

Counteraction against obesity – is it possible?

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Abstract

The obesity epidemic is one of the most serious public health problems across many countries. In Poland more than half of the adult population has excessive body weight, while approx. 20% are obese. 15-20% of children and adolescents suffer from excessive body weight, while 4% of them are obese. Moreover, the number of overweight or obese children is growing alarmingly.

Obesity can lead to many serious health consequences. Though the most serious disorders are cardiovascular diseases, diabetes type 2 and some cancers. In the nearest future diseases related to obesity will probably become the main cause of death in many countries. This may lead to shorter average life expectancy. The treatment costs of obesity and related diseases are constantly increasing.

The most important preventive measure aiming at curbing the effects of obesity involves lifestyle change, including a change in diet and physical activity. The best results should be obtained by multifaceted programmes, which cover activities aiming at the improvement of both diet and physical activity.

Due to the spread of the obesity epidemic, the countries of WHO European Region signed the European Charter on Counteracting Obesity, in which they declared their commitment to combat obesity.

Activities aiming at combating obesity in Poland should be closely connected with the implementation of the National Programme for the Prevention of Overweight, Obesity and Non-Communicable Diseases through Diet and Improved Physical Activity, which will be implemented in 2007-2016.

Key words: obesity, occurrence, consequences, counteracting.

Introduction

Obesity is a worldwide large epidemiological problem. In many countries the growing obesity epidemic can be observed for many years. This epidemic causes health deterioration and hence, increases health care costs.

At the same time in many countries overweight and obesity prevention programmes are being implemented. Most of these programmes did not bring the desired results, especially on the scale of the whole population. However, there are also examples of prophylactic programmes implemented for a given population, which resulted in a lower overweight and obesity incidence due to the improvement in diet and increased physical activity.

The effectiveness of obesity prevention methods depends on many factors. Education directed toward whole population, especially to families, children and adolescents at schools, is an important element of these methods. Research institutions and local governments with the help of national authorities should develop their implementation.

The alarming situation as far as obesity and its consequences are concerned, resulted in great commitment of the WHO and the European Commission to counteract obesity. One of the more important initiatives was the one developed by WHO, expressed in the Global Strategy on Diet, Physical Activity and Health, adopted on the 57th World Health Assembly in Geneva on May 2004 [1]. The WHO European Region Ministers of Health signed the European Charter on Counteracting Obesity in November 2006 [2]. The signatory states declared full commitment to counteracting obesity, at the same time calling to enhance the measures in this field, adjust them to local conditions and to search for innovations and initiate new research, which could improve the effectiveness of the policy.

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Overweight and obesity prevalence in Poland and other countries

The results from research conducted in the last few years indicate a high prevalence of overweight and obesity in Poland. According to the data based on a country-wide representative research, conducted under the following programmes: “Household Food Consumption and Anthropometric Survey” [3], NATPOL PLUS [4] and WOBASZ [5], excessive body weight concerns approx. 60% of adult men and approx. 50% of women. The incidence of overweight among men is estimated to be 39-40% and 28-29% among women, while the percentage of obese men and women is 16-21% and 19-22% respectively.

There are less overweight and obese children and adolescents than adults. According to the data of the “Household Food Consumption and Anthropometric Survey” [6] programme, 16% of boys and 11% of girls are overweight – overweight evaluated on the basis of international cut off points proposed by Cole et al. [7] – and 4% of boys and almost 3.5% of girls are obese.

The prevalence of overweight and obesity changes with age. The youngest age groups of children most often have excessive body weight. As children get older, the incidence of excessive body weight falls, especially as far as obesity incidence is concerned [3,6]. Also among young adults the prevalence of obesity is not high. Overweight is far more common, especially among men. The percentage of persons being overweight or obese rises clearly with age [3,4]. In advanced age, excessive body weight, including obesity, is far more common in women than in men. Moreover, some women, mainly after 40, suffer giant obesity, while men rarely do [3-5].

Abdominal obesity concerns to a larger degree women than men [4-6]. According to the ATP III guidelines [8] from 2001, abdominal obesity prevalence among men is estimated to be 16-28% and among women – 35-40%. The estimation basing on the IDF criteria [9] for the European population from 2005 indicated that the risk of complications related to fat tissue accumulation close to the stomach is more frequent and concerns approx. 39% and 56% women. The incidence of abdominal obesity increases to a large extent with age [6].

In the 1990's, the percentage of overweight or obese persons increased, both as far as children and adolescents and adults are concerned [3,10,11]. However, in the last few years, a turn in this unfavorable tendency is observed among women. Among men the prevalence of excessive body weight is still going up to a lower degree [3-5,12].

Similarly as in Poland, overweight and obesity has become a serious problem in many other countries. The countries with the greatest overweight and obesity prevalence in Europe are: Malta, Greece, UK and Belarus, where the percentage of people above the age of 15 with excessive body weight is 60-70%. In USA overweight and obese persons amount to 73-76% of the population above the age of 15 [13].

Health and economic consequences of overweight and obesity

Predictions concerning health consequences of obesity are very worrying. Obesity will probably become the main cause of death. Moreover, obesity may even outstrip smoking. In 2000 in USA 16.6% of deaths was the result of diseases related to overweight or obesity [14]. It should be mentioned that this number increased by 2% in comparison to 1990.

Persons with BMI>30 have between 50% to 100% higher risk of premature death than persons with BMI=20-25. It is estimated that obesity is the cause of 300,000 premature deaths each year [15-17].

A very worrying phenomenon of falling life expectancy may be observed in many countries. This is the result of the growing prevalence of obesity. It is assumed that in the following two decades in many countries (USA, UK) the average life expectancy will fall [18], if the epidemiological situation does not change.

The main causes of premature deaths among obese persons are cardiovascular diseases (CVD): ischaemic heart disease, hypertension, congestive cardiac failure. The risk of cardiac infarction among women with BMI>29 is three times higher than among women with the normal BMI [19,20].

Obesity is connected with disorders which raise the atherosclerotic disease incidence risk, and therefore also CVD incidence. First of all, lipid disorders, i.e. hyperlipidemia, should be mentioned here. In the state of obesity, hyperlipidemia is characterised by an increased level of triglycerides (hypertriglyceridemia) and a lower level of HDL (High Density Lipoproteins) [21].

An obese person, especially a person with hypertension and/or hypertriglyceridemia, is more prone to have greater blood coagulability, and thus more prone to have blood clots. Such an inclination is very unfavorable as it increases the cardiac infarction risk and the cerebral stroke risk [22].

The results of the epidemiological investigations indicate that obese persons suffer hypertension more often than persons with the normal body weight [23]. Women are especially vulnerable – they have a four times higher risk of developing diastolic hypertension than women with normal body weight [24]. It has been observed that young and obese people are more prone to develop hypertension and suffer cerebral stroke than their slim peers [25].

It happens often that persons with stomach obesity suffer the so-called metabolic syndrome X. The crucial phenomenon within the metabolic syndrome X is the so-called insulin resistance [26]. This expression means that tissues, to which insulin travels, are resistant to insulin in order to help utilize glucose by their cells – these tissues recognize weakly or not at all the signal connected with the presence of insulin. At first, our body breaks this resistance by increasingly secreting insulin. As a result, hyperinsulinemia takes places. Hyperinsulinemia is in itself unfavorable, as it creates favorable conditions for the development of hypertension and fat management disorders. With time the increased level of insulin is not able to break insulin resistance and the level of sugar in blood increases. In the end, the pancreas cells are exhausted, insulin is no longer secreted

and diabetes develops. It should be stressed that the reduction in body weight makes the tissues sensitive to the insulin activity and may turn the above-described course of events [27].

Obesity increases the risk of diabetes type 2 by 3-7 times. A person with BMI>35 has a 20 times higher risk of developing diabetes, than a person with the normal BMI [28]. Obesity followed by diabetes considerably increases the risk of cardiovascular complications and death caused by them [29]. It should be stressed that the main element of treating diabetes type 2 is the reduction in body weight [30]. In persons with no tolerance to glucose, which is a pre-diabetes state, the reduction in body weight by 5 kg and keeping that weight, decreases the risk of developing diabetes considerably (by 74%) [31].

Obesity is also linked to risk of cancer incidence. Forward-looking investigations of Cancer Prevention Study I, conducted in USA, covering 750 thousand men and women, indicated that death rate of obese persons caused by some type of cancers is higher than in case of persons with the normal body weight [32].

The mechanism of relation between overweight and higher cancer risk remains vague [33]. One of the available hypotheses explains that obesity is connected with a bigger number of cells and with more frequent division of them. This in turn increases the risk of the creation of abnormal cells. According to this theory, the excess of calories consumed in childhood favors the developed of big organs with a big number of cells. However, excessive consumption during adulthood causes intensified division of cell mucous membrane. In the case of the so-called hormone dependent cancer (cervical cancer), the impact of the excess of oestrogens and the extended exposure to them, due to the release of them from fat tissue, is taken into consideration.

Among other health disorders related to obesity, osteoarthritis, gallstones, obstructive sleep apnea syndrome, reproductive system diseases and psychosociological diseases should be mentioned.

An increasing incidence of overweight and obesity is also unfavorable from the economic point of view. It is estimated that health care costs for an overweight or obese person are 44% higher than those for a person with normal weight [34].

Overweight and obesity are a great burden to the health care budget of each country. In USA the costs connected with the treatment of overweight or obese persons make for almost \$ 100 billion annually [15,35]. In UK the total costs incurred by overweight and obese persons are estimated to be 6 billion pounds [36]. On the basis of data gathered in different countries the direct costs related to obesity are estimated to amount from 1 to 10% of the expenditures spent on health care, depending on country [37].

Therefore, expenditure spent on programmes combating obesity is justified economically. Berkson et al. [38] compared the costs incurred by treating two groups of obese patients in his investigations. In the first group, a programme treating obesity was implemented, while the second one was a control group. After two years the costs of treating the persons in the group in which intervention was made began to fall. After 7 years these costs were lower by 33.8% than in the control group.

To date, the costs of preventing and combating obesity and chronic non-communicable diseases related to obesity in Poland

were not estimated in detail. Krzyzanowska-Świniarska [39] estimates that treating obesity and its complications amounts to 21% of the health care budget. This is more than PLN 11 billion.

On the basis of investigation conducted in the Lublin region, it was estimated that the direct costs of treating a million patients amount to PLN 250 million. According to these estimates, the general direct costs incurred by obesity in Poland would amount to cir PLN 3 billion [37].

Methods of obesity prevention and prophylactic programmes

The most important measure aimed at curbing health and economic effects of obesity is the prevention of excessive body weight and reduction in weight of obese people. Of crucial importance is a change in lifestyle, including a change in diet and physical activity.

In order to keep normal body weight, it is necessary to maintain the optimal energy balance – i.e. to maintain a state, in which the energy intake equals the energy expenditure. On the one hand, excessive energy intake should be avoided, while on the other hand it is very important to ensure the energy expenditure at an appropriate level by increasing physical activity.

As far as obesity prevention is concerned, balancing calories intake with the energy expenditure is of crucial importance. However, in treating obesity negative energy balance is vital. This balance is obtained by limiting the energy intake and increasing physical activity. A number of different diets have been developed in order to reduce body weight. They differ in energy value, content of fat, carbohydrate and protein, energy density, the glycemic index and the number and size of food portions [40].

The main determinant of the decrease in body weight is the energy value. There are very low caloric diets (VLCD), which provide <800 kcal/day and low caloric diets (LCD), which contain 800-1500 kcal. The most often used diet is the diet providing 1000-1200 kcal. These diets are comprised of natural food products and are not balanced, i.e. they do not fully cover the need for vitamins and minerals. However, some prepared industrially diets providing less than 800 kcal cover the need for all necessary nutrients. A balanced diet based on natural food products usually provides >1500 kcal/day.

The energy deficit amounting to 500-1000 kcal a day results in a reduction in body weight by 0.5 to 1 kg a week. It should be stressed that American experts recommend to fat intake amounting to 25-35% of the total energy or less, SAFA<7% of the total energy, and carbohydrates in the amount of 50-60% of the total energy [41]. They recommend complex carbohydrates coming from different vegetables, fruit and cereal grains. The proposed amount of fibre is 20-30 g/day. Cholesterol should be consumed in smaller amounts than 200 mg/day.

Apart from bad diets, the most important reason for the growing overweight and obesity is low physical activity. Sedentary lifestyle is viewed as the factor that doubles the risk of the development of non-communicable diseases. On the other hand, increased physical activity has a good effect on

both physical and psychological health and lowers the death rate [42].

Low physical activity among children is caused by watching TV by them. In USA a child in the age group between 2-11 years watches TV 23 hours a week on average [43]. Issuing recommendations to limit TV watching is a key element of obesity prevention – American Academy of Pediatrics Committee on Communication proposes to reduce TV watching to 1-2 hours a day [44].

In order for physical activity to be effective, it must be performed on a regular basis, almost every day and 30 minutes a day at a minimum, though it strongly recommended to exercise even 60 minutes a day [45].

The best place to learn how to lead a healthy lifestyle is the family and the best example for children is that of their parents. As far as children that are not supported by their parents are concerned, the risk of obesity incidence is higher. The research results presented by Lissau et al. [46] indicate that the support of parents is of great importance for childhood obesity prevention. Moreover, these results indicated that children whose parents are not aware of how much sweets their children are consuming, whose parents accept the consumption of great quantities of sweets and who spend much money on such products have a considerable risk of developing obesity during childhood. Parents should remind their children not to eat too many sweets. They should, moreover, develop healthy eating habits of their children and encourage them to perform physical activity.

A very important place in which eating habits are to be developed and physical activity encouraged is the school. European and American pediatric associations put a lot of emphasis on the kind of products, especially beverages, offered at school kiosks. Sweet beverages are the main source of sugar and unnecessary calories in diets for school children. According to American studies, 56 to 85% of children consume one sweet beverage per day at school. The greatest quantities of such beverages are consumed by teenage boys [47]. This habit increases the risk of obesity by 60% [48]. Drinking of sweetened beverages is linked to the development of obesity most probably due to the fact that these are calories consumed in a liquid form, i.e. easily available, but also because these calories are a source of additional energy [49].

National Board of Health in the Netherlands recommends to not place vending machines, through which sweets and sweet beverages are sold at schools and educational facilities for children and adolescents [50]. American Academy of Pediatrics recommends to implement a policy limiting the sale of sweet beverages in school kiosks not only due to the risk of overweight and obesity posed by them, but also due to the fact that they replace milk beverages and this may lead to calcium deficiency and dental caries [51,52].

Of special importance is also the necessity to limit the consumption of fast food, which is a source of additional energy. In the study conducted by Bowman et al. [53], fast food provided additional 187 kcal a day. It should be stressed that additional 100 kcal a day above the level of energy that can be used up, can cause an increase in body weight by 5 kg during one year.

In different countries attempts are made to promote activities preventing overweight and obesity. These activities put an

emphasis on a change of environmental conditions [54,55]. They cover measures aimed at increasing physical activity, such as, for example – modifications in buildings to encourage the use of stairs, planning the surrounding area of people's homes in such a way as to encourage walking and jogging, and promoting active means of transportation by constructing safe bicycle lanes. In order to change eating habits, emphasis is placed on appropriate labeling of food products. This in turn will facilitate a good choice of food products and extend the offer of healthy food products in stores, schools and workplace canteens.

Prevention of obesity and overweight conducted among adults proves to be particularly difficult. Measures implemented during researches [56,57] aimed at preventing body weight increase, concentrated mainly on education encouraging adults to change their nutritional habits. However, a long-lasting effect was not obtained in the course of those researches.

As mentioned before the majority of countries including Poland show an alarming tendency to a substantial increase of body weight among children and adolescents. According to the National Association of Pediatric Nurse Practitioners [58] prevention of obesity among children and adolescents is a particularly important issue – without it the present generation of children is facing a shorter life expectancy than their parents.

The best results should be obtained by multifaceted programmes, which cover activities aiming at the improvement of both diet and physical activity. Examples of such programmes conducted in some countries are listed below.

In the state of Georgia the Health Kids' Alliance has initiated a programme in 13 junior high schools aimed at improving fitness and physical activity of students as well as changing their diet [59]. This programme was based on 10 key recommendations of the Centres for Disease Control and Prevention (CDC) designed to help children develop and maintain healthy nutritional habits and increased physical activity. Provisional evaluation shows positive results, however, a longer perspective is necessary to provide an opinion on programme effectiveness.

"Girls on the Run" [60], conducted in all US states, is a programme for improving physical activity through running, walking and dancing. The programme offers preteen girls (8-12 years) two hours of activities per week for 12 weeks. Activities are run in different time periods (before, during and after school) and in different seasons. In the state of Virginia provisional evaluation including the self-evaluation of participants, satisfaction with their figure and healthy nutritional habits has been conducted. It has been stated through the participation in the programme all those parameters improved.

Under Kiel Obesity Prevention Study (KOPS) in Germany, which began in 1996, preventive measures have been introduced at home and at school [61]. The most important prediction factors of the prevalence of excessive body weight in the prepuberty period have been: overweight parents, low economic status and high birth weight. Health promotion aimed at students and teachers comprised nutritional education and introducing active breaks between classes. Education on healthy habits was also conducted among families with overweight or obese children or children with the risk of being overweight. One year after implementing intervention measures in schools and at home, impact on their lifestyles and nutritional habits of

Table 1. Examples of preventive programmes focusing on overweight and obesity, implemented in different countries among children and evaluation of their effectiveness

Country and type of intervention	Effects
Austria: PRESTO – nutrition education under school programmes for children aged 10-12 years (pilot research) [64]	Improvement of nutritional awareness, particularly among youth. BMI has not changed.
Crete, Greece: School programme for health education covering children aged 6-12 years [65,66]	Decrease in BMI in the examined group as compared with the reference group, but in both groups the increased percentage of overweight children was observed.
Denmark: Training of families regarding shopping and meal planning [67]	Reduction of body weight in children (2 years of intervention).
Germany: KOPS – eight-year-long intervention in schools, covering children aged 5-7 years at the initial stage [68]	Improvement of nutritional awareness, increase in physical activity, reduced TV watching, reduction in body fat index (skin and fat fold, % of adipose tissue).
Germany: StEP TWO – School programme among children aged 7-9 years [68]	Reduction of BMI growth rate, decrease in the systolic blood pressure.
Israel: Programme covering diet consulting, exercise and learning to change nutritional behaviour [69]	Multi-factor intervention among obese children brought effects in the form of the reduction of body weight, BMI, improvement of fitness, in particular among children, whose parents are not obese.
Great Britain: „Be Smart” – intervention at school and at home covering children aged 5-7 years [70]	Improvement of nutritional awareness, increased fruit and vegetable consumption. No significant changes in the occurrence of overweight.
Great Britain: „MAGIC” – twelve-week programme of increasing physical activity in kindergartens (children aged 3-4-years). Pilot research [71]	Improvement of physical activeness – by 40%. Results referring to changes in body fat – unknown.
Great Britain: „APPLES” – intervention programme among children aged 7-11 years [72,73]	Improvement in nutritional habits in some aspects. No change in physical activity. No change in BMI.

the subjects was observed. An average increase of adipose tissue in one year among overweight children at schools where the studies were conducted was 0.4% as compared to 3.4% among children from control group. The research is still being conducted and the influence of long-term intervention measures is yet to be analysed.

In 1992 the Minister of Health in Singapore initiated a national programme promoting healthy lifestyle, aimed at combating chronic non-communicable diseases like obesity, low physical activity and tobacco smoking [62]. This programme is complementary with the programme of the Minister of Education “Trim and Fit Study” aimed at limiting obesity among children and adolescents and improving their physical fitness. Those activities are intended for various groups – pupils, parents and teachers. Efforts were made to create right conditions in schools to allow and help students to choose healthy habits. Dietary education lies within the limits of formal school programmes. The range of products available in school kiosks is under control. Water dispensers are also installed in schools. Schools with good results receive prizes. Special attention has been paid to overweight and obese students. They take part in special programmes promoting physical exercises, where they are also motivated to choose healthy food products. Obese pupils who require special counseling are referred to a doctor or a dietician. Until 2000 decrease of overweight was observed among children aged 11-12 years from 16% to 14% and among adolescents aged 15-16 years from 15.5% to 13.1%.

The “Copenhagen City Bike Programme” [63] is also noteworthy. Local authorities have created good conditions for using bicycles as the main mean of transport in the entire city. The programme is accompanied by educational activities

encouraging all age and professional groups to use bicycles. Hence a clerk heading to work on a bicycle is not a rare sight.

It is worth stressing that among preventive programmes conducted so far in different countries; nine controlled interventional researches among children, which brought positive effects were rewarded. Part of them managed to improve nutritional awareness, part of them showed decrease in overweight or increase of physical activity. *Tab. 1* presents those programmes.

Full evaluation of such programmes is possible not earlier than after several years of intervention actions, therefore in the overweight and obesity prevention it is necessary to develop long-term multi-sectoral preventive programmes implemented on all above levels: family, school, health care, media, governments and industry.

European Charter on Counteracting Obesity

European Charter on Counteracting Obesity has been developed in order to respond to the threat for health, European economies and civilization development in connection with the growing obesity epidemic.

The Charter was adopted and signed by the ministers and delegates of 48 countries of WHO European Region jointly with the Director of WHO Regional Office for Europe in the presence of the European Commissioner for Health and Consumer Protection at the WHO European Ministerial Conference on Counteracting Obesity (Istanbul, Turkey, 15-17 November 2006) [2].

The Charter stresses that the obesity epidemic remains one of the major challenges for public health in the WHO European Region. The tendency of developing obesity among children and adolescents was considered especially alarming, for it may bring a threat of obesity epidemics in next generation and may have an unfavorable impact on economic and social growth. It has been assumed that the increase in obesity epidemics in recent decades relates to the change in social, economic, cultural and physical environment.

The statement that obesity epidemics may be reversed is a very important message. Reduction of epidemic and reversal of trends is the main goal of actions taken in the European Region. All relevant sectors and authorities at different levels should share these actions. Support from the private sector and the media will be of great importance, along with the active participation of the society.

The Charter aims at strengthening works aiming at combating obesity in the whole European Region. It will stimulate and influence policies of respective countries, regulatory work, including legislation and action plans.

Long-term progress monitoring process is needed, since the results in the form of reducing obesity and related diseases will become visible after quite some time. At the WHO European level three-year reports on progress in that respect should be drawn up. First such report should be drawn up in 2010.

Directions for further actions

The Polish response to the WHO initiative expressed in the Global Strategy on Diet, Physical Activity and Health consists in the National Programme for the Prevention of Overweight, Obesity and Non-Communicable Diseases through Diet and Improved Physical Activity, approved by the Minister of Health for implementation in the 2007-2016 period [74]. The Programme implementation is compliant with the European Charter on Counteracting Obesity.

Programme objectives include:

- reducing the prevalence of overweight and obesity in Poland, mainly by improving nutrition and increasing physical activity;
- reduction of disease incidence and mortality caused by chronic non-communicable diseases;
- reduction of expenditure for health protection relating to the treatment of chronic non-communicable diseases, especially obesity and related complications, as well as reducing the economic effects of disability and premature mortality.

Directions of further actions aimed at preventing obesity in Poland should be closely linked with the implementation of the abovementioned Programme. Major tasks of the Programme include:

- implementation of representative, repeated every 5 years, research on the nutritional status, dietary habits, physical activity and general health state among the Polish population;
- continuous education and skill improvement of the professional groups dealing with overweight and obesity prevention in the society (physicians, nurses, dietitians, employees of the public food control bodies);

- increasing the awareness regarding the importance of proper diet and physical activity in overweight and obesity prevention;
- training of head masters and teachers regarding the importance of proper diet and physical activity in schools;
- activities aiming at increasing physical activity in all age groups;
- cooperation with food industry for the production of food of key importance in overweight and obesity prevention;
- price policy, which will contribute to the choice of food beneficial from the point of view of obesity prevention;
- amendment of legislation referring to food labeling, diet supplements, special-purpose food products;
- support for the development of initiatives, which were already started and verified in local environment and disseminating them to the whole country.

Conclusion

National Programme for the Prevention of Overweight, Obesity and Non-Communicable Diseases through Diet and Improved Physical Activity creates possibilities for reducing obesity epidemic in our country. It seems that only long-term integrated activities in that regard may contribute to the improvement of the unfavorable current situation.

Long perspective of the Programme is of vital importance, for according to estimates, through investing in the improvement of the population's quality of life; even a few percent of persons with incorrect body weight may be influenced each year. World Health Organisation experts believe that the implementation of appropriate prevention programmes will allow for the reduction of obesity epidemics in approx. 10 years [2]. Therefore, the implementation of the Programme is a real chance for counteracting obesity in Poland effectively.

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