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IS THE CONVENIENCE FOOD A SOURCE OF CHOLESTEROL?

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Key words: cholesterol, gas chromatography, convenience food

The aim of the study was to estimate cholesterol content in some convenience food: ready-to-cook products and fast food products. The content of cholesterol in the products was determined with the gas chromatography method.

Contents of cholesterol in the ready-to-cook very highly differentiated and ranged from 5.4 mg (dumplings filled with potato and cottage cheese "Ruskie") to 62.2 mg/100 g of product (cutlet "Kijowski"). Cholesterol content of fast food products was also diversified and ranged from 12.4 mg (tortilla from McDonald's Restaurant) to 72.1 mg/100 g of product (breaded chicken wings from KFC Restaurant).

Most of the tested convenience food products were not a rich source of cholesterol, but should be consumed in moderation.

INTRODUCTION

Over the last few years, there has been a growing interest in convenience foods, which are highly processed foods that can be quickly prepared or be eaten directly. Convenience foods are available in ever increasing variety. Among the factors responsible for the growing popularity of convenience foods are: increasing proportion of women who work and number of one-person and two-person households, increasing proportion of elderly people in the society, increasing preferences for highly processed and ready-to-eat foods and popularity of snacking between meals, increasing proportion of time spent traveling and commuting and increasing proportion of time spent on professional and vocational activity, with a corresponding decrease in time spent on preparing traditional meals at home [Świderski, 1999; Zwierzyk, 2005].

Depending on the level of processing, convenience foods require minimal preparation by the consumer, possibly limited to simple heating. Some convenience foods may be eaten with no preparation at all. Convenience foods contain a high proportion of animal and vegetable fats which contribute to their physical structure [Świderski, 1999].

Excessive consumption of foods containing large amounts of saturated fatty acids and cholesterol can induce hyperlipidemia, atherosclerosis and other disorders of the heart and vascular system [Hopkins, 1992; Menoti, 1999; Caggiula & Mustad, 1997]. In diets designed to combat hyperlipidemia the intake of cholesterol should be less than 300 mg/day. Moreover the consumption of animal products should also be reduced, especially those that contain high concentrations of saturated fatty acids and cholesterol [Kłosiewicz-Latoszek, 2000; Hu &Willet, 2002].

The aim of this study was to determine cholesterol content of selected convenience foods from grocery stores or fast food restaurants.

MATERIAL AND METHODS

In 2005 and 2006, the convenience foods tested: ready-to-cook and fast-food products, were purchased from grocery stores and restaurants in Wrocław. The foods evaluated for cholesterol content included 17 ready-to-cook products and 9 fast-food products.

Before analysis, samples of the foods to be tested were sliced, ground and heated to about 40°C in order to dissolve fat. The samples were then homogenized into a uniform mass. Analyses were carried out on 1-g samples in three replications.

Cholesterol content was measured by means of gas chromatography in accordance with the method described by Gielecińska *et al*. [2000]. 5α-Cholestan was used as the internal standard. Derivatives of cholesterol and 5α-cholestan were separated using a 30 m HP-5 glass capillary column. The peaks were integrated, and the surface are under the peaks was calculated with the help of the Chromat V 1.9 software package. The accuracy of the method was assessed by the determining cholesterol content in the certified reference material BCR CRM 163. The recovery of the certified value of cholesterol was 95%.

Contents of cholesterol in the convenience foods tested are presented in Table 1.

RESULTS AND DISCUSSION

Cholesterol content per 100 grams in the ready-to-cook product tested varied considerably, ranging from 5.4 mg to

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TABLE 1. Cholesterol contents in selected convenience food (mean ± standard deviation).

Products (n =3)	Cholesterol (mg/100 g product)	Cholesterol (mg/serving)*
Ready-to-cook products		
Minced balls "Domowe"	52.5±1.2	105.0
Cutlet "Kijowski"	62.2±2.2	93.0
Pancakes with meat	34.2±1.1	80.4
Pancakes with cottage cheese	15.8±2.8	39.5
Dumplings with meat	17.5±1.0	56.0
Dumplings "Ruskie"	5.4±0.6	17.3
Beef tripe	51.9±4.1	207.6
Cabbage stuffed with meat and rice	8.7±1.2	20.0
Beans with sausage in tomato sauce	9.6±0.3	28.8
Sauerkraut stewed with sausage and meat	21.1±1.2	84.4
Minced chops in tomato sauce	9.9±0.6	28.2
Minced balls in tomato sauce	11.1±0.9	31.6
Luncheon meat "Przysmak staropolski"	37.7±2.8	75.4
Beef tripe in broth	56.1±3.9	224.4
Cabbage stuffed with meat and rice in tomato sauce	6.6±0.1	22.0
Bean with bacon in tomato sauce	13.4±3.2	40.2
Pea with smoked bacon	8.4±0.7	33.6
Fast food products		
Breaded chicken breast KFC	53.3±0.6	80.0
Breaded chicken wings KFC	72.1±3.7	108.2
BigMac McDonald's	41.5±4.3	87.6
FishMac McDonald's	30.9±4.0	45.1
McChicken McDonald's	23.2±0.3	41.1
McRoyal McDonald's	45.0±3.0	47.3
WieśMac McDonald's	42.4±2.3	88.2
Longer KFC	13.5±1.1	27.0
Tortilla McDonald's	12.4±2.3	24.8

*- Mean weight of ready-to-cook product serving was assessed on the basis of "Album of photographs of food products and dishes" [Szponar *et al*., 2000b], and the fast food products were weighed after purchase.

62.2 mg (Table 1). The ready-to-cook products that had a low cholesterol content per 100 grams included: dumplings "Ruskie" (5.4 mg), cabbage stuffed with meat and rice in tomato sauce (6.6 mg), pea with smoked bacon (8.4 mg) and cabbage stuffed with meat and rice (8.7 mg). The ready-to-cook products that had a high cholesterol content per 100 grams included: cutlet "Kijowski" (62.2 mg), tripe in broth (56.1 mg), minced balls "Domowe" (52.5 mg), beef tripe (51.9 mg) and "Przysmak Staropolski" luncheon meat (37.7 mg). In the fast food products tested, cholesterol content per 100 grams varied widely from 12.4 mg in tortillas from McDonald's, to 72.1 mg in breaded chicken wings from KFC (Table 1). The main sources of cholesterol in ready-to-cook products were beef, pork and poultry meat and by-products, sausage, fat, and eggs. In the fast-food products, the main sources of cholesterol were beef, pork and poultry meat, firm cheeses, and mayonnaise.

The cholesterol content per 100 g of product was recalculated to determine the cholesterol content per regular serving. The ready-to-cook products with the highest cholesterol content per serving were beef tripe and tripe in broth, which provided between 69 and 75% of the allowed daily intake. The fast food with the highest cholesterol content per serving was breaded chicken wings, which provided 39% of the allowed daily intake (Table 1).

For the ready-to-cook products tested, the cholesterol content was from 20 to 80% less than the values given in tables presenting the composition and nutritional value of food products [Kunachowicz *et al*., 2003, 2005]. This discrepancy is probably due to differences between the formulations and ingredients used now and those used a few years ago. In current production practice, animal products are being replaced by plant products, which reduces fat and cholesterol content [Szponar, 2000a].

The production of foods with reduced cholesterol content is important in preventing heart and vascular disorders. Of the convenience foods tested, those with the lowest levels of cholesterol included dumplings "Ruskie", cabbage stuffed with meat and rice, pea with smoked bacon, and bean with bacon in tomato sauce.

Because of the changes in the formulation of many products and because of the growing variety of products available on the market, the data on the composition and nutritional value of foods and dishes should be up-dated. In order to do this, further study on convenience foods is necessary. Data must be collected not only on cholesterol content, but on the concentrations of other nutrients as well.

CONCLUSIONS

1. In the convenience foods tested, cholesterol content ranged widely from 5.4 to 72.1 mg/100 g.

2. Because convenience foods are becoming more popular, and because the variety of available convenience foods is increasing, further study is needed to determine the nutritional value of convenience foods on the basis of cholesterol content and the concentration of other nutrients which play a role in diet-related disorders.

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ŻYWNOŚĆ WYGODNA ŹRÓDŁEM CHOLESTEROLU?

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Celem pracy było oznaczenie zawartości cholesterolu w wybranych produktach żywności wygodnej: produktach garmażeryjnych oraz żywności typu fast food. Oznaczanie zawartości cholesterolu wykonano metodą chromatografii gazowej.

Zawartość cholesterolu w badanych produktach garmażeryjnych była bardzo zróżnicowana i wahała się w granicach od 5,4 mg (pierogi ruskie) do 62,2 mg/100 g produktu (kotlet kijowski). Zawartość cholesterolu w produktach typu fast food była również zróżnicowana i mieściła się w zakresie od 12,4 mg (tortilla z McDonald's) do 72,1 mg/100 g produktu (skrzydełko kurczaka w panierce z KFC).

Większość badanych produktów żywności wygodnej nie zawierała zbyt dużych ilości cholesterolu, ale powinny być one spożywane z umiarem.