Salivary cortisol levels: the importance of clown doctors to reduce stress

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Abstract

This study was designed to correlate entertainment of clown-doctors (CD) activities on hospitalized children and aphysiological biomarker. For this purpose we collected saliva samples and verified children satisfaction with these activities by using a visual analog scale (VAS). Children from 6 to 7 years-old, with diagnosis of any acute pathology, interned in the Pediatric Ward of the Botucatu Medical School Hospital (São Paulo, Brazil) were interviewed. Two groups were taken into consideration: lunchCD and dinnerCD. The following protocol was applied in each group (lunch and dinner): collection of the first saliva sample and presentation of the VAS prior to CD activities, followed by collection of a second saliva sample and another VAS assessment after CD activities. Forty-four children were excluded for one of the following reasons: use of corticosteroids, insufficient saliva sample in one of the collections, refusal to chew on the Salivette® (Sarstedt) device and processed according to the specifications of any kind of candy or gums) or other activities or legal guardians with some instructions, offering them an opportunity to give their opinion about the intervention.

Materials and Methods

Participants

Children aged 6 to 7 years from the Pediatric Ward of the Botucatu Medical School Hospital (Brazili) were recruited. Inclusion criteria were: a diagnosis of any acute pathology and a hospitalization period not exceeding 30 days. The parents or legal guardians agreed to the participation of their children in the study by signing the informed consent form. The procedures were approved by the Institutional Ethics Committee of the Botucatu Medical School (OF:1162012-CEP). Thirty-six children accepted to participate in the whole study design.

The study was divided into two groups: lunchCD and dinnerCD. Each child in the study served as its own control. The following protocol was applied in each group (lunch and dinner): collection of the first saliva sample and presentation of the VAS prior to CD activities, followed by collection of a second saliva sample and another VAS assessment after CD activities. Forty-four children were excluded for one of the following reasons: use of corticosteroids, insufficient saliva sample in one of the collections, refusal to chew on the Salivette® (Sarstedt, Hermer, Germany) at the after time point, or presence of a chronic disease as stated in the medical records.

The CD perform activities in the library of the main ward and at bedside. The CD are composed of students that dedicate one hour (lunch and dinner) once a week to play with the kids. The visits take about one and a half hour and it was mainly about what the children would like most to do, some are involved with little stories, some with balloon designer; some sing songs and play instruments. Every visit is count on about 20 students that volunteer to play with the children, and depending on the day and the number of children at the ward, there are 2 CD per children to play some activity. In case a child is under recovering from some small surgery the CD gives a balloon and leaves the room.

Visual analog scale

The age of 6 to 7 years, called preoperational development period, facilitates the use of a VAS to estimate satisfaction. We used a VAS of faces ranging from sadness to happiness in combination with a scale of descriptive adjectives. The scale consisted of the following seven levels: 1 = very sad; 2 = sad; 3 = a little bit sad; 4 = unconcerned; 5 = slightly happy; 6 = glad; 7 = really happy. The scales were shown and read to the children, offering them an opportunity to give their opinion about the intervention.

Saliva collection and analyses

Saliva was collected with the Salivette® (Sarstedt) device and processed according to manufacturer instructions. We provide the parents or legal guardians with some instructions, for instance, allowing the children without eating (including any kind of candy or gums) or drinking (except water) for 20 minutes previous the saliva collection, not brush or floss the teeth following the meals (only gargle with water), and ask children to brush the teeth only after the second saliva collection. In the lunch group, saliva was collected between 11:00-11:40 am before the intervention (before lunchCD) and between 1:45-2:15 pm after the

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Key words: Salivary cortisol; clowns doctors; biomarker of stress; visual analog scale.

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Spearman’s correlation test revealed an inverse association between cortisol and VAS scores after lunch (0.065, P>0.05), Figure 1A. However, there was a significant negative correlation in the dinnerCD group. There was no association in the lunchCD group, but not in the dinnerCD group. Satisfaction with the CD intervention rated on the VAS was evident in the lunchCD group, but not in the dinnerCD group. However, there was a negative correlation between cortisol levels and VAS scores in the dinnerCD group; the lower the cortisol levels, the higher the VAS score. The well-being associated with CD activities and not only a random effect of circadian variation. Furthermore, in the dinnerCD group the intervention decreased cortisol levels, even when its levels were already low. Although, there is a popular believes that CD is amusement for the patients and reduces stress even for parents and hospital staff. Therefore, it is concluded that CD intervention can be effective in decreasing cortisol levels, a biomarker of stress, in the studied groups. Satisfaction with the CD intervention is higher in the morning than throughout the day. The significant decrease in cortisol levels in the lunchCD group occurred within only 2 hours what may reflect a true effect of CD activities and not only a random effect of circadian variation. Furthermore, in the dinnerCD group the intervention decreased cortisol levels, even when its levels were already low. Although, there is a popular believes that CD is amusement for the patients and reduces stress even for parents and hospital staff. Therefore, it is concluded that CD intervention can be effective in decreasing cortisol levels, a biomarker of stress, in the studied groups. Satisfaction with the CD intervention is higher in the morning than throughout the day. Therefore, it is concluded that CD intervention can be effective in decreasing cortisol levels, a biomarker of stress, in the studied groups. Satisfaction with the CD intervention is higher in the morning than throughout the day.

Figure 1. Spearman correlation between salivary cortisol and Visual Analogue Scale (VAS) after (A) lunchCD and after (B) dinnerCD; n=18 in each group. The r values for the linear correlation are in the top of the figure.

### Results

Table 1 shows the age, similar in the two groups, the internment reason and the medication used for the participant children. The cortisol concentrations and VAS scores before and after lunchCD or dinnerCD are shown in Table 2. Salivary cortisol was reduced after the CD intervention. Spearman correlations between cortisol and VAS scores were analyzed.

**Table 1. Age, internment reason and medication used for the participant children.**

<table>
<thead>
<tr>
<th>Groups</th>
<th>Age (mean)*</th>
<th>Internment reason</th>
<th>Medication used</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDlunch (n=18)</td>
<td>6.5 (6.02-7.05)</td>
<td>Appendicitis (n=3); femur fracture (n=3); adenoid hypertrophy (n=10); trachea trauma (n=2)</td>
<td>Cefazolin (n=2), ceftiraxone (n=2), ketoprofeno (n=3), dipyrone (n=15), metronidazole (n=4)</td>
</tr>
<tr>
<td>CDdinner (n=18)</td>
<td>6.04 (6-7.02)</td>
<td>Appendicitis (n=3); bronchopneumonia (n=3); fimosis/parafimosis (n=4); adenoid hypertrophy (n=8)</td>
<td>Amoxicillin (n=6); ceftiraxone (n=2), dipyrone (n=12); tramadol (n=1)</td>
</tr>
</tbody>
</table>

*The age is presented as median and 25th-75th percentiles.

### Discussion

The present results validate CD activities to be effective in decreasing cortisol levels, a biomarker of stress, in the studied groups. Satisfaction with the CD intervention rated on the VAS was evident in the lunchCD group, but not in the dinnerCD group. However, there was a negative correlation between cortisol levels and VAS scores in the dinnerCD group; the lower the cortisol levels, the higher the VAS score. The well-being associated with CD activities, seen by the VAS, might be related to a reduction in cortisol levels. Cortisol secretion is higher in the morning than throughout the day. Therefore, it is concluded that CD intervention can be effective in decreasing cortisol levels, a biomarker of stress, in the studied groups. Satisfaction with the CD intervention is higher in the morning than throughout the day. Therefore, it is concluded that CD intervention can be effective in decreasing cortisol levels, a biomarker of stress, in the studied groups. Satisfaction with the CD intervention is higher in the morning than throughout the day. Therefore, it is concluded that CD intervention can be effective in decreasing cortisol levels, a biomarker of stress, in the studied groups. Satisfaction with the CD intervention is higher in the morning than throughout the day.
ties are effective in reducing stress. Our results support CD activities as an important and valid tool to reduce a recognized physiological biomarker of stress. We emphasize that VAS did not change for the after dinner time point since during the afternoon the children had the opportunity to play in a variety of activities provided by volunteers of different non-profit organizations or even religious organizations. Those volunteers read stories, play instruments and sing songs together with children and parents helping to minimize the sorrows of being waiting for diagnoses and the healing process. These interventions may also help reduce cortisol levels. When they were asked about their satisfaction with one more activity, the last in the day the dinner CD in the ward, they seemed not to be as satisfied as after lunch CD. Furthermore, at night the children were supposed to go back home to sleep with their family and their belongings, a fact that might explain why the children interviewed at night were not as satisfied as the children interviewed in the afternoon. Usually during the morning there are cleaning and nurse staff taking care of details and there is not much time for playing than it is in the afternoon. Children in the present study were mostly happy by the VAS, what might suggest that they were not in a psychophysiological reaction of the stress as named by Seyle in his studies. Though in the present study the psychological assessment of the children was not our focus and deserves further investigations.

Conclusions

The present results provided physiological evidence of the beneficial effects of playful CD activities in a public pediatric ward. Therefore the CD activities should be more valued and encourage inside a hospital atmosphere, once it reduces an important physiological stress factor in hospitalized children.

References