

Anorexia Nervosa: Some Observations on “Dieters” and “Vomitters”, Cholesterol and Carotene

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Summary: Twenty consecutive cases of anorexia nervosa admitted to a general medical ward were found to consist of ten who reduced weight by means of dieting and ten who in addition employed self-induced vomiting. Clinical and biochemical differences between ‘dieters’ and ‘vomitters’ were less pronounced than those reported elsewhere. However, the ‘vomitters’ had higher scores on the anxiety, somatic and depression subscales of the Crown–Crisp Experiential Index and lower serum carotene concentrations. The implications of these findings are discussed.

A number of authors have discussed the value of dividing patients with anorexia nervosa into those who lose weight by dieting and exercise (‘dieters’) and those who habitually employ self-induced vomiting and in addition may take excessive amounts of purgatives or diuretics (‘vomitters’). It has been stated that in the latter group the illness is likely to be of longer duration (Crisp *et al*, 1968) and when treatment is sought the response is poorer (Beumont *et al*, 1976). Unfortunately, sufferers from anorexia nervosa are notoriously adept at concealing their perverse eating behaviour (Naish, 1979). This study was carried out to determine whether any easily obtainable objective measurements could be used to distinguish between the two types of anorexics.

Methods

The subjects consisted of twenty consecutive cases of primary anorexia nervosa admitted to a general medical ward under the care of a physician (D.M.) between February 1979 and September 1980. All were female and were aged between 13 and 43 years (mean 24 years). All the patients were at least 10 per cent below their calculated ideal weight. Eighteen complained of secondary amenorrhoea of at least three months’ duration. One patient was taking an oral contraceptive and a girl aged fourteen had never menstruated. None was suffering from any physical illness which could have accounted for weight loss or from any overt psychiatric illness.

The duration of the loss of weight ranged from six months to fourteen years (mean 48 months) and that of secondary amenorrhoea from three months to ten years (mean 32 months). By the time of their discharge

from hospital ten patients had been classified as ‘dieters’ and ten as ‘vomitters’. The two groups were comparable in terms of age on admission, marital status, social class and reported durations of weight loss and amenorrhoea.

In all cases the clinical examination and laboratory investigations were carried out before treatment was started. The variables used in comparing the ‘dieters’ with the ‘vomitters’ were chosen on the basis of their freedom from reporter or observer bias, their reliability and ease of measurement, and their recognized tendency to be abnormal in cases of anorexia nervosa. The clinical measurements consisted of body weight, resting pulse rate and supine systolic blood pressure. In addition, all patients were interviewed by a psychiatrist (S.B.) and eighteen completed the Crown–Crisp Experiential Index (CCEI). This is a self-rated questionnaire of neurotic psychopathology which has been administered to anorexics admitted to a psychiatric unit (Stonehill and Crisp, 1977; Hsu and Crisp, 1980). We know of no published reports of its use in such patients treated on medical wards. Finally, the ‘dieters’ and ‘vomitters’ were compared with respect to haemoglobin and serum electrolyte, urea, cholesterol and carotene concentrations.

Results

Analysis of variance did not reveal any statistically significant difference between the ‘dieters’ and ‘vomitters’ on any of the physical measurements. In no instance did the psychiatrist dispute the physician’s diagnoses of anorexia nervosa. Fifteen patients complained of depression but in each case this was thought to be secondary to the anorexia nervosa. The table

TABLE

Physical findings, CCEI subscale scores, serum cholesterol and carotene levels: means and standard deviations

	'Dieters'	'Vomitters'	Variance ratio	
Weight (Kg)	40.2±3.4	41.8±5.7	F = 0.5	NS
Percentage of ideal weight	69.9±7.3	74.1±9.7	F = 1.1	NS
Resting pulse rate (beats/min)	63.8±15.1	71.0±14.1	F = 1.1	NS
Supine systolic BP (mm Hg)	109.0±7.0	110.5±10.1	F = 0.1	NS
*CCEI Anxiety	7.1±2.3	10.7±3.6	F = 5.9	P < 0.05
Phobic	3.3±1.3	4.8±3.5	F = 1.4	NS
Obsessional	6.6±2.1	10.0±4.8	F = 3.5	NS
Somatic	4.8±3.3	9.1±4.2	F = 5.3	P < 0.05
Depression	5.0±3.1	9.8±2.5	F = 11.8	P < 0.01
Hysteria	4.1±1.9	6.0±2.9	F = 2.5	NS
Serum cholesterol level (mmol/l)	6.0±1.2	5.6±1.4	F = 0.5	NS
Serum carotene level (µmol/l)	4.1±1.6	2.2±1.5	F = 5.4	P < 0.05

* Nine 'dieters' and nine 'vomitters' completed the CCEI.

shows the mean scores on the six subscales of the CCEI. The 'vomitters' had significantly higher mean scores on the anxiety, somatic and depression subscales. No patient was anaemic and there was no demonstrable significant difference in haemoglobin levels. One patient, a chronic abuser of purgatives, was hyponatraemic (122 mmol/l), hypokalaemic (1.3 mmol/l), uraemic (38.4 mmol/l) and had a serum bicarbonate level of 6.8 mmol/l. Otherwise serum electrolyte and urea concentrations fell within or deviated little from their normal ranges. Again it was not possible to demonstrate any significant difference between the two groups of patients. The serum cholesterol and carotene levels are set out in the table. The mean carotene concentration was lower in the 'vomitters' than in the 'dieters'. This finding was statistically significant.

Discussion

The diagnostic criteria we employed are in accord with those used elsewhere and our findings consistent with the known features of anorexia nervosa. The measurements made were chosen largely on the basis of their objectivity and were carried out before treatment. The classification into 'dieters' and 'vomitters' was made later after observation and further enquiry. The scores on the CCEI are similar to those obtained from patients admitted to a psychiatric unit (Hsu and Crisp, 1980). However, Stonehill and Crisp (1977) found that the 'vomitters' differed from the 'dieters' only in their higher depression scores. The CCEI scores are of particular interest in view of a recent report (Bhanji, 1979) that anorexics treated by physicians fare better than do those treated by psychiatrists. Caution must be exercised in comparing patients drawn from different localities and assessed by different investigators, but nevertheless our findings

offer a tentative refutation of the hypothesis that physicians are called upon to treat only the less emotionally disturbed patients. We were unable to confirm the finding of Crisp *et al* (1968) that pulse rates were higher and serum sodium and potassium levels lower in 'vomitters'.

The earliest reports of hypercholesterolaemia in anorexia nervosa were by Klinefelter (1965) and Crisp (1965). The former noted that this was commoner among the younger patients and that there was no obvious relationship to diet. Crisp (1965), however, suggested that a diet of high-cholesterol foods may be responsible. There is general agreement that hypercholesterolaemia does not result from abnormal thyroid function (Crisp *et al*, 1968; Kanis *et al*, 1974; Hurd *et al*, 1977; Mordasini *et al*, 1978) but Halmi and Fry (1974) did not confirm the finding of Blendis and Crisp (1968) that raised cholesterol levels were associated with a feeding pattern which included episodes of bulimia. Nestel (1974) proposed that hypercholesterolaemia in anorexia nervosa may reflect reduced cholesterol and bile acid turnover, both of which may be a consequence of a low-calorie diet. Mordasini *et al* (1978), however, found that increased serum cholesterol levels could be accounted for by increased amounts of plasma beta-lipoprotein. They suggested that the hyperlipoproteinaemia, and hence hypercholesterolaemia, results from a dramatic mobilization of body fat to supply energy. Lupton *et al* (1976) have reviewed evidence that hypercholesterolaemia may, in anorexia nervosa, be the direct result of an hypothalamic disturbance. Dally (1959) was the first to draw attention to hypercarotenaemia in anorexia nervosa. He did not feel a high-carotene diet could be held responsible. This view received support from Pops and Schwabe (1968) who reported that most of their anorexics with raised serum carotene

concentrations denied any excessive intake of carrots and other yellow vegetables and fruits. They speculated that in anorexia nervosa there may be either a decreased catabolism of beta-lipoprotein, the major carrier of plasma carotene, or a reduced vitamin A requirement. By contrast, Crisp and Stonehill (1967) described a patient whose hypercarotenaemia could have been due to the consumption of large amounts of spinach puree. Robboy *et al* (1974) found that anorexics had raised serum carotene and vitamin A levels, whereas in patients with organic wasting these were reduced. Serum lipoprotein electrophoresis was carried out in five anorexics and was normal in three. A reliable dietary history was obtained in only two cases: both admitted to eating large quantities of carrots. It was suggested that the hypercarotenaemia in anorexia nervosa could be due to either an increased intake of carotenes and vitamin A or an acquired defect in the utilization or metabolism of vitamin A.

Our findings by no means resolve these contradictions. We provide, however, further evidence. Firstly, we know of no previous report of serum carotene levels being higher in anorexics who regulate their weight by careful attention to diet than in those who do so by taking steps to reduce the absorption of food. Secondly, no such distinction appeared relevant to serum cholesterol concentrations. Russell (1979) has shown that 'vomitters' and 'dieters' may consume different types of diet. In particular he demonstrated a close association between vomiting or purging and carbohydrate bulimia. It is possible, therefore, that when hypercarotenaemia occurs in anorexia nervosa it is due to the patient's diet rather than to some metabolic change secondary to starvation and that the opposite is the case for hypercholesterolaemia.

In general, the clinical and biochemical differences between our 'dieters' and 'vomitters' were less marked than reported previously. However, the two groups differed in their scores on the CCEI subscales and biochemical findings. The presence of a low or normal serum carotene concentration should draw attention to the possibility of surreptitious vomiting.

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