

The Effect of Extracted Polyphenols from Pine, Goat Willow, Black Alder on Amylase after Physiological Activation

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Introduction. The major dietary carbohydrate that is commonly consumed by humans is starch. Starch is a long polysaccharide which contains a large number of glucose units joined by glycosidic bounds. Enzyme amylase is capable of degrading the starch into its components – amylose and amylopectin. The process takes place in oral cavity by ptyalin (Salivary amylase) and continues in small intestines by α -amylase (Pancreatic amylase).

Being the first step in major carbohydrate metabolism chain, the control over amylase may allow control over the dietary intake of glucose; the process might prove helpful in various conditions.

In order to attempt and control amylase, three types of common to Europe tree bark extracts were taken, including Goat Willow, Pine and Black Alder.

The aim. The aim for this research is to determine what the effect of polyphenol rich extracts on amylase as screening in 0804 COST Action is: Chemical Biology with Natural Product framework.

Materials and methods. In order to establish the effects on amylase, 40 vials were prepared and divided into four groups, a control group, which did not receive any tree extract, and three groups – one for each of the trees (Each group consisted of 10 vials). The next step involved dilution of human saliva in varying concentration (from 1/20 up to 1/10240), a 0.1% starch solution was added and 100 μ L of appropriate tree extract. After the period of incubation (30min), a drop of iodine was added to each of the 40 vials as an indicator. Experimental series were prepared in Human physiology and Biochemistry department.

Results. The results from the first donor were unremarkable in the control group due to low amylase in the saliva, the result of this control group was pure blue / (indicate no amylase activity) in all 10 control vials. However, in the groups of pine and Goat Willow, even with low amylase, two out of 10 vials were clear, suggesting amylase activation by the extracts. In contrast, the group of Black Alder showed no change in color and was similar to the control group. In order to establish whether Black Alder inhibits amylase or have no effect, new control and Black Alder groups were made with new donor saliva (The donor was asked to eat bread 20 minutes before the donation, in order to increase amylase secretion). In contrast to the new control group, which showed clear color (Indicator for amylase activity) up to the 8th vial (1/2560 concentration), the Black Alder group showed activity only up to the 2nd vial, consistent with inhibition of amylase.

Conclusions. As can be seen from the results, all of the three tree extracts have an effect on amylase, either activation by Pine and Goat Willow or inhibition by Black Alder. The effect of those extracts on amylase can be used in order to moderate glucose intake in specific patients that requires such moderation as well, as general biological dietary product.

The trees are common to Europe and already widely used in industry. The bark extracts of those trees are available and economical. Up to date more tests should be carried out before in vivo usage, for clarifying the effects on other metabolic pathways.