

Influence of the World War II Food Shortage on the Incidence of Diabetes Mellitus in Japan

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During World War II and for a few years thereafter, the nutrition of the Japanese people was extremely poor. Death from starvation was not rare, and lesser degrees of malnutrition were commonly encountered. During this period the incidence of diabetes mellitus decreased markedly. This phenomenon, similar to that observed during World War I in Germany by Gottstein and Umber,⁵ Singer and Elias,¹⁴ and Beckert,² has been reported by many Japanese workers who have considered the cause as deficient caloric intake.^{1, 10} Kaito and his co-workers⁸ have published statistical studies on the incidence of diabetes mellitus in patients hospitalized in our clinic from 1936 through 1946. In the present report more detailed analytical consideration will be given to the outpatients as well as to the hospitalized cases during 1936 through 1956.

RESULTS

The number of diabetic patients visiting the Third Medical Clinic of Tohoku University Hospital (director, Professor Kurokawa and the late Professor Yamakawa) during the last twenty-one years is depicted in figure 1 and table 1. Also included is the total number of out- and inpatients of this period. During the war years, the number of diabetic patients decreased, reaching a low point during the years 1945 through 1948. The total number of patients, however, remained relatively constant through this period. Rigid government regulation of food supplies was instituted in Japan in 1941. In the Tohoku district (northeastern part of Japan) food shortage became severe first in 1942. After the end of the Pacific War in 1945, food was extremely scarce due to decreased food production and disordered distribution of available food supplies. Food supply improved gradually from 1948 on, and by 1950 was almost normal, although the average food intake of the Japanese did not reach standard caloric requirements until today (table 2). The lowest incidence of diabetes mellitus in our patients was encountered

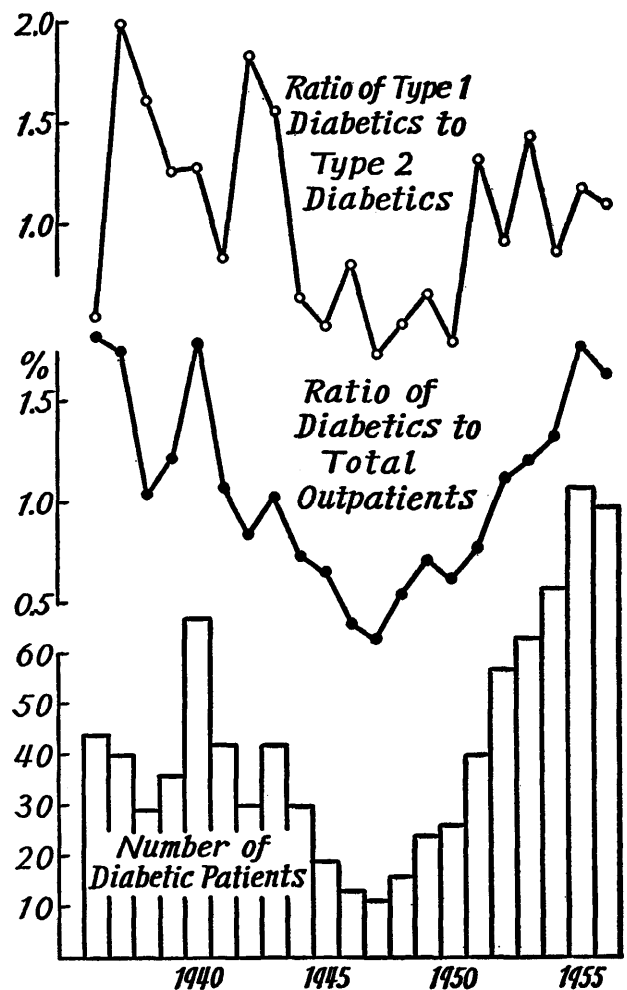


FIG. 1. Fluctuation in number of diabetic patients, ratio of diabetics to total outpatients and ratio of type 1 diabetics (mild and obese) to type 2 diabetics (severe and thin) during 1936 through 1956. Pacific War: Dec. 1941 to Aug. 1945.

in 1947. In 1951 the number of diabetics abruptly increased, and subsequently the number of diabetic patients continued to rise.

It is our practice to divide diabetic patients into two clinical groups. Type 1 diabetes is characteristically mild and, by definition, insulin therapy is not necessary. This

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TABLE 1

Number of diabetic patients in the Third Medical Clinic of Tohoku University Hospital from 1936 through 1956

	Total patients	Ambulatory				Ratio of diabetics to total patients (%)	Total patients	Hospitalized			Ratio of type 1 to type 2
		Diabetics			Total			Diabetics		Total	
		Male	Female	Total				Type 1	Type 2		
1936	2,416	35	9	44	1.82	641	8	15	23	0.53	
1937	2,281	26	14	40	1.75	663	12	6	18	2.00	
1938	2,781	21	8	29	1.04	727	16	10	26	1.60	
1939	2,938	25	11	36	1.22	740	19	15	34	1.26	
1940	3,706	49	18	67	1.80	692	23	18	41	1.27	
1941	3,882	31	11	42	1.08	651	13	16	29	0.81	
1942	3,528	21	9	30	0.85	612	13	7	20	1.85	
1943	4,029	34	8	42	1.04	626	11	7	18	1.57	
1944	3,965	18	12	30	0.75	678	7	11	18	0.63	
1945	2,760	16	3	19	0.68	578	3	6	9	0.50	
1946	3,098	13	0	13	0.41	663	4	5	9	0.80	
1947	3,312	8	3	11	0.33	604	3	8	11	0.37	
1948	2,841	13	3	16	0.56	640	2	4	6	0.50	
1949	3,272	12	12	24	0.73	721	9	14	23	0.64	
1950	4,031	19	7	26	0.64	813	5	13	18	0.38	
1951	5,050	28	12	40	0.79	841	13	10	23	1.30	
1952	5,049	37	20	57	1.12	808	18	20	38	0.90	
1953	5,202	43	20	63	1.21	795	23	16	39	1.43	
1954	5,442	46	27	73	1.34	831	18	21	39	0.85	
1955	5,177	67	26	93	1.79	954	26	22	48	1.18	
1956	5,416	64	25	89	1.64	889	31	28	59	1.10	

TABLE 2

Average nutriment consumption of Japanese people (per man, per day, in urban community). (Reports of the Japanese Welfare Ministry 1956.)

	Cal.	Carbohydrate	Protein	Fat
1946	1,721	—	59.5	16.6
1947	1,857	—	61.6	13.3
1948	1,916	—	64.5	15.5
1949	1,972	—	—	—
1950	2,041	394	71.0	21.0
1951	2,061	398	70.0	21.0
1952	2,042	390	70.6	22.5
1953	2,002	381	69.3	22.4
1954	2,010	381	69.0	23.6
1955	2,025	385	70.0	22.8

Standard requirement of nutriment for Japanese people (man per day) is 2,180 calories and 73 gm. of protein.

type is usually found in older age groups, often in obese patients who are relatively insensitive to insulin. Type 2 diabetes is characteristically severe and, by definition, requires insulin for control. This type of patients is often undernourished and usually sensitive to insulin. The ratio of type 1 to type 2 diabetes is presented in figure 1 and table 1. It can be seen that during the period of reduced incidence of diabetes, a marked reduction in the ratio of type 1 to type 2 took place. During this period the obese and mild diabetics decreased remarkably.

DISCUSSION

A large amount of experimental or clinical work, demonstrating the importance of nutritional factors in the development of diabetes mellitus, has been done. Many investigators (for example, Joslin,⁷ Bertram³) reported the close relationship between obesity and the onset of human diabetes. Recent studies on the hereditary obesity-diabetes syndrome of mice seem to emphasize the relationship of diabetes mellitus and obesity.⁹ Dohan and Lukens⁴ produced diabetes mellitus in cats by continuous perfusion of glucose. A similar attempt was made by Yoshikawa¹⁵ in our laboratory. Although these studies show that diabetes can be induced in animals by excessive carbohydrate intake, it is not known whether the same applies also to human subjects. It is well known, however, that obesity or excessive caloric intake has an adverse effect on human diabetes, and in fact, may produce the appearance of the disease in a "latent diabetic" who otherwise would have been unaware of any diabetic tendency.

There may be many factors to account for the decreased incidence of diabetes mellitus during the years 1942 through 1948. For example, disruption of family groups, loss of property, uncertainty as to the future, and poor living conditions could very well influence the incidence and severity of diabetes. The most important factor, however, is felt to be poor nutrition. In view

of a generalized reduction of caloric intake by the population it should be expected that there was a much greater decrease in the mild, obese, "type 1" diabetics whose diabetic symptoms were abolished by food restriction, and only a relatively slight decrease in thin, severe, "type 2" diabetics. Actually, the population of Japan was receiving the pre-insulin era treatment for diabetes during the war years, i.e., a reduction in caloric intake to the point of starvation. Further evidence, showing nutrition as the principle cause for reduced incidence of diabetes during the war years, is the fact that the same phenomenon was observed also in neutral European countries which did not participate in World War II but did experience a definite and often marked reduction in caloric intake. It is of interest that in these countries sugar and fats were two of the most scarce items. Schliack¹³ observed in Germany the interesting fact that the number of diabetic patients, which decreased during World II, increased abruptly from 1950, when the fat intake of German people was augmented remarkably without simultaneous increase in carbohydrate intake. The present study and Schliack's report suggest the possibility of prevention of diabetes mellitus by keeping the body from overnutrition or overintake of fat.

Hereditry has been shown to be an important "etiological" factor in human diabetes. Other factors are important, however, in determining which of the many individuals having an inherited diabetic tendency will develop clinically apparent disease. Thus, scarcity of food can reduce the incidence of clinical diabetes mellitus, although it would have no permanent curative effect.

To summarize, we feel that the World War II food shortage in Japan favorably affected diabetes mellitus in at least two ways: (1) in known diabetics, the severity of disease was lessened by the prolonged reduction in caloric intake, and (2), the development of clinically apparent diabetes was prevented in many instances, thus leading to lowered incidence of diabetes.

SUMMARY

The incidence of diabetes mellitus in out- and in-patients at the Third Medical Clinic, Tohoku University, was analyzed for the period 1936 through 1956. During the war years, the number of diabetic patients decreased, reaching a low point during the years 1945 through 1948. This decrease was most striking among type 1 diabetics (Type 1 diabetics, by definition, have a mild form of the disease not requiring insulin therapy, are often obese, and are usually in older age groups.) It is concluded that the decreased incidence of diabetes seen in our clinic was due principally to the reduced

caloric intake during and after the war years.

SUMMARIO IN INTERLINGUA

Le Carentia De Alimentos In Japon Durante Le Secunde Guerra Mundial E Su Influentia Super Le Incidentia De Diabete Mellite

Le incidentia de diabete mellite inter le patientes externe e interne al Terti Clinica Medical del Universitate Tohoku esseva analysate pro le periodo ab 1936 usque al fin de 1956. Durante le annos de guerra, le numero del patientes diabetic decresceva, atingente su minimo durante le periodo ab 1945 usque al fin de 1948. Iste reduction esseva le plus frappante inter diabeticos de typo 1 (i.e. diabeticos qui ha le morbo in un leve forma que non require therapia a insulina e qui es frequentemente obese e pertine usualmente a gruppos de etate plus avantiate). Le conclusion es formulate que le reduction del incidentia de diabete observate a Tohoku esseva primarimente le effecto del reduce ingestion caloric durante e post le annos de guerra.

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