THE TREND OF DIABETES IN SASKATCHEWAN, 1905 TO 1934*

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THE North-west Territories were divided in 1905 when Saskatchewan became a province. Thus we have an opportunity of studying the trend of diabetes in a province whose settlement by white men began just over fifty years ago. In 1905 the population of Saskatchewan was 236,000; by 1933 it had increased to 951,000. Seventy per cent of the population is rural.

Racial origins are varied. Approximately one-third of the population were born outside of Canada (1931 census). The immigrants came from Great Britain, from the United States, and from Europe. Germany, Russia, Austria, Poland and the Scandinavian countries have contributed settlers. There are very few Italians, Spaniards, Japanese or negroes, but there are a number of Chinese. The native Indian population is estimated to be 15,000; there has been a substantial increase in their numbers in the past ten years.

Temperature variations are extreme, from 56° below zero in the winter to 104° in the summer, giving a range of 160°.

A great deal of popular interest and disappointment has been aroused by the publication of statistics which show that the death rate from diabetes has not ceased its upward trend since the discovery of insulin. That it continues to increase thirteen years after the insulin has been in general use is of interest to the physician and to the statistician. It will be shown from an analysis of statistics that little assurance can be given that the rate will drop in this province. Diabetes ranks eighteenth in the list of the causes of death in Saskatchewan.

Careful studies have been made on the trend and incidence of diabetes by Joslin, Dublin and Marks,[1] and by Ross and McKinnon,[2] for Ontario. All students of the problem find the same tendencies. The general death rate from diabetes is rising. The rate for those under fifty is falling, but the rate for those over fifty is increasing faster than the rate of those under fifty is falling. The rate for women is increasing faster than that for men.

A country with an average young population has a low diabetic death rate. The lower the income, the higher the birth rate. Raymond Pearl says that this class differential fertility is always present in society. In 1934 the city of Regina, with a population of 60,000, had 18 per cent of the population on relief. There were 918 births to Regina residents; 286 of these babies were born to those on relief; the birth rate of those on relief was 26 per 1,000 and of those not on relief, 13 per 1,000. So in countries with a low per capita income there is a high birth rate, with a resulting low average population age. The following countries have a higher birth rate than Saskatchewan: Greece, Hungary, Italy, Lithuania, Poland, Roumania and Spain. All of these countries have a low per capita income. With their high birth rate goes a low diabetic death rate. Italy in 1931 had a rate of 8.2; Spain had a rate of 8. In the more prosperous northern countries, with lower birth rates and higher average population age, there are higher diabetic death rates. Norway in 1930 had a rate of 11.6, and Holland in 1930 had a rate of 17.6.

In Chart 1 we see the rising rate in Saskatchewan. Reasons for this rise are as follows. The infant mortality is falling, the death rate from tuberculosis is falling, leaving more people to grow to maturity and to develop diabetes in the fifth decade, if not earlier. The average population age is increasing, because people who immigrated as youths are growing older and immigration has ceased. In spite of falling incomes the birth rate is following the downward trend observed in all parts of the world where births are not encouraged by subsidy or by propaganda.

Other reasons why the death rate from diabetes does not improve are: the carelessness of the young diabetic, who feels that he can show sugar without danger, because insulin will always bring him back; but some intercurrent infection often lurks in his system, causing death. Theoretically, the young diabetic should live to old age; it is not the present lack of scientific knowledge that causes him to die, but his own self-indulgence. Knowledge of modern

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diabetic treatment has been available since 1922, but this knowledge has not completely penetrated the medical profession. Definite knowledge of how to treat the diabetic is easily available, but is not always used. Then there are the fake remedies that promise freedom from glycosuria without the use of insulin. They run the gamut from the use of the Abrams' machine to pills.

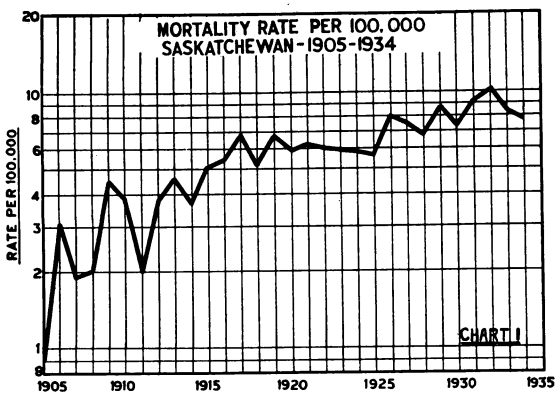
Joslin *et al.*[1] have stated that, "whenever and wherever the conditions of life are easy, food abundant and relatively cheap over long periods, and when large numbers of individuals become accustomed to partake of food in excess of their requirements for the expenditure of energy, the frequent development of overweight and diabetes is favoured. The United States has the highest diabetic death rate in the world. Relatively high rates prevail in most of the British colonies. In Europe the rates in the northern countries are higher than in the south and east, which means that they are higher among the Germanic groups than among the Latins and Slavs. It is precisely in countries where diabetes is most frequent that the level of per capita income is high, and it is reasonable to assume that the level of nutrition corresponds with the per capita income."

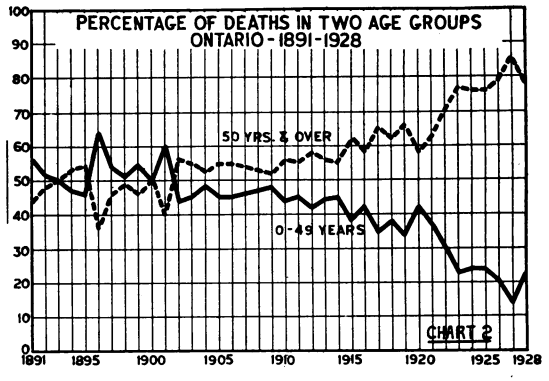
Since 1930 the income of the people of Saskatchewan has decreased in a rapid and spectacular fashion. But the people do not lose weight because of poor diet; when they are short of money they eat an unbalanced high carbohydrate diet, because carbohydrate is the cheapest food available. Flour and cereals yield more calories to the dollar than any other foodstuff; low-calorie diets, with their vegetables and proteins and fresh fruits, are expensive. The following conditions help to produce the low rate in Saskatchewan: a young population (23 per cent of the population is under ten years of age); an agricultural population (70 per cent of the population is rural); no city is over 60,000; a high birth rate, 21.2 per 1,000 (1933); a low per capita income (if this be a factor; 20 or 30 per cent of the population have been on relief at some time during the last five years). The only province in Canada which has a lower rate is Alberta (7.5), a province in most respects similar to Saskatchewan. In spite of the present favourable rate we have no reason to think it will not become worse. Immigration has ceased; generally speaking, immigration brings in the young and healthy. The birth rate is falling, in spite of falling incomes. The rate of natural increase was 20.2 in the years 1921 to 1925; in 1933 it was 14.9. Therefore the average age of the population is increasing; each year will see an increase in the proportion of those over fifty years.

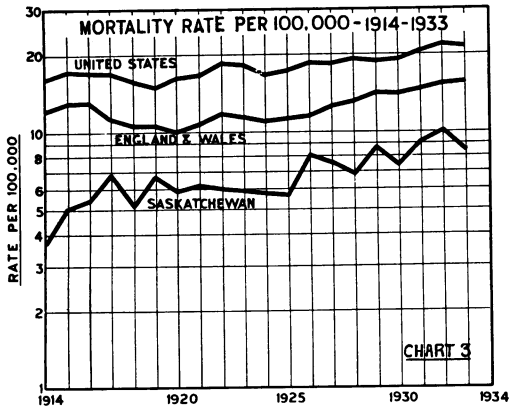
The general death rates from diabetes are shown in Chart 1. The lowest rate recorded for a complete year was 1.9 in 1907, the highest was 10.1 in 1932. The diagram shows a general upward trend marked by small irregularities. The rate of increase was more rapid in the first twelve years than it has been in the last eighteen years. The rates for Saskatchewan from 1905 to 1933 are similar to those of Ontario from 1880 to 1910. In 1880 Ontario was a new unsettled province, just as Saskatchewan was in 1905. The Saskatchewan diabetic mortality curve is similar to that of Ontario, as shown in Chart 2, but it begins twenty-five years later, just as the settlement of Saskatchewan began later than that of Ontario. From 1910 to 1928, eighteen years, Ontario's rate increased 4.1 points, a slow but steady increase. We predict that in 1952 the Saskatchewan diabetic death rate will be about 13. There is no reason to suppose that it will decrease.

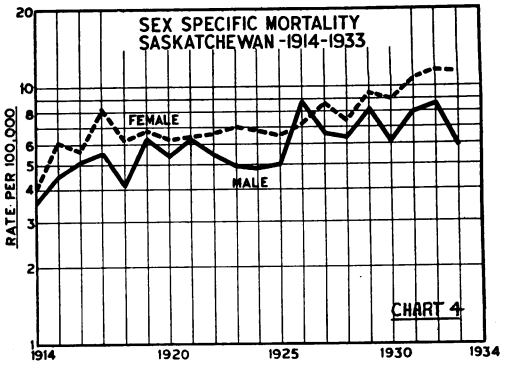
In Chart 3 Saskatchewan's rate is compared to that of England and Wales and of the United States. Since 1915 Saskatchewan's rate has risen from 3.7 to 8.4; the rate of England and Wales from 12 plus to 15 plus; that of the United States from 16 plus to 20 plus. But an increase from 3.7 to 8.4 is twice as rapid a rate of increase as from 12 to 15 and from 16 to 20; it is similar to Ontario's rapid increase from 4.1 in 1886 to 9.5 in 1905.

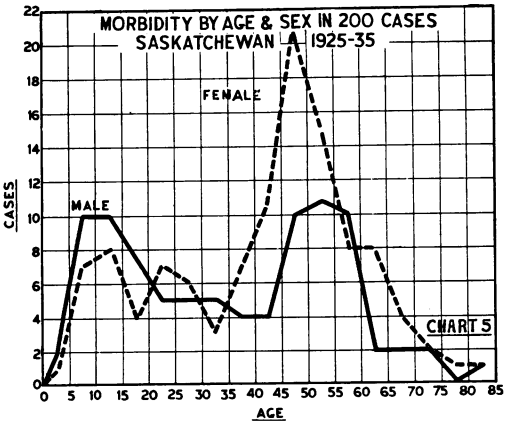
The factor of sex.—The sex-specific death rates for 19 years are shown in Chart 4. With the exception of two years, 1921 and 1926, the rates for females have been definitely higher than for males. All over the world this tendency for the feminine rate to increase has been noted. In a subsequent paper the influence of pregnancy on the development of diabetes will be studied. Some students[1] have thought that the increase in the feminine rate is due to the greater ease of the life of the female on account of improved economic conditions. This reason does not apply to Saskatchewan. The life of the female here is hard. Since 70 per cent of the population is rural that means that they have no modern conveniences, no running water. Anyone who has done housework where every drop of water has to be carried in and carried out, and lifted here and there cannot be said to have an easy life. The country woman finds it

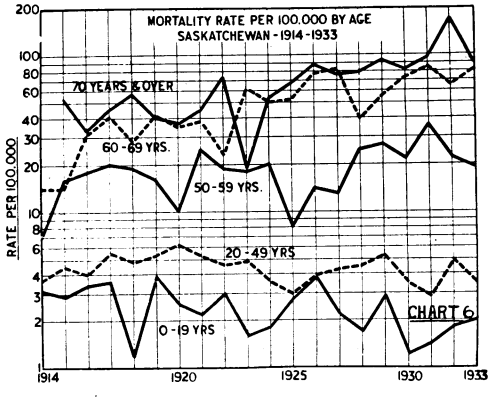


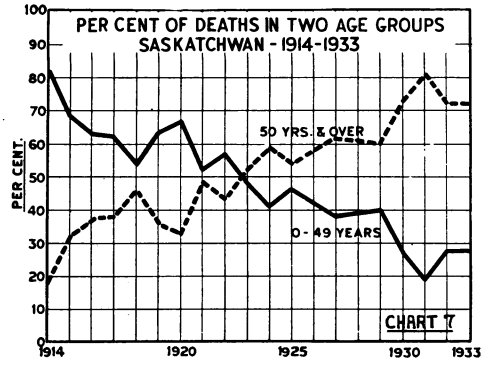


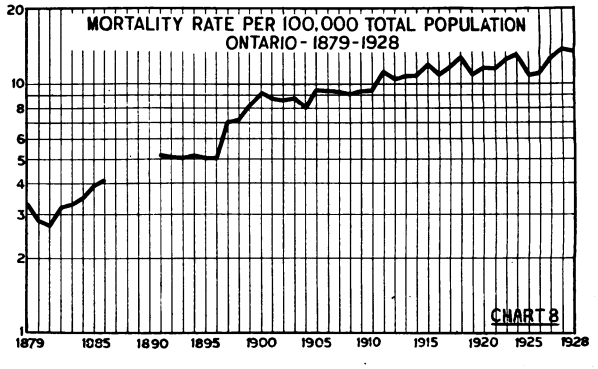












Charts 2 and 8 are reproduced by permission from the article by Ross and McKinnon.[2]

hard to get any outdoor exercise for six months in the winter, and lack of outdoor exercise causes the metabolism to slow down and the weight to increase. Since obesity is the most important predisposing factor in the development of diabetes one would suppose that the prevailing mode for slimness would favourably affect the weight of the female and thus reduce the incidence of diabetes. Apparently, reducing has not affected the female population over fifty years of age.

In Chart 5 an analysis is made of 200 consecutive private cases as to sex and age at onset. There is a rise just before puberty, which is greater in males. The greatest rise occurs in females between 45 and 50; there is a rise in males between 50 and 55 which is not so great as the rise in females. Joslin,[3] in a similar analysis of several thousand cases seen in New England, shows a curve of the same general shape. It is interesting that two curves showing the age-incidence of the onset of diabetes should show such a marked similarity. The one is taken in an old, settled, prosperous part of the country on thousands of cases, the other is taken on a small number of cases in a rural district not long settled. It would seem that the onset of diabetes follows definitely predictable rules according to age and sex, no matter in what environment the study is made. That is, given a hundred consecutive cases of diabetes, a student of the disease could fairly accurately guess the percentages in each decade belonging to either sex.

The age factor.—The variation in rates in different groups is shown in Chart 6. In the under-20 group the rate has not exceeded 3.9 (1919). In the 20- to 49-year group the rate has not exceeded 6.3 (1920), but in the 50- to 59-year group we have a rate of 36 (1931), in the 60- to 69-year group we have a rate of 81 (1933), and in the over-70 group a rate of 170 (1932). Thus we see that the age-groups causing the increase in the rate are not in the under-50 groups. Since 1920 the under-50 groups have shown a downward trend.

In Chart 7 is shown the percentage of total deaths from diabetes in two age-groups. Ever since 1923 the age-group under 50 has contained less than half the deaths. In Chart 8 we see that in Ontario since 1901 the group under 50 had less than half the deaths, again showing that Saskatchewan has repeated Ontario's diabetic history twenty-two years later. Insulin became generally used in 1923; its effects were immediately seen, both in Ontario and in Saskatchewan. In 1932, in Saskatchewan, 81 per cent of the deaths from diabetes occurred in those over 50 years of age.

The race factor.—It has been shown that the incidence of diabetes is high among Jews. Since Jews usually live in cities and there are few cities in Saskatchewan there are not many Jews in the population. Indians are not subject to diabetes. Complete physical examinations, including urinalyses, have been done on 1,500 Indians in Saskatchewan by the Anti-Tuberculosis League, and no case of diabetes has been discovered. Dr. A. B. Simes, who has charge of the medical work in the File Hills Reserve, has not seen a case of diabetes among Indians. One case was reported from the Cowessess band, but this band has an intermixture of white blood. A case was reported from Chesterfield Inlet, of which the details are not known. Mr. W. Murison, Inspector of Indian Affairs in Saskatchewan, has never heard of a case of diabetes in a pure-blooded Indian. The reason is not because they are all thin, for some of the older Indian women are very fat.

SUMMARY

The diabetic death rates in Saskatchewan since it became a province have been analyzed as to age and sex.

Saskatchewan's diabetic death rate is rising.

Because Saskatchewan has a largely rural population and a young average age the rate is low compared to the other provinces, with the exception of Alberta. The rate is low compared to that of England and Wales and to that of the United States.

The death rate from diabetes in the female exceeds that in the male.

The rate is falling in the age-groups under fifty and rising in the age-groups over fifty.

That part of the population most liable to the onset of diabetes is that of the females between 45 and 50.

We can find no evidence to suggest that the Saskatchewan rate will not continue on its upward trend.

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