

Dietary Changes in Temporal Relation to Multiple Sclerosis in the Faroe Islands: An Evaluation of Literary Sources¹

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Abstract. In order to generate additional hypotheses on a possible role of dietary factors in the etiology of multiple sclerosis, the ethnographic literature and other relevant sources from the Faroe Islands were reviewed. A transitory occurrence in the first half of the 20th century was evident for the extended consumption of oat products, of fulmars possibly infected with ornithosis virus, and of foodstuffs treated with wood smoke or smoke condensates. The hypothetical basis of these considerations must be emphasized.

Introduction

The peculiar time course of the incidence of multiple sclerosis (MS) in the Faroe Islands between 1943 and the 1960s [1, 2] might bear important clues to the etiology of this CNS disorder. In spite of the close association in space between the Faroese MS patients and the British troops stationed during World War II [1, 2], a possible role of other factors cannot be excluded considering the farguing changes within the Faroese soci-

ety in the prewar decades [3–6]. In particular, the association of the MS cases with the most populated communities [7, 8] aggravates the elaboration of definite risk factors, since many features, including British troops, were characteristic for the larger communities [7, 8]. One example were the industrial fisheries with their special social background [8].

Since the social changes during the so-called 'slupp period' (about 1870–1940) included also nutrition [3–5, 9], an attempt was made to point out dietary factors that showed a transitory occurrence in an appropriate time interval to the incidence of MS.

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The at first only feasible method appeared to be a comparative evaluation of published geographical and historical sources.

Methods

All relevant works which gave more detailed information on the dietary habits in different time periods were reviewed. These included a number of summarizing works [3, 10–12], ethnographic descriptions of defined periods [4–6, 13–22], papers dealing with agriculture and horticulture [23–27], and several belletristic works [28–32]. Furthermore, four Faroese cookery books that appeared in the course of this century [33–36] were analyzed. The period thus covered reaches from 1670 [13] to our days [36]. Most of this material, including rare copies of the ancient cookery books, were available at the National Library of the Faroe Islands (Landsbóksavn), the Municipal Library (Bybókasavn) in Tórshavn, and at the Royal Library and the University Library in Copenhagen.

Results

A presentation of all details of this evaluation is beyond the scope of the present epidemiological intention. There was an increasing tendency towards a continental diet, as usual e.g. in Denmark, since about 1900, but the changes progressed slowly before World War II. Only after the war a rapid evolution took place with the introduction of many new elements. On the other hand, the traditional diet based on fish, mutton, whale, wild birds and potatoes is still maintained, particularly in the smaller villages, and the present diet might be regarded as a mixture of traditional and modern elements (see appendix).

The features for which a more transitory role in the early 20th century is indicated by the literary sources are summarized in table 1.

Table 1. Transitory dietary features in the Faroe Islands in the period ca. 1900–1960

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- | | |
|---|---|
| 1 | Meat of large whales (finback, blue whale, lesser rorqual) in addition to traditional pilot whale |
| 2 | Use of boric acid ('aseptin') for preservation of sheep's blood in bottles |
| 3 | Large amounts of fulmars (havhestar), possibly infected by <i>Chlamydia psittaci</i> |
| 4 | Oats and rice porridge as usual supper meal |
| 5 | Smoking (peat fire) or application of liquid smoke ('wood vinegar') |
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Discussion

Although daily nutrition is an important part of human environment, comparatively few studies addressed a possible role of dietary factors in the etiology of MS. Thus, correlations of different morbidity or mortality rates with the per capita consumption of animal fats and proteins [37], of pork [38] and of milk [39] were reported. In Norway, the association of MS with meat in contrast to fish consumption [40] gave rise to dietary trials [41]. The lack of MS in Greenland eskimos was explained by their diet rich in polyunsaturated fatty acids [42], and the correlations of MS with colon carcinoma [43] and dental caries [44] were explained by supposed dietary factors. Case-control studies, on the other hand, could not support, so far, a role of one or another nutritional factor [45, 46], but recall problems limit the usefulness of this approach considerably, as shown e.g. in cancer and arteriosclerosis research [47].

Since the subject in question is a sociocultural one and lies back in the past, the present approach might be the only feasible one to generate first-step hypotheses. Doubtless, the results are very preliminary, and need confirmation by more detailed epi-

miological investigations in the Faroe Islands and elsewhere, before further conclusions can be drawn. Nevertheless, some aspects shall be discussed.

Whereas the consumption of the meat of large whales and the use of boric acid for blood preservation are special Faroese features and incompatible with the MS epidemiology in general, the high intake of oat products in the early 20th century deserves some comment. This grain plays a prominent role in human nutrition in those regions where MS is most common (e.g. Scotland, Ireland, Scandinavia). Furthermore, a correlation between the MS risk and the extent of oat cultivation was found in several European countries or regions [48]. A possible role of an oat-related plant virus [49] had been discussed previously [50], but oat lectins [51] and food antigens should also be considered. Epidemiological arguments, however, against a causal role of this factor have been mentioned [48].

The catch of young fulmars which played a prominent role among the lower strata of the Faroese population [6], might be of interest with respect to the epidemic of human ornithosis during the 1930s [7]. Arguing, at first, against a causal role of this virus is the fact that only women were affected by ornithosis in contrast to MS. Whereas some case-control studies [46, 52] could not detect any association between MS and birds, a recent Swedish investigation revealed a higher risk in women keeping domestic birds [53]. In agreement with recent views [54], at best an unspecific role of such a virus might be discussed.

The curing procedures are of particular interest. As emphasized repeatedly [3, 10], smoking does not belong to the traditional methods of food preservation in the Faroe

Islands. This is in sharp contrast to most parts of Europe (excluding the south) and regions settled from Europe (including Iceland).

According to some reports, however, smoking [5, 9, 33] over peat fire or the use of smoke condensates [33, 34] were more usual in those decades. Especially sausages were treated in that way. Interestingly, smoked meat ('røget kød') was especially mentioned in the Law on Food Supply on Faroese Fishing Boats from 1939 [55]. One might speculate that the introduction of refrigerators and freezers since the late 1950s [6] made this method of preservation unnecessary. At least, the most recent cookery book from 1976 [36] mentions these modern methods along with the traditional ones (salting and wind drying), but omits smoking. It shall be mentioned that the eskimos do not smoke their food either [56], whereas smoking over peat fire ('reesting') was very common in the Shetland Islands [57].

When looking for a biological plausibility of that factor, the occurrence of different phenols in wood smoke and smoke condensates [58, 59] is of particular interest. Especially those phenols that bear an aldehyde group in the para position, are easily conjugated with lysine residues of meat proteins [60, 61]. On the other hand, the phenols react with nitrite originating from the curing procedure and form different nitrophenols (NP) [62]. In that way, a variety of NP-carrier conjugates are formed in the meat and presented to the intestinal immune system of the consumer. Considering the properties of e.g. dinitrophenol and trinitrophenol, as known from basic immunologic research, e.g. their ability to break self-tolerance by modifying self-determinants [63, 64], to react with MHC products thus induc-

ing an antiautologous class II T-cell response with subsequent polyclonal B-cell activation [65, 66], to induce the formation of antibodies whose idiotypes cross-react with (murine) class II antigens [67], to cross-react *per se* with human IgG epitopes [68, 69], and to obscure the difference between self and foreign class I [70, 71] and class II [72] antigens, a contributory role of such agents in the generation of autoimmune responses should not

be excluded. Since smoke from coniferous wood is rich in compounds of the guaicol type [58, 59], having a free 6-position, nitrophenol formation might be more extended when coniferous wood is used for smoking. A possible role of the latter factor would be in agreement with the peculiar association of the MS risk with processing of coniferous wood described recently in some countries [48, 73].

Appendix

Grain products

T: only barley (porridge, 'drylur')
1900+: rice, oats, sago as porridge; rye bread
1945+: bread and cakes common

Milk and milk products

T: fresh milk; coagulation milk products (romastampur, loypingur); simple cheese
1900+: increase of milk consumption
1945+: all sorts of imported cheese (Denmark)

Fowl

T: guillemot; puffin; razor-bill; garnet; some geese
1900+: young fulmar (havhestur); more geese
1945+: restrictions in catch of fulmars; decreasing catch of wild birds; chicken more usual

Spices

T: intestinal fat of sheep (garnatalg)
1900+: pepper; curry; mustard; nutmeg; cinnamon
1945+: increasing use, many sorts

Beverages

T: water; milk; soup
1900+: tea; coffee; beer
1945+: all sorts of juice; cola; lemonades etc.

Vegetables and fruits

T: turnips; potatoes (1800+); 'kvann'; sorrel
1900+: cabbage, cauliflower; onions; rhubarb; black and red currant; gooseberries; raspberries; strawberries.
1945+: many imported fruits; deepfrozen vegetables (carrots, peas, spinach).

Meat

T: mutton; pilot whale (grind).
1900+: much beef; liver of beef cattle; large whale
1945+: pork in addition

Fish

T: cusk; coalfish; halibut
1900+: cod (klipfisk, mainly exported)
1945+: no change

Fats

T: Tallow; little butter
1900+: margarine; coconut fats
1945+: different vegetable oils

Preservation

T: wind-drying; salting
1900+: smoking/liquid smokes; salpeter; boiling-down; 'aseptin' (blood); cooking down
1945+: refrigerating; freezing

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