



## **Cacao for Stress Reduction: 21 Day Cacao Challenge**

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### **Background**

Cacao polyphenols have demonstrable beneficial effects on health, reducing the risk of cardiovascular diseases, obesity, diabetes, and cancer.<sup>1</sup> Clinical studies have also shown that commercial dark chocolate can reduce stress and anxiety in both healthy and highly stressed individuals.<sup>2,3</sup> However, the true effect of cacao polyphenols on stress and anxiety, without the masking effects of sugar and other components of commercial chocolate, remains poorly investigated. To address this, we conducted a pilot study investigating the effect of regular consumption of ceremonial-grade cacao, for a period of 21 days, on how individuals perceived their stress levels.

### **Methods**

#### *Study design and population*

In this study, participants were asked to drink 20 mg of unsweetened, organic ceremonial-grade cacao every day. Different doses were allowed, but participants were informed that doses higher than 20 mg a day were not recommended.

Participants were asked to prepare the cacao drink at the same time each day, by melting the cacao paste in water without any additives, including milk and sweeteners. Participants were asked to drink the cacao before eating breakfast, around the same time every morning, and to refrain from any drugs including coffee, other stimulants, and alcohol during the 21 days of the study. Individuals who were taking selective serotonin reuptake inhibitors (SSRIs) or antidepressants were asked not to participate.

Participants were recruited via the “21 Day Cacao Challenge” post on our website<sup>4</sup> and received an information sheet with the above guidelines before being enrolled in the study. Although individuals were asked to withdraw from the study if they would not be able to meet these guidelines, those who decided to participate, but did not meet the guidelines, were not excluded. There were no exclusion criteria. The study was conducted in May, 2020.

### *Outcomes*

At the start of the study (Week 0), and every week during the 21 days (Weeks 1, 2, and 3), participants filled an adapted version of the validated Perceived Stress Scale 10 item questionnaire (PSS-10).<sup>5</sup> The questionnaire was adapted to reflect the participants' perceived stress during the week rather than month before. PSS-10 scores range from 0 to 40, with lower scores indicating lower perceived stress. The primary outcome of this study was the PSS-10 score at Week 3, the end of the study, compared with Week 0, for the participants who completed the 21 days of cacao intake. Data were collected using the Wecudos platform, an exclusive health network for connecting, schedule bookings and tailor guidance from peer recommended and certified professionals, which is no longer available.<sup>6</sup>

### *Statistical analysis*

All statistical analyses were descriptive. Data analysis was conducted in Microsoft Excel.

## **Results**

### *Participant disposition and demographics*

Of the 73 participants who enrolled in the study, 21 withdrew from the study after completing only the first questionnaire at Week 0; 52 participants completed the 21 days of cacao intake and all 4 questionnaires. Of these, 48 (92%) were female and 4 (8%) were male. All these participants were adults ( $41.8 \pm 10.42$  [mean  $\pm$  standard deviation] years old at the start of the study). No participants were taking SSRIs or antidepressants.

### *Outcomes*

Overall, the PSS-10 score decreased to approximately half after the “21 Day Cacao Challenge”. The mean  $\pm$  standard deviation PSS-10 score at Week 0 was  $20.04 \pm 6.74$ , which decreased to  $9.98 \pm 6.04$  at Week 3.

At Week 0, participants consistently reported having felt upset, stressed, angry, unable to cope, to control significant aspects of life, and to overcome difficulties during the previous; 29%–60% responded fairly often or very often to these PSS-10 items, while 10%–36% responded never or almost never (**Figure 1**, left column). Notably, at Week 3, 2%–14% of participants responded fairly often or very often, and 56%–86% responded never or almost never to these items (**Figure 1**, right column).

For questions of how often, in the week before, participants felt confident, on top of things, able to control irritations, and that things were going their way, 6%–19% responded very often at Week 0, which increased to 39%–62% at Week 3 (**Figure 2**).

## Conclusions

Our study showed that regular ceremonial-grade cacao consumption, for a period of 21 days, led to a reduction of PSS-10 score. At the end of the study, participants reported feeling less stressed, angry, overwhelmed, and more confident and able to cope compared to how they felt at the start.

This was a pilot study, which lacked a formal control group and was not powered by statistical comparisons. Reported stress levels may have been strongly influenced by the period of almost global lockdown due to the COVID pandemic during which the study was conducted; the extent by which lockdown influenced participants' stress levels was not investigated, as the country in which they were located and lockdown rules they were subjected to during this study were not recorded. Further limitations included the inability to record additional information on participants' demographics, adherence to guidelines, and other factors that could have influenced results (e.g. habits/behaviours such as exercise, meditation). This study has not been peer reviewed by researchers nor ethical boards.

Despite the above limitations, our results were consistent with findings from clinical trials with commercial chocolate,<sup>2,3</sup> suggesting that the components of ceremonial-grade cacao, such as polyphenols, can help reduce stress and anxiety. Formal clinical trials should be conducted to evaluate the effectiveness and safety of raw cacao for the treatment of stress-related mental health conditions.

## References

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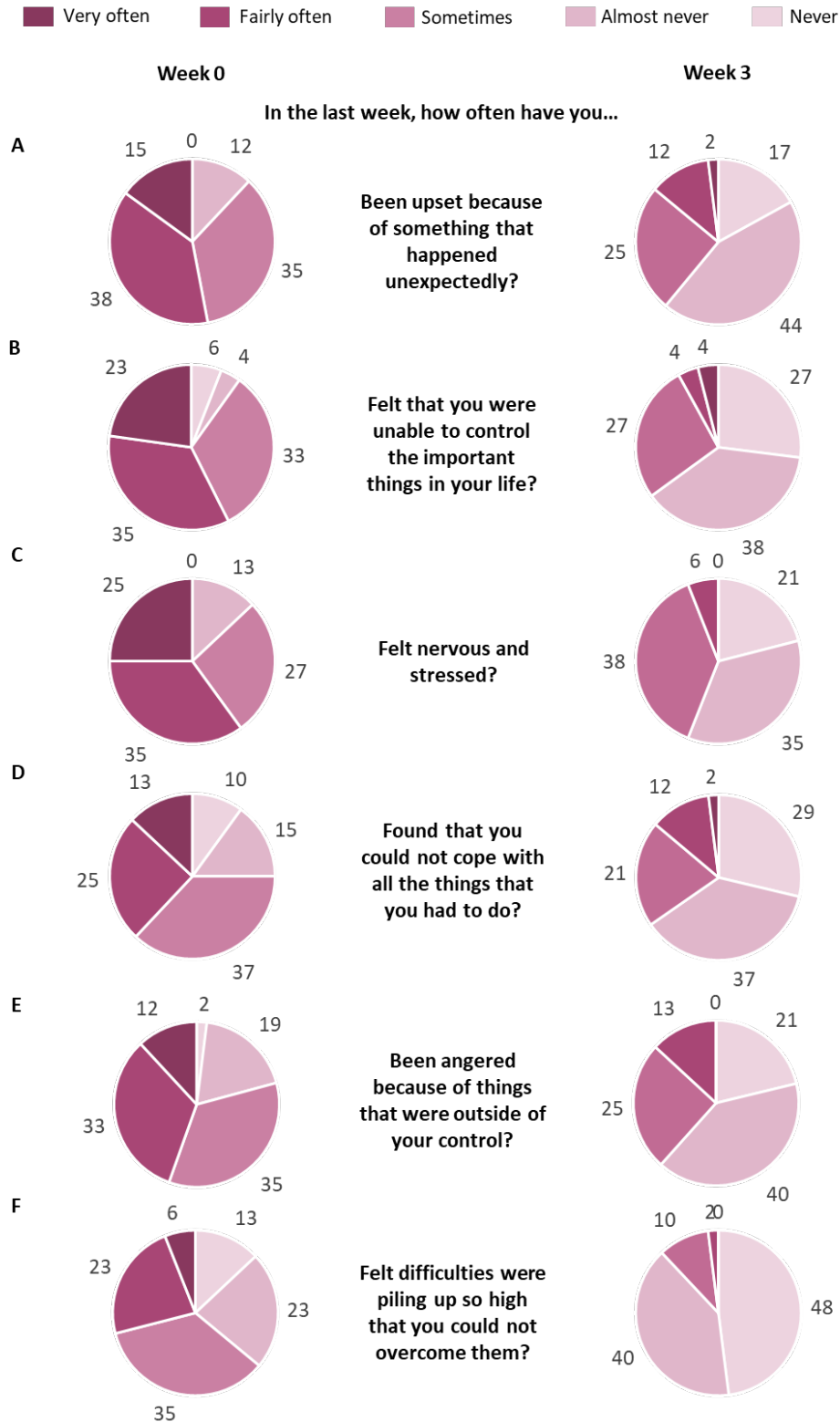
**Author contributions:** **RS** and **DM** contributed to the design of the study, data collection, data analysis and interpretation, and writing.

**Conflicts of interest:** **RS** is the founder and director of Ritual Cacao Ltd; **DM** is the co-founder of Ritual Cacao Ltd.

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**Figure 1:** Participants responses (percentage [%]) at Weeks 0 and 3 to PSS-10 negatively stated items (n=52).



**Figure 2:** Participants responses (percentage [%]) at Weeks 0 and 3 to PSS-10 positively stated items (n=52).

