Diabetes in Wales

DAVID J. B. ASHLEY

From Morriston Hospital, Swansea

Diabetes mellitus is a biochemical disorder of insulin production and glucose metabolism which is known to be fairly common in the countries that have adequate medical services. Many workers regard the underlying defect as an innate potential biochemical disorder which may become clinically evident as diabetes as a consequence of increasing age or as the result of a change in the environmental stresses to which the individual is subjected, e.g. pregnancy, infection, steroid medication, or obesity (Jackson, 1955). This underlying defect is, in turn, regarded as due to the effect of an abnormal genetic constitution whether this is in a single gene (Harris, 1950; Steinberg, 1959) or to the combined effects of a number of genes working in concert (Simpson, 1964; Thompson, 1965).

Present Investigation

Recent investigations have shown that the Welsh and non-Welsh components of the population of Wales, who differ little if at all in environment, can be separated on the basis of their surnames, and that genetic differences in blood group genes and in disease susceptibility can be detected (Ashley, 1966, 1967; Ashley and Davies, 1966a, b, c). The techniques used in the previous surveys have been applied to the study of diabetes mellitus in the Principality.

Swansea Cases. Studies were made from the records of Morriston Hospital, Swansea, on 301 patients suffering from diabetes. All were male or young female subjects below marriageable age, and it was assumed that the surname of each was that of his or her father. The group was subdivided into those who lived in the County Borough of Swansea, those who lived in the adjacent parts of the county of Carmarthenshire, and those who lived in the adjacent parts of the county of Glamorgan. In each case the number of people who had a surname included in a list of 96 surnames regarded as Welsh (Ashley and Davies, 1966a, b) was counted, and this was compared with the number to be expected (Table I). The expected numbers were derived from a survey of the electoral registers of the several parts of Wales.

There was an excess of subjects with Welsh surnames in each area and in the group as a whole. The difference was highly significant in the whole group and in the group of patients whose home was in Glamorgan.

<table>
<thead>
<tr>
<th>Home</th>
<th>Total</th>
<th>Welsh Names</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Observed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swansea</td>
<td>122</td>
<td>63</td>
<td>53</td>
<td></td>
</tr>
<tr>
<td>Glamorgan</td>
<td>93</td>
<td>63</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Carmarthen</td>
<td>86</td>
<td>61</td>
<td>59</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>301</td>
<td>187</td>
<td>162</td>
<td></td>
</tr>
</tbody>
</table>

Deaths from Diabetes. The diabetic state can generally be controlled satisfactorily by attention to the patient’s diet and by the administration of insulin or some other hypoglycaemic agent. There are, however, each year a number of deaths in which diabetes is inculpated as a causative factor. The Registrar General’s Reports for 1963 and 1964 (1965, 1966) give the Standardized Mortality Ratios (S.M.R.) for diabetes for the area of the Welsh Hospital Board, which is coterminous with the Principality of Wales. For men the ratio was 93 in 1963 and 100 in 1964; for women the corresponding ratios were 113 and 131. Only the last of these four ratios is significantly different from 100, as the number of deaths involved is small.

When the seven years 1958 to 1964 are taken together the observed number of deaths among men is 513 and the expected number 545.5; the S.M.R. is 94 which is not significantly different from 100. In the case of females the observed number of...
Diabetes in Wales

275
deaths was 1112 and the expected number 926:1; the S.M.R., 120, is significantly above 100. These
data show that death attributable, at least partially, to diabetes is commoner among women in Wales
than among women in England.

These analyses are concerned with Wales as a
whole and do not take into account the different
components of the population. This difference can
be assessed on the basis of the surname and also on
the basis of the ability to speak the Welsh language.
The two parameters are strongly correlated (Ashley
and Davies, 1966a), and the second, the use of the
Welsh language, can be used to form a subdivision
of Wales into three parts. In one part, the counties
of Anglesey, Caernarvon, Cardigan, Carmarthen,
and Merioneth, more than 70% of the population
claimed at the 1961 census to be Welsh speaking
(Registrar General, 1962b); in the counties of
Monmouth and Radnor and in the County Boroughs
of Cardiff and Newport less than 10% of the popula-
tion were Welsh speaking, while in the remainder
of the country between 15 and 45%, of the population
were Welsh speaking. These three areas are
designated high Welsh, intermediate Welsh, and low
Welsh. The total numbers of observed and ex-
pected deaths attributed to diabetes in these three
areas were calculated for the 5 years, 1958 to 1962,
from the Registrar General's Annual Reports for
those years and from the 1961 Census Returns
(Table II).

TABLE II
DEATHS ATTRIBUTED TO DIABETES IN WALES
1956–1962

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th></th>
<th></th>
<th></th>
<th>Females</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Observed</td>
<td>Expected</td>
<td>Ratio</td>
<td>Observed</td>
<td>Expected</td>
<td>Ratio</td>
<td></td>
</tr>
<tr>
<td>High Welsh Intermediate</td>
<td>85</td>
<td>66:97</td>
<td>127</td>
<td>157</td>
<td>127:5</td>
<td>123</td>
<td></td>
</tr>
<tr>
<td>Low Welsh</td>
<td>192</td>
<td>203:1</td>
<td>106</td>
<td>448</td>
<td>363:5</td>
<td>123</td>
<td></td>
</tr>
<tr>
<td></td>
<td>76</td>
<td>109:4</td>
<td>76</td>
<td>174</td>
<td>163:1</td>
<td>108</td>
<td></td>
</tr>
</tbody>
</table>

In the case of males there is a clear gradient be-
tween the high Welsh speaking area with a high
S.M.R. and the low Welsh speaking area with a low
S.M.R. The difference between the ratios for the
high and low Welsh areas is significant. In the case
of females the ratios for the two higher Welsh areas
are the same and are both greater than the ratio for
the low Welsh speaking area.

Hospital Admissions. In 1964 the Ministry of
Health published a report on an inquiry into
hospital admissions for the year 1961. In the
country as a whole the discharge rate for patients
suffering from diabetes was 6·5 per 10,000 for males
and 8·9 per 10,000 for females. For the hospitals of
the Welsh Hospital Board, i.e. for the hospitals of
Wales, the discharge rate for men was 7·6 per 10,000
and that for women was 10·7 per 10,000. The rate
for men was highest among the 15 hospital region
areas, that for women was third.

Discussion

The frequency of diabetes among the Welsh
people of Wales has been investigated from three
points of view. The hospital admission rate for
this disease is high in Wales relative to the rest of the
country. Deaths attributable to diabetes are com-
moner among women in Wales than in England and,
within the Principality, are higher both for men and
for women in the areas in which Welsh is a com-
monly spoken language. Finally, there is an excess
of Welsh surnames among patients suffering from
diabetes in the hospital of South West Wales which
was studied. The evidence from these three
sources taken together points to a difference be-
tween the Welsh and non-Welsh people of Wales,
which is reflected in their different susceptibilities
to the clinical disease diabetes mellitus.

It is probable (Jackson, 1955) that the clinical
disease is the result of the interaction between the
genetic constitution and the internal and external
environment. The external environments of the
Welsh and non-Welsh people of Wales are similar
in occupation, social status, and housing (Ashley
and Davies, 1966a); a preliminary survey has shown
no difference in fertility and it seems reasonable
to conclude that the observed differences are due to a
difference between the gene pools of the Welsh of
Wales and the non-Welsh immigrants.

This survey offers no assistance in resolving the
conflict between the single gene and multifactorial
hypotheses of the genetic factors in diabetes (Harris,
1950; Steinberg, 1959; Simpson, 1964; Thompson,
1965); in either event it is the prevalence of the
genes in each of the two populations which is mani-
est as the frequency of clinical diabetes.

Summary

The distribution of diabetes mellitus in Wales has
been studied. There is a relative excess of this
disease in those parts of the Principality in which
Welsh is commonly spoken, and there is an excess
of patients with Welsh surnames among patients
suffering from this disease in South West Wales.
It is suggested that this difference between the
Welsh and the non-Welsh is due to a difference in the gene pools of the two groups of people in respect of the gene or genes concerned in the aetiology of diabetes mellitus.

This work was carried out with the aid of a research grant from the Welsh Hospital Board.

REFERENCES


