Treating obesity in individuals and populations

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Although interest in and funding to treat obesity have increased,¹ its prevalence has not yet decreased. In this review I summarise the evidence behind interventions to treat or prevent obesity in adults, children, and communities; discuss the strengths and weaknesses of current research; and recommend a direction for future treatment and research.

Methods

I systematically searched the literature during January 2004 and synthesised the results of systematic reviews of obesity treatment and prevention. The methods and results are fully described in the monograph "What works for obesity?" (www.unitedhealthfoundation.org/obesity.pdf).

What has been studied?

Studies of lifestyle interventions or a combination of diet and exercise were most common.² A few treatment programmes involved simple interventions (such as giving brief advice to decrease fat intake), but most did not. Most addressed both diet and physical activity and often had an educational component—behavioural therapy, incentives for attendance and weight loss, or help from family members and health professionals.² In general, they were time and labour intensive—and therefore probably expensive, although costs were not reported.

Most of the research focused on adults and on individual treatment in a clinical setting.³ Despite the need to address eating and activity habits in early life, research about prevention and treatment of childhood obesity was meagre.^{4 5}

Few studies evaluated the effectiveness of environmental or policy initiatives. Some referred to changes made in the participants' environment, but these were not described in detail and their impact was not analysed separately from that of the main treatment.² None of the systematic reviews of environmental interventions reported in the literature assessed weight measures as outcome variables.⁶

Do any treatments work?

Even "effective" dietary and exercise treatments for adult obesity produced modest weight loss (about 3–5 kg) compared with no treatment or usual care.^{2 3 7} Weight loss drugs such as sibutramine and orlistat, used in conjunction with diet or exercise programmes, also produced 3–5 kg of weight loss, but the effects often did not last after the drug was stopped.^{3 8–10}

Summary points

A thorough search of the evidence for obesity treatment and prevention reveals that the research to date shows clearly what does not work but fails to establish what does

Research studies have largely concentrated on individually based treatments, which result in small amounts of weight loss and have little impact on the obesity epidemic in the population

Despite most experts agreeing that the obesity epidemic is due to environmental factors, the research has largely ignored this

It is time to be realistic with individuals about the effectiveness of lifestyle interventions and obesity drugs, and to focus on public health interventions rather than individual treatments, to halt the obesity epidemic

Although the weight loss of 3–5 kg was statistically significant and had some health benefits,¹¹ its clinical significance was not shown—that is, it may not have been enough to improve the health or quality of life of patients. In most studies with long term follow-up, the weight lost initially gradually came back.

For patients with severe obesity, surgery was effective. Gastric surgery resulted in 25–44 kg weight loss up to two years after the operation, and 20 kg loss up to eight years later.^{12 13}

For treating children, no interventions were definitively effective, although strategies that reduced sedentary behaviour (particularly television watching) and involved parents showed the most encouraging results.^{4 5 14}

Only a few studies assessed attempts to prevent obesity among adults, children, or communities.² These were mostly educational campaigns to motivate individuals, sometimes including environmental changes such as altering food options in grocery stores or schools. None resulted in weight loss.

How good is the evidence?

I assessed the research against the standards for evidence based medicine for interventional studies.^{15 16} Most studies were randomised controlled trials, system-

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BMJ 2005;331:1387–90

atic reviews of randomised controlled trials, or, when randomisation was not ethical or feasible, well controlled prospective studies. Although these were the best studies available according to the principles of evidence based medicine, many did not fulfil its requirements. For example, randomised trials often lacked details describing the randomisation and were seldom blinded. Participants were usually few in number, not well characterised at baseline, and rarely diverse (most were white, well educated women). Attrition rates were high, and intention-to-treat analysis was seldom conducted. Participants were generally not followed long enough to ensure that weight loss was permanent. These flaws bias the results and can exaggerate the effects. Systematic reviews noted the lack of high quality clinical trials and recommended that future studies should fulfil the requirements of evidence based medicine.^{4 5}

Where do we go from here?

Treating individuals

The available research shows that surgery is an effective treatment for severe obesity. Drug treatments have not made a substantial difference in obesity rates. Lifestyle interventions have been called effective but have resulted in only small amounts of permanent weight loss with marginal clinical relevance, despite participants' gains in knowledge and skills. Future studies should include assessments of patient centred outcomes such as satisfaction with the result or quality of life. Of the successful interventions, it would be worthwhile identifying those that required the least effort. Any programmes that could show that weight loss continued beyond the end of the intervention deserve extra attention.

Advertising and the lay literature abound with dieting "success stories." Although most of these may seem scientifically implausible or exaggerated, consumers flock towards products or strategies that offer even a small hope of success. Meanwhile, the scientific community interested in lessening obesity has been noticeably silent both about discounting the false claims made by advertisers and publishing the data behind real successes. To find non-surgical treatments that result in substantial weight loss, we must fully

characterise true obesity treatment successes. The National Weight Control Registry in the United States has information on individuals who have lost substantial amounts of weight and kept it off¹⁷; qualitative and quantitative research on these and other real success stories could be translated into practical strategies for weight loss and maintenance.

It may also be helpful to pose the question differently. Why are some people not obese despite living in an obesity promoting environment? Lean individuals have probably found ways to moderate eating habits and to exercise regularly, but knowing the details of how they achieve these practices could be revealing. Do they exercise every day, do they ever dine at restaurants? Do they hike in the mountains on weekends or walk to school with their children? How and at what age did they develop their good eating and exercise habits? Detailed qualitative research to investigate the factors that help protect high risk people (such as those with obese parents) in particular from becoming obese may help us to understand the key biological, social, and environmental factors leading to successful weight control.

Evidence based public health interventions

Conducting high quality randomised controlled trials for environmental or policy solutions to the obesity epidemic would be prohibitively expensive and time consuming. The high rates of obesity do not allow us to wait for treatments to be proved effective by the standards of evidence based medicine. In other words, something must be done soon, but we don't know what. I therefore propose a five part strategy for achieving an evidence based public health approach to the obesity epidemic. It is a synthesis of my own ideas and those promoted by various authors, and hopefully will stimulate debate.

Redefine evidence

An important first step is to redefine what is meant by "evidence." The randomised controlled trial, the ideal of evidence based medicine, is designed to best control for confounding variables and thus prove a single cause-and-effect relation. In most cases obesity results from several causes, and solutions are also likely to be multifactorial, with no single intervention providing widespread success. Thus it is less important to isolate why an approach is successful than it is to find interventions that work. As such, the standards of evidence based medicine are neither appropriate nor realistic for environmental or public health interventions. Instead, evidence based public health needs practical goals, not just academic ones.¹⁸ "Good enough" evidence could include, for example, well designed and carefully described comparisons between countries or communities, and interventions based on plausible mechanisms of action with documented historical controls and with objective measurement of outcomes.

The Centers for Disease Control and Prevention, for example, has in its *Guide to Community Preventive Services* developed levels of evidence on which to make recommendations.¹⁹ These standards for evidence include study design as well as quality of a study's execution. Study designs might include prospective or retrospective observation and either concurrent or

Learning how some people avoid getting obese despite living in an obesity promoting environment could yield clues for effective interventions

Summary of obesity treatments

Treating individuals

- Suggest obesity surgery for severely obese patients and coordinate referrals to experienced centres
- Inform obese patients that 3-5 kg is average weight loss from diets, exercise, and drugs
- Focus on outcomes important to patients such as quality of life and ability to function
- Discuss the validity of popular diets, dietary aids, and supplements
- Use real success stories to design effective, individualised treatments

Evidence based public health

- Redefine "evidence" and develop uniform standards to appraise public health interventions (for example, does study describe participants and setting in detail, is it longitudinal design, is the control group concurrent or historical, is follow-up for more than 6 months, are the outcomes measures objective, does it document costs, does it document adherence and obstacles?)
- Borrow models from other disciplines, such as mathematical models to predict outcomes from multifaceted interventions or business strategies to achieve successes
- "Piggy back" obesity treatment and outcomes on other health interventions, such as measuring weight of students before and after implementing a school breakfast programme in a low income area
- Search for evidence broadly; for example, search Google, Excite, books, and non-English language sources
- Gather evidence in one place; for example, set up a central database of obesity initiatives to include both successful and unsuccessful, well executed and poorly executed interventions

historical controls. Studies are then assessed for their generalisability, their harms, their costs, and barriers to implementation. Using these levels of evidence, the guide recommends several interventions to increase physical activity, including "point of decision" prompts to encourage stair use and school based physical education.²⁰ Although increasing physical activity has not been shown to lead to weight loss directly, and thus is an intermediate or short term outcome, the guide implements a logic model to agree that increasing physical activity leads to weight loss and that documenting weight loss need not be the focus of every intervention.

Borrow models from other disciplines

Swinburn et al proposed a "portfolio" approach to obesity prevention.²¹ This suggests using a mix of low risk, low yield interventions with higher risk interventions with potentially high impact. The authors also proposed borrowing from other disciplines such as economics by using mathematical modelling to predict the effects of potential interventions, especially complex multifaceted interventions with cumulative effects across communities (such as for people of different generations) and over time (such as for people in a single generation as they age). Mathematical models might be used, for instance, to predict the effect of building a playground within a poor neighbourhood, and variables such as costs, number of

children likely to use the facility, and the energy expended by users could be calculated to give an estimate of the impact on obesity.

Supplement other health interventions

Another useful strategy would be to plan and test interventions that may plausibly improve obesity but have established benefits in other realms.²² For example, programmes as diverse as support for breast feeding, screening for postnatal depression, and schools providing breakfast should be assessed for their effect on obesity.

Search for broad range of evidence

Most frameworks for evidence based public health rely on the published scientific literature, which is perhaps biased towards traditional medical interventions rather than environmental programmes that are harder to study and show a benefit. The published literature is also less likely to contain negative studies revealing unsuccessful interventions, equally important in choosing appropriate interventions. Banning food advertising aimed at children is one frequently proposed intervention, for example, and has been implemented in some countries.²³ However, a thorough search of the medical and social science literature did not yield data on children's weight before such a ban, the effect of the ban, or how the outcomes compare with those of populations not subject to a ban.

To counter such publication bias, general internet search engines such as Google or Excite can be used to find interventions. A brief Google search on "junk food advertising ban" yields information on banning junk food advertising in Australia, New Zealand, England, Scotland, and the European Union. Although these sources may not reveal methodologically rigorous scientific studies, they will, at least, stimulate thought and may contain practical, translatable, applicable knowledge.

Gather evidence in one place

The formation of a database dedicated to anti-obesity initiatives, successful and unsuccessful, could be a start to a single, central location for obesity evidence. Ideally, this would be housed by a global organisation such as the International Association for the Study of Obesity or the World Health Organization with funding from national governments and private foundations. This should be a repository for all initiatives irrespective of quality, but the quality, effectiveness, and feasibility of each initiative could be measured and recorded. Like evidence based medicine, evidence based public health needs agreed standards to separate good studies from bad and to allow meaningful comparisons between interventions to form the basis for systematic reviews.

Conclusion

Rather than showing what does work for preventing and treating obesity, research to date shows us clearly what does not. A thorough search of the available evidence reveals that obesity research has been targeted mainly at individuals and that most interventions result in only small amounts of weight loss and have little impact on the obesity epidemic. Ironically, most

Additional educational resources

- Cochrane Collaboration. Cochrane health promotion and public health field. www.vichealth.vic.gov.au/Cochrane
Website gives updates on current work by the collaboration, opportunities for involvement, and guidelines on systematic reviews to answer many types of public health questions, not only those answerable by randomised controlled trials
- CPAN—Centre for Physical Activity and Nutrition Research. www.deakin.edu.au/hbs/cpan/index.php
Website provides a link to CPAN's interdisciplinary, public health approach to better nutrition and exercise. Its five programmes include one for obesity prevention
- IASO—International Association for the Study of Obesity. www.iaso.org/
This organisation of obesity researchers and professionals publishes the journals *International Journal of Obesity* and *Obesity Reviews* and sponsors several scientific meetings that include basic science and clinical and public health research about adult and childhood obesity
- Centre for Health Evidence. www.cche.net/cche/home.asp
This non-profit organisation, part of the University of Alberta, is involved in projects to make clinical care more evidence based and research evidence more relevant to real life and routine practice. Its main function is to meet the health information needs of decision makers at all levels

Information resources for patients

- American Obesity Association. www.obesity.org/
This advocacy and education organisation focuses on changing public policy and perceptions of obesity. The website also contains patients' stories of being obese

experts agree that the obesity epidemic is environmental, but the research has largely ignored this factor.²⁴ It is time to be realistic with individuals about the limited effectiveness of lifestyle interventions and obesity drugs, and to focus on public health interventions rather than individual treatments to halt the obesity epidemic.

This article is based on the monograph "What works for obesity? A summary of the evidence behind obesity interventions," which was published in association with *Clinical Evidence* by the BMJ Publishing Group and commissioned, funded, and distributed by the United Health Foundation. I thank Matt M Davis and Boyd Swinburn for reviewing earlier versions of this manuscript and offering helpful comments.

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Competing interests: None declared.

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(Accepted 21 September 2005)

Corrections and clarifications*More drug trials end early hiding potential problems*

In this news story by Day (*BMJ* 2005;331:1103, 12 Nov) the wrong page numbers were given for the review by Montori et al that the story referred to. The correct reference is *JAMA* 2005;294:2203-9 [not 2228-30].

Croatia's brain drain

This letter by Polasek and Kolcic (*BMJ* 2005;331:1204, 19 Nov) contains a couple of errors. Firstly, the second author's name is given the wrong way round—it should be Ivana Kolcic, rather than the more unusual Kolcic Ivana. Secondly, the authors provided the wrong results from their analysis of final year medical students from Zagreb's medical school. The last sentence of the second paragraph should read: "The logistic regression results indicate that better ranked students (odds ratio 2.60, 95% confidence interval 1.16 to 5.82), younger medical students (odds ratio 0.83, 0.73 to 0.95), and those interested in scientific work (odds ratio 3.10, 1.10 to 8.84) considered emigrating from Croatia."

Lords back bill to legalise assisted suicide

Professor Baroness Finlay of Llandaff has written to correct this news story by Dyer (*BMJ* 2005;331:1160, 19 Nov). She points out that the title of the headline to the story is misleading in that "a first reading of a bill is never opposed—it is a formality when the title of a bill is laid before parliament; the bill is not debated then." She also considers that the story "does not accurately reflect the contents of the bill. It is not simply the previous [Assisted Dying for the Terminally Ill Bill] with voluntary euthanasia removed."