

## Subcritical Water and Conventional Extraction of Phenolic compounds from Onion Skin Waste: Implications in Diabetes Disease.

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### Introduction

Diabetes type 2 accounts for 90 % of all diabetes worldwide [1]. One strategy for diabetes type 2 treatment consists of blocking the enzymes responsible for carbohydrates digestion, but many side effects have been associated with oral antidiabetics [2]. Onion skin waste (*Allium cepa* L.) (OSW) has been reported to positively affect human health because of its flavonoids content [3]. The aim of this work is to evaluate the antidiabetic potential of a subcritical water (SW) extract obtained at 145 °C in a batch reactor from OSW *Horcal* variety, and to compare it with those obtained by conventional extraction (CE) at 37 °C with an ethanol:water (70 %, v/v) mixture from *Horcal* and *Red* OSW varieties.

### Results and discussion

The major compounds found in *Horcal* and *Red* OSW extracts obtained by CE were quercetin and quercetin-4'-glucoside, whereas in the *Horcal* SW extract, protocatechuic acid and quercetin-4'-glucoside were the majority. All the extracts inhibited  $\alpha$ -glucosidase and aldose-reductase, but just CE extracts inactivated  $\alpha$ -amylase (Fig. 1). Inhibition occurred in a concentration-dependent manner, and the extracts obtained by CE resulted to be more active than the SW extract. However, the strong  $\alpha$ -amylase inhibition is related to different side effects such as flatulence, diarrhea or liver disorder. Hence, the SW extract presents a great advantage in comparison with CE extracts because, by not inactivating  $\alpha$ -amylase, these effects could be avoided [2]. In addition, the IC<sub>50</sub> value determined in the SW extract for  $\alpha$ -glucosidase (76±4 µg/mL) resulted to be much lower ( $p < 0.01$ ) than the value determined for acarbose (136.3±1.1 µg/mL), one of the most widely used oral antidiabetics.

### Conclusions

Although extracts obtained by CE resulted to be more active than the SW extract in terms of enzyme inhibition, the latter did not interfere with  $\alpha$ -amylase activity, whose inhibition is associated with numerous side effects. SW extraction has been proven to be a useful technology to obtain extracts from OSW with antidiabetic properties because of its ability to inactivate enzymes involved in carbohydrates digestion.

### Funding

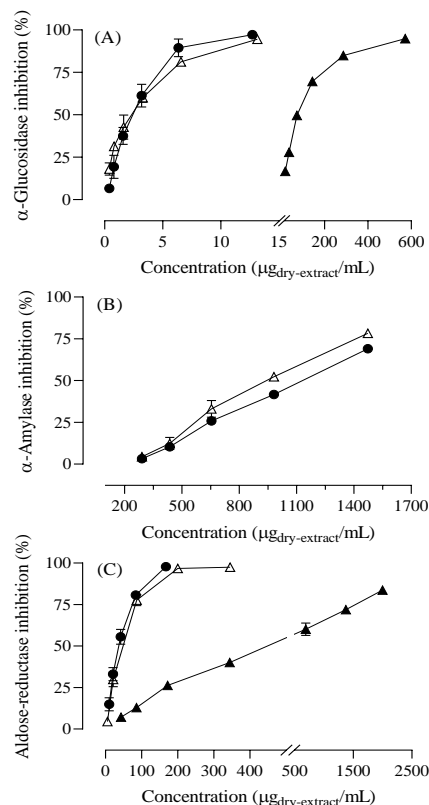
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### References

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**Figure 1.** Inhibitory effect of OSW extracts ( $\Delta$  *Horcal*-CE,  $\bullet$  *Red*-CE,  $\blacktriangle$  *Horcal*-SWE) on: (A)  $\alpha$ -Glucosidase, (B)  $\alpha$ -Amylase and (C) Aldose-reductase.