patient’s oral health. It is worth noting that the DCBS also helps identify potential caries and periodontal risk patients on the basis of the report of the patient’s wrong beliefs. Since research on the dental beliefs of HIV+ patients will undoubtedly help improve the oral health care planning, we decided to undertake this study to provide new background in this field. The aim of this work was to assess the score variation of scales 1 and 2 of the DCBS regarding oral health needs, clinical progression of the viral infection, medical care needs, age and gender in HIV+ patients. We tested the hypothesis that the dental and periodontal treatment needs in HIV+ patients are associated with wrong beliefs influenced by systemic medical conditions.

MATERIALS AND METHODS

Study population
Serving as participants were 102 HIV+ randomly selected patients of any age and either sex. Subjects were recruited at the Infectious Diseases Unit, “Juan A. Fernandez” Hospital, Buenos Aires, Argentina. All of the patients were diagnosed with positive serology for HIV at least 5 years prior to the study and were under antiretroviral drug therapy. Patients suffering from HIV-non-related systemic diseases were excluded. Each patient signed the informed written consent prior to enrollment.

Oral health care needs assessment
Dental and periodontal treatment needs were assessed through the CCITN\textsuperscript{12} (Community Caries Index of Treatment Need) and CPITN\textsuperscript{13} (Community Periodontal Index of Treatment Need) respectively. Oral exams were performed by three previously calibrated dental examiners.

Medical conditions assessment
Data on CD4 cells count (cells/mm\textsuperscript{3}), pharyngeal-esophageal candidiasis, tuberculosis, pneumonia and hospitalization because of HIV-related opportunistic diseases were collected from the medical clinical record. Except for CD 4 cell counts, data were expressed as the number of episodes of each disease.

Dental beliefs assessment
Scales 1 (Internal locus of control, 15 items) and 2 (External locus of control, 14 items) from the DCBS\textsuperscript{10} were taken as an index of dental beliefs. Those scales altogether make up a 29-item scale with score ranging from 29 to 145. For each of the 29 items, subjects indicate their responses on a five point scale ranging from “strongly disagree” to “strongly agree”. The questionnaire was administered to patients prior to oral exam.

Data analysis
Mean values and SEM were calculated for age, CD4 cell count, number of episodes of pharyngeal-esophageal candidiasis, tuberculosis, pneumonia, hospitalization because of HIV-related opportunistic diseases, CCITN, CPITN, number of items reporting disagreement on scales 1 and 2 of DCBS and the global score resulting from the sum of the scores (1 to 5) assigned to each of the items. Differences in mean values between data from male and female patients were tested for statistical significance by Student’s t test. The level of significance used was p< 0.05. A linear regression model was built in which the number of items reporting wrong dental beliefs was the dependent variable and the remaining variables were independent. The model was analyzed by the least square method and the contribution of each variable was assessed by partial F tests.

RESULTS
Altogether 65.70% of the respondents were males and 34.30% were females aged 36.0 ± 0.87 y and
36.11 ± 1.21 y respectively. The differences in age did not reach statistical significance ($t_{(100)} = 0.36$, $p=0.71$).

Oral health care needs assessment revealed a great need of treatment (Fig. 1A). Altogether 54% of the sample needed dental prosthetic treatment and 45% needed tooth removal or endodontic treatment. Mean CCITN was 11.06 ± 0.22. Differences in mean CCITN between male (11.32 ± 0.29) and female (10.57 ± 0.46) patients were not significant ($t_{(100)} = 1.67$, $p = 0.09$). Periodontal conditions (Fig. 1B) revealed supragingival tartar in 68% of the sample, whereas 24% showed 4-5-mm periodontal pockets. The remaining 8% showed 6-mm pathological pockets. The mean CPITN was 2.25 ± 0.06. Differences in mean CPITN between male (2.46 ± 0.08) and female (2.31 ± 0.10) patients were not significant ($t_{(100)} = 1.09$, $p = 0.27$).

Mean CD4 cell count was 345 ± 12 cells/mm³. Differences in CD4 cell counts were not significant ($t_{(100)} = 1.19$, $p = 0.23$) between male (334.80 ± 13.39 cells/mm³) and female (365 ± 22.30 cells/mm³) patients. The mean number of episodes of pharyngeal-esophageal candidiasis was 0.94 ± 0.13. Male patients had 1.01 ± 0.17 episodes of candidiasis, whereas female patients had 0.80 ± 0.19 episodes of candidiasis. Differences were not significant ($t_{(100)} = 0.78$, $p = 0.43$).

Pneumonia episodes (0.80 ± 0.11) were not found to be significant ($t_{(100)} = 0.56$, $p = 0.57$) between male (0.85 ± 0.11) and female (0.71 ± 0.19) patients.

As for tuberculosis episodes, clinical records showed a mean value of 0.4 ± 0.11. Male patients showed a mean value of 0.40 ± 0.14 whereas the mean value for female patients was 0.71 ± 0.19. Mean values were not significantly different ($t_{(100)} = 1.81$, $p = 0.07$).

Hospitalization because of HIV-related opportunistic diseases showed a mean value of 1.14 ± 0.14 times. The mean values recorded for male and female patients were 1.05 ± 0.17 and 1.28 ± 0.21 times respectively. Statistically significant differences in mean values were not found ($t_{(100)} = 0.79$, $p = 0.42$).

Table 1 depicts the means and standard errors derived from the scales 1 and 2 of the DCBS. The global score was found to be significantly higher for male patients. The global score was in average 36% lower than the maximal recordable value. The

### Table 1: Scores on the DCBS

<table>
<thead>
<tr>
<th></th>
<th>Female ($n = 67$)</th>
<th>Male ($n = 35$)</th>
<th>$t$</th>
<th>$p$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale 1</td>
<td>55.12 ± 1.20</td>
<td>50.17 ± 0.95</td>
<td>3.22</td>
<td>0.002*</td>
</tr>
<tr>
<td>Scale 2</td>
<td>39.07 ± 0.61</td>
<td>40.48 ± 0.50</td>
<td>1.77</td>
<td>0.080</td>
</tr>
<tr>
<td>Total</td>
<td>94.19 ± 0.86</td>
<td>90.65 ± 0.65</td>
<td>2.91</td>
<td>0.004*</td>
</tr>
</tbody>
</table>

Means and standard errors of scores recorded on selected scales of the DCBS. Maximal recordable score values were 75 and 70 for scale 1 and 2 respectively. *Statistically significant ($p < 0.05$).
mean score value derived from scale 1 was significantly higher in female patients, whereas significant differences were not observed for scale 2. There was a mean of 4.89 ± 0.30 items reporting wrong dental beliefs in scales 1 and 2 of the DCBS. The distribution ranged from 0 to 12 and was normal. There were eight independent variables that were significant in the regression model in which the dependent variable was the number of items reporting wrong dental beliefs (Table 2). The estimated parameters were positive except for the CD4 cell count. This fact indicated that wrong dental beliefs were directly associated with age, a great caries and periodontal treatment need and more episodes of pharyngeal-esophageal candidiasis, pneumonia, tuberculosis and hospitalization because of HIV-related opportunistic diseases. Conversely, wrong dental beliefs were inversely associated with CD4 cell count. The adjusted mean (4.73 ± 0.36) of the items reporting wrong dental beliefs calculated using the parameters of the regression analysis was not significantly different (t(202) = 0.65, p = 0.59) from the observed mean (Fig. 2).

Fig. 2 shows the mean number of items reporting wrong dental beliefs with respect to scales 1, 2 and gender. The observed means for scale 1 were significantly different (t(100) = 2.03, p = 0.04) between male (3.88 ± 0.39) and female (2.74 ± 0.41) patients. Differences in mean values for scale 2 between male (1.35 ± 0.14) and female (1.48 ± 0.21) patients did not reach statistical significance (t(100) = 0.52, p = 0.59). However, when mean values for scale 1 were compared to those for scale 2, significant differences were observed for both male (t(132) = 6.08, p < 0.0001) and female (t(68) = 2.70, p = 0.009) patients.

**DISCUSSION**

Employing CCITN and CPITN, this study revealed a great dental and periodontal treatment need in
HIV+ patients as previously reported by several authors using different methods\textsuperscript{6,7,8,9,14}. The score on scale 1 and 2 (DCBS) was inversely associated with the observed treatment needs. DCBS observed score values were in average 36\% lower than maximal recordable values. According to the interpretation of the DCBS score, this result indicates beliefs consistent with a poor role of the individual as an active participant in ensuring oral health and increased longevity of teeth. Hence, the DCBS was useful to identify patients with a great oral health care need because of their wrong dental beliefs. The finding of wrong dental beliefs as an explanatory variable of the oral health care needs in HIV+ patients suggests the need of dental education interventions. The wrong dental beliefs observed in HIV+ patients should therefore be taken into account when designing specific oral health care programs for these patients at both individual and community levels. A few authors\textsuperscript{15,16} reported on the planning of health services for HIV+ patients, suggesting that health programs should include dental benefits. This study provides evidence supporting that suggestion.

This study found evidence that the DCBS was a useful tool to identify the oral treatment need of HIV+ patients because of wrong oral health beliefs. Nevertheless, it should be born in mind that the DCBS questionnaire administered in this study was a Spanish adapted version that included only scales 1 and 2. Regarding this point, it is worth mentioning that the use of the adapted questionnaire was part of the validation process of the Spanish version of the DCBS. Another important finding concerned the higher contribution of the items on scale 1 (Internal Locus of Control) to the total number of items reporting wrong dental beliefs. This fact points out the need of effective motivation so as to emphasize the role of the individual as an actively involved participant in ensuring optimal oral health. This study originally hypothesized that scores on DCBS (scales 1 and 2) would be higher for female patients. For this reason, data from male and female patients were compared. As health programs give priority to women’s health care, a lower number of wrong health beliefs in this group was expected. Our results exhibited a trend this direction.

The results reported in this study showed an association among systemic health status, wrong dental beliefs and oral health care needs. This fact suggests that the ideal management of HIV+ patients should involve the collaborative efforts of physicians and dentists to optimize patient treatment and minimize secondary complications deriving from the oral cavity. That is, communication between medical and dental professionals should be improved in order to deliver more effective care to patients as reported by Migliorati & Madrid\textsuperscript{17}. Wrong dental beliefs concerning dental self-care were found to depend on medical variables related to the progression of HIV infection. Recently, Hillman\textsuperscript{18} reported on knowledge regarding HIV/AIDS in adult individuals. The author found evidence of wrong beliefs on general health and HIV-related diseases. In this respect, the HIV+ patient might likely assume that the development of oral diseases as the HIV infection progresses is due to the viral infection itself, not to the lack of oral self-care or unmet dental treatment needs for instance. That is, wrong beliefs regarding HIV infection might lead to wrong dental beliefs. Another point to be discussed concerns the implications of the report of wrong dental beliefs in HIV+ patients. It clearly indicates the need of dental education interventions but also implies that wrong dental beliefs are likely a barrier in the access to oral health care. In this respect, some authors have described health misconceptions as a barrier in the access to health services\textsuperscript{19,20}. Particularly, Kenagi et al.\textsuperscript{20} reported that dental care was the most frequently unmet health need in close to half of a sample of 161 HIV+ patients because of their lack of dental care demand. Wrong dental beliefs are likely to account for this fact. Nonetheless, further research on this subject is needed.

In conclusion, wrong dental beliefs in HIV+ patients with oral health care needs are dependent on medical variables related to the progression of the viral infection and likely determine the demand for dental treatment.

ACKNOWLEDGEMENT
This work was supported by grant from the University of Buenos Aires (Grant UBACyT 0800).

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