

## THE HEALTH BENEFITS OF CHOCOLATE ENRICHMENT WITH DRIED FRUITS

Özlem Çağındı, Semih Ötleş

Ege University of Izmir, Turkey

**Abstract.** One of the most popular food all over the world is chocolate and it has highly nutritious energy, fast metabolism and good digestibility. Nowadays, most important trend is healthy foods. Develop a chocolate product that will be be nutritional for many more people. It is well known that dried fruits has high nutritious values and health benefits. Dried fruits are good sources to developed chocolates. This paper aims to review health importance and usage of dried fruits in chocolate.

**Key words:** chocolate, enrichment, dried fruits, health benefits

### INTRODUCTION

Cocoa and chocolate products have been delicacies for hundreds of years. Chocolate and cocoa are products derived from cacao beans, the seeds of the *Theobroma cacao* tree. Both the Mayans of the Yucatán and the Aztecs of Mexico prepared, roasted and ground beans into a drink, named “xoxocoatl”, “cacahuatl”, or “chocolatl” by the Aztecs, among whom it was reserved for the highest social classes [Lupien 1999, Dillinger et al. 2000]. Until recently evidence was dating back to the first and second centuries AD of cacao usage by the Olmec Indians in the Gulf Coast regions of Mexico. Cocoa beans also comprised a kind of unified monetary system in the middle Americas of the Aztecs and Mayas and ancient records chronicle price lists at that time [Lupien 1999]. Although the first Latin name of the tree – *Amygdalae pecuniariae* – meant “money almond” in recognition of its status as currency, it was the Swedish botanist Linnaeus who named the genus *Theobroma*, which translates as “food of the gods” [Lupien 1999, Dillinger et al. 2000]. Following the Spanish conquest of Central and South America during the 16th century, Hernando Cortés took samples of cacao beans back to Spain along with the tools and instructions to make a chocolate beverage and by this intro-

duced chocolate to the Royal Court in Spain. It was described and recommended by European physicians as a nutritious drink that allowed one to travel without any further food in hot weather [Bearden et al. 2000]. Owing to the expense of both the cacao and the sugar that soon came to be added to it, consumption of this drink was originally confined to royalty and the aristocracy and many claims were made about it, one of which was its being aphrodisiac [Borchers et al. 2000]. Evidence for the use of cacao or chocolate for medicinal purposes can be traced to ancient Aztecs sources. Cocoa powder was not developed until two centuries after Cortés imported cacao to Spain by Conrad van Houten of the Netherlands. Solid chocolate soon followed, and finally milk chocolate was created by Daniel Peters of Vevey, Switzerland [Borchers et al. 2000].

Chocolate is one of the most popular foods all over the world and is a highly nutritious energy source, with a fast metabolism and good digestibility. The presence of cocoa, milk and sugar in its composition can be the warranty of an appropriate ingestion of proteins, carbohydrates, fats, minerals and vitamins [Pedro et al. 2006]. Nowadays, one of the most important trends in food manufacturing is originated by the consumers' demand of functional or health-promoting foods, i.e., foods that not only cause no harm, but also remedy or prevent illnesses such as heart disease, osteoporosis, cancer, diabetes, etc. The development of food processing technology has been influenced by numerous factors; among them, consumer demands have undoubtedly oriented the new trends in the manufacturing, preservation, and control of food [Karel 2000]. Developing a chocolate product that will be affordable and also nutritional for many more people is a challenge. The development of some new products as a method of increasing the consumption of chocolate. Chocolate products may be developed from different dried fruits.

Epidemiological studies have noted a consistent association between the consumption of diets rich in fruits and a lower risk for chronic diseases, including cancer [Block et al. 1992, Steinmetz and Potter 1996, World Cancer... 1997], heart disease [Hertog et al. 1993, Joshipura et al. 2001] and stroke [Gillman et al. 1995, Joshipura et al. 1999]. Additional benefits that are likely to follow from increased consumption of these plant foods include better diabetes control and reduced risk of obesity, because of the high fiber and low-calorie content of such a diet [Steinmetz and Potter 1996]. Although fruits and vegetables account for only about 5 to 10% of total calories consumed, they make a significant contribution to overall health.

## **CHOCOLATE ENRICHMENT WITH DRIED FRUITS**

Food fortification is an old process (addition of vitamin A and D to milk, or iron to bread) usually performed to replace nutrients lost during the processing of foods. At present, fortification is focused on the addition of health-promoting ingredients [Pszczola 1998, Galverna 2000], thereby providing a desired functionality. The new ingredients added to fortify foods are desired as natural to meet consumer demands [Zabetakis 1996, Lapadatescu et al. 1997].

The health benefits of eating dried fruit as part of an everyday balanced diet are well known. Chocolate products may be developed from cherries, strawberries, cranberries, sultanas, raisins, currants, apricots, prunes, dates etc. These dried fruits are rich in the easily absorbable fruit sugars; fructose and glucose, which provide a constant source of

Table 1. The vitamin content of some dried fruits (100 g) [www.driedfruit-info.com/about/nutritional.html]

Vitamins	A IU/ug	B <sub>1</sub> mg	B <sub>2</sub> mg	B <sub>3</sub> mg	B <sub>6</sub> mg	C mg
Sultanas	30 (ug)	0.1	0.08	0.05	0.3	–
Raisins	15.8 (IU)	0.153	0.022	0.56	–	0.88
Currants	77.8 (IU)	0.126	0.038	0.81	–	1.3
Apricots	10.900 (IU)	0.01	0.16	3.3	–	12
Prunes	1.894 (IU)	0.09	0.19	1.6	0.05	3
Dates	50 (ug)	0.07	0.04	2	0.15	–

Table 2. The mineral content of some dried fruits (100 g) [www.driedfruit-info.com/about/nutritional.html]

Minerals (mg)	Calcium	Iron	Magnesium	Phosphorous	Sodium	Potassium	Copper
Sultanas	52	1.8	35	95	53	860	0.35
Raisins	54.2	2.1	35.3	102	15.6	673	0.038
Currants	87.8	2.5	37.1	104	9.1	747	0.36
Apricots	67	5.5	62	108	26	979	–
Prunes	51	3.9	59	79	8	694	–
Dates	68	1.6	59	64	5	750	0.21

energy, have a greater nutrient density, greater fiber content, increased shelf-life, and significantly greater phenol antioxidant content compared to fresh fruits. In Table 1 the vitamin content of dried fruits, in Table 2 mineral content of dried fruits is given. Therefore, more dried fruits should be recommended to be added to the diet by dieticians and nutritionists.

## HEALTH BENEFITS CHOCOLATE WITH DRIED FRUITS

There are real health benefits of chocolate recognized in the medical world. Chocolate contains a large amount of antioxidants. Antioxidants balance and neutralize free radicals in the human organism. Free radicals effect cell in the body and are at the source of the visible signs of aging. For this reason dark chocolate is considered very well for health. Addition of these, enrichment chocolate with dried fruits will be healthier.

Fruit consumption have been shown by multiple epidemiology studies to reduce the risk of chronic diseases such as cancer [Block et al. 1992], heart disease [Rimm et al. 1996], and stroke [Joshiyura et al. 1999]. Initially it was assumed that vitamins C, E,

and the provitamin beta carotene were responsible for the health benefits of fruits. Dried fruits contain substantial quantities of essential nutrients in a rational proportion. They are excellent source of minerals, vitamins and enzymes. They are easy to digest and clean the blood and the digestive area. Following are some of dried fruits:

### **Raisins**

Raisins one of the most nutritious dried fruits in the world. Raisins have enough sugar content and hence increased food value and are an excellent food in all cases of debility and wasting diseases. Raisins prove very helpful during the treatment of constipation. Raisins enrich blood as they are a rich source of easily iron. They prove helpful in anemia. Raisins are cholesterol-free, low in sodium and totally fat-free. They provide many necessary vitamins and minerals, including iron, potassium, calcium and certain B vitamins. Raisins are a good source of fiber and rich in antioxidants. Raisins are 70% pure fructose (a natural form of sugar) which is easily digested for quick energy [www.nutsonline.com].

### **Cranberries**

Cranberries contain proanthocyanidins that can prevent the adhesion of certain types of bacteria, including *E. coli*, associated with urinary tract infections to the urinary tract wall. The anti-adhesion properties of cranberry may also inhibit the bacteria associated with gum disease and stomach ulcers. Recent scientific research shows that cranberries and cranberry products contain significant amounts of antioxidants and other phytonutrients that may help protect against heart disease, cancer and other diseases. The medical and health community is fast recognising antioxidants as premier disease fighters [www.nutsonline.com].

### **Strawberries**

Specific heart-healthy nutrients in strawberries include vitamin C, potassium, fiber and folate. In addition, strawberries contain antioxidant phytochemicals such as ellagic acid, quercetin, kaempferol and phenolic acid – members of a family of compounds called flavonoids that are being studied for their potential benefits in human health. Folate has been shown to reduce the chance of fetal neural tube birth defects such as spina bifida. Folate reduces serum levels of homocysteine, a substance that has been observed to be an independent risk factor for CVD. Vitamin C keeps teeth and gums healthy, aids in healing cuts and scrapes, and helps the body resist infection. It is also a potent antioxidant that has been associated with reduced risk of certain kinds of cancer. Higher vitamin C intakes with lower death rates from cardiovascular disease (CVD), lower prevalence of CVD, and reduced risk of angina. A diet high in fiber can have benefits throughout life. Dietary fiber has well-known health benefits such as lowering blood cholesterol and promoting a healthy digestive system. This in turn may decrease the risk of heart disease and certain types of cancer. Strawberries have only 50 calories per serving and no cholesterol or saturated fats, making them a great healthy snack or addition to any meal [www.nutsonline.com].

## **Apricots**

Apricots are rich in vitamin A and are a good source of potassium and magnesium, two minerals that give the body endurance, energy and stamina. Apricots contain iron, important for blood building and silicon, necessary for beautiful skin and hair and are extremely rich in beta carotene and are an excellent source of carotenoids, which may help to prevent cancer [www.nutsonline.com].

## **Plums**

Dried plums contain carbohydrates, and their main sugars are fructose, glucose and sorbitol. At the same time they have almost no sucrose. In addition, the dietary fiber in dried plums may help to modulate the body's uptake of sugar in dried plums. The differences in the sugar profiles and the fiber in dried plums may help explain the moderate GI index. Dried plums are a source of dietary fiber, sorbitol, potassium, copper, boron and phenolic compounds which are active in a web of interrelated physiological and health promoting functions. Together these compounds help regulate glucose metabolism, promote cardiovascular health, are involved in bone metabolism, protect against cancer, and contribute to digestion. Dried plums completely stopped and were able to reverse bone loss in an animal model of ovarian deficiency. The mechanism responsible for this is not known. Some speculate the mechanism might be related to the phenolic compounds, sorbitol, boron or dried plums' ability to impact absorption of minerals. In an animal model using ovariectomized rats, dried plums suppressed the rise in serum cholesterol without affecting HDL (good) cholesterol associated with the onset of menopause. At menopause, women's risk for coronary heart disease drastically increases due to ovarian hormone deficiency. Options for lowering cholesterol include a diet rich in plant fiber and other protective nutrients [www.nutsonline.com].

## **Cherry**

In addition to being rich in potassium, vitamin C, and B complex, research has shown that cherry consumption can help the body prevent heart disease and cancer, as well as provide pain relief and improved bone health. These health benefits are possible due to the antioxidants found in cherries, the most vital of which are the flavonoids anthocyanins and quercetin, and the phenolic acid amygdalin. According to researchers, a flavonoid found in cherries that has anticarcinogenic properties called quercetin can help to prevent heart disease. Cherries are considered a nutritionally significant source of quercetin, containing large quantities per serving that surpass most fruits. A phenolic acid called amygdalin, also termed Vitamin B<sub>17</sub> and laetrile, found in the kernels of cherries and other fruits, has been shown to reduce tumor size and further spread of cancer, as well as to alleviate the pains of the cancerous process. Populations such as the Hunza in Pakistan that have always incorporated amygdalin into their diets have remained cancer free, leading scientists to believe that its consumption could also be a powerful cancer prevention food. Anthocyanins found in cherries also block inflammatory enzymes, reducing pain. Sweet cherries are also considered to be excellent sources of boron, providing 396 µg/100 g. Boron consumption, coupled with calcium and magnesium has been linked to increased bone health. Tart cherries naturally pack a health-promoting punch that provides pain relief for many consumers [www.newscientist.com].

## CONCLUSION

The new trend in food manufacturing is functional or health-promoting foods, These foods prevent illnesses such as heart disease, osteoporosis, cancer, diabetes, etc. Epidemiological studies have shown that consumption of diets rich in fruits promotes lower risk of chronic diseases, including cancer, heart disease, stroke, and also diabetes control and reduced risk of obesity.

The development of chocolate with dried fruits increases both nutritious values and health benefits of chocolate. Dried fruits contain essential nutrients; minerals, vitamins and enzymes. Raisins, cranberries, strawberries, apricots, plums and cherry could be used to develop chocolate.

## REFERENCES

- Bearden M.M., Pearson D.A., Rein D., Chevaux K.A., Carpenter D.R., Keen C.L., Schmitz H., 2000. Potential cardiovascular health benefits of procyanidins present in chocolate and cocoa. In: ACS Symposium Series 754: Caffeinated beverages – Health benefits, physiological effects, and chemistry. Eds T.H. Parliament, C.-T. Ho, P. Schieberle. American Chemical Society Washington, 177-186.
- Block G., Patterson B., Subar A., 1992. Fruit, vegetables, and cancer prevention: Are view of the epidemiological evidence. *Nutr. Cancer* 18, 1-29.
- Borchers A.T., Keen C.L., Hannum S.M., Gershwin M.E., 2000. Cocoa and chocolate: Composition, bioavailability, and health implications. *J. Medic. Food* 3, 77-105.
- Dillinger T.L., Barriga P., Escarcega S., Jimenez M., Lowe D.S., Grivetti L.E., 2000. Food of the gods: Cure for humanity? A cultural history of the medicinal and ritual use of chocolate. *J. Nutr.* 130, 2057-2072.
- Galverna O., 2000. The world of nutraceuticals. *Int. Food Ingrid.* 4, 34-35.
- Gillman M.W., Cupples L.A., Gagnon D., Posner B.M., Ellison R.C., Castelli W.P., Wolf P.A., 1995. Protective effect of fruits and vegetables on development of stroke in men. *J. Am. Med. Assoc.* 273, 1113-1117.
- Hertog M.G.L., Hollman P.C.H., Katan M.B., Kromhout D., 1993. Intake of potentially anticarcinogenic flavonoids and their determinants in adults in The Netherlands. *Nutr. Cancer* 20, 21-29.
- Joshiyura K.J., Ascherio A., Manson J.E., Stampfer M.J., Rimm E.B., Speizer F.E., Hennekens C.H., Spiegelman D., Willett W.C., 1999. Fruit and vegetable intake in relation to risk of ischemic stroke. *J. Am. Med. Assoc.* 282, 1233-1239.
- Joshiyura K.J., Hu F.B., Manson J.E., Stampfer M.J., Rimm E.B., Speizer F.E., Colditz G., Ascherio A., Rosner B., Spiegelman D., Willett W.C., 2001. The effect of fruit and vegetable intake on risk for coronary heart disease. *Ann. Intern. Med.* 134(12), 1106-1114.
- Karel M., 2000. Tasks of food technology in the 21st Century. *Food Tech.* 54, 56-64.
- Lapadatescu C., Feron G., Vergoignan C., Djian A., Durand A., Bonnarme P., 1997. Influence of cell immobilization on the production of benzaldehyde and benzyl alcohol by the white-rot fungi *Bjerkandera adusta*, *Ischnoderma benzoinum* and *Dichomitus squalens*. *App. Microbiol. Biotechnol.* 47, 708-714.
- Lupien J.R., 1999. Overview of the nutritional benefits of cocoa and chocolate. In: *Chocolate and cocoa: Health and nutrition*. Ed. I. Knight. Blackwell Science Oxford, 3-8.
- Pedro N.A.R., de Oliveira E., Cadore S., 2006. Study of the mineral content of chocolate flavoured beverages. *Food Chem.* 95(1), 94-100.
- Pszczola D.E., 1998. The ABCs of nutraceutical ingredients. *Food Tech.* 52, 30-37.

- Rimm E.B., Ascherio A., Giovannucci E., Spiegelman D., Stampfer M.J., Willett W.C., 1996. Vegetable, fruit and cereal fiber intake and risk of coronary heart disease among men. *JAMA* 275, 447-451.
- Steinmetz K.A., Potter J.D., 1996. Vegetables, fruit, and cancer prevention: A review. *J. Am. Diet. Assoc.* 96, 1027-1039.
- World Cancer Research Fund and American Institute for Cancer Research. 1997. Vegetables and fruits. In: *Food, nutrition and the prevention of cancer: A global perspective*. Ch. 6.3, 436-446. [www.driedfruit-info.com/about/nutritional.html](http://www.driedfruit-info.com/about/nutritional.html)  
[www.newscientist.com](http://www.newscientist.com)  
[www.nutsonline.com](http://www.nutsonline.com)
- Zabetakis I., 1996. The biosynthesis of strawberry flavour. *Food Sci. Technol. Today* 10, 157-159.

## **WŁAŚCIWOŚCI ZDROWOTNE CZEKOLADY WZBOGACANEJ OWOCAMI SUSZONYMI**

**Streszczenie.** Czekolada jest jednym z najbardziej popularnych produktów na świecie. Jest to produkt wysokoenergetyczny, szybko metabolizowany i łatwo strawny. Ostatnio ze względu na właściwości prozdrowotne produkty czekoladowe wytwarza się tak, aby miały lepszą wartość żywieniową. Wiadomo, że owoce suszone mają wysoką wartość odżywczą i właściwości zdrowotne, dlatego są dobrym surowcem do wzbogacania czekolady. W pracy przedstawiono przegląd suszonych owoców wykorzystywanych jako dodatek do czekolady i przedstawiono ich wartość prozdrowotną.

**Słowa kluczowe:** czekolada, wzbogacanie, suszone owoce, właściwości zdrowotne

*Accepted for print – Zaakceptowano do druku: 15.09.2009*

*For citation – Do cytowania: Çağmı Ö., Ötleş S., 2009. The health benefits of chocolate enrichment with dried fruits. *Acta Sci. Pol., Technol. Aliment.* 8(4), 63-69.*