

Lessons Learned from Diabetic Diets over the Last Centuries

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Citation: Liebermeister H (2018) Lessons Learned from Diabetic Diets over the Last Centuries. J Obes Overweig 4(2): 202

Received Date: October 16, 2017 **Accepted Date:** December 17, 2018 **Published Date:** December 19, 2018

Abstract

For more than two millennia, healers and patients have tried to cure the symptoms of diabetes by dietary measures. These have changed with the advancing state of knowledge about this first mysterious, later puzzling disease.

In the last 100 years, the introduction of insulin, oral antidiabetics and improved possibilities for self-control have changed and somewhat reduced the importance of special dietetic measures. Since patients with type 2-diabetes now suffer earlier and more severely from the consequences of the metabolic syndrome, they should choose a normal “prudent diet” to prevent or at least attenuate this fate.

Keywords: Diabetic; Diabetic Diets; Diabetes Mellitus

Introduction

A lesson from history often shows short-cuts and frequently some wrong ways. These have also shown up in the field of diabetes and its dietetic treatment [1]. But I do not only want to describe these ways and also the wrong ways, but also to explain how they originated.

In fact: they are the consequences of the state of the art at the time which lacked many of the methods and perceptions which for us in modern times seem to be obvious. But in those days these recommendations were logical and pretty much plausible.

One example: Most of us know today that our earth turns around the sun, but only 400 years ago for every reasonable man and first of all for theologians it was clear and could be spelled out without danger of being burned at the stake that the sun rotates around the earth as is written in the holy Bible (Josua 10, 12-13). In fact the astronomical observations, measurements and explanations of Ptolemaeus using epicycles as an expedient fitted this theory astoundingly well [2].

The illness: “Diabetes” is known since antiquity. Diabetes in Greek signifies “through-flow” and describes the observation of the physician Aretaios in Kappadocia (80-131 p. C.) that in these patients the beverages “ran through” in spite of their heavy thirst and that they even lost weight [1].

The word “mellitus” was added only much later in Europe after the 30 years’ war when the British physician Thomas Willis stuck his finger in the urine of a diabetic patient and licked it [3].

Hindus, on the other hand had noticed already around the year 1.000 that this urine attracted ants and other insects and had drawn the correct conclusion - maybe testing also with their fingers - that it contained sugar. But this observation never got out of India.

But based on these observations, the Indian physicians of these times developed rather more modern dietetic recommendations for their patients: oat or wheat-meal with honey and physical exercise, either extended walking or – maybe for rich patients – riding on elephants.

Much earlier, the Roman physician Celsus recommended: restraint when eating or drinking sour wine, this is advice which could be also given today. The old Egyptians (1.500 a. C.) published a recipe in Papyrus Ebers, but which concerns all form of polyuria [4]. Diabetes was considered - which is understandable - a renal disease, and physicians tried to concentrate the watery urine by recommending milk as a drink. Much later, in the 19. century, Kussmaul noticed the exhalation of acetone and described the diabetic coma and the pronounced respiration of comatose patients named after him [5]. People had learned to demonstrate the presence of sugar and acetone in the urine, but could not measure them exactly, and no method was known to gauge the levels of sugar, fats or cholesterol in blood.

Therefore physicians concentrated on the sugar in urine whose presence they could demonstrate. They used the expression “sugar-disease” and tried to ban sugar from nutrition. They also knew that sugar is a carbohydrate and limited the uptake of carbohydrate-containing nutrients. They also followed the suggestion of A. Bouchardat: “Mangez le moins possible” i. e.: “eat as little as you can”, an advice which also nowadays could eliminate and also prevent about every second case of diabetes [6,7].

“Diabetic patients with type 2 frequently don’t have diabetes, but a belly.” Bouchardat had found out during the famine caused by the Prussian siege of Paris in 1870, that his diabetic patients benefitted from this enforced fasting and that the sugar in their urines diminished considerably. His experiences were also confirmed in both world wars with the ensuing periods of starvation [8]. Before insulin was discovered, especially American physicians among them F. M. Allen propagated days of total fasting and extreme cures of hunger [9]. They succeeded in diminishing death by coma, but quite a few patients died from malnutrition. Therefore, in Sweden and in the USA nutrition schemes were developed which contained lots of fat, but little carbohydrates and proteins – to prevent gluconeogenesis - with the aim of lowering sugar excretion. Erich Grafe, the medical teacher of my father in Würzburg, reported after a visit to Stockholm: “Swedes are used to much greater amounts of fat than Germans, and the sight of 12 diabetic patients taking slices of cucumber smeared with lots of butter for a second breakfast as I observed in a hospital-room of Professor Petrén would be unthinkable in a German hospital” [10]. On the other hand, von Noorden in Frankfurt had noticed that ketoacidosis improved after administering oats and recommended “oat days” with 150 to 180 grams of oats to prevent an impending diabetic coma [11]. And this also was a correct observation and logical since we know today: “fats burn in the fire of carbohydrates.” Only the burning of fat after administration of carbohydrates can limit the formation of ketone bodies and thereby possibly prevent a diabetic coma. Carbohydrate uptake also prevents the formation of so-called “nutritional acid slush”, i.e. the formation and excretion of acetone which diet-apostles try to fight by cures of total fasting and others. They don’t know or don’t acknowledge that this slush formation is only the consequence of the lack of carbohydrates due to their dietetic teachings.

It is logical that oat-days with the administration of carbohydrates and calories were successful in preventing diabetic comas, but they were not appropriate for long-term nutrition. This “oat cure” advised soups from 100 to 200 grams of oats for one to two weeks combined with 200 to 300 grams of butter, red wine and tea. Also known were slowly decomposable carbohydrate-carriers and diabetics were encouraged - as in our days - to prefer whole-meal products instead of white meal bread. v. Noorden shaped the expression “Broteinheit” i. e. bread-unit. It is defined as containing 10 up to 12 grams of digestible carbohydrates, e. g.: one (thin) slice of bread or a middle-sized apple or a potato [12].

Content of bulk material and retarded digestion are much more significant in diabetes diet than the sometimes absurd discussion of relative amounts of fat or carbohydrates in daily nutrition.

Taken together: before the discovery of insulin, especially patients with diabetes of type 1 died either in coma or by starvation

Their diet was supposed to be sparse and devoid of glucose. Proteins should be included sparingly and people had to change to oat-meal following v. Noorden or to the “Mehlfrüchte-Kur” i. e. “cereals” plus vegetables, recommended by W. Falta or to fat in the “Petrén-diet” [13].

Without insulin, you had to drive a car without brakes, as often as possible without accelerating or going downhill.

The fear of glucose was certainly justified before the discovery of insulin, but this acceptable attitude during the time of the German emperors was for a long time the scientific basis of official recommendations for the nutrition of patients with diabetes. It was also the legal base for the production of useless special “Diabetiker-Lebensmittel” as dietetic products. The EU has banned them many years ago, and Germany was the last nation to stop their production.

This fixation on sugar - strengthened by the unlucky German expression of “Zuckerkrankheit” - has led to much misery.

But even today elder, obese diabetic patients are frequently warned by outmoded dietiticians to avoid sugar and carbohydrates. They are asked – even those without insulin treatment – to calculate their intake of carbohydrates in “Broteinheiten”. Thereby carbohydrates are branded as dangerous and their uptake is diminished by a too small prescription of these “bread-units”. Consequences were obvious: voracious appetite and these hungry patients started to eat more fats and proteins; they put lots of butter and sausage not on cucumber as in Sweden of old days, but on very thin slices of bread.

During the 19th century, the determination of blood sugar required around 250 ml. of blood. Only after the medical student CH Best had learned to measure blood sugar with a newly developed method, FG Banting was able to discover insulin in 1922 [14].

This dependence of a discovery on a correct measurement-procedure showed up again in the field of diabetes during World War II, when A. Loubatières in Montpellier worked with the first sulfonylurea product and found out that it was a poor antibiotic, but could lower blood sugar down to deadly hypoglycemias [15].

After the discovery of insulin, the situation changed dramatically: Many diabetic patients nearing death by starvation could be maintained in life – some of them for many years - in a tolerable state of health. The two Canadian researchers offered their

discovery to humanity without applying for a patent, and the pharmaceutical industry was soon able to start the mass-production of this life-saving hormone. The victory over diabetes was then proclaimed triumphantly, but erroneously.

Some complications appeared which had not been noticed before. It had been known previously that diabetic patients could develop blindness, but before insulin was discovered few of them had survived long enough to reach this state. Now the frequency of diabetic coma diminished dramatically, but patients had to confront diabetic microangiopathy and its effects on the eyes, kidneys, nerves and feet to its full extent. Soon it was correctly assumed that an efficient correction of the diabetic metabolism could lessen and retard these complications remarkably.

The “Alt-Insulin” of these days contained many impurities. This resulted in a strong formation of antibodies and these antibodies bound insulin in blood and set it free only slowly. Thereby the effect of insulin was retarded. This had a good and a bad consequence: Patients did not have to inject their insulin as often as they would be obliged to do today after being transferred to highly purified normal insulin which induces only a small antibody-production, but even with only two injections per day their insulin levels stayed highly elevated for a long time after their meals and they had to fear hypoglycemias. In addition, pharmaceutical firms had soon developed longer acting insulin-preparations which further increased these good and bad consequences.

In-between and late meals had to be introduced to compensate for these persisting insulin levels, and doctors and patients were obliged to adapt nutritional intake more to the timetable of insulin injections, the quantities injected and to the action profile of the insulin preparation used [16].

Now the diet proposal for a diabetic patient – and unfortunately not only for patients requiring insulin – could include e. g.: 20 bread-units, distributed over 6 meals:

- 2 BE for the first breakfast meal
- 3 BE for the second
- 6 BE for lunch
- 2 BE for afternoon tea
- 5 BE for supper
- And 2 BE for a late night-meal

These meals had to be served exactly on time and sugar remained forbidden.

Patients learned to estimate roughly their sugar - and if needed their acetone-levels - in the urine, not to measure them. But determination of blood-sugar remained difficult and could only be performed maybe once per month in the doctor's office. It is understandable that such a strict regime of insulin injections and meals, if it had proved to be of value, had to be maintained as strictly and for such a long time as possible.

This stiff corset had to be accepted in those days: the physicians, e. g. my grandfather and my father had been medical officers in wartime and patients came to a garde à vous when the hospital physician appeared, and they accepted these strict prescriptions more or less and without question.

Today, we have learned to simplify prescriptions for insulin injections and nutrition. We use kitchen-measurements (handful, tip of a knife) instead of diet-balances and know better how to motivate our patients by these methods. But there is still too much talk about percentage of fat and there are too little practical suggestions such as “five a day”= 5 small (in children) or big (in adults) handfuls of vegetables or fruits per day.

But progress gave us better and more precise methods for blood-sugar determination, even on appropriate “strips” for “dry-chemistry”. Now our patients are able to measure themselves and get an impression of the quality of their diabetes handling. But it took quite a while until this “democratization” of diabetes treatment established itself. Nowadays patients themselves can decide how much and when to inject insulin and fix their meals accordingly.

Michael Berger and EA Chantelau from Düsseldorf could point to original the ideas of JP Joslin and succeeded in implanting this more liberal attitude towards diabetes diet in Germany [17].

Doctors learned that insulin offered the possibility to control a moderate intake of glucose. Today it can reach about 10 % of daily nutritional-uptake. **The car now has a brake.**

The differences in nutrition of diabetic patients and metabolically healthy persons are getting smaller and smaller. There is a **convergence** of our nutrition proposals. A relief for those cooking. One meal now can be served to the whole family.

This change was supported by observations that diabetic patients did not so much die any longer in coma, but suffered from the deadly consequences of arteriosclerosis i. e. myocardial infarctus and strokes as did persons without diabetes, only more frequently and earlier.

People got older and more obese. Wealth had its price, more and more people suffered from diabetes type 2. They did not die any longer from starvation but from the effects of obesity. Research discovered and described the **metabolic syndrome**, the deadly quartet consisting of: Obesity, Hypertension, Diabetes and Hyperlipoproteinaemia [18].

In the meantime the methods for determination of cholesterol and its components e. g. LDL and HDL as determinants of arteriosclerosis had been established.

Furthermore epidemiologists had proven in the UKPDS-study that for diabetes-patients it was more important to normalize their hypertension, their lipid levels and their bodyweight than to fine-tune their bloodsugar-levels [19].

After this abandonment of the “glucocentric” view of diabetes – again due to the advent of new laboratory methods – which is somewhat comparable to the Kopernikanian revolution - diabetic patients not needing insuline now can nourish themselves pretty much the same way as persons without diabetes, they don't need to follow a special diet, but they try to realize a reasonable nutrition, e. g. “flexible mediterranean diet” following the advice of diabetologists worldwide [20].

In changing long-term habits of nutrition, we have to avoid a number of mistakes which are typical for eating and drinking in our industrial society:

- Too fat
- Too much sugar
- Too much salt
- Too much alcohol
- Not enough cellulose as bulk material
- And not enough secondary plant constituents

Diabetic persons without insulin-treatment don't need a kitchen balance any longer, but a well-functioning bath-room balance. They should not insist on counting pieces of sugar and bread units, but they should know unhealthy fat preparations and avoid them. Inquiries have partially confirmed the affirmations of obese people that they didn't eat so much more as their neighbors with normal weight. They may consume less sugar, but much more saturated animal fat which may lead to arteriosclerosis.

They should seek to lose about 5 to 10 kgs in a year by diminishing their caloric intake and take up more physical exercise. Such an obtainable and persistent moderate weight loss consists mostly of fats from “unhealthy” depots in liver and abdomen. It lowers blood-sugar levels, helps to spare medication and lowers high blood pressure and blood-lipid-levels [21]. Many benefits from one singular treatment. And a lowered nutritional intake combined with more physical activity is a really **natural** treatment without chemistry on one and less hocus-pocus on the other hand. But today still, recommending an uptake of 55 and more relative percent carbohydrates is mistaken, since this advice can be followed only by professional cycling-sportsmen maybe taking part in the tour de France.

Facit: With our proposals for nutrition – no longer with the focus on a special diet – in diabetes mellitus, we should keep the wrong ways of the past to the back of our minds, but should not err around with them.

Conclusion

Former remedies for the nutrition of patients with diabetes mellitus may seem strange to modern men. But they were based on rational reflections and influenced by the state of knowledge of their time.

The advances in diabetes treatment by insulin and oral antidiabetics have lessened the importance of special antidiabetic regimes. Especially, for the many patients with type 2-diabetes who in our times do not so much succumb to diabetic coma or to dangerous hypoglycemia, but to the cardiovascular consequences of the metabolic syndrome. They should follow a flexible mediterranean diet and alleviate the task of the cook who would no longer have to prepare 2 different types of meal one for the diabetic and one for the rest of the family.

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