

HTA-Report | Summary

Overweight prevention in adolescents and children (behavioural and environmental prevention)

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Health political background

In 2006, the prevalence of overweight among children and adolescents aged three to 17 years is 15 %, 6.3 % (800,000) of these are obese. It is important to note that the prevalence has strongly increased during the past years and is still increasing. In Germany, the direct and indirect costs of adiposity in children and adolescents in 2003 were 44 million Euro. The costs per child between five and 20 years old were 3,484 Euro.

Scientific background

Adiposity is the pathological increase of fatty tissue. Persons concerned show an increased proportion of body fat in their total body mass. According to recommendations of the World Health Organisation (WHO), adiposity in adults is defined using the body-mass-index ($BMI = kg/m^2$). For children and adolescents, the BMI is not ideal, but is often used (also for lack of a better alternative). Individual BMI values can be assessed using population specific reference values in terms of age- and gender-specific percentiles.

The reasons for the development of overweight and adiposity are manifold: among others family history (i. e. obese and overweight parents), low social status – as defined by income and educational level of the parents – and sociocultural factors are relevant. For the development of overweight and adiposity in children and adolescents, physical inactivity as well as a nutrition rich in calories and fat are essential. The consequences of adiposity in childhood are an increased risk for metabolic and cardiovascular diseases and increased mortality in adulthood. Toeholds for primary prevention are kindergarten and schools: here, physical activity and healthier eating habits can be encouraged in children and adolescents. The involvement of parents in the prevention of overweight and adiposity is also of importance. Particularly in children and adolescents, the literature emphasises the relevance of preventive measures geared towards circumstances (changing environmental and living conditions of the concerned persons), as the incidence of overweight and adiposity is strongly influenced by the social and familial environment.

Research questions

What is the effectiveness and efficiency of different measures and programs (geared towards changing behaviour and environmental and living conditions) for primary prevention of adiposity in children and adolescents? How relevant are social aspects (i. e. regarding socioeconomically disadvantaged groups) in this connection?

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Methods

This HTA-report was prepared by applying the methods for a systematic literature review. The systematic literature search (DIMDI-HTA-superbase databases, August 2007) yielded 1,649 abstracts. Following a two-part selection process according to standard, predefined criteria 29 medical and two economic publications were included in the assessment. A total of 18 publications were used to cover social aspects. Assessment of the studies was performed according to predefined criteria. 53 publications were added by hand search.

Results

To assess the effectiveness of measures for prevention of adiposity, only randomized, controlled studies including at least 30 children and specifying anthropometric data are used. To be assessed, the intervention or observation period described in the study has to last at least one year.

A total of ten primary studies with seven interventions and 19 reviews were identified. The primary studies mostly use multi-disciplinary approaches (increased sports programs and nutritional interventions), almost all of them take place in schools.

The Kiel Obesity Prevention Study (KOPS) is a longitudinal study evaluating measures of primary and secondary prevention in children and adolescents. The programs for primary prevention lead to increased knowledge on nutrition, but not to a lower risk of adiposity in all children. Only overweight girls have lower remission rates after the intervention.

In numerous programs, the interventions are supervised by teachers in schools and integrated into regular instruction. One study confines itself to a reduction of sugary drinks and another evaluates an increase in physical activity as the only intervention. Some studies include aspects of interventions geared towards changing conditions, such as improvement of the school cafeteria or cooperation with confectionary retailers. However, behavioural prevention, particularly more sports and less fatty foods, are generally in the foreground.

None of the seven interventions leads to success in all subgroups. Three studies report no changes and four studies report an impact in children (mostly girls) who are already obese. Overall, none of the interventions show an effect in boys of normal weight.

In four cases parents are included in the adiposity prevention programs, usually by making informational material available to them. Taking into account the inclusion of parents, age structure and the type of intervention, no explicit success factors become obvious.

Similarly, no success factors of individual interventions can be extrapolated from the 19 reviews. Again, individual interventions are successful in girls, but not in boys. One study reports on 61 interventions of which only three programs show a lasting effect. The studies included in the reviews are of varying quality, but also studies with shorter observation periods hardly show any effect. It has to be pointed out that in most cases, the interventions are only described briefly. A detailed description of programs is important in order to extrapolate measures that are promising.

Only two economic model calculations on interventions for adiposity prevention in children and adolescents are available. The first one evaluates cost-effectiveness and the net-benefit of the Planet Health Program. The program took place in schools among 14 year olds. Through information during instruction, it was attempted to reduce television consumption and motivate the adolescents to increase their physical activities in order to reduce the prevalence of overweight and adiposity. As these measures showed suc-

cess only in female students, the economic analysis was modelled on them. Using a Markov model, the probability that an overweight child will turn into an overweight adult was modelled and set in contrast to this probability in children of normal weight. As endpoints the prevented obesity in adulthood and the saved (through prevention) quality adjusted life years were used. Including direct and indirect costs, the program results in 4,305 USD per QALY and net savings for society of 7,313 USD. The second economic analysis is an Australian model calculation. On the basis of the best available evidence, 13 interventions for preventing overweight and adiposity in children and adolescents are chosen and their cost effectiveness is modelled. Due to the political relevance of some interventions, the lack of evidence was accepted. The endpoints for health were the reduction of BMI and DALY (disability adjusted life years). For the estimation of DALY, the difference between the estimated future morbidity and mortality with and without the respective intervention was calculated. The intervention with the greatest impact on society is the reduction of TV-ads geared towards children for foods and drinks rich in fat and sugar. This intervention leads to savings of about 400,000 BMI units or 37,000 DALY.

For the assessment of social aspects, three primary studies were used. In order to ensure a comprehensive view, 17 articles were additionally used as background information. The available literature more or less consistently shows a negative correlation between socioeconomic status and overweight or adiposity in children and adolescents. This means that, the lower the socioeconomic status of the family (income, educational level of parents etc.), the higher the prevalence of overweight and adiposity in the children. This correlation is emphasised in almost all the literature, however, it is sometimes stronger in girls. This is also true for Germany. KOPS reports that children of families with low socioeconomic status are overweight more frequently. This relationship already becomes obvious between the age from five to seven years.

In many articles, the financial resources of families and in (socially disadvantaged) living areas are considered crucial. Some publications come to the conclusion that healthy nutrition is expensive – vegetables and fruits cost more than sweets and foods rich in fat – and that financial resources therefore limit the access to nutritious food. Socially disadvantaged living areas often lack parks, bike ways and pedestrian walks and therefore restrict the possibilities for physical activities of children. If these living areas additionally are considered unsafe, children are forced to spend a lot of time indoors.

Furthermore, there are correlations between cultural and/or ethnical origin and (the risk of) overweight or adiposity. However, it is pointed out that the majority of this difference can be explained through socioeconomic factors. Socioeconomic aspects and not ethnical or cultural factors are therefore in the foreground.

Considering the clear correlation between socioeconomic status and overweight or adiposity in children and adolescents, the lack of studies on the effectiveness of interventions in this target audience is surprising. Two studies conducted in the USA on specific programs for groups of socioeconomically disadvantaged children and adolescents are available. In one school intervention on the basis of the adapted CATCH-program (CATCH = Child and Adolescent Trail for Cardiovascular Disease), a deceleration of the increase of overweight is achieved compared to the control group. However, no reduction of overweight compared to the start of the program can be shown. The flexibility of the program design is considered essential for the relative success of this intervention. A second school intervention is based on a combination of the model to promote health and the trans-

theoretical model. Aside from instructional units for all, it offers specific small groups for persons willing to change. Positive effects – such as a lower rise of the proportion of body fat, a longer duration of physical activity – can be shown. A relevant percentage of this effect can be explained by the combination of the two models, which proves that the models are effective.

The German KOPS does not show significant differences between intervention- and control groups in the school intervention among children of low socioeconomic status. The results of the family intervention show that these interventions are even counterproductive for disadvantaged children. In contrast, a disproportionately strong success is reported in children of families with higher socioeconomic status. In addition, the analysis shows that the comparable gain of knowledge develops a lower relevance of actions in socioeconomically disadvantaged groups.

Similar to many other articles, the publications on KOPS therefore emphasise the importance of preventive measures geared towards changing environmental and living conditions, especially regarding socioeconomically disadvantaged children and adolescents. Behavioural prevention alone is not considered target-oriented or sufficient. Apart from an adequate educational-, social- and family policy, preventive measures in schools and at the local level geared towards changing conditions are demanded. Concrete suggestions are made in regard to facilitating healthy nutrition and sufficient physical activity through appropriate design of conditions at schools. In addition, the provision of incentives for physical activity, by establishing bike ways, pedestrian walks and parks, as well as offers of youth organisations and recreational centres in - socially disadvantaged – districts is recommended. Pregnant women and families with low socioeconomic status should receive support so that interventions can already start in early childhood. Concomitantly, the reduction of social inequalities is a central task.

Discussion

There is a lack of high quality primary studies on adiposity prevention in children and adolescents, especially of studies comparing different measures. This holds also true for economic analyses, which seems logical insofar, as the basis for economic analyses are usually primary studies (preferably randomized controlled trials (RCT) due to their evidence level).

There are hardly any programs evaluated in primary studies and HTA showing lasting effects in boys and girls. A few programs report success in girls, some only in girls already overweight. None of the HTA or systematic reviews assessed was able to determine clear criteria of success for lasting effects of adiposity prevention. In general, there are few studies on prevention regarding environmental and living conditions (such as 'active way to school'), and interventions focused on specific target audiences (i. e. for socially disadvantaged) are also strongly underrepresented. Numerous meta-analyses mention that a reduction of sedentary activities, particularly televisionconsumption is promising. However, it needs to be considered that these statements are made on the basis of three primary studies conducted in the US and therefore, the evidence is not necessarily adequate.

A single economic analysis attempting a comparison of different interventions for decision makers in an Australian state is available. However, for some of the measures compared hardly any evidence was available.

Regarding the socially disadvantaged it is noticeable that – despite the fact that some authors emphasise the importance of preventive measures geared towards environmental and living conditions particularly for this group – no studies on such interventions are available. This leads to the conclusion that a vast deficit exists in this area.

Conclusions/recommendations

As the studies assessed showed no or hardly any effect on boys, gender-sensitive interventions would be meaningful. Considering the situation regarding primary studies, the lack of economic evaluations is not surprising. Against the background of an increasing prevalence of adiposity, the necessity of interventions to prevent and contain adiposity and overweight should be undisputed. Therefore, ascertaining which interventions are meaningful from a health policy and economic standpoint should be a priority.

It is recommended to systematically register future programs (preferably online) in order to make it easier to draft criteria of success. It is important to systematically analyse projects even if they are not successful. New interventions should be well prepared and only be implemented after review of the available evidence.

As long as no primary studies of high quality are available, the best-available evidence should be used in order to have a basis for deciding which interventions should be implemented.