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## **Dietary catering and its effectiveness combined with physical exercise**

### **Catering dietetyczny i jego efektywność w połączeniu z wysiłkiem fizycznym**

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## **Abstract**

**Introduction:** Proper nutrition benefits affect the health of the body. Throughout the world, you can observe the prevailing trend for physical exercise, healthy eating and active lifestyle. There are a lot of publications and books about dietetics, physical activity and selected diets.

**The aim of a study:** The aim of the presented work was concerning the effects of catering diet combined with physical exertion, by customers catering for " Perfect Housewife " based in Ostrów Wielkopolski, Poland.

**Material and methods:** A hundred people using dietary catering were asked about the results of the service. The relation between dietary catering and physical activity, sex, place of residence and having food intolerance were evaluated.

**Conclusions:** 1. Results of dietary catering are better when it is combined with physical activities. 2. Men have better mood more often and residents of towns from 20 to 100 thousands inhabitants have better medical examinations results as a consequence of using dietary catering. 3. Food intolerance have no influence on the efficacy of using dietary catering.

**Key words:** diet catering, physical activity, food intolerance

## **Introduction**

Companies or restaurants offering diet catering meet the needs of independent food preparation, diets, healthy cocktails etc. These are carefully, according to the prevailing nutrition standards prepared meals, delivered door to door of the customer. They are developed individually to the customer's needs, according to its nutritional recommendations, the appropriate calories and the intolerance. The customer receives 5 meals prepared for the whole day. Thanks to this there is no possibility to snacking, and therefore, the correct calorie is maintained, which results in the form of weight reduction, the acquisition of healthy eating habits, etc.

Dietering is: "Professional dietary catering, delivering 5 balanced and tasty meals every day. A skilled team of cooks is on the taste of the dishes, while the nutritionist cares about the health and the effects of dropping the kilos "[1]. The customer contracting the given type of diet with a calorie assigned receives a package of 3 or 5 meals a day, which are delivered in the morning to the indicated address in a paper or thermal insulating bag. Each meal is packed

in a separate hermetically sealed container. The meals are prepared by professional nutritionists [2].

Based on the nutritional interview and the telephone conversation that the nutritionist carries out, the most appropriate diet for the client is determined. When laying the diet is included primarily the goal that the customer wants to achieve, but also the state of health, lifestyle and taste preferences (from the menu you can exclude products that are not liked or not indicated e.g. because of food allergies). Cooks prepare meals, with high quality products (in part from organic farms). Dietary catering sets are delivered daily to your address, home or work. The client eats meals and outside the water, it does not need to do other purchases-it will avoid dietary errors and intakes, save time on self-cooking and, above all, eat tasty and healthy [3].

By using the services of dietary catering, it is avoided to eat between meals. Consuming sugars in excess leads to a deficiency of vitamins, minerals, iron, calcium but also macro and micronutrients. It is ensured to provide the body with the necessary ingredients, so there is no need to reach for snacks. The healthy diet is one of the twelve health determinants that have been identified by the World Health Organisation [4]. Food must be safe and nutritional values guarantee good health. Caring for the welfare of customers using catering services is ensured by a qualified nutritionist, whose task is to balance meals in such a way as to provide the body with adequate distribution of the daily ration in each meal. By consuming the valuable ingredients contained in the "Boxed Diet", it provides the body with good mental performance and emotional balance, as well as guaranteeing a good condition. When deciding on dietary catering we get appropriately selected calorific content for the body. We eat as much as we need-an adequate amount of calories is preserved for growth, age and daily life [4].

### **Types of diets in "boxed food"**

Opening up to the needs of the company's customers come out with a suggestion of many interesting proposals 5 meals a day. As a result, you can choose your diet according to your preference. You have the choice of m.in. "Standard diet", which contains both vegetable and dairy products and meat. It is prepared on the basis of products of natural origin and composed of full-blown dishes. The calorie selection remains: 1000 kcal, 1500 kcal, 2000 kcal and 2500 [5]. The sample menu shows table 1.

Table 1. Sample standard diet menu

	<b>Menu</b>	<b>Allergens</b>
<b>I breakfast</b>	Pumpernickel with lentil and sunflower paste and vegetables	Cereals containing gluten
<b>II breakfast</b>	Chia pudding with blueberries	Milk and products thereof, including lactose
<b>Dinner</b>	Turkey in a nut sauce with millet and beets	Peanuts and products thereof, milk and products thereof, including lactose, nuts
<b>Afternoon tea</b>	Jelly with strawberries and almond flakes	Nuts
<b>Supper</b>	Ratatouille with chicken	----

Source: Own study based on [5]

"Sport diet" is aimed at people whose physical activity is an indispensable element of everyday life. Balanced proportions of the constituents of proteins and carbohydrates will allow the preservation of strength, while parallel building muscle mass. Meals have an increased amount of complex carbohydrates and animal proteins. The diet has two options of calorific strength: 3000 kcal and 4000 kcal. The sample menu shows table 2.

Table 2. Sample sports diet menu

	<b>Menu</b>
<b>I breakfast</b>	Smoked salmon sandwich with vegetables, banana protein cocktail
<b>II breakfast</b>	Homogenized cheese with mango mousse, blackberries and dried fruit
<b>Dinner</b>	Halibut in a sauce with basmati rice and green beans, broccoli cream
<b>Afternoon tea</b>	Jelly with strawberries and almond flakes
<b>Supper</b>	German salad

Source: Own study based on [5]

"Paleo Diet" is another of the diets offered by catering companies. It is dominated by high protein and low carb products, which are based on fat meats, fish, vegetables and fruits.

Available calorie: 1200 kcal, 1500 kcal, 1800 kcal, 2000 kcal and 2500 kcal [5]. The sample menu shows table 3.

Table 3. Sample menu for paleo diet

	<b>Menu</b>
<b>I breakfast</b>	Baked ham with iceberg lettuce, a portion of apple mousse with cinnamon
<b>II breakfast</b>	Thick strawberry soup
<b>Dinner</b>	Turkey thigh in oranges, chinese cabbage
<b>Afternoon tea</b>	Celery cream
<b>Supper</b>	boiled eggs, carrot salad

Source: Own study based on [5]

Each person carries a different lifestyle, shows less or more physical activity. This is due to the fact that there is a varied calorie demand. The requirements for the amount of nutrients depend on age, gender, physical predisposition and the type of physical work performed. The advantage of dietary catering is the provision of five meals per day, tailored to the customer's needs. Due to the amount of calories available, the companies offer a diverse calorie daily meal prepared, which is a great convenience for customers.

**Relationship between physical activity and dietary catering**

Physical activity is an important factor in the prevention and treatment of diseases. Its low level is given as the biggest reason for increasing mortality through cardiovascular disease and cancer. A few years ago, it was believed that the quality and quantity of meals consumed were the main reasons for these diseases. Very little attention was attached to physical activity. Over the years it has become a very "fashionable" element of a healthy lifestyle. It is considered to be the most important element that connects to the normal diet.

Physical activity is defined as "any form of body movement caused by muscle contractions where the energy expenditure exceeds the resting energy levels". The definition covers all forms of activity, i.e. Recreational activities (sports, dancing), professional sports, home activity and activity linked to transport. The body was created for movement, so it requires

constant physical activity for optimum functioning once the avoidance of diseases. A sedentary lifestyle is a developmental factor for chronic medical conditions (cardiovascular diseases), which represent the highest number of deaths. As a result of physical activity, the body is undergoing morphological and functional changes. They prevent or delay the occurrence of medical conditions and significantly improve the ability to take effort. A range of positive aspects can be exchanged, which indicate that individuals who exercise physical activity achieve health benefits, including:

- delayed development of hypertension, better control of blood pressure,
- a lower incidence rate of type II diabetes,
- reducing the risk of obesity through increased fat consumption. It helps to control body weight,
- improved bone mineralization at a young age, which affects the risk of bone fractures in later years,
- improved digestive functions and regulation of the intestinal rhythm,
- increased self-esteem,
- reduced risk of depression and dementia,
- better sleep quality and low stress levels [6].

Properly selected physical activity promotes the development of the body and maintaining health. Muscles develop, bones form properly, physical fitness increases, and the circulatory and respiratory system develops. However, each type of activity should be adapted to the age, physical structure and current state of health [7].

Currently, more and more often one can observe an active approach to spending free time. In particular, it includes young people and people from the cultural, business and media communities. Aerobics, tennis, gym exercises are currently the most popular sports. They are attracted by their care for appearance and physical beauty, a club way of spending their free time, where social contacts as well as group recreational and sports activities play the main role. Attention and care for health are important. It is a social duty to regenerate the body, rest and biological regeneration. Playing sports prevents hypokinesia and obesity, combating passive lifestyle and poor eating habits [8].

## **Subject of study**

The study was carried out among 100 people using the "perfect lady of the house" Di-  
etetic Catering service, located in Ostrów Wielkopolski. Among the subjects were 56.0% of  
women and 44.0% of men. The most subjects were aged between 20 and 29 years (32.0% of  
subjects), 30-39 years (33.0% of subjects) and 40-49 years (29.0% of people).

The survey was used as a research method in the work. This method allows to carry out  
studies on the phenomenon of the use of dietetic catering and its effectiveness in conjunction  
with physical exertion. The tool used to perform the following tests is the original survey  
questionnaire. The socio-demographic data in the survey consists of questions about basic  
data about respondents, such as gender, age, education, residence and income per person.

The purpose of the presented work was to assess the impact of the use of dietary cater-  
ing in conjunction with physical exertion, by dietary catering customers. The dependence of  
the catering diet has been investigated depending on the sport, sex, place of residence and  
possession of food intolerance.

## **Results**

The results of the catering diet differed significantly among people practicing and not  
practicing sports. A statistically significant difference was observed in the acquisition by the  
subjects of two groups of healthy dietary habits ( $P = 0,036$ ). For this effect the catering diet  
was statistically more likely to indicate to people practicing sports compared to those who do  
not play sports. However, the relationship was weak ( $\Phi = -0.21$ ). The descriptive statistics of  
the observed results of dietary use and sport are presented in table 4.

**Table 4. Observed results of using a diet and playing sports**

The observed results of dietary use	Cultivates sports		Does not cultivate sports		Total		Significance (p)
	n	%	n	%	n	%	
Weight reduction	32	50,8	18	48,7	50	50,0	$\chi^2(1)=0,04$ p=0,835
Improved wellbeing	30	47,6	18	48,7	48	48,0	$\chi^2(1)=0,00$ p=0,920
Improving research results	16	25,4	11	29,7	27	27,0	$\chi^2(1)=0,22$ p=0,637
Healthy eating habits	34	54,0	12	32,4	46	46,0	$\chi^2(1)=4,35$ p=0,036 Phi=-0,21

n-number of observations; %-percent  
 $\chi^2$ -Pearson's CHI-square test result; P-Probability level

There was a lack of statistically significant differences between the use of the catering diet by people attending the gym regularly and those using it intermit, or at all. Descriptive statistics of the observed results of dietary use and regular attendance at the gym are presented in table 5.

**Table 5. Observed dietary results and regular attendance at the gym**

The observed results of dietary use	Regular gym attendance		Not attending or irregular attending the gym		Total		Significance (p)
	n	%	n	%	n	%	
Weight reduction	21	44,7	29	54,7	50	50,0	$\chi^2(1)=1,00$ p=0,316
Improved wellbeing	23	48,9	25	47,2	48	48,0	$\chi^2(1)=0,03$ p=0,859
Improving research results	11	23,4	16	30,2	27	27,0	$\chi^2(1)=0,58$ p=0,445
Healthy eating habits	25	53,2	21	39,6	46	46,0	$\chi^2(1)=1,84$ p=0,174

n-number of observations; %-percent  
 $\chi^2$ -Pearson's CHI-square test result; P-Probability level

Table 6 shows the descriptive statistics of the results of the catering diet among male and female subjects. A statistically significant difference was observed in the frequency of their feeling of improvement (P = 0.005). For this effect, the catering diet was statistically more frequently pointed out by men than women. This relationship was poor (Phi = 0.27).



**Table 6. Observed results from diet and gender**

The observed results of dietary use	Women		Men		Total		Significance (p)
	n	%	n	%	n	%	
Weight reduction	31	55,4	19	43,2	50	50,0	$\chi^2(1)=1,46$ $p=0,226$
Improved wellbeing	20	35,7	28	63,6	48	48,0	$\chi^2(1)=7,69$ $p=0,005$ Phi=0,27
Improving research results	13	23,2	14	31,8	27	27,0	$\chi^2(1)0,92$ $p=0,336$
Healthy eating habits	27	48,2	19	43,2	46	46,0	$\chi^2(1)=0,25$ $p=0,61$

n-number of observations; %-percent

$\chi^2$ -Pearson's CHI-square test result; P-Probability level

The results of the catering diet differed significantly among the surveyed living in cities of different sizes. A statistically significant difference was observed in the frequency of their perception of improvement in test results ( $P = 0,019$ ). For this effect the catering diet most often pointed to people living in the city from 20 to 100 thousand inhabitants. However, the relationship was weak ( $V$  Cramera = 0.27). Table 7 shows the descriptive statistics of the results of the catering diet depending on where you live.

**Table 7. The observed results of the use of the diet and the place of residence**

The observed results of dietary use	City to 20 thousand inhabitants		City from 20 to 100 thousand inhabitants		The city from 100 to 500 thousand inhabitants		Significance (p)
	n	%	n	%	n	%	
Weight reduction	14	51,9	25	45,5%	11	61,1	$\chi^2(2)=1,38$ p=0,501
Improved wellbeing	10	37,0	28	50,9%	10	55,6	$\chi^2(2)=1,89$ p=0,387
Improving research results	4	14,8	21	38,2%	2	11,1	$\chi^2(2)=7,82$ p=0,019 V Cramer=0,27
Healthy eating habits	17	63,0	22	40,0%	7	38,9	$\chi^2(2)=4,29$ p=0,117

n-number of observations; %-percent  
 $\chi^2$ -Pearson's CHI-square test result; P-Probability level

Food intolerance among the subjects was also analysed. There was a lack of statistically significant differences between the use of the catering diet by people with or without food intolerance. Descriptive statistics of the observed results of dietary use and the possession of food intolerance is put in table 8.

**Table 8. Observed results from dietary use and intolerability**

The observed results of dietary use	Does not have food intolerance		Has food intolerance		Total		Significance (p)
	n	%	n	%	n	%	
Weight reduction	37	52,1	13	44,8	50	50,0	$\chi^2(1)=0,43$ p=0,508
Improved wellbeing	35	49,3	13	44,8	48	48,0	$\chi^2(1)=0,16$ p=0,684
Improving research results	19	26,8	8	27,6	27	27,0	$\chi^2(1)=0,00$ p=0,932
Healthy eating habits	35	49,3	1	37,9	46	46,0	$\chi^2(1)=1,07$ p=0,300

n-number of observations; %-percent  
 $\chi^2$ -Pearson's CHI-square test result; P-Probability level

The results of the catering diet differed significantly among those performing different types of work. A statistically significant difference was observed in the acquisition by the sub-

jects of three groups of healthy dietary habits ( $P = 0,003$ ). On this effect, the catering diet most often pointed to people working physically or working in the field. The relationship was moderate ( $\Phi = 0,35$ ). Descriptive statistics of the observed results of the use of the diet and the type of work performed table 9.

**Table 9. The observed results of the use of the diet and the type of work performed**

The observed results of dietary use	Office work		Physical work / field work		Own business		Significance (p)
	n	%	n	%	n	%	
Weight reduction	26	45,6	13	61,9	7	53,9	$\chi^2(2)=1,69$ $p=0,428$
Improved wellbeing	29	50,9	8	38,1	7	53,9	$\chi^2(2)=1,18$ $p=0,552$
Improving research results	15	26,3	6	28,6	3	23,1	$\chi^2(2)=0,12$ $p=0,939$
Healthy eating habits	23	40,4	16	76,2	3	23,1	$\chi^2(2)=11,18$ $p=0,003$ $V$ Cramera=0,35

n-number of observations; %-percent

$\chi^2$ -Pearson's CHI-square test result; P-Probability level

## Discussion

The issue of healthy eating has now become a very popular topic for reflection. An example would be a recent public debate on the prohibition of the sale of unhealthy snacks in school establishments. It also shows the growing popularity of culinary programs in mass media, or the multiplicity of products and services associated with healthy nutrition (for example, healthy food or dietary services), available on the market. It seems that the emergence of this topic in the public discourse involves noting by physicians and demographers the effects of diet and dietary habits of poles on the state of Health of society [9]. Mennel et al. [10] pointed to the existence of a relationship between unhealthy nutrition and the increase in the incidence of many civilizational diseases, such as obesity, diabetes, heart disease, especially in industrialised countries. One way to prevent inappropriate dietary habits is to raise public awareness of healthy lifestyles, which are understood as frequent physical activity, regular eating, a sufficient number of hours Daily sleep, non-smoking and moderate alcohol drinking [10]. The increase in the feeling that the implementation of preventive health care is necessary can also be seen in Poland. According to Tobiasz-Adamczyk [11] "in the last two decades, the society has recognised the importance of a healthy lifestyle, which is intended to include a proper diet,

regular exercise, cessation of smoking and alcohol reduction" the author also noted that " Today's awareness of many consumers is geared towards adapting nutrition patterns to health requirements".

An intense lifestyle is common nowadays, and often reveals a lack of time for home-cooked meals. In addition, the low availability of dietetic services funded by the NFZ, and mostly complicated food-and-food-diet menus, make many people decide to eat dietetic catering. Chase and Al Research showed that the implementation of diet in the form of an individual selection of dietary catering can be an effective tool in combating obesity and abnormal glycemia.

Respondents in studies used dietary catering mainly to reduce excess body weight. Other commonly mentioned reasons for using dietary catering were awareness of healthy eating, but simple convenience.

Similar results were obtained in the study of Żyngiel [12], which included 100 women living in the tri-city area, which benefited from this form of nutritional services. The author stated that the main reasons why dietary catering was explored were the willingness to normalize excess weight and improve well-being. On the other hand, the results of study A. May [13] show that the service of Dietetic Catering is particularly popular in the offices. Professional responsibilities force many people to spend most of their days at work and therefore they can not always afford to go out for lunch, or prepare at home meals that they could take to work. It can therefore be assumed that the convenience of such persons is the main reason for the use of dietary catering. May [13] also acknowledged that a significant motivation to use this service for some subjects was the willingness to reduce body weight.

Respondents in studies have pointed to the many advantages of catering diets. These include the variety of meals and their taste. The positive effects of the catering diet most often reported by the subjects are weight reduction, improved well-being and the acquisition of healthy eating habits. In the latter case, the subjects who practising the sport experienced an improvement significantly more frequently than those not practicing sport. The results of the study of Żyngiel also indicate the result of the improvement in the wellbeing and weight reduction resulting from the use of dietary caterer [14]. The women surveyed also claimed that the companies providing dietary catering services presented a professional approach to the principles of rational nutrition, offering meals that were adequately balanced in terms of energy and Nutrient content. The possibility of choosing the right diet and the quality of food of-

ferred by catering companies was also highly assessed. In general, dietetic catering has been rated as a convenient, albeit costly, form of providing nutritional services. In turn, the May [13] study showed weight reduction, time savings and convenience as the most commonly exchanged effects of the catering diet. Moreover, although catering has been a significant expense for many surveyed, some of them stressed that it allows for a rational planning of monthly nutritional expenditure. Reduction of weight as a result of the use of Dietetic catering took place mainly in the initial stage of the catering diet. As in our own surveys, respondents in the study may [13] rarely have regular physical activity. Also, as in own studies, the positive effects of the catering diet were somewhat more common with respondents who regularly practising physical activity.

However, slightly different results were presented in the studies Pogoń and WSP. [7]. The authors found that Dietetic catering seems ideal for people whose knowledge of dietetics is insufficient to independently arrange a balanced diet and for those who do not have the opportunity to acquire healthy habits Due to lack of time. However, the inability to obtain information on safe methods of weight reduction and lack of knowledge about reduced calorie diets may result in inappropriate therapy. There is no research into the available literature on the dependency of the catering diet effects on sex. May [13], while examining both women and men in terms of the effects of dietary catering, however, the number of respondents in the author's studies (8 Women and 2 men) is too small to observe significant differences in Effects depending on the gender.

All respondents in their own studies lived in towns and cities. In most of the categories of results of the catering diet, no differences were observed between the inhabitants of towns of different population sizes in this area. However, there was a statistically significant difference in the improvement of research results between urban residents from 20 to 100 thousand. (both larger and smaller) cities. These were the first to improve research results as a result of the catering diet. It is worth noting, however, that this dependence was relatively weak.

In the literature, there is also a lack of studies on the effect of the residence of the respondents on the effects of dietary catering. However, many research authors emphasise the fact that this nutritional service has recently been available only in major cities. It therefore appears that the need for greater availability of dietary catering in Poland and for further research into the widest possible number of persons using this service to provide reliable results of the effect of residence on the benefits of The use of a "boxed diet".

In its own studies, no differences were observed between the effects of dietary catering depending on the possession or non-existence of food intolerance. There are no reports in the literature. However, it is worth mentioning the words of Pogoń and [7] who argue that in the case of people with dietetic problems, the support of dietetic catering companies was negligible and, for reasons of the safety of therapy, it is essential to consult a nutritionist.

## **Conclusions**

1. People practicing sport are more likely to notice the positive effects of the catering diet in the form of acquiring healthy eating habits.
2. Men more often than women have pointed to improved wellbeing as a result of the use of dietetic catering.
3. The occurrence of food intolerance does not affect the effects of the catering diet.
4. Keeping a catering diet allows you to reduce weight, improve your well-being and acquire healthy eating habits.
5. The dietary catering service provides an alternative, convenient way to eat healthy diets for people who live in an intense lifestyle.

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