

# Relation between Aspects of Nutritional Disturbance and Menstrual Activity in Primary Anorexia Nervosa

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## Summary

A significantly high number of patients with anorexia nervosa are overweight immediately before the onset of the condition. This premorbid weight may be a feature of their constitution but is sometimes a more transitory phenomenon. Menstruation ceases early in the condition but usually within the context of significant weight loss. However, the subsequent amenorrhoea, related to factors that presumably may not begin to operate until several weeks later, may be a symptom which first draws attention to the condition.

Treatment included the restitution of body weight to the matched population mean weight for each patient. This may be important, as the mean weight at which menstrual activity returned was not significantly different from the matched population mean weight. A further treatment aim, so far as nutrition was concerned, was restoration of regular and reasonable feeding behaviour, including adequate carbohydrate ingestion. It is suggested that these findings support the view that the nutritional disturbance in anorexia nervosa is an important factor affecting menstrual activity.

## Introduction

Secondary amenorrhoea, in the absence of an "organic" cause, is sometimes described as "idiopathic," "functional," or "constitutional," thus drawing attention to our lack of knowledge of the basic cause or causes and to our suspicion that the disorder is often a variable manifestation to do with the individual's biological make-up, including her temperament and mode of reacting. In support of these notions menstrual irregularity has been reported as being more common in women with psychoneurotic characteristics (Coppen, 1965), and in those with a variety of psychiatric disorders (Gregory, 1957-8). Major starvation is also associated with secondary amenorrhoea (Sydenham, 1946; Keys *et al.*, 1950; McCance *et al.*, 1951; Gauger, 1954), and with loss of libido and a relatively selective atrophy of gonads (Keys *et al.*, 1950; Bliss and Branch, 1960). Such starvation, often studied in famine conditions, usually results in total calorie and predominant protein malnutrition. It will also often be associated with mental distress and depression. Conversely, primary psychiatric disorder sometimes leads to major nutritional change in the individual. Amenorrhoea, usually secondary, is a cardinal and often an early feature of primary anorexia nervosa, in which there is usually a state of predominant carbohydrate starvation.

In our view anorexia nervosa is a specific disorder of weight pivoting around the weight and maturational changes of

puberty and reflecting a phobic avoidance response to adolescent weight and its various psychosocial implications for the individual. Neurophysiological research (Kennedy, 1963) has shown the close proximity and probable functional relationship between hypothalamic areas affecting feeding behaviour, general level of activity, sexual behaviour, and menstrual activity. Major disturbance in all these fields is also characteristic in anorexia nervosa.

## Present Study

The present study is concerned with a population of patients having primary anorexia nervosa or weight phobia. All the patients clearly suffered from this condition according to criteria described elsewhere (Crisp, 1967a), and including at least three months' history of amenorrhoea. The investigation reported here concerns the pattern of amenorrhoea in relation to premorbid weight, patterns of food intake, weight loss, and weight gain.

## Method

Information was culled from the notes of a series of patients seen over the preceding 10 years. Nearly all had been studied in detail and many had received a period of at least three months' inpatient treatment. Information had originally been obtained mainly in interview situations. Sometimes more direct observations of menstrual bleeding and measurement of weight had been possible, especially during periods of inpatient treatment. The notes of 100 patients were studied in this way. Fourteen were discarded on the grounds of insufficient information, leaving a pool of 86 patients on whom much of the information required was available. Matched population mean weights (Kemsley, 1952) could be calculated only on 65 patients, 20 being excluded because their disorder was judged to have started before the age of 15, thus precluding any sensible attempt to compare them with matched subjects without also controlling for the age of puberty, and a further patient was excluded because her measured height had not been recorded. Information of reported weight at the time of the last menstrual period (L.M.P.) was not available for 14 patients, of whom three were aged 14 or younger.

Thus full information covering all items in patients aged 15 years or more was available on 54 patients. The data on this group are displayed separately in the relevant figures. The problem of unreliability of some areas of information provided by these patients about themselves has been discussed in detail elsewhere (Crisp, 1967b). An attempt was made in this study to improve the accuracy of such information, and the data reported often represent a final synthesis of information derived from the patient at various stages during treatment as well as from other sources. Specifically these data are concerned with: (1) age (years and months) at onset of major food avoidance (almost invariably dieting behaviour—that is, carbohydrate starvation); (2) age (years and months) at time of L.M.P.; (3) premorbid weight—that is, weight immediately preceding onset of major food avoidance; (4) weight at time of L.M.P.; and (5) time of return of menses in relation to restitution of weight.

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**Results**

Information concerning age at the time of onset of major food avoidance and age at the time of the L.M.P. on the total population of 86 patients is shown in Fig. 1. Though the mean age of onset of dieting behaviour precedes the mean age at the time of the L.M.P., the difference in the ages does not reach statistical significance.

The distribution of premorbid weight as a percentage of matched population mean weight in 65 patients aged 15 years or more is shown in Fig. 2. Thirty-one were 10% or more above average weight whereas only three were 10% or more below average weight. The mean weight at the onset of dieting was 61 kg, which is 6 kg higher than the matched population mean weight ( $P < 0.001$ ) (see Table).

The distribution of weight at the time of the L.M.P. as a percentage of the premorbid weight in 72 patients is shown in Fig. 3. In 46 patients amenorrhoea supervened only after weight loss of 10% or more of the premorbid body weight. Twelve patients reported that they had not yet begun to lose weight at the time of their L.M.P., and one patient reported amenorrhoea in conjunction with initial transitory weight gain. The Table shows that though the mean amount of weight loss between the onset of dieting and the L.M.P. was 9 kg, the mean weight at the time of L.M.P. was only 3 kg below the matched population mean weight. A number of patients were still overweight at the time of their L.M.P. (Fig. 4).

*Relationship of Amenorrhoea and Body Weight in Anorexia Nervosa*

No.	Patients with Anorexia Nervosa Aged 15 or More	Mean Weight $\pm$ S.D. (kg)	Sig. of Diff. (P)
54	Mean weight at onset of dieting	61.0 $\pm$ 11.1	} <0.001
	Mean matched population mean weight at onset of dieting	55.0 $\pm$ 3.7	
	Mean weight at time of L.M.P.	52.1 $\pm$ 6.2	
27	Mean weight at time of return of menstruation	53.3 $\pm$ 6.2	} N.S.
	Mean matched population mean weight at time of return of menses	55.5 $\pm$ 3.0	

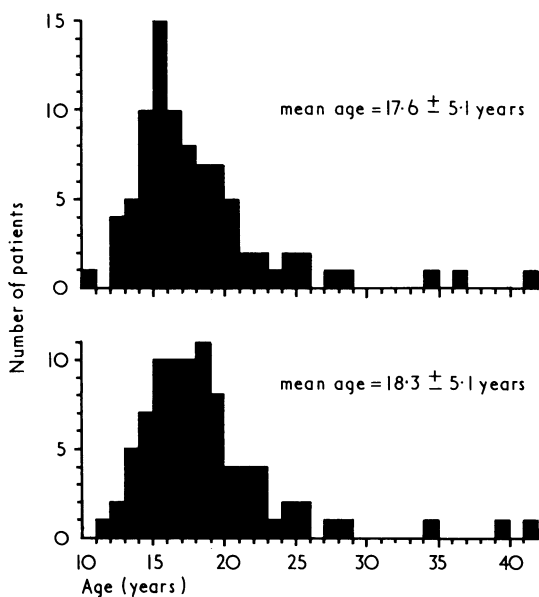


FIG. 1—Age at onset of severe dieting behaviour (above) and at L.M.P. (below) in 86 patients with anorexia nervosa.

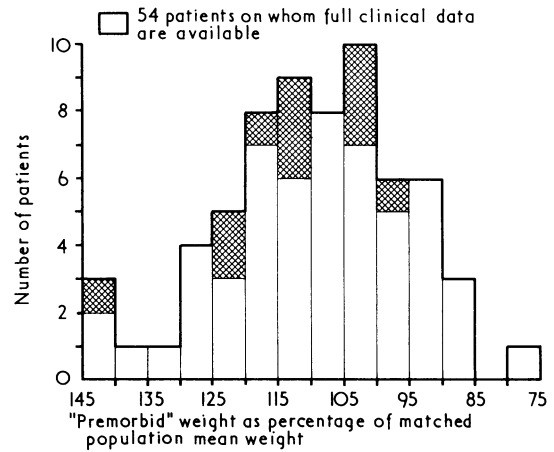


FIG. 2—"Premorbid"—that is, onset of dieting—weight as percentage of matched population mean weight in 65 patients with anorexia nervosa.

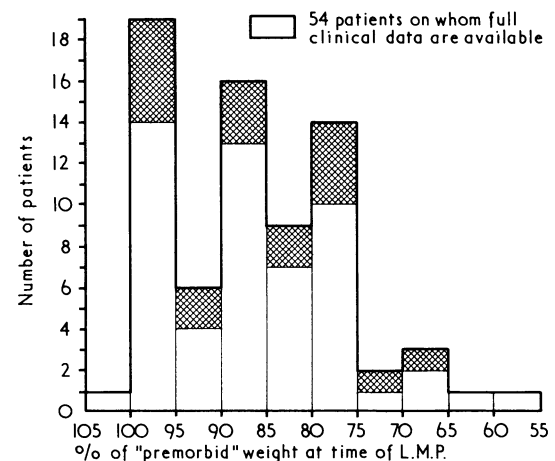


FIG. 3—Weight at time of L.M.P. as a percentage of "premorbid"—that is onset of dieting—weight in 72 patients with anorexia nervosa.

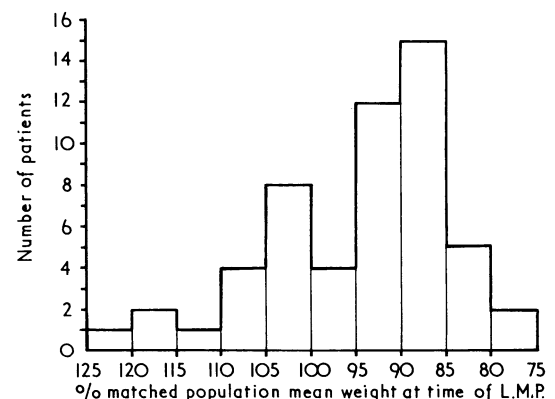


FIG. 4—Weight at time of L.M.P. as percentage of matched population mean weight in 54 patients with anorexia nervosa.

Finally, 27 patients were examined in respect of the reported time of return of their menstrual bleeding (a minimum of three successive bleeds within a six-month period) in relation to

restoration of stable weight, usually to within a few pounds of matched population mean weight. The patients in this investigation often found themselves at this latter weight with normal feeding patterns, including adequate carbohydrate ingestion, at least for some time after treatment, because its achievement was part of the aims of the treatment programme (Crisp, 1967a).

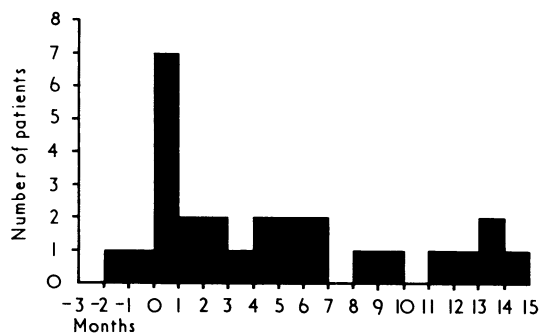


FIG. 5—Relationship of time of return of menses to restitution of weight in 27 patients with anorexia nervosa.

Later their weight sometimes deviated from this level. None of these 27 patients whose menses had returned in the way described above relapsed into primary anorexia nervosa again. Some, however, later became overweight.

Despite some inevitable degree of uncertainty about the exact timing of an event such as restoration of "normal" weight, Fig. 5 shows that often there was probably a substantial time lag between this event and the return of menstrual bleeding.

## Discussion

This study is concerned with the relationship of menstrual disturbance to aspects of nutritional changes in primary anorexia nervosa. There is some overlap between the population of patients who develop anorexia nervosa and the more common state of adolescent and more pervasive obesity (Crisp, 1967b, 1970). In this investigation the patients, immediately preceding their weight loss, were on average 6 kg heavier in weight than their matched population mean weight. In some instances this premonitory weight reflected recent acute weight gain. However, other patients did not show such major and acute weight gain during the immediate premonitory phase and provided histories of more chronic overweight, especially when the onset of the anorexia nervosa had occurred as late as within the third decade of life.

An appreciation of the fact that individuals with primary anorexia nervosa rarely seek change is, in our view, important to the understanding of its treatment. They usually wish and need to stay as they are, and are terrified of being trapped into treatment. They will often deny, sometimes to themselves but especially to others, that they have any difficulties or are in any way abnormal. To this end they will often effectively conceal aspects of their behaviour that could be seized on by others as clear evidence of "illness," or of which they are personally ashamed. Clinical information is therefore often restricted and distorted, and the condition can present major problems of differential diagnosis. This study has also been subject to these problems and we have attempted to pay attention to them, so that the information presented has often been the product of several separate avenues of inquiry.

Amenorrhoea is often an early sign of the disorder, in the sense that it draws the attention of others to the condition at a time when dieting behaviour may not have been going on for very long or may have been effectively concealed, and when weight loss is not great, especially in relation to general standards. Information concerning the relationship of these three factors can become especially distorted when obtained from patients with chronic anorexia nervosa, and when there is no information available from other sources.

Since in our study, as well as in studies of others, amenorrhoea can be seen to have occurred early in the condition, we would like to draw attention to the difference between the concept of the L.M.P. as the starting point of amenorrhoea, as distinct

from the proposition that amenorrhoea is heralded by the absence of the next menstrual bleed. Thus the endocrinological changes which promote this may supervene some weeks after the L.M.P. We regard this as important for our thesis that dieting behaviour, especially carbohydrate avoidance, may be an important factor in this disorder, contributing to the "switching off" of menstrual and reproductive activity at an early stage. Experimental evidence is still lacking on this point. We know that other factors can also affect menstrual bleeding, and it may well be that they also operate in this condition. For instance, excessive or abnormal emotional states and more complex psychopathological processes may be more directly associated with reduced or abnormal menstrual activity as part of their psychophysiological basis. Such factors as these may also have a more or less pervasive and therefore constitutional hold on the individual. However, we are not certain that the view of Russell *et al.* (1965), within which they proposed a possibly constitutional "subnormal" gonadotrophic factor as characteristic of this condition, always holds. Our population of patients, as previously mentioned, stemmed partly and significantly from a somewhat overweight adolescent population.

The treatment of these patients included the restitution of body weight to the individual matched population mean weight. This may be important as the mean weight at which menstrual activity returned was not significantly different from the matched population mean weight. Others have been less concerned to achieve this degree of restitution of nutritional status, and we wonder whether this may be a factor contributing to the findings reported by Russell *et al.* (1965), which show persistence of gonadotrophic abnormalities in such patients after treatment. Other overweight adolescent populations have been found to display more than usually vigorous and rapid physical development, though this can clearly be a variable factor among them, related among other things to the heterogeneous nature of the state of "common obesity." Such development has also been found to occur significantly often in the present patient population (Crisp, 1970). We suspect, therefore, that of the variety of constitutional factors that can contribute to both conditions, reflected presumably in the hypothalamic links referred to in the introduction, the factors of menstrual and sexual activity and fertility are not uniformly diminished among our patients.

If our views concerning the importance of carbohydrate ingestion and normal dietary patterns for menstrual function are correct to some extent, then patients whose weight and feeding patterns have not returned to "normal" would not be expected to show a full return of such activities. In our group of patients, when recovery was more complete the menstrual bleeding usually returned to its premonitory pattern, and such patients have often eventually settled down in married life and experienced normal pregnancies.

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