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EDITORIAL

REDUCING DIETS

It has long been known that restriction of calorie intake is the most important factor in the loss of excess weight. The traditional medical advice to patients wanting to reduce always includes a diet sheet which, if it is scrupulously followed, cuts down the calorie intake to below the level supposed to be necessary for the maintenance of a dietary equilibrium. Experience has shown that this measure does not always lead to weight loss. Although discrepancies are usually attributed to failure or inability of the patient to carry out his instructions, the frequency of the experience has been noted. Moreover, slight departures from—not restrictions of—the normal diet appear sometimes to lead to loss of weight, and one set of workers found in a test series that persons on a high-fat diet lost weight more rapidly than those on high-protein or high-carbohydrate diets.[1] This uncertainty led Kekwick and Pawan[2] to examine the relation of calorie intake to obesity a little more closely. The question that these workers set themselves to answer was this: Is it the restriction of total calorie intake that causes the weight loss, or is it the alteration in proportions of carbohydrate, fat and protein in the diet?

The normal sedentary worker, it is usually stated, takes his daily 2,200 calories as 12% of protein, 24% of fat and 64% of carbohydrate, while the average reducing diet (yielding about 1,000 calories a day) consists of protein, fat and carbohydrate in about equal percentages. Kekwick and Pawan's experiment was conducted on cases of obesity in a hospital ward under the most favourable conditions; none of the patients could 'sneak' any food and rigid biochemical controls (water retention, nitrogen balance, fat absorption) were performed. The patients fell into 3 groups for the purposes of the experiment, viz.:

1. A group fed on a diet of which the component proportions were the same (protein 20, fat 33, carbohydrates 47), but the total amounts varied (500, 1,000, 1,500 and 2,000 calories).

2. A group fed on a diet of which the total calorie content was fixed (1,000 calories) but the components varied. Three different diets were used, each of which consisted of 90% of one component.

3. A group whose diet was stabilized on a normal (2,000

VAN DIE REDAKSIE

VERSLANKINGSDIËTE

Dit is reeds lank bekend dat 'n beperking van die kalorie-inname die belangrikste faktor by die vermindering van oortollige gewig is. Die tradisionele mediese raad aan pasiënte wat wil verslank sluit altyd 'n gebalanseerde dieetskema in wat—mits dit nougeset gevolg word—die kalorie-inname kortsny tot minder as wat nodig is om 'n dieetbalans te handhaaf. Die ondervinding het egter geleer dat hierdie maatreël nie altyd daarin slaag om die gewig te verminder nie. Afwykings word gewoonlik daaraan toegeskryf dat die pasiënt nie sy instruksies kon of wou uitvoer nie, maar daar is reeds opgelet dat die verskynsel (dat die gewig nie op so 'n dieet verminder nie) heel dikwels voorkom. Dit blyk selfs dat klein veranderings in die normale dieet, en nie soseer inkortings nie, soms 'n vermindering van gewig in die hand werk, en een groep navorsers het in 'n reeks toetse uitgevind dat persone op 'n vetryke dieet vinniger verslank het as dié wat 'n proteïen- of koolhidraatryke dieet gehou het.[1] Dit was hierdie onsekerheid wat Kekwick en Pawan[2] aangespoor het om die verhouding tussen kalorie-inname en vetsug nader te ondersoek. Hierdie navorsers het hulle dit ten doel gestel om die volgende vraag te beantwoord: Is dit die beperking van die totale kalorie-inname wat verslanking veroorsaak, of is dit 'n verandering in die verhouding van koolhidraat, vet en proteïen in die dieet?

Die normale ‚sittende' werker se daaglikse 2,200 kalorieë bestaan na bewering uit 12 persent proteïen, 24 persent vet en 64 persent koolhidraat, terwyl die gemiddelde verslankingsdieet (omtrent 1,000 kalorieë daagliks) uit proteïen, vet en koolhidraat in omtrent ewe groot persentasies bestaan. Kekwick en Pawan se eksperiment op vetsugtige pasiënte is in 'n hospitaal, onder die gunstigste toestande gedoen; nie een van die pasiënte kon skelmpies kos in die hande kry nie, en streng biochemiese kontroles (waterterughouding, die stikstof-balans, en vetabsorpsie) is toegepas. Die pasiënte is in 3 groepe verdeel vir die doeleindes van die toets:

1. 'n Groep gevoed op 'n dieet waarvan die samestellende proporsies dieselfde was (proteïen 20, vet 33, koolhidraat 47) maar waar die totale hoeveelhede verskil het (500, 1,000, 1,500 en 2,000 kalorieë).

2. 'n Groep op 'n dieet waarvan die totale kalorie-inhoud vasgestel was (1,000 kalorieë) maar waar die samestellende voedseltipes verskil het. By hierdie groep is 3 verskillende diëte gebruik, elk bestaande uit 90 persent van één van die samestellende voedselsoorte.

3. 'n Groep met 'n dieet wat vasgestel was op 'n normale daaglikse dieet van 2,000 kalorieë. Hulle is later verander na 'n dieet van 2,600 kalorieë, afwisselend ryk aan vet en aan koolhidraat, om vas te stel of hulle verslank het—

calories) daily diet. They are changed to a 2,600-calorie diet, alternatively of high-fat and high-protein composition, to see whether they lost weight in confirmation, more or less, of the results in group 2.

Although the entire experiment was neither large nor prolonged, it appears to have been conducted with a thoroughness that makes the results noteworthy, even if they do not find general acceptance.

The results of the first series bore out the generally-accepted view that the less a person eats the faster he will lose weight. By making weekly alterations in the total daily calorie intake of each patient, Kekwick and Pawan demonstrated a clear proportional relationship between intake and weight loss. The second series yielded more interesting results. Here the total calorie intake could still be regarded as a reducing diet (1,000 calories), yet the patients on the 90% carbohydrate diet lost no weight at all whilst the losses of those on the 90% protein diet and 90% fat diet were marked. Some patients of the latter groups lost 1-1½ lb. a day. The response of patients in the third group provided confirmation of Kekwick and Pawan's thesis that—within limits—it is the substance of the diet that is important rather than the amount. By feeding with 600 calories over the 'normal' they recorded actual losses in weight in some of their patients, provided the whole diet was a high-fat or a high protein one.

By means of biochemical checks that they carried out in these experiments Kekwick and Pawan were able to show that there was no defective absorption to account for the weight loss, nor any significant loss of carbohydrate stores or body protein. Slightly less than half the weight lost was shown to be due to loss of body water, and 50-70% to loss of body fat. The rate of insensible water loss is greater with high-fat and high-protein diets; this fact, together with the marked variations in weight loss between the different constant-calorie diets, is taken to suggest that obese persons alter their metabolism in response to variations in the diet. Kekwick and Pawan draw no practical conclusions from their experiments, and they have been taken to task for its brevity, 7-9 days being very short periods for studying changes of weight in obesity,[3] and for their conclusions over the role of body water in weight loss. From their own data the striking increase in insensible water loss would itself account for about 70% of the weight lost with the high-protein or high-fat diets, and proportionally less therefore would be due to loss of body fat.

1. Lyon, D. M. and Dunlop, D. M. (1932): Quart. J. Med., **1**, 331.
2. Kekwick, A. and Pawan, G. L. S. (1956): Lancet, **2**, 155.
3. Hervey, G. R. (1956): *Ibid.*, **2**, 355.

hierdie deel van die toets was gedoen om die resultate van die tweede groep min of meer te bevestig.

Die hele eksperiment was maar kort en het nie baie persone ingesluit nie, maar dit blyk nogtans dat die navorsers só deeglik was dat die uitslae van hulle toets tog die aandag verdien, al word hulle nie algemeen aangeneem nie.

Die resultate van die eerste serie bevestig die algemene opvatting dat hoe minder 'n mens eet, hoe vinniger word hy maerder. Met hulle weeklikse veranderings in die totale daaglikse kalorie-inname van elke pasiënt, het Kekwick en Pawan 'n duidelike proporsionele verhouding tussen inname en gewigsvermindering aangetoon. Maar die resultate van die tweede serie was nog interessanter. In die tweede toets kon die totale kalorie-inname nog steeds as 'n verslankingsdieet beskou word (1,000 kalorieë daagliks) maar die pasiënte wat die 90 persent koolhidraat-dieet gehou het, het glad nie maerder geword nie, terwyl daar duidelike verslanking was by die pasiënte op diëte van 90 persent koolhidraat en 90 persent vet. Sommige van die pasiënte in die laasgenoemde twee groepe het tussen 1 en 1½ lb. per dag ligter geword. Die reaksie van die pasiënte in die derde groep het Kekwick en Pawan se vermoede bevestig dat (binne perke, natuurlik) die samestelling van die dieet meer belangrik is as die totale hoeveelhede. Met 'n dieet wat 600 kalorieë meer dan die ,normale' bevat het, het hulle 'n gewigafname by sommige van hul pasiënte behaal mits die hele dieet 'n vet- of proteïenryke was.

Kekwick en Pawan was in staat om aan te toon deur middel van die biochemiese kontroles dat daar geen gebrekkige absorpsie was wat moontlik die gewigafname kon veroorsaak het nie, en dat die liggaamsreserwes van koolhidraat en proteïen nie merkbaar verminder het nie. Effens minder as die helfte van die gewigafname was klaarblyklik te danke aan die verlies van liggaamsvog, en 50 tot 70 persent was te danke aan die vermindering van liggaamsvet. Die spoed van onvoelbare waterverlies was vinniger by die vet- en proteïenryke diëte; hierdie feit, tesame met die duidelike variasies in die gewigafname tussen die verskillende kalorie-konstante diëte, word beskou as 'n aanduiding daarvan dat vet mense hulle metabolisme verander in reaksie op wysigings van die dieet. Kekwick en Pawan maak geen praktiese afleidings uit hulle navorsing nie; hulle is reeds oor die kole gehaal oor die kort duur van die eksperiment—7 tot 9 dae is maar kort om die veranderings in die gewig by vetsugtige pasiënte te bestudeer[3]—en ook oor hulle gevolgtrekkings insake die rol van liggaamsvog by verslanking. Bereken op hulle eie gegewens, kan die merkwaardige vermeerdering van onvoelbare waterverlies self verantwoordelik wees vir omtrent 70 persent van die vermindering in gewig op die proteïen- en vetryke diëte, en gevolglik speel die verlies van liggaamsvet na verhouding 'n kleiner rol by verslanking.

1. Lyon, D. M. en Dunlop, D. M. (1932): Quart. J. Med., **1**, 331.
2. Kekwick A. en Pawan, G. L. S. (1956): Lancet, **2**, 155.
3. Hervey, G. R. (1956): *Ibid.*, **2**, 355.

SURVIVAL AT SEA

The physiological problems that arise in survivors of shipwreck or the ditching of aircraft have been studied by a number of investigators.[1] Apart from drowning or injury, in many cases death at sea has been due to exposure, and especially to inability to maintain the temperature of the body. When the body is immersed in cold water, heat is lost much more rapidly than when in air at the same temperature. This is due not only to the fact that water con-

ducts heat more readily than air, but also to the high specific heat of water. In general it has been found that heat balance is not maintained in water below about 20°C (68°F); the body temperature steadily falls until death eventually ensues. In freezing water, survival for about an hour may be expected. Shivering cannot prevent the fall in body temperature. The same danger of injury or death of the tissues occurs when limbs are immersed in cold water.

The muscular effort of swimming produces enough heat to balance the heat lost in ice-cold water and may maintain the normal body temperature for a short time. Further research is needed on this point, since there is the possibility that in thin individuals, who lack the insulation of a layer of fat, swimming may increase heat loss as well as heat production. Even when the body is not immersed in water, exposure in a cold environment such as cold air, especially if there is a wind, or snow and spray, or wet clothes, may render it impossible to maintain heat balance.

In hot climates an important physiological problem is loss of water and electrolyte balance. As much as 5 litres of sweat a day may be lost by a man lying on a raft in the tropical sun, and death might occur within two or three days. There is, however, less hazard in hot climates than in cold ones.

The clearer understanding of the physiological aspects of naval life-saving has lead to improvements in the design of equipment in rafts and lifeboats. The essential requirements are to give protection from water and cold, and in the tropics to provide shade and air movement. Specially designed suits, tents and rafts have been thoroughly studied under various climatic conditions.

The supply of water is the outstanding problem. Survival for 2 weeks without water is unlikely even in favourable circumstances. It has been found that carbohydrate (100 g. daily) reduces the break-down of protein and the output of urine; thus barley-sugar sweets will save more than their own weight of water. Other measures that may be adopted include the prevention of sea-sickness, the collection of rain water, and the chemical de-salting of sea water. The drinking of sea water must be forbidden. If a ration of fresh water is mixed with sea water it will not enable an individual to survive as long as the fresh water ration alone. Fish do not yield much water and the fluid obtained from them is not of favourable composition. As a food, fish contains much protein and need to be avoided unless plenty of fresh water is available.

1. Hervey, G. R. (1955): Science News, **38**, 72.