ORIGINAL ARTICLE

Cardiovascular disease risk factors in Pakistani population with newly diagnosed Type 2 diabetes mellitus: A cross-sectional study of selected family practitioner clinics in four provinces of Pakistan (CardiP Study)

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Abstract

Objective: To explore cardiovascular risk factors in people with newly-diagnosed type 2 diabetes mellitus.

Methods: The cross-sectional, prospective, multicentre, study was conducted from June 2014 till July 2015 at family practice clinics in 27 cities across Pakistan, and comprised individuals aged 30-50 years diagnosed with type 2 diabetes mellitus within the preceding six months. Laboratory investigations were conducted at Shaukat Khanum Memorial Cancer Hospital and Research Centre, Lahore, and Aga Khan University Hospital, Karachi. The 10-year absolute risk of fatal or non-fatal coronary heart disease and stroke was calculated using the United Kingdom Prospective Diabetes Study Risk Engine version 2.0. Data were analysed using SPSS 19.

Results: Out of 888 subjects, 362(40.8%) were women and 526(59.2%) were men. The overall mean presenting age was 42.4±5.8 years. After stratification by age, those ≥40 years were significantly associated with higher glycated haemoglobin (p=0.02) and those ≤39 years were associated with higher levels of very low density lipoprotein (p=0.001) and triglyceride (p=0.006). The mean risk estimate for CHD was 9.7% (95% Confidence Interval (CI) 9.0-10.1)), for fatal CHD 4.4% (95% CI 4.0-4.6), for stroke 1.5% (95% CI 1.2-1.7), and for fatal stroke 0.25% (95% CI 0.24-0.26).

Conclusion: There is a need for screening cardiovascular risk factors even in younger age groups of newly-diagnosed diabetes.

Keywords: Type 2 diabetes mellitus, Cardiovascular disease, Dyslipidaemia, Risk factors. (JPMA 69: 306; 2019)

Introduction

Diabetes is a metabolic disorder with an increasing global prevalence largely due to population expansion, aging, urbanisation, increasing obesity and sedentary lifestyle.[1] According to International Diabetes Federation (IDF) estimates, worldwide the number of people with type 2 diabetes mellitus (T2DM) was 387 million in 2014 with a projected rise to 592 million in 2035.[2] The greatest proportional increase in adults with diabetes is expected in low-income and lower middle-income countries (LMICs).[3] In 2007, more than 110 million people in Asia were living with diabetes, with a very high disease load among the young. Young age of onset and long disease duration puts Asian people with diabetes at high risk for cardio-renal complications. Cardiovascular disease (CVD) is a serious complication of T2DM that results in substantial morbidity, increased mortality and burden on healthcare infrastructure.[4]

The greater morbidity and mortality from CVD in developing countries will have the greatest impact in South Asia, which forms nearly a quarter of the total global population and where a serious lack of access to healthcare also exists.

Pakistan, an LMIC with a total population of approximately 199 million projected population based on census figures, has an estimated diabetes prevalence of 11.4% in the age group of 25 years and above.[5]

Few studies from Pakistan have explored the chronic complications of diabetes, including CVD.[5,6] However, no nationwide data exists on cardiovascular complications of diabetes. Risk factors for CVD, such as poor glycaemic control, smoking, hypertension (HTN) and deranged lipid profile, are amenable to intervention which could reduce the risk of complications.

At present, globally the vast majority of people with diabetes receive frontline treatment by general practitioners (GPs) and family physicians (FPs) rather than by specialist endocrinologists.[7] The current study was

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planned to explore risk factors for cardiovascular complications of diabetes in people presenting to GP/FP clinics across Pakistan. The primary objective was to determine the frequency and distribution of the fixed (age, gender, ethnicity) and modifiable risk factors (glycated haemoglobin [HbA1c] levels, blood pressure (BP), lipid profile and smoking status) that contribute to CVD risk among diabetics. The secondary objective included assessment of absolute risk of a CVD event over the next 10 years using current values for all the fixed risk factors, and potentially modifiable risk factors like HbA1c levels, systolic blood pressure (SBP), high-density lipoprotein cholesterol [HDL-C] levels, and smoking status, using UK prospective diabetes study (UKPDS) risk calculator for CVD risk estimation.[8] This will hopefully fill the gaps in knowledge that can form the basis for effective national prevention programmes targeting this population.

Subjects and Methods

The cross-sectional, prospective, multicentre, study was conducted from June 2014 till July 2015 at family practice clinics in 27 cities across Pakistan, and comprised individuals aged 30-50 years diagnosed with T2DM in the preceding six months.

Those matching the inclusion criterion consecutively presenting at the outpatient clinics of the participating centres were screened for the study. Those aged under 30 years were excluded due to the likelihood of type 1 DM, while those aged above 50 years were excluded as age is an independent risk factor for CVD and could act as a confounder. The eligible participants were enrolled after written informed consent. The study was approved by the institutional review board of the coordinating centre, Shaukat Khanum Memorial Cancer Hospital and Research Centre (SKMCH&RC), Lahore, and the National Bioethics Committee (NBC), Islamabad, Pakistan.

Endocrinologists as Regional investigators (RIs) were included and they were part of the study steering committee that comprised RIs, Principal investigator (PI) and co-PIs and was responsible for the study questionnaire, design and oversight. Larger 'sample' of centres from larger cities was selected to ensure adequate representation but it was convenience-based selection as per ease of access. We enrolled a selected number of 5 participants from each clinic. All the participating GPs received training on protocol procedures prior to the initiation to ensure protocol compliance and uniformity in patient selection and data collection across all centres. The study questionnaire included the eligibility checklist and study variables such as demographic information, date of diabetes diagnosis, height, weight, BP measurement, smoking and family history etc. Data on laboratory variables was collected directly from lab reports. Lab investigations were carried out at SKMCH&RC and Aga Khan University Hospital (AKUH), Karachi.

Fasting blood sample with minimum 10-hour fasting was collected. Two individuals did the study oversight for data queries resolution and data validation at the coordinating centre for quality control.

With an expected proportion of diabetics with high cholesterol level being 46%, we aimed for a 95% confidence interval (CI) with a sample size of 1000 participants. Keeping into account 30% expected missing data, the target sample was kept at 1300.

Demographic and baseline characteristics were expressed using descriptive statistics. Lab variables to normal ranges, as defined by the American Diabetes Association (ADA) criteria[9] for fasting glucose, HbA1c and lipid profile, were compared. Joint National Committee (JNC) criteria were used to define HTN and for categorisation of BP readings.[10,11] Ethnicity specific cut-offs were used for body mass index (BMI).[12] Data was analysed using SPSS 19.

The 10-year absolute risk of fatal or non-fatal coronary heart disease (CHD) and stroke was calculated using the UKPDS risk engine version 2.0 which is a T2DM-specific risk calculator based on 53,000 patients' years of data.[8]

Results

Of the 1067 participants enrolled, 888(83.2%) comprised the study sample. Of them, 362(40.8%) were women and 526(59.2%) were men.

In terms of age bifurcation, 612(69%) subjects were ≥40 years and 276(31.1%) were ≤39 years. Province-wise, 534(60.1%), 253(28.5%), 91(10.2%) and, 10(1.1%) were residents of Punjab, Sindh, KPK and Balochistan, respectively. The vast majority of participants were from the city of Karachi 114(12.8%) and Lahore 106(11.9%), followed by Faisalabad 56(6.3%), Multan 56(6.3%), Peshawar 54(6.1%), Hyderabad 54(6.1%), Bahawalpur 52(5.9%), Rawalpindi 46(5.2%), Sukkur 37(4.2%), Gujranwala 36(4.1%), Larkana 34(3.8%), Sahiwal-Okara 27(3.0%), Gujrat 25(2.8%), Rahim Yar Khan 22(2.5%), Sargodha 20(2.3%), Abbottabad 19(2.1%), Sialkot 19(2.1%), Jhang 17(1.9%), Sheikhupura 15(1.7%), Bhakkar & Mianwali 15(1.7%), Mardan 13(1.5%), Islamabad 11(1.2%), Bannu-D I Khan 11(1.2%), Quetta 10(1.1%), Nawabshah 9(1.0%), Toba Tek Singh 5(0.6%), and Khairpur 5(0.6%).

Table-1: Characteristics of participants.

Characteristic	n=888
Age - Mean (Years)	42.42 ± 5.8
≤39 Years, n (%)	276 (31.1%)
≥40 years, n (%)	612 (68.9%)
Gender	
Male, n (%)	526 (59.2%)
Female, n (%)	362 (40.8%)
Ethnicity, n (%)	
Punjabi	431 (48.5%)
Sindhi	74 (8.3%)
Saraiki	81 (9.1%)
Balochi	6 (0.7%)
Pathan	97 (10.9%)
Kashmiri	12 (1.4%)
Urdu Speaking	170 (19.1%)
Mixed/Multiracial	17 (1.9%)
Family history of Type 2 DM, n (%)	
Yes	645 (72.6%)
No	243 (27.4%)
Family history of Ischaemic Heart Disease (IHD), n (%)	
Yes	222 (25%)
No	666 (75%)
Family history of Hypertension, n (%)	
Yes	363 (40.9%)
No	525 (59.1%)
Family history of Other Diseases, n (%)	
Yes	3 (0.3%)
No	836 (94.1%)
Other - Stroke	8 (0.9%)
Other - CVA	4 (0.5%)
Other - Not Mentioned	35 (3.9%)
Other - Chronic Severe Asthma	2 (0.2%)

Data are expressed as mean ± standard deviation or number (percentage).
DM: Diabetes mellitus.
CVA: Cerebrovascular accident.

As regards ethnicity, 431(48.5%) participants were Punjabi, followed by 170(19%) Urdu-speaking, 97(11%) Pathan, 81(9%) Saraiki, 74(8.3%) Sindhi, 17(2%) mixed/multiracial, 12(1.4%) Kashmiri and 6(0.7%) Balochi (Table-1).

The overall mean presenting age of participants was 42.4±5.8 years; mean weight was 76±14.1kg; height 1.7±0.01 meters; BMI 27.8±5.1kg/m^2; SBP 128.1±14.8mmHg; diastolic blood pressure (DBP) 84.2±9.3mmHg; blood glucose 175.5±83.5mg/dl; HbA1C 80±6mmol/mol (9.5±2.7%); triglyceride (TG) 201.6±146.3mg/dl; serum total cholesterol (TC) 186.2±45.0mg/dl; VLDL 40.4±29.3mg/dl; low-density lipoprotein cholesterol (LDL-C) 115.7±36.0mg/dl; HDL-C 41.2±11.2mg/dl.

Table-2: Frequency and Distribution of modifiable risk factors as per sub-categories.

Characteristics	Categories	Frequency Distribution, n (%)
Body Mass Index (BMI)	Under Weight (<18.0 kg/m2)	10 (1.1%)
	Normal BMI (18.0 - 22.9 kg/m2)	137 (15.4%)
	Over Weight (23 - 24.9 kg/m2)	120 (13.5%)
	Obesity (≥25 kg/m2)	621 (69.9%)
Blood Pressure	Normal BP: (≤ 120/80)	357 (40.2%)
	Pre-hypertension: (SBP 120-139 by DBP 80-89)	192 (21.6%)
	SBP <140 by DBP ≥90	122 (13.7%)
	SBP ≥140 by DBP <90	39 (4.4%)
	High BP ≥140 by ≥90	178 (20.0%)
Fasting Glucose Level	Normal (≤99mg/dL)	153 (17.2%)
	Impaired fasting Glucose (100 - 125 mg/dL)	150 (16.9%)
	Abnormal (≥126 mg/dL)	585 (65.9%)
Glycated haemoglobin (HbA1c)	<39mmol/mol (<5.7%)	57 (6.4%)
	39-46mmol/mol (5.7 - 6.4%)	81 (9.1%)
	≥48mmol/mol (≥6.5%)	750 (84.5%)
Total Cholesterol	Within Normal Range (<200mg/dL)	570 (64.2%)
	Above Normal Range (200-≥240mg/dL)	318 (35.8%)
LDL Cholesterol	Within Normal Range (<100mg/dL)	488 (55.0%)
	Above Normal Range (>100mg/dL)	400 (45%)
HDL Cholesterol	Below Normal (≤40mg/dL)	309 (34.8%)
	Within Normal Range (40-59mg/dL)	565 (63.6%)
	Above Normal Range (≥60mg/dL)	14 (1.6%)
VLDL	Within Normal Range (2-30mg/dL)	498 (56.1%)
	Above Normal Range (>30mg/dL)	390 (43.9%)
Triglycerides	Within Normal Range (<150mg/dL)	501 (56.4%)
	Above Normal Range (150-≥200mg/dL)	387 (43.6%)

LDL: Low-density lipoprotein
HDL: High-density lipoprotein
VLDL: Very low-density lipoprotein.

The commonest sub-group for each of the categorical variables under consideration included having a family history of diabetes 645(72.6%); not having a family history of hypertension 525(59.1%); not having a family history of ischaemic heart disease (IHD) 666(75%); not having a family history of other diseases 836(94.1%); never having smoked 750(84.5%); being obese 621(69.9%); not having had atrial fibrillation 594(97.4%); having normal BP 357(40.2%); having abnormal blood glucose 585(65.9%); having HbA1c levels 6.5% or higher 750(84.5%); having TG levels within normal range 501(56.4%); having TC levels within normal range 570(64.2%); having VLDL levels within normal range 498(56.1%); having LDL-C levels within normal range 488(55%); and having HDL-C levels within normal range 565(63.6%). In addition to 621(70%) obese subjects, another 120(13.5%) were overweight. Among the 531(60%) with abnormal BP, 192(21.6%) were pre-hypertensive, 39(4.4%) had isolated systolic hypertension, 122(13.7%) had isolated diastolic

Table-3: Proportional distribution of sub-categories of risk factors associated with cardiovascular disease, by age-group (N=888).

Risk factor	Age-category ≤ 39 years (n=276) Count (%)	≥ 40 years (n=612) Count (%)	χ2 test, (df), & p-value
Gender			2.4, (1), 0.12
Male	174 (63)	352 (57.5)	
Female	102 (37)	260 (42.5)	
Family history of Type 2 diabetes			3.5, (1), 0.06
Yes	212 (76.8)	433 (70.8)	
No	64 (23.2)	179 (29.2)	
IHD			0.4, (1), 0.50
Yes	73 (26.4)	149 (24.3)	
No	203 (73.6)	463 (75.7)	
Hypertension			2.2, (1), 0.13
Yes	123 (44.6)	240 (39.2)	
No	153 (55.4)	372 (60.8)	
Other diseases			0.9, (1), 0.32
Yes	13 (4.7)	39 (6.4)	
No	263 (95.8)	573 (93.6)	
Smoking status			1.9, (2), 0.36
Current	33 (12.0)	64 (10.5)	
Past	9 (3.3)	32 (5.2)	
Never	234 (84.8)	516 (84.3)	
BMI (kg/m^2)			2.1, (3), 0.55
Under weight (<18.0)	4 (1.4)	6 (1.0)	
Normal BMI (18.0-22.9)	43 (15.6)	94 (15.4)	
Over weight (23-24.9)	31 (11.2)	89 (14.5)	
Obesity (≥25)	198 (71.7)	423 (69.1)	
Blood pressure (mmHg)			9.3, (4), 0.054
Normal BP (≤ 120/80)	126 (45.7)	231 (37.7)	
Pre HTN (SBP 120-139 by DBP 80-89)	56 (20.3)	136 (22.2)	
SBP <140 by DBP ≥90	42 (15.2)	80 (13.1)	
SBP ≥140 by DBP <90	8 (2.9)	31 (5.1)	
High BP ≥140 by ≥90	44 (15.9)	134 (21.9)	
Atrial fibrillation			0.9, (1), 0.32
Yes	5 (1.8)	18 (2.9)	
No	271 (98.2)	594 (97.4)	
Fasting blood glucose level (mg/dL)			2.5, (2), 0.27
Normal (≤99)	46 (16.7)	107 (17.5)	
Impaired fasting glucose (100-125)	39 (14.1)	111 (18.1)	
Abnormal (≥126)	191 (69.2)	394 (64.4)	
Glycated haemoglobin/HbA1c (%)			†7.8, (2), 0.02
<39 mmol/mol (<5.7)	26 (9.4)	31 (5.1)	
39-46 mmol/mol (5.7-6.4)	19 (6.9)	62 (10.1)	
≥48 mmol/mol (≥6.5)	231 (83.7)	519 (84.8)	
Fasting total cholesterol (mg/dL)			0.8, (1), 0.35
Normal (<200)	171 (62.0)	399 (65.2)	
Above normal (200 to ≥240)	105 (38.0)	213 (34.8)	
LDL-C (mg/dL)			0.9, (1), 0.33
Within normal (100-129)	145 (52.5)	343 (56.0)	
Above normal (130 to ≥159)	131 (47.5)	269 (44.0)	
HDL-C (mg/dL)			4.2, (2), 0.12
Below normal (≤40)	109 (39.5)	200 (32.7)	
Normal (40-59)	162 (58.7)	403 (65.8)	
Above normal (≥60)	5 (1.8)	9 (1.5)	
VLDL (mg/dL)			†10.1, (1), 0.001
Within normal (2-30)	133 (48.2)	365 (59.6)	
Above normal (>30)	143 (51.8)	247 (40.4)	
Triglycerides (mg/dL)			†7.4, (1), 0.006
Normal (<150)	137 (49.6)	364 (59.5)	
Above normal (150 to ≥200)	139 (50.4)	248 (40.5)	

IHD: Ischaemic Heart Disease. BMI: Body mass index. HTN: Hypertension. SBP: Systolic blood pressure. DBP: Diastolic blood pressure. LDL: Low-density lipoprotein. HDL: High-density lipoprotein. VLDL: Very low-density lipoprotein.

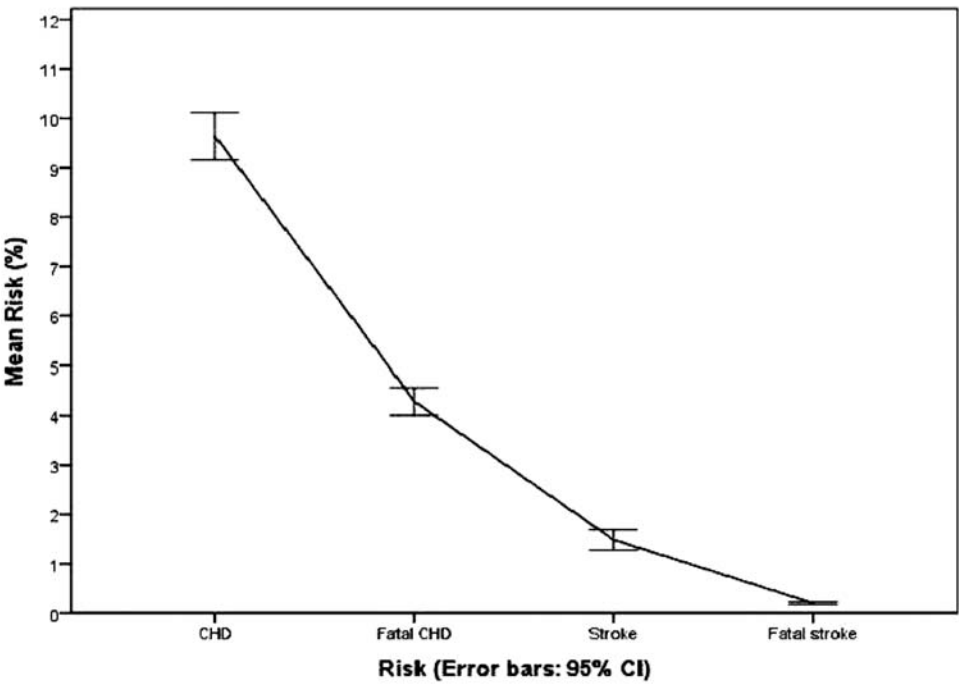

Figure: Mean ten-year risk estimates for cardiovascular disease as assessed by UKPDS risk calculator.
Lines represent mean risk for non-fatal and fatal coronary heart disease (CHD), fatal coronary heart disease (fatal CHD), non-fatal and fatal stroke (stroke) and fatal stroke. Confidence intervals are shown as error bars.

hypertension and 178(20%) had hypertension.

Analyses of blood glucose levels and HbA1c were also done (Table-2).

Those aged ≥40 years were significantly associated with higher HbA1c (p=0.02) and those aged ≤39 years were significantly associated with higher levels of VLDL (p=0.001) and TG (p=0.006). Other associations were not statistically significant (Table-3).

Mean risk estimate for CHD was 9.7% (CI: 9.0-10.1), fatal CHD 4.4% (CI: 4.0-4.6), stroke 1.5% (CI: 1.2-1.7), and fatal stroke 0.25% (CI: 0.22-0.24) (Figure).

Discussion

Diabetes adds to the CVD risk, and the National Cholesterol Education Programme (NCEP) categorises diabetes as CVD equivalent.[13] Most of the cardiovascular risk factors like dyslipidaemia, hypertension, obesity and glucose intolerance co-exist in people with T2DM which increases their risk of CVD.[14]

Number of men in our study was more compared to the number of women. Number of participants in age group 40-49 years was more compared to those younger than 40 years. A younger age of onset is seen in a developing country[15] which puts this population at a higher risk of developing complications of diabetes due to longer hyperglycaemic exposure.[16]

Participants belonging to Punjabi ethnicity were more common in our study perhaps due to a large number of cities included from the province of Punjab which is the most populated province of the country.[17]

Familial clustering of T2DM is well-known and is high in South Asians.[18] Similarly, in our study almost two-thirds of the participants had family history for diabetes in first-degree relatives. Family history of IHD in first-degree relatives is also a risk factor for the development of IHD or CVD.[19] In our study 25% participants had a family history of IHD.

Smoking is a strong risk factor for developing CVD, especially amongst people with diabetes.[20] The prevalence of smoking in our study was lower (15%) and similar to earlier studies done in Pakistan[16,20] which indicates a reporting bias.

The mean BMI of our study population was 27.76 kg/m^2, which does not fulfil obesity criteria from the developed world (≥30kg/m^2).[21] Studies suggest that for a given BMI, South Asians have more visceral fat than Western population which increases metabolic risk associated with obesity.[22] When we used ethnicity-specific criteria[11] to define obesity (BMI≥25kg/m^2), we found 70% obese patients in the study. South Asians are considered to be at risk of developing obesity-related co-morbidities at lower levels of BMI and waist circumference.[11] The higher prevalence of obesity may probably be one of the reasons for the study population developing diabetes at an early age. The findings of the current study are consistent with another cross-sectional study from Karachi which reported 68% prevalence of obesity.[16] A nationwide study from India involving 4600 newly-diagnosed T2DM people reported 26% prevalence of obesity.[23]

Mean HbA1C was 80±6mmol/mol (9.5 ± 2.71%) in the present study. Though only participants with confirmed T2DM diagnosis were included, 6% participants had an HbA1c <5.7% and another 9% had HbA1c in the pre-

diabetes range of 5.7-6.4%. Considering that participants enrolled were recently diagnosed with T2DM, it is quite likely an effect of lifestyle modification resulting in a better glycaemic control in some participants, or it was too early for HbA1C to have started rising. HbA1C compared in two-sub groups (A: 30-39 years; B: 40-49 years) revealed higher HbA1C in group B, and this difference was statistically significant. This represents poor long-term control of blood sugar or possible delay in diagnoses. Fasting blood glucose is altered in people with diabetes, but in the present study, 17.2% had normal fasting glucose, 16.9% and 65.9% had impaired and abnormal fasting glucose, respectively. Possible explanations are improvement in glycaemic control by lifestyle modification or abnormalities of post-prandial glucose levels only.

People with diabetes are more likely to have atherogenic dyslipidaemia which is characterised by TGs, raised small dense LDL (sdLDL), elevated VLDL and decreased HDL-C levels.[24] The current study found that >40% participants had dyslipidaemia wherein the prevalence of elevated TC, elevated LDL-C and VLDL were seen in 43.9%, 45% and 43.9% participants respectively. Low HDL-C was seen in 34.8% participants and 43.6% had elevated TG. It is quite likely that some of the patients had >1 lipid abnormalities. A higher prevalence of dyslipidaemia is an important finding as the presence of dyslipidaemia in people with T2DM would increase the risk of CVD by 3-4 folds compared to people without diabetes having dyslipidaemia.[25] Furthermore, ~50% participants in the younger age group (≤39 years) had higher VLDL and TG levels compared to the older age group (≥40 years), indicating a higher prevalence of dyslipidaemia in the younger age group. Lower HDL-C levels and higher TG levels were seen in South Asians compared to British population in the UK.[16]

Hypertension is well- recognised as an independent risk factor for the development of CVD. This risk increases further when it is associated with diabetes.[14] The mean SBP and DBP was 128.08±4.76mmHg and 84.23±9.28 mmHg which was slightly higher than normal and similar to that reported by an earlier study that reported a higher SBP and DBP in South Asians compared to Caucasians.[16] Out of all participants enrolled, 38% had hypertension, defined as SBP >140 mmHg and/or DBP >90 mmHg. A local study reported 42% prevalence of HTN in people with T2DM (20). The JNC 7 guide for the management of HTN reported that amongst those older than age 50, SBP >140mmHg is a more significant determinant of CVD risk than DBP. Pre-hypertension individuals (SBP 120-139mmHg or DBP 80-90mmHg) should be advised on lifestyle modification to prevent the progressive risk in BP to decrease risk of CVD.[26]

The current study used the UKPDS risk engine to assess 10-year absolute risk of CVD. The strength of the engine is that it can address multiple aspects of cardiovascular disease risk[27] with a higher applicability to high-risk cohorts of diabetes. UKPDS risk engine is intended for use in adults who have T2DM, no previous heart disease or strokes, white Afro-Caribbean or Asian-Indian ethnic background and no serious life-threatening illness such as cancer.[12] Limitations of UKPDS risk engine have been described since the model was derived from people recruited for a randomised controlled trial and so was limited to people eligible for the study.[28] A study among Australian diabetics[29] compared UKPDS and Framingham cardiovascular risk equation and found UKPDS calculator to be suitable only for stroke risk prediction in this population alluding to need for ethnicity-specific calculators. In comparison with QRISK2 (a cardiovascular disease risk algorithm based on data from QRESEARCH database), the UKPDS calculator is considered to be more specific to patients with T2DM, highlighting that risk estimations amongst persons with diabetes differ from healthy individuals.[30]

As in any cross-sectional study, selection and recall bias exists in the current study which is its limitation. Data on lifestyle and educational status of the participants was not collected, which are associated with CVD risk. Participating centres were from 27 larger cities of Pakistan and it may not be appropriate to generalise the findings to the rural population. The study used convenience-based sampling, which can impact sample representativeness.

Conclusion

CVD and diabetes are amongst the commonest non-communicable diseases in Pakistan associated with major morbidity, mortality and burden on healthcare infrastructure. To the best of our knowledge this is the largest study to assess CVD risk amongst people with T2DM. Data also highlights the need of screening for cardiovascular risk factors in younger age group with newly diagnosed T2DM. Ethnicity-specific thresholds are needed for BMI, indicating the need for national consensus guidelines. Public health programmes addressing risk factors for CVD that are amenable to intervention through lifestyle modification are needed.

Disclaimer: The study was presented at the following meetings: Updates on Diabetes / Diabetes Quiz: During 2nd Cardiometabolic Conference: Tokyo Japan. May 17, 2017; Diabetes and Cardiovascular Risk: Finding of CardiP

Trial, Invited talk and oral presentation during annual meeting of Pakistan Endocrine Society, Islamabad. Nov 19, 2016; CardiP Trial: Cardiovascular Disease and Diabetes: At AACE Symposium during summer retreat of Pakistan Endocrine Society. May 29 -30, 2015. PC Bhurbon , Pakistan; and Double trouble-Tackling Cardiovascular risk in diabetic subjects: During Plenary session at 2nd Annual Symposium of South Asian Federation of Endocrine Societies (SAFES) meeting in Dhaka, Bangladesh. April 24, 2015.

Conflicts of Interest: None.

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