**ABSTRACT**

The aim of the present study was to evaluate the effects of acute and repeated intake of biscuits, containing as source of dietary fiber either spent coffee grounds (SCG), added with fructooligosaccharides or extracted coffee antioxidant dietary fiber (ADFSCG) obtained by ohmic procedure, on body weight management and CR of human volunteers. Nutritional composition of biscuits (TC, C-ADFSCG and C-SCG) was determined confirming a total fiber content of 5, 34 and 1.7 g of fiber/45 g (administered portion), respectively. Satiety increased after ADFSCG consumption compared with TC and C-SCG, with high area under the curve (AUC) (p < 0.05). Ad libitum food intake measured at breakfast, total energy intake was significantly (p < 0.05) lower with C-ADFSCG compared with C-SCG and TC. ADFSCG was well tolerated. Reduced activity, sleep quality and biological chronotype (morningness/eveningness) with melatonin has been used as a biological marker were improved by C-ADFSCG and C-SCG, suggesting its positive effect on CR regulation. In the absence of other lifestyle changes, the new ADFSCG show promise to positively improve body weight management thus improving health, and could be considered as a potentially healthy functional ingredient for application in the food industry.

**Keywords:** Spent coffee grounds; Dietary fiber; chronodisruption; circadian rhythms, satiety.

**METHODS**

**OBJECTIVE**

To evaluate the effect of acute and repeated intake of biscuits, containing as source of dietary fiber either SCG (added with fructooligosaccharides) or extracted coffee antioxidant dietary fiber obtained by ohmic procedure, on body weight management and CR of human volunteers.

**BACKGROUND**

Disruption of circadian rhythms (CR), called chronodisruption, especially in the evening chronotype, is associated with an increased risk of non-communicable diseases such as cancer, overweight and obesity. Recently, foods have been considered as powerful modulators of the CR. However, there is a lack of evidence on the effect of the intake of dietary fiber or antioxidants on CR parameters like locomotor activity (1). Spent coffee grounds (SCG) have been proposed as new functional food ingredient due to their large amount of dietary fiber and high antioxidant capacity which provide several health benefit effects (2, 3, 4). Recently, a dietary fiber ingredient from spent coffee grounds, possessing improved technological and antioxidant properties, was extracted by employing ohmic heating approach (5).

**RESULTS**

**Table 1.** Biscuits formulation

<table>
<thead>
<tr>
<th>Biscuits</th>
<th>Caffeine (mg/portion)</th>
<th>Carbohydrates (g/portion)</th>
<th>Fat (g/portion)</th>
<th>Fiber (g/portion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADFSCG</td>
<td>0</td>
<td>44.6</td>
<td>11.1</td>
<td>0.7</td>
</tr>
<tr>
<td>C-ADFSCG</td>
<td>0</td>
<td>44.6</td>
<td>11.1</td>
<td>0.7</td>
</tr>
<tr>
<td>C-SCG</td>
<td>0</td>
<td>44.6</td>
<td>11.1</td>
<td>0.7</td>
</tr>
</tbody>
</table>

**Table 2.** Nutritional composition of the biscuits.

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>Caffeine (mg/portion)</th>
<th>Carbohydrates (g/portion)</th>
<th>Fat (g/portion)</th>
<th>Fiber (g/portion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADFSCG</td>
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<td>11.1</td>
<td>0.7</td>
</tr>
<tr>
<td>C-SCG</td>
<td>0</td>
<td>44.6</td>
<td>11.1</td>
<td>0.7</td>
</tr>
</tbody>
</table>

According with the Codex Alimentarius (1997), ADFSCG and C-SCG have a high fiber and protein content (Table 1 and 2).

**INTRODUCTION**

**Acute study**

1. Biscuits containing ADFSCG (4g/portion) [C-ADFSCG]*
2. Biscuits containing spent coffee grounds and fructooligosaccharides (C-SCG)*
3. Traditional biscuit recipe (120g chocolate chips)

**RESULTS**

**Table 3.** Characteristics of the participants in both studies.

<table>
<thead>
<tr>
<th>Age</th>
<th>Weight</th>
<th>Height</th>
<th>BMI</th>
<th>Caffeine (mg/portion)</th>
<th>Carbohydrates (g/portion)</th>
<th>Fat (g/portion)</th>
<th>Fiber (g/portion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>24.27 ± 2.28</td>
<td>71.49 ± 5.69</td>
<td>1.65 ± 0.15</td>
<td>23.73 ± 2.56</td>
<td>0.47 ± 0.20</td>
<td>0.39 ± 0.39</td>
<td>0.36 ± 0.36</td>
<td>0.29 ± 0.36</td>
</tr>
</tbody>
</table>

**CONCLUSIONS**

For the first time, it is reported that the use of antioxidant dietary fiber from spent coffee grounds as food ingredient in biscuits, and SCG (added with fructooligosaccharides), may have a positive impact in the circadian rhythm. Biscuits containing dietary fiber extracted using ohmic heating have higher concentration of the nutrient than those containing SCG as ingredient presented additional benefits allowing a better body weight management.

**REFERENCES**