

CRUDE FIBRE, BOWEL MOTILITY, AND PATTERN OF DIET

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It has been known for long that there is a relationship between crude-fibre intake, bulk-forming capacity of diet, and bowel motility. Whereas fibre intake and bulk-forming capacity have attracted attention only relatively recently, there is an extensive literature on the subject of adequacy of bowel movement, laxation, and constipation. Purging was often referred to in Biblical times. Down through the ages in the various pharmacopoeias and recipes for herbs and simples, there was no lack of remedies for the costive.

Cereal Fibre in the Diet

Cereal-fibre intake was high in civilized communities until 3-4 generations ago. In Britain, before 1870-80, stone-ground wheat meal had little of the bran fraction removed from it. Bread made from this meal (often mixed with rye) was consumed in large amounts; a century ago the average daily consumption was about 21 oz. per person.¹ In addition, oatmeal porridge formed much of the diet of the poorer classes. Thus, a considerable amount of cereal fibre was ingested by the majority of the population. Since 1870-90, however, wheat has been ground in roller mills permitting the production of a bran-free white flour having a negligible fibre content. The bread made from it was eagerly welcomed by the general public, and in time almost entirely superseded the wholemeal bread. As prosperity increased and foods other than bread became more easily available, the amount of this foodstuff eaten per person slowly declined; whereas it was 16 oz. in 1902,² by 1945 it had decreased to about 11 oz.³ Moreover, of the present low intake, only a small proportion is made from high extraction meal. In the United States, Riley⁴ has related how 'the mass of the food of our fathers and grandfathers . . . was subjected to the simplest and most necessary processing only', and then referred to the changes in milling that took place when Benjamin Harrison was President. By 1942, of the total amount of cereal consumed, only 3% was of high extraction type.⁵

The progressive reduction in the consumption of bread was accompanied by great increases in the amounts of other foodstuffs eaten. Of these increases, perhaps the most outstanding has been that of sugar. In Britain, from 1835 to 1935 its consumption rose by about 500%;⁶ similar rises occurred in other Western countries. Sugar, upon digestion, leaves no residue. Major increases in consumption also occurred with dairy produce, eggs, and meat;⁶ these foods yield little residue after digestion. Very marked changes have taken place in the consumption of fruit and vegetables (other than potatoes).⁶ Yet in bulk-forming capacity, experimental⁷ and clinical observations⁸ indicate that lightly milled bread easily ranks highest, followed by vegetables like cabbage and carrots, with fruit lowest in the list. Briefly, the change in cereal extraction rate, the fall in bread consumption, and the lesser effectiveness in laxation of the increased consumption of fruit and vegetables, together greatly reduced the bulk-forming capacity of the diet.

Early Views on Constipation

How did this change affect bowel movement? There was no doubt among the authorities of the period of change that constipation was common, and would seem to have become increasingly so, although adequate information is lacking. By 1886 Cheadle,⁹ a leading clinician, wrote that there was 'no disordered condition of the body which is so frequently the subject of medical treatment as constipation'. This was reiterated by Sir John Sawyer¹⁰ in 1910, when he said that the treatment and cure of habitual constipation engage attention oftener than other details of remedial art. In the same year, Goodhart¹¹ affirmed 'that with advancing civilization aperients would always be with us', but lamented 'the change from the occasional pill of our forefathers to the excess of the present day'. There seems, moreover, to have been agreement over the primary cause of the increase in constipation. Cheadle,⁹ for

example, listed the chief cause as consumption of 'food which leaves little residue; very completely digested food . . . faecal matter too small to duly excite peristalsis'. This view was reiterated in various ways by later observers. It is recognized, of course, that factors other than crude fibre are influential in laxation. Thus it is accepted that physical exercise, as against sedentariness, is beneficial for bowel movement.¹² In various discussions in the past (when the subject evoked much more attention than at present), the question was asked occasionally: whoever heard of a ploughman or of a labouring man being constipated?¹³ Understandably, the urbanization accompanying the industrial age, the mechanization of farming, and other factors, certainly caused a decrease in the general activity of a large proportion of the population, and undoubtedly bears on the subject under review. Notwithstanding, there are reasonable grounds for considering that the prime factor influencing bowel motility, directly or indirectly, is the bulk-forming capacity of the diet. In this respect, it is of significance that during the last war, in countries which experienced dietetic changes which included an increase in crude-fibre intake, marked reductions in the incidence of constipation were reported, — in Britain,¹⁴ Eire,¹⁵ the Channel Islands,¹⁶ Switzerland,¹⁷ etc., — and the sale of aperients fell.

Excessive Treatment of Constipation

Regarding the situation at present, it has been stated that 'in no function of the body of civilized man is there so much self-interference as in the elimination of faecal waste'.¹⁸ The extent of the 'interference' must be enormous. In Britain, in a study of 1,352 National Health Insurance male workers, it was found that 61% purged themselves regularly with patent medicines, usually every weekend.¹⁹ In another study, an examination of 1,100 Post Office employees revealed that almost a quarter were taking aperients twice a week or more often; there was an increase in the practice with age, reaching a maximum of 40% in the sixth decade.²⁰ It is not therefore to be wondered at that inadequacy of bowel movement or constipation has been called the 'bane of the British people',²¹ and 'the national curse'.²² Nor is the condition less common in the United States; an editorial²³ in the *Journal of the American Medical Association* once movingly referred to 'the imperative need that millions of persons feel for something that will assist in the regulation of the bowel'. As to the amounts and the cost of purgatives used, accurate figures are not available. But in Eire (3 million inhabitants) in 1941, data given by Saunders¹⁵ indicated that the consumption of one purgative, Epsom salts, was approaching 300 tons *per annum*. If we extrapolate this consumption to the United States, then the amount ingested annually would approach 20,000 tons. In relation to costs, it was reported some years ago that over 100 million dollars were spent annually in the United States on laxatives; not included in this figure was the cost of proprietary cereal products frequently used for the same purpose and calculated to be in the neighbourhood of this sum.²⁴ Concerning propaganda, Thompson²⁵ stated that in Britain in 1941 about £300,000 were spent annually on advertising constipation cures; from the information given by him 2% of all newsprint advertisement space was thus occupied.

Significance of Constipation

The question which now arises is, is it really of any significance to health whether stools are hard or soft, large or small, formed or formless, eliminated regularly or infrequently, with ease or with pain?

In the early days, clinicians had no doubt that constipation was deleterious. Sir Lauder Brunton²⁶ and many others discoursed expansively on the relevant toxæmias and other ill effects. From the turn of the century onwards, patients with 'intractable constipation' were subjected to 'multilating' opera-

tions (severe at that time) whereby various lengths of the large gut were removed.²⁷ Sir William McEwen²⁸ in his Huxley lecture in 1910 sarcastically stated: 'There is at present openly expressed discontent about the alimentary tract. Some are persuaded that there is an intestinal whorl too much, and that this extra whorl requires to be short circuited'. As late as 1929, an Annotation²⁹ in the *Lancet* indicated that 'constipation is undoubtedly the cause of much ill-health'. About that time, however, largely due to the careful studies of able gastro-enterologists like Alvarez,³⁰ it was demonstrated that the direct ill effects of constipation are largely psychogenic, and that the 'well recognized train of symptoms: malaise, headache, hebetude, poor appetite, coated tongue and foul breath', associated with a loaded intestine, appear to be mainly of nervous origin.³¹ At the other extreme, the Gilbertian situation is such that Lord Horder³² drew attention rather to 'the harmful habit of swallowing purgative drugs'.

At present, therefore, the low intake of crude fibre associated with a measure of inadequacy of bowel movement, while common, is not apparently of direct importance to health; the condition is so readily relieved by 'something' from the chemist shop, that it is no longer a problem for the physician. The unimportance with which the subject is now regarded may be judged by the fact that the word 'constipation' is not even mentioned in the 66-page index of a recently published authoritative textbook on nutrition.³³

Inferior Present-day Dietary Pattern

The more important aspect of the subject which should be investigated is whether the pattern of diet which, *inter alia*, includes a low or negligible intake of crude fibre, is broadly inferior to that pattern which includes a high intake. The diet of our forefathers was high in crude fibre and bulk-forming capacity; but it was possibly low in energy value, and certainly low in animal protein, sugar and fat.^{34,35} This is still the pattern of diet consumed by the majority of the world's population (in Africa and Asia). Unfortunately, the variety of adverse environmental factors which affected populations in the past, and also affect less privileged populations today, militates against a precise assessment of the value of the pattern of diet described. Of great significance to the problem at issue is the fact that in wartime that pattern, in some measure, is often involuntarily imposed on civilized populations. The results of certain of these long-term changes in regimen are illuminating. In Britain, after the last war, it was stated that 'there has been a striking decrease in deaths of infants under 1 month, a great reduction in deaths due to inflammation of the gallbladder, a great reduction in deaths due to exophthalmic goitre, a reduction in diabetes mellitus, an enormous improvement in the death rate of children aged 5, and a substantial decrease in mortality associated with pregnancy. There was evidence of a diminished amount of anaemia'.³² While certainly there were changes other than diet which occurred simultaneously in the manner of life of the British people, it seems likely that the change in diet was the principal influencing factor. In Switzerland, much the same changes in diet and subsequent observations were made. Arising therefrom Fleisch¹⁷ maintained that 'the large amounts of calories, proteins, and fat formerly considered as the optimum and which were eaten in such civilized countries as the United States, England and Switzerland, are surely no necessity. They probably do not represent the optimum for health and capacity . . . A large part of the meat and eggs eaten before the war, and a large part of the refined food such as cooking-fat, sugar, white bread, macaroni, etc., can be advantageously replaced for health by potatoes, vegetables, fruit and darker bread. Today the world is imbued with the spirit that an agreeable taste goes hand in hand with biological value. The food of peace-time which was concentrated, strongly refined, rich in protein and fat, flatters the palate, but it is not the optimum for the organism'.

How many of the beneficial changes described could have been due to increased intake of crude fibre, with consequent effect on bulk-forming capacity and bowel motility? It is well-nigh impossible to differentiate between the metabolic ramifications of this factor, and the ramifications of the

total associated pattern of diet. There is some evidence, however, that addition of crude fibre to the diet of small animals has a promotive effect on general health, including fertility and longevity.³⁶ Surely we ought to know much more about the question whether crude fibre is or is not of importance in human nutrition, especially among contrasting populations. For instance, the South African Bantu has a higher rate of bowel motility, larger stools and greater frequency of defaecation than the European. Have these any bearing on health or disease patterns and are they connected with the amount of crude fibre in the diet?

Conclusions

The conclusions reached from the above wartime observations have been apparent to authorities in other periods. Charles Mayo³⁷ was not happy about the changing pattern of disease accompanying modern changes in diet. Cathcart³⁸ persistently maintained that it was possible to be well and to keep well on the simplest of diets. It has been averred by Wilder³⁹ that the need for better nutrition arises largely from the use of processed foods, especially white bread and refined sugar.

Assuming that these observations are true and their interpretation valid, then it is inescapable that there is much to be learnt from that pattern of diet of which a high intake of crude fibre is a feature. One implication is that the philosophy of producing 'bigger and better' by the reiteration of 'drink more milk', 'eat more fish', and similar popular slogans, requires re-examination. It will, of course, be argued by many that, while the importance of the observation cited is indisputable, the likelihood of peace-time populations changing from a palatable diet to one of less palatability is so remote as not to merit serious consideration. This view is open to argument. But irrespective of differences of opinion, there is a need, indeed, a duty, for writers of present-day textbooks on nutrition to devote a portion of their space to the nutritional lessons to be learnt from the past, from wartime experiences, and from present-day backward populations.

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