

# Sex Distribution and Frequency of Diabetic Concomitants or Complications

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## SUMMARY

The data herein presented or reviewed indicate that the prevalence of concomitants or complications of diabetes such as hypertension, obesity, retinopathy, neuropathy, etc. may vary greatly from clinic to clinic. Though variable diagnostic criteria, observer error, ethnic or national differences may account for some of the disparity, selection of patients through death, economic factors, etc., which results in clinic rosters which are not representative of the total diabetic population also plays a role of undetermined significance. Hence definitive statements concerning the relative predisposition of males and females to concomitants or complications of diabetes must await standardization of population and criteria, data on incidence as well as prevalence, and expression of such data on a cumulative basis. Until then we can only speak of findings in limited populations because we have as yet no basis for intergroup comparisons. *DIABETES* 15:507-10, July, 1966.

Among current patients in our diabetic clinic obesity and hypertension are more common in women, and shin spots and absent pedal pulses are more frequent in males. The prevalence of retinopathy, Achilles tendon areflexia, decreased vibration perception, orthostatic hypotension, and peripheral neuropathy is about the same in the two sexes. Comparisons with other centers (tables 1 and 2)<sup>1-16</sup> reveal wide differences in the reported frequencies of these manifestations in the two sexes and in diabetics as a group. Such differences are however of unproved validity because of obvious limitations in the data stemming from nonuniformity of criteria, patient selection, estimates limited to prevalence,

etc. These limitations point up the continuing need for information on diabetic complications in which incidence and prevalence of uniformly defined abnormalities in homogeneous groups of patients are expressed on a cumulative basis.

## MATERIALS AND METHODS

Our study was based on examinations of 374 consecutive diabetic patients at the Falk Clinic of the University of Pittsburgh. The following information was obtained by the same group of observers during one or more sessions: age, sex, age at diagnosis, duration of diabetes since diagnosis, therapy, blood pressure while sitting and standing, body weight and height, status of fundi, pedal pulses, ankle reflexes, vibration perception at the malleoli, and the presence or absence of paresthesia, pain in the extremities, and hyperpigmented and retracted scars of the antero-lateral lower legs (shin spots).<sup>17</sup>

The following criteria were employed:

*Hypertension*: systolic readings of 160 or higher with a diastolic blood pressure of 100 mm. Hg or higher;

*Obesity*: body weight in excess of 200 pounds in males and 170 pounds in females;

*Retinopathy*: presence of microaneurysms, hemorrhages, exudates, neovascularization, retinitis proliferans, retinal detachment, and blindness, alone or in combination;

*Absence of pedal pulses*: both dorsalis pedis and both posterior tibial pulsations absent;

*Absence of ankle reflexes*: areflexia during facilitation while kneeling;

*Increased threshold for vibratory sense*: diminished perception of the movements of a Biothesiometer<sup>18</sup> as reflected by readings of 30 or higher at the external and internal malleoli of both ankles;

*Orthostatic hypotension*: consistent decrease (greater than 10 mm. of Hg) recorded in the systolic and the

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## SEX DISTRIBUTION AND FREQUENCY OF DIABETIC CONCOMITANTS OR COMPLICATIONS

TABLE 1

Prevalence of hypertension, obesity and retinopathy in male and female diabetic patients according to race, ethnic or geographic origin

Reference	Hypertension		Obesity		Retinopathy		Total No.	Patients		Race, ethnic or geographic origin
	Males	Fe- males (per cent)	Males	Fe- males (per cent)	Males	Fe- males (per cent)		No. of Males	No. of Females	
Anderson and Gunter <sup>1</sup>	—	—	48	84	—	—	52	26	26	Negro
Rudnick and Anderson <sup>2</sup>	41	41	40	45	12	25	108	64	44	Japan
Cohen et al. <sup>3</sup>	1X	1.4X	—	—	—	—	60	37	23	Yemen Jew
Root et al. <sup>4</sup>	—	—	—	—	43	57	784	353	431	?White
Wada et al. <sup>5</sup>	15	32	20	30	32	46	87	46	41	Japan
Lewis and Symons <sup>6</sup>	36	56	49	53	19	21	654	177	477	White
MacNeal and Rogers <sup>7</sup>	28	54	—	—	45	54	103	29	74	Negro, Latin, White & Jew
Cosnett <sup>8</sup>	30		9	23	26		207	89	118	Natal Indians
Pathania and Sachar <sup>9</sup>	29	24	—	—	—	—	349	103	246	Punjab Indians
Wilkerson and Krall <sup>10</sup>	—	—	65	77	—	—	70	31	39	White
Aarseth <sup>11</sup>	28	52	—	—	—	—	310	123	187	Norway
	—	—	62	68	—	—	6,000	—	—	Norway
	—	—	—	—	40	44	288	116	172	Norway
Martensson and Palm <sup>13</sup>	42	61	—	—	39*	41	163	80	83	White
Skouby <sup>14</sup>	—	—	—	—	70*	70	286	—	—	White
Lundbaek and Jensen <sup>15</sup>	—	—	—	—	76*	83	148	—	—	White
Engelsson <sup>16</sup>	—	—	—	—	85+		217	—	—	White
Danowski et al.	15	24	16	41	22	22	374	94	280	White, Negro

\*Diabetes of fifteen years' duration or longer

TABLE 2

Prevalence of reflex and vibratory sense symptoms and neuropathy in diabetic patients according to race, ethnic or geographic origin

Reference	Absent ankle reflex		Vibratory sense decrease		Painful neuropathy		Total No.	Patients		Race, ethnic or geographic origin
	Males	Females	Males	Females	Males	Females		No. of Males	No. of Females	
Rudnick <sup>2</sup>	X	3X	—	—	—	—	108	64	44	Japan
Wada <sup>5</sup>	15	29	—	—	—	—	87	46	41	Japan
Broch <sup>12</sup>	2	2.6	4	4.8	11	14	426	197	229	Norway
MacNeal <sup>7</sup>	—	—	14	4	—	—	103	29	74	Negro, Latin, White, Jew
Aarseth <sup>11</sup>	28	32	—	—	—	—	306	—	—	
Danowski et al.	29	30	43.6	44.3	9.6	7.5	374	94	280	White Negro

diastolic blood pressure in the upright position compared to readings with the patient supine;

*Painful neuropathy*: numbness, tingling, other paresthesia or pain of the extremities;*Shin spots*: one or more hyperpigmented and retracted

scars (shin spots) of the antero-lateral portions of the lower legs.

## RESULTS

Of the 374 consecutive unselected patients evaluated in our clinic, 280 were females and ninety-four were

males. The two sexes were equally represented with respect to age (table 3) and the duration of the diabetes (table 4). About three quarters of the males and females were older than fifty years at the time of the evaluation (table 3). Diabetes had been diagnosed within the preceding five years in approximately 40 per cent in each sex (table 4). Uniformity was less in regard to therapy (table 5): a slightly larger proportion of women than of men (31.4 versus 22.3 per cent) was under treatment with tolbutamide and more men than women (53.2 and 32.8 per cent) were taking insulin.

From table 1 it is apparent that in our clinic obesity and hypertension are each more common in women. On the other hand in our current group of patients shin spots and absent pedal pulses are more frequent in the males (table 6). Retinopathy, Achilles tendon areflexia, decreased vibration perception, orthostatic hypotension and painful neuropathy are encountered with about equal frequency in the representatives of the two sexes whose diabetes is at present under our guidance (tables 1, 2 and 6).

#### DISCUSSION

Review of reports on the sex distribution and the frequency of various concomitants or complications of diabetes in the two sexes obtained in cross-sectional survey of prevalence only in clinics in different parts of the world does not yield uniform results (table 1). Thus hypertension was more frequent in females than in males in diabetic Caucasian populations from Great Britain (Lewis) and Scandinavia (Anderson; Martensson and Palm) and in a mixture of Negro, Latin and other Caucasian (Jewish and non-Jewish) patients in the U.S. (MacNeal), including those in our clinic (table 1). This was also true in one clinic (Wada) from Japan. On the other hand, in another Japanese clinic (Rudnick) and in one serving Punjab Indians (Pathania) hypertension was equally frequent in the two sexes. It is to be noted, however, that in the clinics that did agree with regard to sex predisposition to hypertension, the recorded prevalence rates in the two sexes in the individual clinics differed by twofold or more.

Again, obesity was more prevalent in females in our clinic, in one composed of Negroes in the U.S. (Anderson), Japanese in Japan (Wada), Natal Indians in India (Cosnett) and, possibly, in an ethnically mixed North American clinic (Wilkerson) (table 1). On the other hand, such a sex difference in the occurrence of obesity could not be demonstrated in another clinic in Japan, in one in Great Britain, nor in a third

TABLE 3

Age and sex distribution of the 374 patients (94 males and 280 females) by age groups

Age (years)	Males (per cent of 94)	Females (per cent of 280)
15.1-35	13.8	6.8
35.1-50	13.8	13.9
50.1-65	45.7	41.1
65.1-80	22.3	35.4
80.1-95	4.3	2.9

TABLE 4

Sex distribution of the 374 patients in accord with the duration of diabetes

Duration (years)	94 Males (per cent)	280 Females (per cent)
0-5	42.6	43.6
5.1-10	20.2	25.7
10.1-15	16.0	16.1
15.1-20	9.6	7.9
20.1-35	11.7	6.8

TABLE 5

Type of therapy of male and female diabetic patients

Therapy	M:F (ratio)	Males (per cent)	Females (per cent)
Diet only	13:50	13.8	17.8
Diet + insulin	50:92	53.2	32.8
Diet + tolbutamide	21:88	22.3	31.4
Diet + tolbutamide; insulin*	10:50	10.6	17.8

\*Tolbutamide or insulin was administered during separate cycles of therapy.

TABLE 6

Other findings in 374 Falk Clinic diabetic males and females

	Males and females (per cent)	94 Males (per cent)	280 Females (per cent)
Absent pedal pulses	17.6	24.5	15.4
Orthostatic hypotension	12.0	11.7	12.1
Shin spots	45.7	65.9	39.1

in Norway. Again, the figures of the various clinics for the prevalence of obesity in the males and in the females differed by four to sevenfold.

Similarly, diabetic retinopathy was reported to be more common in diabetic females in North America (Root, MacNeal) and in Japan (Rudnick, Wada), but not in our group, in a clinic in Great Britain (Lewis), nor in several in Scandinavia (Aarseth; Martensson and Palm; Skouby; Lundback and Jensen; Englessen)

(table 1). Once more, the prevalence rates for retinopathy in the two sexes differed several fold in the various clinics.

Equally great differences in terms of predominance of one sex, the other, or neither are evident with respect to Achilles tendon areflexia and decreased vibratory sense (table 2). Moreover, a wide discrepancy was recorded in the prevalence of these abnormalities in these several clinics.

A long list of possible explanations for the recorded differences in the frequency of such diabetic concomitants or complications in the two sexes from clinic to clinic can be compiled. Minimally, this would include race, age, duration of diabetes, nutritional customs, social practices, selection by death, poverty, etc., diabetic regimen, differences in diagnostic criteria, and a host of other variables. It is obviously not possible, on the basis of such cross-section study, to weigh the importance, if any, of each of these in determining the rates in the individual clinics and their sex distribution. Hence, judging from the limitations in published data and in our own, it is at present not possible to state with certainty that one sex or the other is or is not more apt to develop hypertension, obesity, etc. Such information cannot be obtained from simple cross-sectional studies which describe prevalence only. It must be based on prospective studies, which provide data on incidence as well as prevalence of precisely defined abnormalities as determined at successive intervals in a homogeneous group. The findings should then be expressed on a cumulative basis, accounting for all members of the original group, including those who have died. Such data would then permit more valid comparisons, though differences in criteria, observer error, etc., would probably still be troublesome.

Hence, any report, including our own, is only of value in describing the status of a selected and not necessarily representative sample of a diabetic population studied at a particular moment of time in a particular group in a particular country and in a particular clinic. Such information may be in keeping with certain preconceptions or hypotheses and can titillate the imagination with regard to hitherto unsuspected relationships, but cannot be applied indiscriminately to larger segments of the diabetic population or its problems.

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