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Short Report

Effects of weight-reduction on obesity-associated diseases

Auswirkungen einer Gewichtsreduktion auf Adipositas-assoziierte Krankheiten

Hermann Liebermeister[1]

1 PVS Mosel/Saar, Neunkirchen, Germany

Abstract

Even moderate, but persistent weight-loss ameliorates most of the related diseases in obesity. Besides the consequences of the metabolic syndrome, this includes less well-known obesity-associated changes, such as impaired fertility, menstrual disorders, psychic changes, total leucocyte-count as a parameter of immunity and the impaired pulmonary function in asthma and sleep-apnoea.
Life-expectancy is prolonged by diminution of visceral fat depots, whilst weight-loss by shrinking of fat-free body-mass seems to have a contrary effect.

Zusammenfassung

Auch eine mäßige, aber dauerhafte Gewichtsverringerung bessert die meisten Begleitkrankheiten der Adipositas. Dazu gehören - neben dem Metabolischen Syndrom - auch weniger bekannte Folgeerscheinungen der Adipositas, wie Fertilitätsstörungen, Menstruations-Anomalien, psychische Veränderungen, die Gesamt-Leukozyten-Konzentration als Parameter für die Immunitäts-Lage und die gestörte Lungenfunktion bei Asthma und Schlaf-Apnöe.
Die Lebenserwartung erhöht sich nach Verringerung der intraabdominalen Fett-Depots, während ein Gewichtsverlust infolge Abbaus der fettfreien Körpermasse den gegenteiligen Effekt auszulösen scheint.

Text

A meta-analysis of 23 studies on 599 volunteers [1] has shown that - independently of the procedure chosen - visceral fat is diminished more effectively than total fat. Thus the potentially dangerous visceral fat responds especially well to weight reduction.
We therefore may expect that weight reduction has a favorable effect on obesity-associated diseases.
It is well known that more than 80 % of non-insulin-dependent diabetics are overweight. S.D. Müller from Aachen has put it this way: "Type-2-diabetics don't have diabetes, but a belly." He is getting nearer to the truth, as the starvation-periods during and after both world-wars lowered diabetes-mortality much more than the introduction of insulin or of oral anti-diabetic medication. Moreover, weight reduction leads - as has been well known for many years [2] - to a clear-cut reduction of elevated serum-levels of glucose, triglycerides and insulin. This metabolic improvement and the normalization of insulin-incretion with a pronounced early phase and moderate long-term incretion persist only however if there is no substantial regain in weight [3].
Many diabetics can - depending on the degree of their weight-loss - reduce or abandon their medication: insulin or oral anti-diabetics and limit themselves to purely dietetic measures [4].
Pronounced weight-loss after surgical treatment of obesity III has dramatic effects as shown by the 2 years follow-up of the Scandinavian Obesity Study (SOS) [5].
The diabetes incidence in the surgically operated group is therefore 16 times lower than in the conventionally treated group. Even ten years after the surgical intervention, diabetes-risk is still 3,4 times lower [6].
A moderate weight-loss not only improves the diabetic metabolism, but also ameliorates other risk-factors inherent to the metabolic syndrome [7]:
A meta-analysis of 14 studies has shown that a weight reduction by 10 % - (= ca. 10 kg) - leads to a lowering of the accompanying hypertension. A weight loss of 10 kg diminishes systolic blood-pressure by approximately 15 mmHg, the diastolic pressure by about 10 mmHg [8].
Another meta-analysis of 16 controlled studies by the Cochrane Collaboration demonstrated in every one of them that weight-reduction was significantly more effective in this respect than a low-salt-diet or even antihypertensive medication [9].
Weight-loss also induces a lowering of hyperlipoproteinemia with an increase of HDL-levels [10].

Table 1

2 years follow-up of the Scandinavian Obesity Study (SOS) [5]

Obesity III (BMI > 40)	**surgical treatment (441)**	**conservative treatment (401)**
Weight-loss in kg	+28 (+/-15 SD)	+ 0,6 (+/-8,9 SD)
Incidence of Diabetes %	**0,5**	**8,0**
Hyperinsulinemia%	0,9	5,5
Hypertriglyceridemia%	0,6	9,2

In addition, the muscular mass of the left ventricle, another recognized risk-factor, decreases by successful weight reduction [11].

A drastic weight-lowering by gastric banding leads to an improvement of pulmonary function [12]. In addition, a strict caloric restraint with a 14,5 % reduction in starting-weight induced in 19 obese patients with asthma led to significant improvements in pulmonary function, extent of medication, subjective well-being and frequency of attacks even after one year [13].

In 315 obese patients with BMI above 35, gastric banding led to a weight reduction of 30 kg on average and lowered the percentage of "snorers" from 82 to 14 %, the frequency of OSA (obstructive sleep-apnoea-syndrom) fell from 33 to 2(!) % and instead of 39 % only 2 % claimed afterwards that they did not sleep well [14].

During the SOS-study mentioned above, it could be demonstrated that a weight-loss of 22 kg on average by surgical intervention diminished the increase of intima-media-diameter in the carotid bulbus by two/thirds to a degree which can be observed in a control population [15] of slimmer individuals.

Whilst urate-levels during fasting increase distinctly - especially if patients do not drink enough - due to a competition in excretion between uric acid and ketone-bodies produced in large amounts during fasting, urate concentration falls considerably after long-term weight-reduction [16].

Even the increased total leucocyte-count as an indication of an impaired immunity-situation in obesity responds to a weight-lowering [17].

It is a well known fact that successful weight-reduction can normalize menstruation-disorders and impaired fertility in obese women [18]. In our Optifast®-center, we had to stop several weight-reduction-measures because of a pregnancy which developed unexpectedly after a long period of sterility [19].

Parallel to weight-lowering, we could also largely normalize the parameters of neuroticism and extraversion which show pathologic deviations in obesity [20].

It took a long time, until the hoped for improvement in life-expectancy by weight-reduction could really be proven. Numerous studies led to diverging results, mostly because there was no differentiation between a therapeutic weight-reduction and weight-loss by severe diseases. Retrospective analysis has demonstrated that fat-loss itself improves life-expectancy, whilst pure weight loss may lead to its decrease, as has been shown in two especially well controlled community-studies: Tecumseh Community Health Study: 321 deaths in 1,890 participants after 16 years observation [21] and the Framingham Heart Study: 507 deaths in 2,731 participants after 8 years [22]. This probably explains the divergent findings and hypotheses about the improvement in life-duration after weight loss. Apart from first hints in the Build-Study 1979 [23], we have now 3 studies which lend support to the hypothesis that weight reduction does not only improve risk-factors, but also prolongs life:

- In white US-women, observed during 12 years by the American Cancer Society, voluntary weight losses between 0,5 and 9 kg lowered total mortality by 20 % [24]. Carcinoma-mortality was reduced by 37 %, diabetes-mortality by 44 % and cardio-vascular mortality by 35 %. This effect was especially impressive in women with an unfavourable pre-investigation situation.
- In India, Singh et al. [25] reported a diminished mortality after myocardial infarction in patients who liberally consumed fruits and vegetables and this improvement was especially pronounced after a weight-reduction by 10 %.
- After vertical gastroplasty, the 10-years-mortality reached 10 % in the non-operated control-group and only 3,7 % in the extremely obese treated by surgical intervention [26].

Reduction of the visceral fat depots seems to be the decisive factor for the improvement in life-expectancy, whilst pure weight-loss seems to have a rather life-shortening-effect [21].

Finally, we should consider that our patients are (much) more impressed and motivated by other facts [27]: "I can again go dancing at last and buy attractive clothing", "I now can tie my shoes myself", or "my jogging partner Bruno with slight overweight is glad because he beats me again after losing 6 kg as he used to before".

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Corresponding author:
Prof. Dr. Hermann Liebermeister
PVS Mosel/Saar, Boxbergweg 3a, 66538 Neunkirchen, Germany
Liebermeister-N@t-online.de

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