Obesity treatment : evaluation of conservative treatment strategies

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Valorization

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Social relevance

The dramatic worldwide rise of overweight and obesity since the 1980's is alarming. Prevalence has increased from 28.8% to 36.9% in men, and from 29.8% to 38.0% in women. Nowadays, even 23% percent of children are overweight or obese. Although the increase in developed countries has slowed down since 2006, the developing countries still show a dramatic rise. In some developing countries the estimated obesity rate exceeds 50%. Weight gain is the result of a structural imbalance between energy intake and energy expenditure. In our 'obesogenic' environment with an abundance of highly palatable foods, the temptation of eating more calories than needed is very high. Disturbed eating behaviour is a common condition among obese patients, and the abundance of calorie dense high palatable foods makes this problem even worse. Next to the association with psychological problems, overweight and obesity also increase the risk of numerous co-morbid conditions like type 2 diabetes mellitus, cardiovascular disease and cancer that not only present a serious risk for health, but also increase the economic burden of obesity. Treating these co-morbid conditions increases health care costs and when people cannot work because of their illness, the economic burden only gets worse. Not to mention the estimated 3.4 million deaths caused by overweight and obesity each year.

It is clear that there is a need to combat this epidemic and that every possible approach to prevention and treatment should be taken into consideration. Scientific evaluation of treatment strategies as presented in this thesis is one step in this process. This will lead to more evidence-based treatment strategies that can be applied in practice.

Target groups

As mentioned above, the prevalence of overweight and obesity is alarming. Therefore, the target group that could benefit from effective treatment strategies is very large. Direct benefits from treatment are weight loss and improvement of mental and physical well-being. This would result in less health-related costs, and therefore a reduction of the economic burden of obesity and its co-morbid conditions.

The insights in treatment strategies that result in significant weight loss and improvements in mental and physical well-being can help health care professionals to introduce more effective treatment programmes. These treatment programmes could be further

adapted to specific patient characteristics, and to patient groups suffering from various (multiple) co-morbid conditions, like type 2 diabetes or cardiovascular disease.

Health care insurance companies are always searching for more efficient and effective treatment for all kinds of diseases. The multifactorial aspect of obesity with the risk of developing numerous co-morbid conditions makes obesity a potential high cost condition. Insight in evidence based treatment strategies that reduce (the risk of) these co-morbid conditions can be very valuable for insurance companies. Such information can help to choose the right treatment for a patient, so that there is no waste of money on treatments that do not produce the results needed.

Activities

Societal implementation of scientific research results can take several years. However, in the case of scientific research on the topic of obesity treatment, which is a hot topic nowadays, such results may be implemented at a quicker pace. That is exactly the case for some results presented in this thesis. Implementations related to the results in this thesis will be discussed below in order of appearance.

The study presented in **chapter 3** is a part of the large scale DIOGENES multicentre trial. DIOGENES was a pan-European programme targeting the obesity problem from a dietary perspective seeking new insights and new routes to prevention. The results of the DIOGENES trial have been used to publish a book named the World's best diet (Bitz & Astrup, Verdens bedste kur, Kopenhagen, JP/Politikens Vorlag (2012)). It has been translated in many languages and is being published in several countries including the Netherlands. This book focuses on a high protein and low carbohydrate diet resulting in improved long-term weight loss maintenance. The diet is based on fresh vegetables, lean protein sources like fish, poultry, legumes, nuts and dairy foods and dense, grainy foods like rye bread, pumpernickel and barley. The idea is to change the carbohydrate-to-protein ratio in the diet by a modest reduction of fat intake and a modest increase in protein intake, to give a ratio of around 2:1 in favour of carbohydrates. Although the book was published before the paper in chapter 3 was written, the results in chapter 3 underline the importance of increased protein intake as it is explained in this book.

Chapter 4 showed the results of the CO-EUR 18-month multidisciplinary treatment programme. CO-EUR used these results to completely renew their treatment programme. CO-EUR concluded that the largest improvement in physical and mental health is achieved in the first 9 months. Therefore, a shorter programme could be more efficient. So instead of one standardized 18 months programme, CO-EUR now offers 3 individualized modular treatment programmes of 6, 12 and 18 months respectively.

The 18 months variant is only used in extreme cases where severe psychological co-morbidities need long-term treatment. Instead of the former standardized 18 months programme, the 3 treatment programmes are now individualized and modular. Every treatment starts with 4 months of their in-house designed Health Improvement Programme (HIP!). This is an innovative, integrative psychotherapy module that is being backed up by dietetics and physical activity In these first four months the treatment team searches for personal goals and obstacles in the clients life. They analyse the underlying pathology, coping strategies and social interaction after which a holistic theory or psychodynamic hypothesis is formulated. On the basis of these aspects the multidisciplinary treatment programme is constructed. After these first 4 months the treatment team can choose out of a number of modules to form an individual treatment programme adapted to the specific needs of the patient. Evaluation of these new programmes would be very interesting, because early recognition of possible flaws can result in further improvement of the treatment programme. A continuous evaluation cycle to compare the data of the different treatment locations of CO-EUR has already been implemented. The data generated by this evaluation cycle was used to show whether the results of the different treatment locations were comparable, and if not, what could be done about it.

The result from our study in **chapter 5** that physical activity alone can improve glucose tolerance in severely obese persons can help in understanding the value of physical activity within a multidisciplinary treatment programme. Getting obese patients to become more physically active can be a challenge for health care professionals within a treatment programme. Innovative ehealth products like smartphone apps can aid in showing the amount of physical activity performed on a daily basis and what is eventually needed to improve the patient's physical health. The results on how much physical activity is needed to improve glucose tolerance can be used in such ehealth products. This can improve the understanding of the treatment in relation to the health status of the individual patient.

The genetic predictors of high weight loss as described in **chapter 6** could be used in comprehensive prediction models. Although patient specific prediction models are still in their infancy, such models could predict treatment outcome in an early stage of treatment, so that the treatment could be quickly adapted to the patient's specific needs. The complexity of the human body makes it very difficult to predict treatment outcome, and genetic factors are probably not the most important influential factors in this process. Future research has to be performed to gain more knowledge and insight on this subject.

Innovation

Together with the increase of people suffering from obesity, scientific research concerning this topic has exploded in the last 30 years. Many new products and diets are brought to the market every year claiming to promote rapid weight loss, often with little to no effort from the obese person. Numerous diets have been developed ranging from eating only certain foods like bananas or apples or diets consisting of high fat/no carbohydrates and vice versa, all claiming to be the one diet that works wonders. The truth to all diets is, is that they all work! It is the adherence to a diet that is the problem. Most of those diets are doomed to fail because it is impossible to adhere to them for a longer period of time. Who would want to eat apples for the rest of their lives? Designing a diet that truly works and that can be adhered to for many years, maybe even a lifetime, is a challenge. Scientist around the globe are continuously researching our diet and dietary habits in search of a solution for the obesity epidemic. In January 2005, the Diet, obesity and genes (DIOGENES) project started. It was an innovative multi-disciplinary, multi-centre research project to advance understanding of how obesity can be prevented and treated from a dietary perspective. It integrated studies of dietary, genetic, physiological and behavioural factors. This five-year programme involved a consortium of 29 partners across Europe. It was made up of world-class centres in diet-and health studies, epidemiology, dietary genomics and food technology. It also included 3 major food industrials and 5 Small- and Medium-Sized Enterprises. It was the first large-scale pan-European dietary intervention study to date.

The CO-EUR treatment centre was founded in 2008. It was one of the few multi-disciplinary obesity treatment centres in the Netherlands at that time. Prof. Dr. van Baak and Prof. Dr. Kuipers were asked to help in the scientific evaluation of the CO-EUR treatment programme. This thesis is the product of that evaluation. Three chapters in this thesis are written with data generated from the CO-EUR treatment programme. This thesis is also the first in the Netherlands that evaluates a local commercial obesity treatment programme. It has already been explained that the results of this evaluation have been used to renew the programme, making it more efficient with 3 different treatment programmes.

Planning and realisation

In this thesis we evaluated conservative treatment strategies for obesity. We gained insight in the value of high protein diets, physical activity and behavioural aspects in the treatment of obesity. Next to these conservative strategies there is also treatment based on medication or surgery. Although we did not review the possibility of combining these treatments within this thesis, it could be an interesting topic for future re-

search. When surgery would be combined with a pre-treatment as offered within the CO-EUR treatment programme, treatment outcome might be improved further. This would provide a solid base for a large number of treatment seeking obese patients. Being able to offer a broad perspective of treatment options could help in serving the wishes and needs of many obese patients.

As mentioned before, there are several topics from this thesis already implemented in existing products or treatment programmes. There is still a lot of knowledge left in this thesis that could be useful for future studies or implementations in health care solutions. Prediction models that include genetic factors are under development and our data may contribute to their further development. However, such models will still take years to become more accurate, because undoubtedly more factors that influence treatment outcome and their interaction will be discovered. And many of these factors will be patient or population specific. Obesity treatment will keep on evolving and the search for the perfect treatment will probably never stop.