

Abstract Service

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Epidemiologic data of diabetes in India and in Indians elsewhere is of concern to all working in the area. From the time when type-1 diabetes was considered as non-existent and prevalence of type-2 diabetes, at worst, comparable to the Caucasian population we have come a long way; we now understand that type-1 diabetes occurs at least as frequently and type-2 much more frequently in Indians. What was the cause of such an underestimate is not immediately clear; there are several hypotheses. Type-1 diabetes, for example, could kill even before diagnosis is made; there could be a real change in events leading to development of insulin-resistance and type-2 diabetes: diet, exercise, (truncal) obesity.

Prevalence and age of onset of type 1 diabetes in adult Asians in Coventry Diabetes Study.
Simmons D

Diabetic Medicine 1990; 7: 238- 41.

Although Asians are known to have excess of Type-2 diabetes when compared with Europoids, the relative prevalence of Type-1 diabetes in Asians remains controversial. The Coventry Diabetes Study enumerated all adult diabetic subjects in the electoral ward of Foleshill (population 10,304) by a house to house survey. Residents treated with insulin were classified having either type-1 or type-2 diabetes on the basis of plasma C-peptide concentration and their diabetic history. Insulin treatment was received by 22% of Europoids and 125 of Asians with previously diagnosed diabetes. Diabetic history was available for all and C-peptide for 69% of insulin treated subjects. The age adjusted prevalence of type-1 diabetes was 0.16 (95% CI 0.6-3.3) % in Europoids and 0.12 (95% CI 0.4-2.7) % in Asians. Asians were found to have a significantly higher age at diagnosis [26 (range 19-34) vs. 18(6-29) years, $p < 0.05$] than Europoids, and all were born outside of the United Kingdom. No Type-1 diabetes was diagnosed under 19 years of age in Asians while 5 of the 8 Europoid subjects with Type-1 diabetes were diagnosed under this age. Type-1 diabetes does occur in Asians born outside the UK either commencing later in life or, if of earlier onset, precludes migration to the UK.

Prevalence of insulin-dependent diabetes mellitus in Asian children.

Samanta A, Burden AC, Jones GR, Woodlands IG, Clarke M, Swift PGF, Hearnshaw JR.
Diabetic Med 1987; 4: 65- 7.

A survey was conducted in 1984-85, within Leicester City boundaries, which contains 64,535 children below the age of 15 years (20,267 Asian and 44,268 White Caucasian) to ascertain the prevalence of insulin-dependent diabetes mellitus (IDDM) using a central register maintained for the changeover to U-100 insulin, diabetic health visitor index cards, hospital admissions of diabetic children, and individual registers maintained by us. Overall prevalence per thousand for children aged 0-15 years was 0.54 for Asian and 0.99 for White Caucasians; for ages 10-15 years they

were 0.97 and 1.87 and for ages 0-9 years, 0.31 and 0.38, respectively. This was not statistically different at the 5% level.

Ours is the first population based study of its kind in Asian children, and challenges the view that there is large difference in the prevalence of IDDM between Asians and White Caucasians. A wider analysis of this observation incorporating a large population base is suggested.

Evidence for an environmental effect in the aetiology of insulin-dependent diabetes in a transmigratory population.

Bodansky HJ, Stains A, Stephenson C, Haigh D, Cartwright R. *Brit. Med. J* 1992; 304:1020- 2.

Objective: To examine whether children of families moving from an area of low incidence of childhood diabetes to one which is higher show a corresponding rise in disease incidence.

Design: Disease incidence study over 12 years.

Setting: Bradford District Metropolitan Council area,

Subjects: All subjects aged 0.16 years resident within the study area.

Main outcome measure: The incidence of childhood diabetes in Asian and non-Asian families.

Results: The incidence of diabetes in Asian children increased from 3.1/100,000 per year in 1978-81 to 11.7/100,000 per year in 1988-90 (χ^2 for trend = 4.95, df = 1, $p = 0.026$) whereas that for other children remained constant at 10.5/100,000 per year. Over the entire study period rates were lower in Asian females (4.9/100,000 per year) than in Asian males (8.8/100,000 per year) whereas the reverse was true for other children (males 9.2/100,000 per year; females 12.0/100,000 per year) (test for common odds ratio: $\chi^2 = 3.81$, df=1, $p=0.052$).

Conclusions: Offspring of this transmigratory population had a rising incidence of childhood diabetes which was approaching that of the indigenous population. The data provides strong evidence for an environmental effect in the aetiology of insulin-dependent diabetes.

Type-1 diabetes is not uncommon in Indians! Look out for an epidemic with the development!

The HLA-D associations of Type-1 (insulin-dependent) diabetes in Punjabi Asians in the United Kingdom.

O. Odugbesan, J. Fletcher, C. Mijovic, E. Mackay, A.R. Bradwell and A.H. Barnett.
Diabetologia 1987; 30: 618-21.

Type-1 (insulin-dependent) diabetes is less common in Asian Indian than in white Caucasoids. Forty-five Punjabi Asian with Type-1 diabetes and 96 racially matched control subjects were HLA-DR typed. DR3 was increased in diabetic patients vs control subjects (82% vs 38%, $p < 10^{-5}$) with relative risk 7.7 and etiological fraction 0.72. DR4 was

increased in diabetic patients vs control subjects (31% vs 7% $p < 0.003$) with relative risk 5.7 and etiological fraction 0.26. DR2 showed a negative association (relative risk 0.19, etiological fraction -0.28), as did DR7 (relative risk 0.21, etiological fraction -0.33). HLA DQB-chain gene probing-using restriction enzyme BamHI in 43 diabetic patients and 90 control subjects showed that the DR1 associated 6.2 and 3.2kb fragments were less common in diabetic patients than in the control subjects (12% vs 36%, $p < 0.02$). A 12kb fragment was associated with DR4 in both diabetic patients and control subjects. DR3 is the major susceptibility factor for Type-1 diabetes in Punjabi Asians and DR4 is a second marker. Gene probing indicates that the same DR4 subset is associated with the condition as in white Caucasoids. DR1 and its associated DQB restriction fragments are reduced in Asian Type-1 diabetic patients making it unlikely that DR1 haplotype carry a predisposing factor in this racial group. We conclude that the genetic component Type-1 diabetes in Punjabis shows differences from that of the white Caucasoid population and that the lower frequency of DR4 in this population may contribute to the lower prevalence of Type-1 diabetes.

HLA-D region RFLP indicates that susceptibility to insulin-dependent diabetes in South India is located in the HLA-DQ region.

Hitman GA, Karir PK, Sachs JA, Ramachandran A, Snehlatha C, Viswanathan M, Mohan V. *Diabetic Medicine* 1987; 5 57-60.

Recently, close marker for insulin-dependent diabetes mellitus in Western 'Caucasoid' subjects have been defined from DQ region (both alpha and beta genes) restriction fragment length polymorphism. In order to define the genetic contribution to insulin-dependent diabetes mellitus in an Indian population we have analyzed 58 unrelated Dravidian (South Indian) insulin-dependent diabetic patients and 43 controls. In insulin-dependent diabetes and increased frequency of the Taq 1DQB restriction fragment length polymorphism designated T2 omega/T6 (relative risk = 10.6) and of homozygote for Taq 1 DQalpha 4.6 kb (relative risk = 11), was found in the patients. The highest relative risk for insulin-dependent diabetes mellitus was obtained by comparing patients and control subjects who either (a) co-inherited DQT 2 omega/T6 with certain DQalpha restriction fragment length polymorphism or (b) were DQ alpha 4.6 kb homozygote, the combination of (a) and (b) accounting for 55.5% of insulin-dependent diabetes mellitus subjects and none of the controls (relative risk = 101; 95% confidence limits 93-109).

Fletcher J, Odugbesan O, Mijovic C, Mackay E, Bradwell AR, Barnett AH. Class II HLA DNA polymorphism in type-1 (insulin-dependent) diabetic patients of North Indian origin. *Diabetologia* 1988; 31: 343-50.

Genetic associations with Type-1 (insulin-dependent) diabetes may be primary or secondary to linkage disequilibrium. Studies of different racial groups should allow these to be distinguished. We have reported that Type-1 diabetes is associated with HLA-DR3 and DR4 in subjects of North Indian (Punjab) origin and now present the results of a study of HLA class II DNA polymorphism in this group and in White Caucasoid subjects. DR4 in North Indian

Type-1 diabetic patients was associated with DQB and DX alpha DNA polymorphism identical to those found in DR4-positive White Caucasoid patients. This DQB/DX a pattern was increased in frequency in North Indian diabetic patients vs control subjects (33.3% vs 8.5%, $p < 0.001$), relative risk = 5.12 (95% confidence limits: 1.96-13.4). A DQB polymorphism with very low relative risk for Type-1 diabetes in White Caucasoid subjects was also markedly reduced in North Indian diabetic patients vs control subjects (2.3% vs 24.7% $p < 0.02$, relative risk = 0.10 95% confidence limited: 0.02-0.46). This pattern was associated with DR2 in white Caucasoid subjects, but with DRw6 in North Indians. A DR3-associated DRB polymorphism was markedly increased in North Indian diabetic patients vs control subjects (90.2% vs 40.7%, $p < 10^{-6}$, relative risk = 12.1, 95% confidence limits: 4.32-33.9), The DQ sub-region may be a primary site of genetic influence on susceptibility to Type-1 diabetes. Further studies in different racial groups will clarify the HLA associations of Type-1 diabetes.

HLA association with Type-1 Indian diabetics: Yes; further details with further studies on various sub-populations in India.

Autoantibodies in Indian-Asian with insulin-dependent diabetes in the UK

Odugbesan O, Fletcher JA, Sanders A, Bardwell AR, Botazzo GF, Barnett AH. *Postgraduate Med. J.* 1988; 64: 357-60.

Classical insulin-dependent diabetes mellitus (IDDM) is relatively uncommon in Indian-Asians whether in India or in the UK and this may be related to immunogenetic factors. We have studied the presence of absence of islet-cell antibodies and other auto-antibodies in 36 subjects with IDDM and 41 controls, all of Indian origin. Islet cell antibodies (ICA-IgG) were found in 8 subjects with IDDM but in none of the controls. Four of the 8 patients with ICA-IgG also possessed the complement fixing variety (CF-ICA). There was no definite association between possession of ICA and HLA-DR antigens. Thyroid antibodies were commoner in patients (22%) compared with controls (7%) as were parietal cell antibodies (8.3% vs 4.8%). None of the patients or controls had adrenal antibodies.

The frequency of organ-specific antibodies in Indian-Asians with IDDM is similar to that of White Caucasians. The overall frequency of ICA is, however, lower than that reported for White Caucasians although the temporal distribution is similar. We conclude that, even though the prevalence of IDDM in Indian-Asians is lower than in White Caucasians there is no evidence that different immunological mechanisms are involved in the pathogenesis of IDDM in the two groups.

Not uncommon, not different from "Caucasians", pathogenesis seems similar too! The data may be disturbing for some scientists who have been saying otherwise! The spectrum seems to be changing and the "atypical young diabetics" may not be "atypical" any more.

Patterns of mortality among migrants to England and Wales from Indian subcontinent.

Balarajan R, Bulusu L, Adelstein AM, Shukla V. *Brit. Med. J.* 1984; 289: 1185-7.

Causes of deaths in immigrants to England and Wales from the Indian subcontinent were assessed by ethnic subgroup. Observed and expected deaths for 1975-78 were aggregated to calculate proportional mortality ratios. Observed mortality due to infective and parasitic disease, endocrine disease (notably diabetes), disease of the circulatory system (notably ischaemic heart disease and cerebrovascular disease, in males) and diseases of the digestive system (notably cirrhosis of the liver) exceeded expected mortality. Fewer than expected deaths were due to malignant neoplasms (notably lung cancer and chronic bronchitis); proportional mortality ratios for cancer were lower for Hindu groups than for Moslems and were lowest for Punjabis. Mortality due to ischaemic heart disease, high in all groups, was highest in Moslems. Significantly, more Punjabi males died from cerebrovascular disease and cirrhosis of the liver. Diabetes was commonest among Gujaratis.

The variation seen in the patterns of mortality in the different ethnic groups indicates the need for further epidemiological and health service research centred on these communities.

Disease patterns in Indian South Africans.

Mayet-F-G
S. Afr. Med. J 1982; 61, 968-72.

Personal experience at the R.K. Khan Hospital in Durban, catering for the Indian population group, is reported. Observations are based on 31, 101 case records of patients admitted over a 10-year period. Diagnoses on admission and their frequency, together with features of diseases of special interest, are presented. *Compared with experience with Black patients, degenerative diseases are much more common than infections.*

More Indians are dying of non-communicable illnesses, World Bank report 1993 says so. More Indians die of coronary than any other community! What predisposes us for this? Will we be able to cope with on-coming epidemic of coronaries? Are there any modifiable risk factors? Especially for Indians.

Diabetes mellitus as a risk factor for acute myocardial infarction in Asian and Europeans.

Woods KL, Samanta A, Burden AC.
Br. Heart J 1989; 118-22.

Ischaemic heart disease is more common among immigrants from the Indian subcontinent than among Europeans in the United Kingdom. The excess cannot be accounted for by differences in smoking, blood pressure, or lipid concentrations. There is, however, an increased prevalence of diabetes mellitus in the Asian population. Separate estimates of the relative risk of acute myocardial infarction associated with diabetes from parallel case-control studies were made to compare the importance of diabetes as a risk factor in the two ethnic groups. For Asians the relative risk was 3.3 (95% confidence interval 1.9 to 5.8) and for Europeans 1.3 (1.0 to 1.7). Calculations of population attributable risk indicated that clinical diabetes mellitus

accounts for 21% of the incidence of myocardial infarction in Asians but only 3% of the incidence in Europeans. Diabetes mellitus is of sufficient quantitative importance as a risk indicated that clinical diabetes mellitus accounts for 21% of the incidence of myocardial infarction in Asians but only 3% of the incidence in Europeans.

Diabetes mellitus is of sufficient quantitative importance as a risk factor to account for the whole of the observed excess of deaths from ischaemic heart disease among Asians in the United Kingdom.

Coronary heart disease in south Asians overseas: a review.

McKeigue P.M, Miller GJ, Marmot M.G,
J. Cain. *Epidemiol* 1989; 42: 597-609.

Coronary heart disease rates have been reported in several parts of the world to be unusually high in people origination from the Indian subcontinent. High coronary disease rates appear to be common to South Asian groups of different geographical origin, religion, and language. This presents a challenge to the understanding of coronary heart disease: the high rates in South Asians are not explained on the basis of elevated serum cholesterol, smoking or hypertension. Low plasma HDL cholesterol, high plasma triglyceride levels and high prevalence of non-insulin-dependent diabetes have been consistently found in South Asians overseas: this probably reflects an underlying state of insulin resistance. Further studies are needed to determine whether this metabolic disturbance can account for the high rates of coronary heart disease in South Asians, and to identify possibilities for prevention.

The effect of demographic factors on serum lipids in diabetics of Trinidad and Tobago. Possible association with ischaemic heart disease.

Ragooborsing D, Davidson J.B.
West Indian Med. J 1989; 38: 99-104.

This study was undertaken in order to investigate the effect of race, sex, weight, activity level and residential area on serum lipoprotein patterns, and to determine how this could possibly relate to the incidence of ischaemic heart disease (IHD). Seven hundred (700) diabetics attending outpatient clinics at Sangre-Grande and Port-of-Spain hospitals were screened. There were 132 males and 249 females of African descent; 99 males and 163 females of East Indian extract and 19 males and 38 females of other ethnic origins. The average age of the population studied was 50 years (+/- 15). The results obtained from this study indicate that diabetes mellitus is apparently more common in women than in men, particularly in those women who have borne children, and the incidence rises markedly after menopause. East Indians have higher triglyceride (TG), very low-density lipoprotein cholesterol (VLDL-C) and low-density lipoprotein cholesterol (LDL-C), but lower high density lipoprotein cholesterol (HDL-C) concentrations than their counterparts of African origin. TG, LDL-C and total serum cholesterol (TC) concentrations are highest in overweight-obese patients while HDL-C concentrations are highest in the lower weight division. The domestic working class, as well as those who were in retirement, has higher TG, LDL-C and TC than members of other occupational status. The fractions mainly

affected by a residential area are TG, HDL-C and LDL-C. Moreover, diabetes mellitus and its consequent impact on lipoprotein homeostasis imposes a greater predilection to IHD, especially among members of the East Indian community.

The relationship between different lipoprotein fractions and the incidence of coronary heart disease on diabetics of Trinidad and Tobago.

Ragoobirsingh D
West Indian Med. J 1989; 38: 42-7.

This study was undertaken in order to investigate the relationship between the different lipoprotein fractions and the incidence of coronary heart disease (CHD) in diabetics of Trinidad and Tobago. Seven hundred (700) diabetics attending outpatient clinics at Sang-Grande and Port-of-Spain hospitals were screened. There were 132 males and 249 females of African descent; 99 males and 163 females of East Indian extraction and 19 males and 38 females of other ethnic origins. The average age of the population studied was 50 years (+/- 15). From this survey, it is evident that the impact of the diabetic state on lipoprotein homeostasis results in elevation of serum lipid concentrations. The elevation of low-density lipoprotein. The elevation of low-density lipoprotein cholesterol seems to be the most reliable lipid risk indicator of the lipoprotein profile, predisposing patients to a coronary event. The data also provides unequivocal evidence that diabetic patients of Trinidad and Tobago have more coronary atherosclerosis and a higher incidence of clinical CHD than dose the non-diabetic population of similar age.

Ascorbic acid and cholesterol levels in-patients with diabetes mellitus and coronary artery disease.

Mayet FH, Sewdarsen M, Reinach SG.
A. Sfr. Med. J 1986; 70: 661-4.

Indian and black patients admitted to King Edward VII and R.K. Khan Hospitals with a diagnosis of cardiac infarction and diabetes mellitus were studied. (The mean serum cholesterol levels were higher in the Indian group). This preliminary study suggests a negative correlation between leucocyte ascorbic acid and serum cholesterol levels in Indians, especially in-patients with infarction. This however, does not preclude an effect of latent ascorbic acid deficiency on the vessel wall. The possible relevance of the findings to the development of atherosclerosis is discussed.

Indians (or Asians, In general) have higher prevalence of diabetes and coronary heart disease (CHD) and a higher mortality related to CHD. Does the excess risk of CHD get explained by a high prevalence of diabetes? Several studies would say yes, and others would say no. Paul McKeigue's study concludes that there is more to it than meets the eye! Other papers from this group would show how!

Disturbances of insulin in British Asian and White men. Arnold JD.

Br. Med. J 1989; 299: 914.

Arnold argues that the study by Hughes et al, (Br Med. J. 1989) showing a higher 2 hour post oral glucose C-peptide in Brtishers of Asian origin compared to White subjects may

not necessarily represent a greater C-peptide secretion and hepatic insulin extraction, since this may represent racial variation in C-peptide clearance rates.

Diabetes, hyperinsulinaemia, and coronary risk factors in Bangladeshis in east London.

McKeigue PM, Marmot MG, Syndercombe Court YD, Cottier DE, Rahman S, Riemersma RA.
Br. Heart-J. 1988; 60: 390-6.

Immigrants from the Indian subcontinent (South Asians) in England and Wales have higher morbidity and mortality from coronary heart disease than the general population; this seems to apply to both Hindus and Muslims. Studies in north- west London and Trinidad found that the increases risk of coronary heart disease in Indians was not explained by dietary fat intakes, smoking, blood pressure, or plasma lipids. In the present study, the distribution of coronary risk factors was measured in an East London Borough where the mortality and attack rate coronary heart disease are higher in the Asian population, predominantly Muslims from Bangladesh, than in the rest of the population. In a sample of 253 men and women aged 35-69 from general practice, mean plasma cholesterol concentrations were lower in Bangladesh than in European men and women. Mean systolic blood pressure were 10 mm Hg lower in Bangladeshis. Plasma fibrinogen concentrations were similar in Bangladeshis and Europeans and factor VII coagulant activity was lower in Bangladeshis than in European men. In smoking rates were higher in Bangladesh men and the ratio of polyunsaturated fatty acids to saturated fatty acids in plasma lipids was lower in Bangladeshis than in Europeans. Diabetes was three times more common in Bangladeshis than in Europeans and serum insulin concentration measured after a glucose load were twice as high in Bangladeshis. High insulin concentrations in Bangladeshis were associated with high plasma triglyceride and low high-density lipoprotein cholesterol concentrations. Insulin resistance, leading to diabetes, hyperinsulinemia, and secondary lipoprotein disturbances, is a possible mechanism for the high rates of coronary heart disease in South Asian in Britain and overseas.

High insulin levels and impaired glucose tolerance, and hypertriglyceridemia and low HDL cholesterol do all these not occur with insulin resistance? But what about obesity?

Relationship of glucose intolerance and hyperinsulinaemia to body fat pattern in south Asians and Europeans.

McKeigue PM, Pierperpoint T, Ferrie JE, Marmot MG.
Diabetologia 192; 35: 785-91.

Type-2 (non-insulin-dependent) diabetes mellitus and insulin resistance is associated with centrally distributed obesity. These disturbances are especially prevalent in people of South Asian (Indian, Pakistani and Bangladesh) descent. We examined the relationship of glucose intolerance to body fat pattern in a population survey of 2936 men and 537 women of South Asian and European origin living in London, U.K. In both groups glucose intolerance (defined as diabetes or impaired glucose tolerance) was more strongly associated with waist-hip girth ratio than with skinfolds or body mass index. The associations between body mass index and glucose

intolerance were fully accounted for by waist-hip ratio. In European men with normal glucose tolerance fasting insulin levels were more strongly correlated with body mass index than with waist-hip ratio. Physical activity scores were lower in South Asians than in Europeans but no statistical associations between glucose intolerance and low physical activity were detectable. Leisure-time physical activity scores were inversely correlated with 2-h insulin levels in both groups. In contrast with other studies, these results suggest that a specific effect of intra-abdominal fat deposition underlies the association between glucose intolerance and obesity. The association between hyperinsulinaemia and obesity is less specific for centrally for centrally distributed fat. When measured appropriately waist-hip ratio is the most valid anthropometric index for identifying individuals whose obesity predisposes them to glucose intolerance.

And now it is the type of obesity: central more than peripheral! And "South Asians" are one big family too.

Relation of central obesity and insulin resistance with high diabetes prevalence and cardiovascular risk in South Asians.

McKeigue PM, Shah B, Marmot MG.
Lancet 1991; 337: 382-6.

They hypothesized that the high mortality from coronary heart disease (CHD) in South Asians settled overseas compared with other populations is due to metabolic disturbances related to insulin resistance was tested in a population survey of 3193 men and 51 women aged 40-69 years in London, U.K. The sample was assembled from industrial workforces and general practitioners lists. In comparison with the European group, the South Asian group had a higher prevalence of diabetes (19% vs. 4%), higher blood pressure, higher fasting and post-glucose serum insulin concentrations, higher plasma triglyceride and lower HDL cholesterol concentrations. Mean waist-hip girth ratios and trunk skin folds were higher in the South Asian than in the European group. Within each ethnic group waist-hip ratio was correlated with glucose intolerance, insulin, blood pressure, and triglyceride. These results confirm the existence of an insulin resistance syndrome, prevalent in South Asian populations and associated with a pronounced tendency to central obesity in this group. Control of obesity and greater physical activity offer the best chances for prevention of diabetes and CHD in South Asian people.

Muslims and Gujarati Hindus smoke about same as Britishers, Sikhs much less. In South Asians blood pressure is slightly higher, and cholesterol is lower, if anything. Triglycerides are higher in all Asians (perhaps except Gujaratis). Waist-hip ratio is definitely higher (and comparable between sub-groups) in South Asians. Diabetes occurs about 4 times more often; insulin levels are about two and a half- time than of Britishers. The scene is clearer: South Asians are one big family, several known risk factors are less common or similar to the native British's; Only truncal obesity, hyperinsulinemia and diabetes could explain the excess coronary risk!

Serum immunoreactive insulin responses a glucose load in Asian, Indian and European type-2 (non-insulin dependent) diabetic patients and control subject.

Mohan V, Sharp PS, Cloke HR, Burrin JM, Schumer B, Kohner EM.
Diabetologia 1986; 29: 235-7.

The serum immunoreactive insulin response to an oral glucose load was estimated in 15 Asian Indian and 29 Europeans non-diabetic subjects and in 45 Asian Indian and 72 European Type-2 (non-insulin-dependent) diabetic patients. In the non-diabetic group, basal insulin values were higher in the Asian Indians than the Europeans (16.7 ± 3.0 vs. 6.9 ± 0.7 mU/l, $p < 0.001$), and remained higher throughout the glucose tolerance test. Total insulin response was also higher in the Asian Indians ($p < 0.001$), and linear regression analysis revealed basal insulin, body mass index and race to be important predictors of insulin response. Amongst the diabetic patients, basal insulin values were again higher in the Asian Indians compared with the Europeans (18.0 ± 5.0 vs. 11.5 ± 0.9 mU/l, $p < 0.05$). Total insulin response was also greater ($p < 0.01$). Linear regression analysis revealed the basal insulin value to be the only significant predictor of insulin response. The results demonstrate higher insulin levels in Asian Indians than Europeans in both normal subjects and Type 2 diabetic subjects. The insulin response to a glucose load is also greater in the Asian Indians. In the control subjects, ethnic differences contribute to this response whereas in the diabetic patients this is a function of the elevated basal insulin values of the Asian Indians.

Central rather than generalized obesity is related to hyperglycemia in Asian Indian subjects.

Shelgikar KM, Hockaday TDR, Yajnik CS.
Diabetic med. 1991; 8: 712-7.

The relationship of body mass index and waist-hip ratio with plasma glucose concentrations during an oral glucose tolerance test (OGTT) was studied in native Indian (Asian) subjects. A total of 389 subjects [(131 non-diabetic, 74 impaired glucose tolerant (IGT) and 184 Type 2 diabetic (newly diagnosed and untreated)], were studied. Prevalence of obesity ($BMI \geq 27.0$ kg m⁻² in men and ≥ 25.0 kg⁻² in with Type-2 diabetes than that reported in White Caucasian and migrant Asian populations. Body mass index was highest in IGT subjects [(26.1 (19.7-34.3) kgm⁻², median 95-95th percentile)] and was higher in diabetic subjects [24.2 (19.39-32.2) kg⁻²] then in non-diabetic control subjects [23.5 (17.1-30.0) kgm⁻²]. However, waist-hip ratio was higher in both IGT [0.88 (0.75-0.98)] and diabetic subjects [0.88 (0.70-0.97)], with no difference between the hyperglycemic groups. On multivariate analysis, fasting as well as 2-h plasma glucose concentrations during OGTT were found to be related to waist-hip ratio ($p < 0.01$) and subscapular fat thickness ($p < 0.01$) but not to body mass index (or triceps fat thickness). Thus, in native Indians central obesity seems to be a more important association of hyperglycemia than generalized obesity.

The relationship between obesity, plasma immunoreactive insulin concentration and blood pressure in newly diagnosed Indian Type-2 diabetic patients.

Yajnik CS, Naik SS, Bhat DS, Joshi VM, Shelgikar KM, Alberti KGMM, Hockaday TDR.

The association of blood pressure with clinical and biochemical measures were studied in 185 newly diagnosed Type-2 diabetic patients, 74 impaired-glucose-tolerant (IGT) and 128 non-diabetic control subjects. Hyperglycemic subjects were older than control subjects [controls 40 (24-59) years, IGT 48 (29-64) years, diabetic 43 (29-60) years, median (5th–95th percentile) both $p < 0.05$]. They were also more obese [body mass index (BMI) controls 23.5 kg m⁻² (17.2-29.9, IGT 26.0 kg. m⁻² (19.8-33.9), diabetic 24.2 kg m⁻² (19.3-32.2)] and with a greater waist-hip ratio [controls 0.83 (0.70-0.98), IGT 0.88 (0.75-0.98), diabetic 0.89 (0.75-1.0)]. Blood pressure was significantly higher in both IGT [systolic 127 mmHg (108-162), diastolic 88 mmHg (66-99)] and diabetic patients [systolic 130 mmHg (104-160), diastolic 84 mmHg (66-1-2)] compared to non-diabetic controls [systolic 120 mmHg (100-151), diastolic 80 mmHg (60-94)]. Univariate analysis showed that in diabetic patients systolic blood pressure was related to age ($r=0.17$, $p<0.05$), BMI ($r=0.23$, $p<0.01$) and plasma immunoreactive insulin (fasting and post glucose, $r=0.25$, $p<0.01$) but not to C-peptide concentrations, diastolic blood pressure to BMI ($r=0.35$, $p<0.001$), waist-hip ratio ($r=0.23$, $p<0.01$) and plasma immunoreactive insulin (fasting $r=0.30$, $p<0.001$, post-glucose $r=0.20$, $p<0.05$) but not to C-peptide concentrations. Multivariate analysis revealed that systolic blood pressure in diabetic patients was related to BMI ($p < 0.01$) and fasting immunoreactive insulin ($p < 0.05$) while diastolic blood pressure was related to BMI ($p < 0.001$) and waist-hip ratio ($p < 0.01$). Thus, blood pressure is associated with obesity even in our relatively non-obese population and it is also associated with plasma immunoreactive insulin concentrations. The mechanism of these associations remains to be established.

Comparative study of plasma lipids, carbohydrate tolerance and coronary angiography in three racial groups.

Thandrouen FT, Asmal AC, Learly WP, Mitha AS. *S. Afr. Med. J* 1980; 57: 533-6.

Coronary artery disease (CAD) was investigated by selective coronary cine angiography in 94 white, 59 Indian and 17 Black patients, and correlated with plasma cholesterol and triglyceride levels and glucose tolerance. CAD was found in 97%, 97% and 82% hypercholesterolaemia in 68%, 61% and 50% of the Whites, Indian and Blacks respectively in the White group, cholesterol levels correlated with both frequency and severity CAD.

Hypertriglyceridaemia occurred in 44% of the White, 47% of the Indian, and 23% of the black group, but did not correlate with the extent of CAD in any. Diabetes was detected in 56% of the Whites and 47% of the Indians, but was absent in all the Blacks tested. Hypercholesterolaemia appeared to be the only risk factor common to all racial groups.

Insulin resistance, diabetes and risk markers for ischaemic heart disease in Asian and non-Asian in Bradford.

Br. Heart J. 1992; 67: 343-50.

A cross-sectional study was carried out to examine the hypothesis in a community not studied before, that insulin resistance associated with centralized adiposity is the mechanism underlying the predisposition of Asian immigrant communities to both ischaemic heart disease and diabetes mellitus. The study setting was two factories in the textile sector in Bradford, West Yorkshire. Subjects comprised male manual workers of Asian ($n = 1100$ and non-Asian origin ($n = 156$) aged 20-65 years. Diabetes was almost three times more prevalent in the Asian group. Two hours after an oral glucose load Asian men had double the serum insulin concentrations of non-Asian men ($p<0.0001$). Asian men also cholesterol ($p<0.03$), HDL-cholesterol (HDL₂, $p<0.0001$; HDL₃, $p<0.0001$) and apolipoprotein AI ($p<0.0001$). Fasting plasma triglyceride concentrations were slightly higher ($p=0.072$) in the Asian men; thus the ration of triglyceride cholesterol was higher ($p=0.0006$). The interrelation between serum insulin and plasma lipid concentrations indicated metabolic differences between the ethnic groups. Insulin concentrations were associated with cholesterol concentrations in the Asian men only and there was a lack of association between triglycerides, LDL-cholesterol and HDL-cholesterol in this group. The risk marker profile in the Asian men was therefore quite different to that of their non-Asian counterparts and was associated with a greater tendency to centralized adiposity. These data support the insulin resistance hypothesis and thus have important implications for strategies for the prevention of heart disease in Asian communities in the U.K.

Prevalence of ischaemic ECG abnormalities according to the diabetes status in the population of Fiji and their associations with other risk factors.

Tuomilehto J, Zimmet P, Kankaanpaa J, Wolf E, Hunt D, King H, Ram P. *Diabetes Res. Pract.* 1988; 5: 205-17.

The prevalence of ECG abnormalities indicating the presence of coronary heart disease was examined in the Melanesian (444 men and 457 women) and Asian Indian (408 men and 435 women) population living in Fiji. The aim of the present analysis was to determine the levels of coronary risk factors in people with diabetes, impaired glucose tolerance (IGT) of normal glucose tolerance. The prevalence of ECG abnormalities suggesting coronary heart disease (Q-waves, ST-depression of T-wave changes) was higher among women than men and among Asian Indians than Melanesians. The prevalence of ECG abnormalities was highest in diabetic subjects, intermediate in people with IGT and lowest in people who had normal glucose tolerance. People with IGT were more likely than other to have high risk factor levels. In people with IGT the increased levels of other coronary risk factors might explain a great deal of the increased prevalence of the ECG abnormalities as compared with the prevalence in those with normal glucose tolerance. Also in diabetic subjects, the levels of other coronary risk factors were increased in those had ECG abnormalities, but not more than was the case with IGT, so that diabetes itself seemed to remain as the major identified risk factor for ECG abnormalities. The prevalence of diabetes in our study populations, especially in Asian Indians, was very high. This suggests that diabetes is the major risk factor for coronary heart disease in such populations.

As in the Asians in Europe so in the Asians everywhere else. Central obesity, hyperinsulinemia, hypertriglyceridemia, and a high coronary risk. Not to forget that the traditional risk factors are risk factors in Indians too. One, these may not necessarily explain the excess risk; two, in current stage of animal protein intake, and other such cultural influences the classical risk factors may not be taking major toll; three sooner or later these may show up, and it may not be additive to the existing risk factors; it may be synergistic. Beware South Asians!

Review: The growing prevalence of non-insulin-dependent diabetes in migrant Asian populations and its implications for Asia.

Fujimoto W.Y.
Diab. Res. and Clin. Pract. 1992; 15: 16-83.

Many of the prevalence studies of diabetes in Asian population are reviewed. When compared to Whites, Asians have an even greater predominance of non-insulin-dependent (NIDDM) over insulin-dependent diabetes (IDDM). Diabetes prevalence is higher among migrant Asians than in their homelands, and is often higher than in the majority population of their new homes. It is hypothesized that when a vulnerable population experiences environmental influences accompanying Westernization insulin resistance and eventually glucose intolerance develop. Asians are postulated to be a vulnerable ethnic group. Since many portions of Asia are also becoming westernized, it is postulated that insulin resistance and glucose intolerance will become more common in Asia. If this prediction is correct, then NIDDM will be a major health problem in Asia in the near future.

Prevalence of known diabetes in an urban Indian environment: the Darya Ganj diabetes survey

Verma NPS, Mehta SP, Madhu S, Mather HM, Keen H.
Br. Med. J. 1986; 293: 423-4.

In view of a high prevalence of diabetes reported from Asians abroad a house to house survey was made at all households within a defined area in Darya Ganj, a fairly affluent suburb of New Delhi. The crude prevalence of diabetes was found to be 3.1% of the 45 to 70 years old subjects asked 10.2% had known diabetes. It has to be emphasised that the disease burden from the data of known diabetics variably underestimates the true magnitude of problem. What is incontestable from the data of Verma et al is the fact that the disease load is sizeable within the borders as well!

High prevalence of diabetes in an urban population in south India.

Ramachandran A, Jali MV, Mohan V, Snehletha C, Viawanathan M.
Br. Med. J. 1988; 297: 587-90.

An urban population in a township in south India was screened for diabetes with an oral glucose tolerance test; every fifth person aged 20 and over registered at the local iron ore company's hospital being screened. Of 678 people (346 men and 332 women) who were tested, 34 (5%, 20 men and 14 women) had diabetes and 14 (2%; 8 men and 7

women) had impaired glucose tolerance. Thirteen subjects were already known to be diabetic. Diabetes was present in 21% (37/179) of people aged over 40. The peak prevalence (41%; 7/17) was in the group aged 55-64. A family history of diabetes was present in 16 of the 34 subjects with diabetes and nine on the 15 with impaired glucose tolerance. Diabetes was significantly related to obesity in women but not in men [57% (8/14) v 5% (1/20)]. The plasma glucose concentration two hours after glucose loading was correlated to body mass index, age and income in both sexes. The prevalence of diabetes was significantly higher in subjects whose income was above the mean.

When the overall prevalence of diabetes was adjusted to the age distribution of the Indians living in South all, London, and in Fiji it increased to 10% and 9%, respectively. The prevalence of diabetes is high among urban Indians and is comparable with the high prevalence seen in migrant Indian populations.

Impaired glucose tolerance and diabetes mellitus in Hindu Indian Immigrants in Dar-es-Salaam.

Ramaiya KL, Swai ABM, McLarty DG, Alberti KGMM.
Diabetes Med. 1991; 8: 738-44.

The prevalence of impaired Glucose Tolerance (IGT) and diabetes mellitus was studied in a migrant Hindu Indian community in Dar-es-Salaam, Tanzania. Using 1985 WHO criteria, 75 g oral glucose tolerance tests (OGTT) were performed on 1147 (583 men; 564 Women) subjects aged 15 years and over. The age-standardized prevalence of IGT in men and women was 15.2 and 17.2% and that of diabetes was 9.0% (6.5% known; 2.6% previously undiagnosed) and 9.0% (3.7% known; 5.3% previously undiagnosed), respectively. Diabetes was present in 12.9% of men and 12.1% of women aged 35 years above. The overall age and sex standardized prevalence of IGT was 16.2% and of diabetes 9.1%. The major risk factors associated with diabetes in both men and women were age, family history of diabetes, and physical inactivity, and in women body mass index (BMI). Age and BMI contributed to the higher frequency of IGT in women as compared with men while in men; age was the only contributory factor. Despite overweight and obesity being more frequent in women than men, age-standardized prevalence rates of IGT and diabetes were similar between men and women. This decreased prevalence of diabetes in men and women performing moderate/heavy physical activity was independent of age and BMI.

Diabetes and impaired glucose tolerance in an Asian community Tanzania

Swai ABM, McLarty DG, Sherrif F, Chuwa LM, E, Lukmanji Z, Kermali W, Makene W, Alberti KGMM.
Diab. Res. and Clin. Practice 1990; 8: 227-34.

The prevalence of diabetes and impaired glucose tolerance has been determined in an Asian Muslim community in Dar-es-Salaam, Tanzania. Two-h oral glucose (75g) tolerance tests were performed on 1049 subjects over 14 years old, who were fasting, from a random sample of families. The overall age and sex-adjusted prevalence of diabetes was 7.1% (4.4% known, 2.7% previously undiagnosed) with a steady increase from 0.8% at 15-24 years and 3.0% at 25-34 years, to 24.9% for 65 years and over. Impaired glucose

tolerance (IGT) rates ranged from 11.4% (14-24 years) to 22.3% (over 64 years). The overall age adjusted prevalence of IGT was 21%).

The mean body indices (BMIs) were 24.3 and 26.4 for males and females, respectively, but age adjusted diabetes rates were similar in the two sexes (7.0% and 7.6% respectively). Diabetes and IGT were commoner in those with a family history of diabetes. Increasing parity was also associated with higher diabetes prevalence.

Diabetes and IGT are thus common in Asians in Tanzania, in contrast to the indigenous community. Rates are indeed higher than in most other immigrant Asian communities.

The Southall Diabetes Survey: prevalence of known diabetes in Asians and Europeans.

Mather HM, Keen H.
Brit. Med. J. 1985; 291: 1081-4.

A house to house inquiry for patients with known diabetes was carried out in a defined area of Southall, west London, which contained over 34000 Asian and 27000 Europeans in the 1981 Census: 1143 diabetic patients were ascertained, of whom 761 were Asian and 324 European. The prevalence adjusted for age of known diabetes in Asians was at least 3.8 times higher than that in Europeans. For patients aged between 40 and 64 years it was at least five times higher, were over 12% in Asians aged 60-69, and over 8% in those aged 50-59. These data are important in planning for the care of diabetic patients in health districts with large Asian communities. The causes and later consequences of the exceptionally high prevalence require further study.

Prevalence of diabetes and cardiovascular disease risk factors in Hind Indian subcommunities in Tanzania.

Ramaiya KL, Swai AB, McLarty DG, Bhopal RS, Alberti KG.
BMJ 1991; 303: 271-6.

Objectives: To differences in the prevalence of diabetes mellitus and other coronary heart disease risk factors, and to identify factors associated with these differences within a Hindu Indian community.

Design: Population based cross-sectional survey.

Setting: Dar-es-Salaam, Tanzania.

Subjects: Of 20 Hindu subcommunities categorised by caste in Dar-es-Salaam, seven were randomly selected. 1147 (76.7%) of 1495 subjects aged 15 or over participated.

Main outcome measures: Blood glucose concentrations (fasting and two hours after oral glucose loading), serum total cholesterol and serum triglyceride concentrations, blood pressure, and height and weight.

Results: The subcommunities differed substantially in socioeconomic characteristics and lifestyle. Overall, 9.8% of subjects (109/1143) hypertension, and 13.3% impaired glucose tolerance. 14.5% (166/1143) hypertension, and 13.3% tolerance, 14.5% (166/1143) hypertension, and 13.3% (151/1138) were obese. The mean fasting blood glucose concentration was 4.9 mmol/l, the blood glucose concentration two hours after oral loading (75g), 6.0 mmol/l, the total cholesterol concentration 4.9 mmol/l, the serum

triglyceride concentration 1.4 mmol/l, and mass index (weight/height: kg/m²) 24.3. Systolic and diastolic blood pressures were 121 and 77 mm Hg respectively. There were important intercommunity differences even after standardisation for age, sex and body mass index- for an example, in mean fasting blood glucose concentration [range 4.5 (Jains) to 5.9 mmol/l (Patel)]. Serum total cholesterol concentrations [range 4.5 (Jains) to 6.2 mmol/l (Sulthars)], systolic blood pressure [range 110 (Limbachias) to 127 mm Hg (Bhatias)], and prevalence of diabetes [range 3.4% (3/87 Limbachias) to 19.4% (43/222 Bhatias)]. Variables which showed significant linear correlation with sub-community variations were entered into a multiple regression model. Inter-community variations persisted. The Limbachia and Jain communities had the lowest prevalence of and mean values for coronary heart disease risk factors and the Bhatia and Patel communities highest.

Conclusions: In the series inter-community variations in disease and risk factors might have been related to genetic, dietary, socio-economic, and lifestyle differences but could not be explained by the characteristics studied. Studies of Indian sub-communities are warranted to confirm and warranted to confirm and extend these descriptive findings and explore the genetic basis of diabetes. Communities of Indian origin should not be perceived as homogeneous.

The Coventry diabetes study: Prevalence of diabetes and impaired glucose tolerance in Europoids and Asians.

Simmons D, Williams DRR, Powell MJ.
Quaterly J. Med. 1991; 296: 1021-30.

The Coventry Diabetes Study compared the prevalence of diabetes and impaired glucose tolerance in adult Asians and Europoids in relation to age, sex and body mass index. The study involved a cross-sectional house to house screening for diabetes in the electoral ward of Foleshill, Coventry, and a traditional area for migration into the city. Subjects with high blood glucose and 10 per cent of other were referred for a 75-g oral glucose tolerance test.

Of the 10304 adult residents age 20 years or above, 3529 (64 per cent) of 5508 Europoids and 3692 (84 per cent) of 4395 Asians were either screened for diabetes or already diabetic and 719 (65 per cent) of 1114 Europoids and 780 (72 per cent) of 1084 Asians invited to glucose tolerance test attended. Although the prevalence of insulin-dependent diabetes was 3.2 per cent [95 per cent confidence interval (CI): 2.6-4.0] and 4.7 per cent (CI per cent 4.0-5.5) in Europoid males and females but 12.4 per cent (CI 11.0-13.8) and 11.2 CI per cent (10.0-12.5) in Asian males and females giving prevalence ratios of 3.9 per cent (3.1-5.0) in males and 2.4 per cent (2.0-2.9) in females. These differences were not due to differences in body mass indices. The prevalence of impaired glucose tolerance was also higher in Asians aged below 60 years, and in 65 per cent of Europoids and 40 per cent of Asians non-insulin-dependent diabetes was previously undiagnosed. The non-insulin-dependent diabetes / impaired glucose tolerance ratio was significantly higher in Asians than Europoids.

Non-insulin-dependent diabetes in Asians differs from that in Europoids. Besides the higher overall prevalence, there is a greater proportion of males, a lower proportion of undiagnosed disease, a younger age at diagnosis and a

greater proportion of abnormal glucose tolerance that is due to non-insulin-dependent diabetes.

Comparative prevalence of non-insulin-dependent diabetes mellitus in Asian and White Caucasian adults.

Samanta A, Burden AC, Fent B.
Diab. Res. & Clin. Pract. 1987; 4: 1-6.

The prevalence of diabetes mellitus in adults was determined within a specific area of Leicester City, containing 20053 Asians and 18068 White Caucasians over the age of 16 years in the 1981 census. Subjects who had ever had classical symptoms with a random venous plasma glucose ≥ 11.1 mmol/l were taken as diabetic. Exact numbers were ascertained from an analysis of diabetic clinic records and specialist health visitor records. The latter have formed an important part of community care for diabetics in Leicester for the last 30 years, and patients are referred by hospital consultants and nursing staff and by general practitioners. Diabetes was ascertained in 967 Asians and 1194 White Caucasians. Age-adjusted relative risk of diabetes (95% confidence interval) increased in Asians over 45 years of age and was 1.6 (1.3-1.8) and 2.7 (2.5-3.2) for those aged 45-64 years and over 65 years, respectively. Relative risk of NIDDM was significantly higher (approximately x2) in Asians in all age groups. Our study shows that in Asians the prevalence of diabetes rises above 45 years of age and that NIDDM causes more frequently in adult Asians. The causes and long term effects of this require further analysis. The prevalence studies for looking at the load of diabetes and impaired glucose tolerance show about the same results. In Asians and elsewhere: approximately twice the prevalence seen in most of the Caucasian population. But what about its causes?

Parity, ethnic group and the prevalence of type-II diabetes: the Coventry Diabetes Study.

Simmons D
Diabetic Med. 1992; 9: 706-9.

The prevalence of type-II (non-insulin-dependent diabetes) in relation to parity was compared among South Asian (Asian and European women during a cross-sectional-house-to-house screening programme for diabetes in Foleshill, Coventry, U.K. The parity of female residents was ascertained in eight of the 12 areas visited. These areas contained 2096 European (68 with diabetes diagnosed) and 1148 Asian women (95 with diabetes diagnosed). Crude prevalence of type-II diabetes was 3.2% and 14.7% in Europeans aged 30-64 years and >65 years, respectively, and 10.9% and 36.5% in similarly aged Asians, respectively. In those aged 30-64 years, the age- and BML- adjusted prevalence of type-II diabetes was highest among nulliparous (Europeans 4.4%, Asians 16.3%) and grand multiparous (parity ≥ 5 : Europeans 6.3%, Asians 16.5%) women when compared with women who had had one or two deliveries (Europeans 0.9%, Asians 3.3%, $p < 0.001$, both ethnic groups). However, parity had no effect among women aged ≥ 65 years.

Indians have a higher parity!

Glucose intolerance during pregnancy in Asian women.

Samanta A, Burden ML, Burden AC, Jones GR.

Diabetes Res. & Clin. Practice 1989; 127-35.

The present study was aimed at examining differences in gestational diabetes mellitus (GDM) between two ethnic populations (immigrant Asians and indigenous White Caucasians) residing in Leicester, U. The study was divided into two parts: to determine the prevalence of GDM and to determine the level at which glycaemia may impose a risk to the mother and the fetus.

Of a total of 12,005 pregnancies (4561 Asian and 7444 White Caucasian), over a 3 year period 310 (6.8%) Asian and 504 (6.7%) White Caucasian were given a 75-g oral glucose tolerance test (OGTT) at 28-32 weeks for indications of large for date pregnancies, hydramnios, glycosuria, a history of previous abortions, stillbirths, congenital abnormalities or glucose intolerance, and family history of diabetes. Abnormal glucose tolerance (AGT) was taken as a 2-h venous plasma glucose ≥ 7.8 mmol/l, which reverted to normal when formally tested during the puerperium (WHO criteria, 1985). AGT was found in 1.33% Asians and 0.87% White Caucasian pregnancies ($p < 0.01$). This was further divided into the impaired glucose tolerance (IGT) (2-h value 7.8-11.1 mmol/l) and gestational diabetes mellitus (GDM) (2-h value ≥ 11.1 mmol/l). IGT was found in 1.2% Asian and 0.84% White Caucasian pregnancies ($p < 0.01$) and GDM in 0.18% and 0.02 respectively ($p < 0.01$). Subsequently, 554 consecutive pregnancies (198 Asian and 356 White Caucasian) who had an OGTT over a 2 year period were analysed for maternal complications (toxaemia of pregnancy, Caesarian sections) and foetal complications (macrosomia, microsoma, congenital abnormalities, perinatal mortality, prematurity), according to a 2-h venous plasma glucose stratified as follows: ≤ 4 , 4.1-5, 5.1-5.5, 5.6-6.6, 6.7-7.7, 7.9-11. ≥ 11.1 mmol/l. There was trend for an abnormal OGTT to occur in older and heavier women. There was a significant linear trend in the proportions of Asian maternal complications across the glycaemic bands ($p < 0.05$), but not so in the White Caucasian group. Foetal complications were higher in Asians in the glycaemic band > 7.8 mmol/l when compared to White Caucasians. In both ethnic groups, foetal complications appeared to be higher at the extreme ends of the glycaemic bands. However, different levels of glycaemia within the 'normoglycaemic' range (2-h value < 7.8 mmol/l) did not seem to adversely influence either maternal or foetal outcome in either group. In conclusion, Asian women have a significantly higher prevalence of abnormal glucose tolerance during pregnancy; with a significant linear trend in the proportion of maternal complications across glycaemic bands. Foetal complications are also higher in Asians who have a 2-h venous plasma ≥ 7.8 mmol/l on OGTT. Further studies in different ethnic groups are suggested.

High prevalence of gestational diabetes in women from ethnic minority groups.

Dornhorst A, Paterson CM, Nicholls JSD, Wadsworth J, Chiu DC, Elkeles RS, Johnston DG, Beard RW.
Diabetic Med. 1992; 9: 820-5.

The influence of ethnic origin body mass index, and parity on the frequency of gestational diabetes was assessed in 11205 consecutive women attending a multiracial antenatal clinic in London, where all women were screened for gestational diabetes. Logistic regression was used to model

the relationship between gestational diabetes and ethnic origin, age, body mass index (BMI), and parity. Results were presented as adjusted odds ratios, where the reference categories are White women, age <25 years, BMI <27 and parity <3. Ethnic origin was the dominant influence on the prevalence of gestational diabetes. Women from ethnic groups than White had a higher frequency of gestational diabetes than White women (2.9% vs. 0.4%, $p < 0.001$). Compared to White women the relative risk of gestational diabetes in the other ethnic groups was: Black 3.1 (95% confidence limits 1.8-5.5). South East Asian 7.08 (4.01-14.1), Indian 11.3 (6.8-18.8), and miscellaneous 5.9 (3.5-9.9). Increasing age was an independent risk factor. The relative risk was higher in women ≥ 35 years in all ethnic groups other than in South East Asian women. Obesity (BMI ≥ 27) was a further independent risk factor in all ethnic groups except in the Indian and South East Asian women. Obesity (BMI ≥ 27) was a further independent risk factor in all ethnic groups except in the Indian and south East Asian women. Parity ≥ 3 increased the relative risk of gestational diabetes in the White, Black and South East Asian women only. Age and obesity were factors of particular importance in Black women in whom the risk was 4.1 fold greater in those ≥ 35 years compared with women < 35 years, and 5.0 fold higher if the BMI was ≥ 27 compared with < 27 . Ethnic origin has a major influence on the prevalence of gestational diabetes and the importance of other risk factors varies between ethnic groups. These findings have important implications for the screening of women in pregnancy.

Dose gestational diabetes forecast a higher chances of syndrome of insulin resistance, hypertriglyceridemia, central obesity, and, coronary artery disease? It may be interesting reading the next abstract!

Type-2 (non-insulin-dependent) diabetes mellitus, hypertension and hyperlipidemia (syndrome X): relation to reduced fetal growth

Barker DJB, Hales CN, Fall CHD, Osmond C, Phipps K, Clark PMS.
Diabetologia 1993; 36:62-7.

Two follow up studies were carried out to determine whether lower birth weight is related to the occurrence of syndrome X type-2 (non-insulin-dependent) diabetes mellitus, hypertension and hyperlipidemia. The first study included 407 men born in Hertfordshire, England between 1920 and 1930 whose weights at birth and one year of age had been recorded by health visitors. The second study included 266 men and women born in Preston, U.K. between 1935 and 1943 whose size at birth had been measured in detail. The prevalence of syndrome X fell progressively in both men and women, from those who had the lowest to those highest birthweights. Of 64 year old men whose birthweights were 2.9 kg or less, 22% had syndrome X. Their risk for developing diabetes was ten times greater than that of men whose birthweights were more than 4.31 kg. The association between syndrome X and low birthweight was independent of duration of gestation and possible confounding variables including smoking, alcohol consumption and social class currently or at birth. In addition to low birthweight, subjects with syndrome X had small head circumference and low ponderal index at birth and low weight and below average dental eruption at 1 year of age. It is concluded that Type-2 diabetes and hypertension have a common origin in suboptimal development in utero,

and that syndrome X should perhaps be renamed "the small-baby syndrome".

Indian babies are small too! But then there are several unanswered questions. Babies larger than 4 kg in India occur rarely without gestational diabetes. Maternal diabetes increases the risk for diabetes much more than paternal diabetes! Yet these two (gestational diabetes and intrauterine growth retardation) could be independent risk markers! Interesting, isn't it?

But we cannot possibly change our mother's gestational diabetic state today! Neither do I have any control over my birth weight! Though if found correct, these risks may be modifiable in terms of several generations. Today what may remain modifiable are lack of exercise; high calorie, high fat, low residue diet; truncal obesity; stress, etc. For this generation these may pay more dividends, for the next may be a better maternal and childcare!

High prevalence of type-2 (non-insulin-dependent) diabetes among the offspring of conjugal types 2 diabetic parents in India.

Viswanathan M, Mohan V, Snehlatha C, Ramachandran A.
Diabetologia 1985; 28: 907-910.

The prevalence of Type-2 (non-insulin-dependent) diabetes among offspring of conjugal type-2 diabetic in India was determined by performing oral glucose tolerance tests. Diabetes was present in 50% of offspring, and 12% had impaired glucose tolerance according to the National Diabetes Data Group criteria. Thus, 62% of all offspring had abnormal glucose tolerance tests. This is the highest prevalence rate for diabetes among offspring of conjugal parents and might represent an ethnic variation of the genetic factors operating in Indian patients with Type-2 (non-insulin-dependent) diabetes.

A genetic analysis of type-2 (non-insulin-dependent) diabetes mellitus in Punjabi Sikhs and British Causcasoid patients.

Hitman GA, Karir PK, Mohan V, Rao PV, Kohner EM, Levy JC, Mather H.
Diabetes Med 1987; 4: 526-30.

A genetic analysis of diabetic and non-diabetic Punjabi Sikhs (n=164) was made for markers of non-insulin-dependent diabetes mellitus insulin receptor, insulin and HLA-D alpha chain gene probes. Additionally, British Causcasoids (n=163) were studied using the insulin receptor probe. Insulin receptor gene restriction fragment length polymorphisms were defined using Southern blot techniques and the restriction enzyme Bgl II and Bam HI. In Punjabi Sikhs and British Causcasoids neither of the restriction fragment length polymorphism's distinguished non-insulin-dependent diabetes mellitus subjects from controls. In the Sikhs no association with non-insulin-dependent diabetes mellitus was seen with the hypervariable region of the insulin gene or with HLA-DR/DQ/DX alpha chain restriction fragment length polymorphisms. We therefore conclude that despite the high prevalence of non-insulin-dependent diabetes mellitus in Asians were unable to find any genetic markers for this disease using the available cloned gene probes.

One big human- family, aren't we. At least our Type-2 diabetes has none of the not-so-prevalent "genetic markers" of the illness. Only the finding that offspring of conjugal type-2 diabetic parents have an out of proportion higher risk for developing of diabetes is also disturbing.

Asian Diabetes in Britain: a clinical profile.

Nicholl CG, Levy JC, Mohan V, Rao PV, Mather HM.
Diabetic Med. 1986; 3: 257-60.

The clinical feature of large unselected groups of Asian (401) and European (491) patients attending a diabetic clinic were compared. The prevalences of symptomatic ischaemic heart disease, Hypertension, retinopathy, and lens opacities were similar in the two groups, despite the shorter known duration and the relative youth of the Asian patients. Pedal pulses were more often absent in Europeans, whereas in the age-group 20-64 years, ankle and knee reflexes were more often unobtainable in Asians. The degree of adiposity was similar in the two groups, but was less in Asian males than females. A first-degree diabetic relative was reported more commonly in Asians than in Europeans. These findings are important in relation to the exceptionally high prevalence of Diabetes recently described in the Southall Asian community.

A comparison of the clinical features and vascular complications of diabetes between migrant Asians and Caucasians in Leicester, U.K.

Samanta A, Burden AC, Jagger C, *Diabetes Res. Clin. Pract.* 1991; 14: 205-13.

907 consecutive patients, (456 Asian and 451 Caucasian) were assessed, employing a similar methodology to the multi-centre WHO study. The Asians were older at diagnosis (46.5 years compared with 40.6 years, $p < 0.01$); they had a shorter duration of diabetes (6.3 years versus 11.4 years, $p < 0.1$), a higher rate of diabetes in the first degree relatives (29.5% compared with 16%, $p < 0.1$), less ketonuria at presentation (85.3% compared with 47.8%, $p < 0.1$) and fewer were treated with insulin (31.4% compared with 68.7%). Comparing the prevalence of complications between Asians and Caucasians, the ischaemic heart disease rate was similar; peripheral vascular disease was less (3.7% Asian, 9.3% Caucasian, $p < 0.05$); retinopathy was less (11.6% Asian, 9.3% Caucasian, $p < 0.05$) retinopathy was less (11.6% Asian, 32.3% Caucasian, $p < 0.01$); but renal disease was more (22.3% Asian, 12.6% Caucasian, $p < 0.01$). After adjusting for age, sex, duration of diabetes, age of diagnosis, Hypertension, smoking and treatment with or without insulin, and these differences remained significant. Multivariate logistic regression failed to reveal a significant contribution due to any of the above variables, for due to body mass index (BMI), hemoglobin A₁ (HBA₁), or physical activity in prevalence of complications in Asians compared with Caucasians. Marked heterogeneity in the complications of diabetes in the two ethnic groups studied was found, but must be confirmed from population-based studies.

Diabetes and its vascular complications in Malaysia.

Jones JJ, Watkins PJ, Owyong LY, Loh PP, Kutty MK, Jogie B.

Trop. Geogr. Med. 1978; 30: 439-49.

One hundred and thirty-two newly diagnosed Asian diabetic patients (39 Malay, 30 Chinese and 63 Indians) have been studied in Kuala Lumpur. The highest proportion of diabetic patients was Indian and the lowest were Chinese. Vascular complications were equally common in Asian diabetic patients as in Europeans; coronary heart disease was relatively more common in Indians and cerebral vascular disease in Chinese. Twenty percent of all Asian diabetic patients requiring admission to hospital also had coronary heart disease, 9% had cerebral vascular disease and 8% had gangrene or ulceration of the feet. In Kuala Lumpur, diabetes is a very important risk factor for coronary heart disease: 17% of all patients admitted to the General Hospital with coronary heart disease were already diabetic.

Diabetic renal disease: differences between Asian and white patients.

Samanta S, Burden AC, Feehally J, Walls J.
Brit. Med. J. 1986; 293: 366-7.

370 Indian subcontinental (Indian Pakistani, Bangladeshi, and Sri, Lankan) diabetics were compared by the Leicester diabetes clinic group with a similar number (368) of White patients for prevalence of diabetic nephropathy based on $> 0.5g$ proteinuria per day in absence of urinary infection. Despite a younger age [mean 52 (SD 12) vs. 58 (15) and shorter duration of known diabetes [8 (3.6) vs. 12 (4.2)], the prevalence of proteinuria was more than two times higher in Asians compared to Whites (14% vs. 6%). This was associated with similar glycosylated hemoglobin [9.5 (2.0) vs. 9.3 (2.5)] and blood pressure (hypertension $> 15*/94$ mm Hg: 2% vs. 2.5%). The occurrence of proteinuria in a higher proportions of South Asians forecasts a grim future for the diabetic population unless preventive remedial steps are taken fast. In order to take logical preventive steps we will have to identify and attack the risk markers of nephropathy. Clearly, the well known risk marker, hypertension, does not explain the higher prevalence of nephropathy in Asians.

Microalbuminuria in non-insulin-dependent diabetes: its prevalence in Indian compared with Europoid patients.

Allawai j, Rao PV, Gilbert R, Scott G, Jarrett RJ, Keen H, Viberti GC, Mather HM.
Br. Med. J. 1988; 286: 462-4.

Non-insulin-dependent diabetes mellitus is strikingly common in British Indians, but their susceptibility to diabetic complications is unknown. The ration of albumin to creatinine concentrations was measured in samples of the first urine voided in the morning in 154 Indian and 83 Europoid patients with non-insulin-dependent diabetes and in a control group of 129 non-diabetic Indians. The ratio was significantly higher in the Indian patients than in the Europoid patients and the Indian controls. There were no significant correlations between the logarithm of the albumin: creatinine ratio and age, known duration of diabetes, hemoglobin A₁ concentration, or body mass index within either diabetic group. Hypertension and raised albumin: creatinine ratio was significantly associated, and significant correlations were seen between the logarithm of the albumin: creatinine ratio in the Indian but not the Europoid diabetics.

Because of the high prevalence of diabetes at a relatively early age in Indians, nephropathy may emerge as an important clinical problem.

Increased incidence of end-stage renal failure secondary to diabetes mellitus in Asian ethnic groups in the United Kingdom.

Burden AC, MacNally PC, Feehally J, Walls, J.
Diabetic Med. 1992; 9: 641-5.

Diabetic renal disease is a more common in-patient of Asian ethnic origin than White Caucasians in the United Kingdom. This study determines whether a disparity in the incidence of end-stage renal failure secondary to diabetes mellitus exists between these ethnic groups. The incidence of treated end-stage renal failure was estimated using the person-time at risk incidence rate for patients receiving renal replacement therapy incidence rate of end-stage renal failure expressed for the estimated population of patients with diabetes mellitus in patients of Asian ethnic origin was 486.6 (95% CI, 185.1 to 788) cases per million persons – years per year, compared to 35.6 (17 to 54.2) in White Caucasians. All patients of Asian ethnic origin developing end-stage renal failure had non-insulin-dependent diabetes. The high incidence of end-stage renal failure secondary to diabetes mellitus in-patients of Asian ethnic origin in the U.K.

imparts significant public health implications for resource planning and allocation, and the need to initiate strategies to ameliorate renal disease in this ethnic group.

Prevalence of hypertension in White, Black and Asian diabetics in a district hospital diabetic clinic.

Pacy P J et al.
Diabetic Med. 1985; 2: 125-30.

And now a higher renal failure in diabetics.

There is enough data for us to act, to guide us to take positions for prevention of the oncoming epidemic of coronary heart disease and diabetes mellitus related mortality. There are several unresolved issues. But there is one thing clear: there are modifiable risk factors and we need to at least retard what can be retarded. Let us preserve whatever is good in our culture, as we imbibe what is good in others.

Acknowledgements:

We acknowledge the assistance of British Diabetes Association and Serdia Pharmaceuticals in the compilation of these abstracts.