International Journal of Current Advanced Research
ISSN: O: 2319-6475, ISSN: P: 2319-6505, Impact Factor: 6.614
Available Online at www.journalijcar.org
Volume 9; Issue 05(C); May 2020; Page No.22172-22176
DOI: http://dx.doi.org/10.24327/ijcar.2020.22176.4369

Research Article

BASELINE CHARACTERISTICS AND TYPE-2 DIABETES MELLITUS

Rashmi Rekha[1] and Dr. Usha Kumari[2]

[1]Research Scholar, Department of Zoology, MDDM College, BRABU, Muzaffarpur
[2]Associate Professor, Department of Zoology, MDDM College, BRABU, Muzaffarpur

A R T I C L E I N F O

Article History:
Received 14th February, 2020
Received in revised form 29th March, 2020
Accepted 05th April, 2020
Published online 28th May, 2020

Key words:
type-2 diabetes mellitus, body mass index, waist circumference, age

A B S T R A C T

Diabetes mellitus is a serious epidemic around the world and its prevalence rate increases gradually. Many complications are also associated with this disease. The aim of this study was to assess the relationship between different anthropometric or baseline characteristics and occurrence of type-2 diabetes mellitus. Research finding indicate that there is relationship between some baseline characteristics and presence of Diabetes Mellitus (type-2). After a cross sectional screening of 600 subjects (male= 252; female= 348); all were used in data analysis. Out of 600 subjects 30 (5%) were found to be diabetic. Assessing the baseline characteristics between diabetic and non-diabetic subjects a significant difference ($p<0.05$) were observed in mean weight, Basal Metabolic Rate, waist circumference, systolic blood pressure, random blood glucose level and age. Observing all the characteristics on the basis of gender, significant difference were seen in above mentioned characteristics except mean age ($p>0.05$) of female shows that female were suffering from diabetes in early age than male.

INTRODUCTION

Baseline characteristics are important tool for researcher for conducting meta-analysis and systemic reviews (Centre for Reviews and Dissemination, 2009). Baseline characteristics are demographic, medical and other information, particularly prognostic variables. Researchers collect this information about each participant at the beginning of a study, before they have received the treatments that are going to be compared in a treatment comparison. Type-2 diabetes mellitus (T2DM) is a condition in which either body resists the effect of insulin or doesn't produce enough insulin to maintain normal glucose level. Different baseline characteristics of human body relate T2DM in different ways. Increased age is one of the factors associated with diabetes development. The highest incidence of diabetes occurs between the ages of 65 to 74 (Centers for Disease Control and Prevention, 2007). A survey of diabetes in Punjab by Tripathy J P. *et al* in 2017 was reported that the overall prevalence of diabetes was 8.3% but if consider the age between 45-69 years it becomes significantly higher (18.0%). Age is found to be most positively associated parameter with T2DM (Ramachandran A *et al*., 1988). If BMI increases above normal levels it is directly associated with an increased risk of being diagnosed as having complications of diabetes mellitus. For men, the increased risk of these complications occurred at higher BMI levels than in women (Gray N *et al*, 2015). There is direct association of increase risk of T2DM with Increase BMI (Ganz, M.L *et al*., 2014; Anja Schienkiewitz *et al*. 2006; Zhao Q *et al*.2017). Increased waist circumference is also closely associated with an increased risk of diabetes (Schulze MB, *et al*. 2006). An increase in the waist circumference by the gender-specific standard deviation (9.9 cm for men and 11.2 for women) was associated with a 2.21-fold increase in risk of diabetes in men and a 2.31-fold risk increase in women (Feller, S. *et al*., 2010). Abdominal obesity is the single-most important risk factor for metabolic disorder and its predisposition to T2DM (Huang T *et al*., 2015). WC is a simple and reliable anthropometric measure used in epidemiological studies as a substitute for central obesity (Millar SR *et al*., 2015). The link between weight and type 2 diabetes mellitus (T2DM) is very strong, with studies confirming that the vast majority of patients with T2DM are overweight or obese, and also obese people are at the highest risk of developing T2DM (Daousi C *et al*., 2006). Overweight adults who had elevated blood glucose levels could delay the onset of T2DM, or decrease the risk of T2DM, by losing weight (Knowler WC *et al*., 2009). The obese individuals are 80 times more likely to develop T2DM than those with normal weight (Whitlock, 2019). In a cohort study it was found that an increase in 20mmHg systolic blood pressure increased the risk of diabetes by 58% (Emdin CA, 2015). It was also observed that systolic hypertension was prevalent in 37.4% of diabetes mellitus patients (Ephraim RK *et al*., 2016). The aim of this study was to assess the relationship between different baseline characteristics and occurrence of type-2 diabetes mellitus.

Corresponding author:* **Dr. Usha Kumari
Research Scholar, Department of Zoology, MDDM College, BRABU, Muzaffarpur

MATERIAL AND METHODS

***Study design*:** The study was an observational type of study. It was carried out by means of a cross-sectional community-based screening of the people residing in Muzaffarpur district, located in Bihar, India.

***Sampling technique*:** The subjects were selected by simple random sampling from the list of households in that area. Screening was done by door to door visit and all those family members of the house aged 20 years or more were screened irrespective of their health status. The proportional required sample size was collected from each identified area. Non responders were motivated and contacted again for participation in the study.

***Duration/time period*:** The study was carried out during August 2018 to January 2020. The study was carried out with 600 participants.

Physical measurement of different parameter was as follow

***Random Blood Sugar**:* A random blood sugar reading was taken using capillary blood obtained by finger prick and recorded with the help of glucometer. Subjects with a random blood sugar equal to or more than 200 mg/dl were consider as diabetics. Subjects with a random blood sugar between 140-200 mg/dl were considering as Prediabetics. All others were considered as non-diabetics.

***Hypertension*:** Mercury-in-glass sphygmomanometer used in recording of the blood pressure. Those subjects whose systolic blood pressure SBP was ≥140 mmHg and / or diastolic blood pressure DBP ≥90 mmHg considered as hypertensive.

***Weight, Height and BMI*:** The weights of subjects were recorded to the nearest kilogram by standing them on weighing machine without shoes. Height was recorded with the subjects standing against a straight wall on level surface with feet close together to the nearest 1 cm. Height was measured by using a steel tape. BMI was calculated by formula- weight in kilogram/(height in meter)^2.

***Waist circumference*:** A tailor's inelastic measure tape graduated in centimeters (0-150) is used to measure waist circumference. It was positioned by placing a plastic tape horizontally midway between 12th rib and iliac crest on the mid-axillary line of subjects.

***Statistical analysis*:** The data was analyzed using Microsoft excel by applying unpaired t-test for quantitative data. All p values were two-sided and significance level was taken as $p < 0.05$. Mean, standard deviation of all parameter were calculated and analyze by using Z-test. Z is normal deviate for two tailed alternative hypothesis at a level of significance.

RESULT

This study includes 600 subjects. Among these subjects 252 were males and 348 were females. Out of 600 subjects 30 were found to be suffering from type-2 diabetes mellitus (T2DM). On assessing baseline characteristics of all subjects, mean age is found to be 44.52±15.96, mean BMI is 24.58±4.26 kg/m^2, and mean waist circumference is 82.01±9.06 cm. All baseline characteristics of subjects in terms of age, height, Body Mass Index (BMI), Waist Circumference (WC), weight, Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP) and Random Blood Sugar (RBS) are given in Table-1.

The baseline characteristics of male and female subjects were compared by applying Z test. Mean height of male is found 172.44cm±5.23, which is significantly higher than female which is 157.33cm±4.32 (z=37.52, p=0). Table-2 also show that waist circumference of male is larger (mean=86.34cm, SD=9.31) than female (mean= 78.89cm, SD=7.45) [z=10.47, p=0]. Clear difference also observed in mean weight of male (mean=73.92kg±11.87) which is significantly higher than female (mean=60.28kg±11.44) [z=14.11, p=0]. Overall a significant difference ($p<0.05$) was observed in the mean weight, height, Waist Circumference (WC) of male and female subjects, while no significant difference ($P>0.05$) was seen in the mean age, Body mass Index (BMI), Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP) and Random Blood Sugar (RBS) of male and female subjects as shown in Table-2.

In this study we find that prevalence of diabetes is 5%, and prevalence of pre-diabetic is 17.34% as shown in Table-3. Out of 252 male, 16 were suffering from T2DM. Among 348 female, 14 were suffering from T2DM. This shows that male are more (2%) prone to T2DM than female.

The characterization of diabetic and non-diabetic subjects is computed by applying Z test. A significant difference ($p<0.05$) was observed in many characteristics i. e. mean age, weight, BMI, WC, SBP, and RBS of diabetic and non-diabetic subjects (Table-4). The age is significantly higher (p=0.008, z=2.64) in diabetic than non diabetic. The mean value was 49.93 in diabetics and 44.23 in non-diabetics. The BMI is significantly higher (p=0.0005, z=3.45) in diabetic than non-diabetics. The mean value was 27.69 kg/m^2 in diabetic and 24.43 kg/m^2 in non-diabetics. The waist circumference were found significantly higher in diabetic than non-diabetic (p=0.0007, z=3.37). The value was 88.60cm in diabetics and 81.66cm in non diabetics. Weight was also significantly higher in diabetics than non-diabetics (p=0.0007, z=3.18). The mean value was 74.27kg in diabetics and 65.57kg in non-diabetics. Systolic blood pressure is significantly higher in diabetics than non-diabetics (p=0.003, z=2.96). The mean value of SBP was 143.4 in diabetics and 133.01 in non-diabetics. This observation shows that increased age, weight, BMI, waist circumference, Systolic blood pressure and random blood sugar considered as risk factor of diabetes. Height and diastolic blood pressure were matched in both groups. Height and DBP is not found significant factor ($p>0.05$) when compare diabetic and non-diabetic subjects.

Further among male subjects, Diabetics and Non-diabetics were compared by applying t-test. Among 252 male, 16 male were diabetics and 236 male were non-diabetics. According to Table-5, significant difference ($p<0.05$) were observed in mean age, BMI, WC, weight and SBP but no significant difference were observed in mean height and DBP. Mean age of diabetic male (51.75±11.74) compare to non-diabetic male (44.29±16.15) was found a significant factor. (p=0.035, t=1.813). Mean BMI of diabetic male (27.39 kg/m^2±4.53) when compare to non-diabetic (24.67 kg/m^2±3.58) was found highly significant (p=0.002, t=2.89). Mean WC of diabetic male (91.75cm±8.58) compare to non-diabetic (85.95cm±9.26) was found significant (p=0.022, t=2.02). Mean weight of diabetic male (79.69Kg±12.76) to non-diabetic (73.54kg±11.74) was found significant (p=0.022, t=2.02).

Mean SBP of diabetic male (146.19±20.01) to non-diabetic (133.87±14.65) was found highly significant (p=0.0001, t=3.17).

Diabetic and Non-diabetic female subjects were compare by using T-test. Among 348 female, 14 female were diabetics and 334 female were non-diabetics. Among female, significance difference was seen in mean BMI, waist circumference, weight, and SBP. But there was no significance difference seen in mean age, height, and DBP (Table-6).

Table 1 Baseline characteristics of subjects

CHARACTERISTIC	MEAN	SD
Age (Years)	44.52	15.96
Height (cm)	163.68	8.83
BMI (kg/m^2)	24.58	4.26
WC (cm)	82.01	9.06
Weight (kg)	66.01	13.43
SBP (mmHg)	133.54	14.59
DBP (mmHg)	82.12	5.34
RBS (mg/dl)	135.75	46.46

Table 2 Baseline characteristics: Male and female

TRAIT	MALE		FEMALE		Z TEST	RESULT P<0.05
	MEAN	SD	MEAN	SD		
Age (years)	44.76	15.99	44.34	15.95	0.32	0.74
Height (cm)	172.44	5.23	157.33	4.32	37.52	0
BMI (kg/m^2)	24.84	3.70	24.41	4.61	1.26	0.20
WC (cm)	86.34	9.31	78.89	7.45	10.47	0
Weight (kg)	73.92	11.87	60.28	11.44	14.11	0
SBP (mmHg)	134.65	15.29	132.73	14.02	1.57	0.11
DBP (mmHg)	82.04	5.54	82.17	5.19	-0.297	0.77
RBS (mg/dl)	136.95	48.16	134.88	45.24	0.54	0.59

Table 3 Distribution of the subjects as per blood glucose levels (%) n

Random Blood sugar level (mg/dl)	Male	Female	Total
<140	197 (78.17)	269 (77.29)	466 (77.67)
140-200	39 (15.48)	65 (18.68)	104 (17.34)
>200	16 (6.35)	14 (4.02)	30 (5)
Total	252 (100)	348 (100)	600 (100)

Table 4 Baseline Characteristics of Diabetic and Non-Diabetic Subjects

TRAIT	Diabetics		Non—Diabetics		Z TEST	Result P<0.05
	MEAN	SD	MEAN	SD		
Age (years)	49.93	11.21	44.23	16.12	2.64	0.008
Height (m)	163.73	9.15	163.67	8.82	0.04	0.972
BMI (kg/m^2)	27.69	5.10	24.43	4.15	3.45	0.0005
WC (cm)	88.60	11.10	81.66	8.81	3.37	0.0007
Weight (kg)	74.27	14.64	65.57	13.24	3.18	0.0007
SBP (mmHg)	143.4	18.91	133.018	14.16	2.96	0.003
DBP (mmHg)	81.86	6.99	82.13	5.25	-0.20	0.84
RBS (mg/dl)	296.9	60.26	127.26	25.41	15.35	0

Table 5 Baseline Characteristics of Male Diabetics and Non-Diabetic Subjects

	Male					
TRAITS	Diabetics		Non-diabetics		T TEST	Results P<0.05
	MEAN	SD	MEAN	SD		
Age (years)	51.75	11.74	44.29	16.15	1.8139	0.0351
Height (m)	170.75	5.29	171.59	6.32	-0.5192	0.3050
BMI (kg/m^2)	27.39	4.53	24.67	3.58	2.8894	0.0020
WC (cm)	91.75	8.58	85.95	9.26	2.0151	0.022
Weight (kg)	79.69	12.76	73.54	11.74	2.0168	0.0222
SBP (mmHg)	146.19	20.01	133.87	14.65	3.1712	0.0001
DBP (mmHg)	82.31	8.51	82.02	5.30	0.202	0.42

Table 6 Baseline Characteristics of Female Diabetics and Non- Diabetic Subjects

	Female					
Traits	Diabetics		Non-diabetics		T TEST	Results P<0.05
	Mean	SD	Mean	SD		
Age (years)	47.85	10.63	44.19	16.13	0.8407	0.2005
Height (m)	155.71	4.98	157.40	4.33	-1.422	0.0778
BMI (kg/m^2)	28.05	5.84	24.26	4.50	3.0483	0.0012
WC (cm)	85.00	12.79	78.63	7.06	3.1741	0.0001
Weight (kg)	68.07	14.59	59.96	11.20	2.62	0.0044
SBP (mmHg)	140.21	17.74	132.42	13.79	2.0510	0.0202
DBP (mmHg)	81.35	4.97	82.21	5.21	-0.61	0.274

DISCUSSION

Present study showed a significant difference of height, waist circumference and weight between male and female subjects. Ford *et al*. (2003) find that WC is larger in males compared with females and larger in older adults compared with younger adults up to the age of 70 which support the following findings. Kaun P *et al*. (2011) observed same BMI in both the gender which relate the present study. According to Max Roser *et al*. (2020), globally male are 7% taller than female. Across the world, this relative difference of height between the sexes can vary from only 2-3% to over 12%, similar to our finding. According to Shome S *et al*. (2014), socio-cultural differences including differences in economic pattern may be the leading causes in the variation of height weight distribution in the states of India. Weight difference between genders is mainly depending on height (Matthew Sperrin, 2016).

Present study show overall prevalence of diabetes was 5%. Hemavathi Dasappa *et al*. (2015) had reported a prevalence of 12.33% in urban slums of Bangalore in 2015, while Ramchandran A *et al* (2001) reported a 9.3% prevalence of diabetes mellitus in slums of Mumbai. Misra *et al* (2001) reported a prevalence of 10.3% in a slum area in Delhi. This study found more prevalence of diabetes among male as compare to female. Gupta *et al*. (2004), Mohan *et al*. (2005) and Reddy *et al* (2006) have reported higher prevalence of diabetes among males too. This very difference has been observed in many other studies world-wide (Ramaiya KL, 1991). However, some studies evidence the opposite (Buse J.B, 2011).

While compare the diabetic and non-diabetic subjects a significant difference were observed in baseline characteristics i. e. age, BMI, SBP, weight and WC. Increased age is one of the factors associated with diabetes development. The highest incidence of diabetes occurs between the age of 65 to 74(Centers for Disease Control and Prevention, United States, 1980-2005) which is found similar to our observation. Age is found to be most positively associated parameter with DM type-2 (A Ramachandran *et al*, 1988). T2DM accounting for 5% of the diabetes population <30 years in 2003, extending to 24% of the diabetes population <40 years (Song *et al*. 2009) and increasing to 12% by 2006 (Harron *et al*. 2011). Hypertension is an emerging risk factor for diabetes as reported by Hayashi T *et al*, (1999), Conen D *et al*. (2007); and Wei GS *et al* (2011) support our study. In a study of Kim m *et al* (2015) on 1557 prediabetic subjects, 28% were found to be hypertensive. During the 8-year follow-up period, about 14.7% of all participants developed type-2 diabetes, with incidence rates in baseline normotensive, prehypertensive, and hypertensive subjects of 16.7, 25.7, and 34.1 per 1000 person-years, respectively. These results indicated that participants

with normal BP had the lowest risk of type 2 diabetes, with the risk steadily increasing as BP increased.

In a study reported that women with a body mass index (BMI) of 30 kg/m^2 have a 28 times greater risk of developing diabetes than women of normal weight. The risk of diabetes is 93 times greater if the BMI is 35kg/m^2 or more (Colditz GA *et al*, 1995). Our studies also find that BMI is significant factor for diabetes. The prevalence of type 2 diabetes is three to seven times higher in those who are affected by obesity than in normal weight adults, and is 20 times more likely in those with a body mass index (BMI) greater than 35 kg/m^2 (*Joanne Z. Rogers, 2005).*

The present study reported that one of the indications of approaching toward diabetes is increase in waist circumference than normal. Same conclusion was drawn by S. Feller (2010) and NA Elkafrawi *et al*. (2017). WC is independently and strongly associated with T2D, particularly in women, and should be more widely measured for risk stratification (Inter Act Consortium ,2012)

CONCLUSION

The present study concluded that baseline characteristics can be used as a predictor for diabetes mellitus. A significant difference was observed in mean weight, height, and waist circumference when compare with male and female subjects. Male are more prone to diabetes than female. Increase in age, weight, BMI, WC, SBP, and RBS is related with increase in T2DM. Height and systolic blood pressure is not found significant factor related with diabetes. Same finding is observed when compare with diabetic male/female with non-diabetic male/female. Various components related with diabetes were modifiable. So, by spreading awareness among people help in reduction of prevalence of this disease.

Conflict of interest: Authors declared no conflict of interest.

Bibliography

Anja Schienkiewitz, Matthias B Schulze, Kurt Hoffmann, Anja Kroke, Heiner Boeing, Body mass index history and risk of type 2 diabetes: results from the European Prospective Investigation into Cancer and Nutrition (EPIC)–Potsdam Study, *The American Journal of Clinical Nutrition*, Volume 84, Issue 2, August 2006, Pages 427–433, https://doi.org/10.1093/ajcn/84.2.427

Buse, J.B., Polonsky, K.S. and Burant, C.F. () Type 2 diabetes mellitus. In: Kronenberg, H.M., Melmed, S., Polanski, K.S., Larsen, P.R., Eds., William's Textbook of Endocrinology,12th edition, Saunders, Philadelphia,2011, p.1371-1435.

Centers for Disease Control and Prevention. Incidence of diagnosed diabetes per 1000 population aged 18-79 years, by age, United States, 1980-2005. Available at: www.cdc.gov/diabetes/statistics/incidence/fig3.htm. Accessed August 16, 2007.

Centre for Reviews and Dissemination: Systematic Reviews: CRD's guidance for undertaking reviews in health care. Book Systematic Reviews: CRD's guidance for undertaking reviews in health care. 2009, York, England: CRD: University of York

Colditz GA, Willett WC, Rotnitzky A, Manson JE. Weight gain as a risk factor for clinical diabetes mellitus in women. Ann Intern Med 1995;122(7):481–6. [PubMed]

Conen D, Ridker PM, Mora S, Buring JE, Glynn RJ. Blood pressure and risk of developing type 2 diabetes mellitus: the Women's Health Study. Eur Heart 2007; 28: 2937–2943. [PubMed] [Google Scholar]

Daousi C, Casson IF, Gill GV, *et al*. Prevalence of obesity in type 2 diabetes in secondary care: association with cardiovascular risk factors. Postgrad Med J. 2006;82:280–4. [PMC free article] [PubMed] [Google Scholar]

Devulapally Y, Negi DS, Pasula KB. Comparative study of anthropometric parameters in diabetic and non-diabetic human beings. Natl J Physiol Pharm Pharmacol 2017;7(9):983-986.

Elkafrawi NA, Shoaib AA, Elaal Elghanam MH. Measurement of waist circufrence as a screening tool for type 2 diabetes mellitus in female patients. Menoufia Med J 2017;30:168-73

Emdin CA, Anderson SG, Woodward M, Rahimi K. Usual Blood Pressure and Risk of New-Onset Diabetes: Evidence From 4.1 Million Adults and a Meta-Analysis of Prospective Studies. J Am Coll Cardiol. 2015;66(14):1552□1562. oi:10.1016/j.jacc.2015.07.059

Ephraim RK, Saasi AR, Anto EO, Adoba P. Determinants of isolated systolic hypertension among diabetic patients visiting the diabetic clinic at the Tamale Teaching Hospital, Northern Ghana. Afr Health Sci. 2016;16(4):1151□1156. doi:10.4314/ahs.v16i4.33

Feller, S., Boeing, H., & Pischon, T. (2010). Body mass index, waist circumference, and the risk of type 2 diabetes mellitus: implications for routine clinical practice. Deutsches Arzteblatt international, 107(26), 470–476. https://doi.org/10.3238/arztebl.2010.0470

Ford ES, Mokdad AH, Giles WH. Trends in waist circumference among US adults. Obes Res. 2003;11:1223–1231. [PubMed] [Google Scholar]

Ganz, M.L., Wintfeld, N., Li, Q. *et al*. The association of body mass index with the risk of type 2 diabetes: a case–control study nested in an electronic health records system in the United States. Diabetol Metab Syndr 6, 50 (2014). https://doi.org/10.1186/1758-5996-6-50

Gray N, Picone G, Sloan F, Yashkin A. Relation between BMI and diabetes mellitus and its complications among US older adults. South Med J. 2015;108(1):29-36. doi:10.14423/SMJ.0000000000000214

Gupta R, saran M, Thanvi J, Sharma V, Rastogi P, kaul V, Gupta VP. High prevalence of multiple coronary risk factors in Panjabi Bhatia Community. Ind Heart J 2004; 56:646-52.

Harron K., Feltbower R., McKinney P., Bodansky H., Campbell F., Parslow R. (2011) Rising rates of all types of diabetes in south Asian and non-south Asian children and young people aged 0–29 years in West Yorkshire, UK, 1991–2006. Diabetes Care 34: 652–654 [PMC free article] [PubMed] [Google Scholar]

HayashiT Tsumura K, Suematsu C, Endo G, Fujii S, Okada K. High normal blood pressure, hypertension, and the risk of type 2 diabetes in Japanese men. The Osaka Health Survey. Diabetes Care 1999; 22: 1683–1687. [PubMed] [Google Scholar]

Hemavathi Dasappa,1,2 Farah Naaz Fathima,3 Rugmani Prabhakar,2 and Sanjay Sarin4 Prevalence of diabetes and pre-diabetes and assessments of their risk factors in urban slums of BangaloreJ Family Med Prim Care. 2015 Jul-Sep; 4(3): 399–404

Huang T, Qi Q, Zheng Y, Ley SH, Manson JE, Hu FB, *et al*. Genetic predisposition to central obesity and risk of type 2 diabetes: two independent cohort studies. Diabetes Care. 2015;38(7):1306–11.

Joanne Z. Rogers, MSN, RN, CNSN, APRN, BC-AD, and Christopher D. Still, DO, FACN, FACP, obesity and type 2 diabetes; OAC community; 2005 www.obesityaction.org>community>article-liberary

Kim, M., Lim, N., Choi, S. *et al*. Hypertension is an independent risk factor for type 2 diabetes: the Korean genome and epidemiology study. Hypertens Res 38, 783–789 (2015). https://doi.org/10.1038/hr.2015.72

Knowler WC, Fowler SE, Hamman RF, *et al*. 10-year follow-up of diabetes incidence and weight loss in the Diabetes Prevention Program Outcomes Study. Lancet. 2009;374:1677–[PMC free article] [PubMed] [Google Scholar]

Kuan, P & Ho, H & Shuhaili, M & Siti, AA & Gudum, Henry. (2011). Gender differences in body mass index, body weight perception and weight loss strategies among undergraduates in Universiti Malaysia Sarawak. Malaysian journal of nutrition. 17. 67-75.

Matthew Sperrin, Alan D. Marshall, Vanessa Higgins, Andrew G. Renehan, Iain E. Buchan, Body mass index relates weight to height differently in women and older adults: serial cross-sectional surveys in England (1992–2011), *Journal of Public Health*, Volume 38, Issue 3, 17 September 2016, Pages 607–613, https://doi.org/10.1093/pubmed/fdv067

Max Roser, Cameron Appel and Hannah Ritchie (2020) - "Human Height". Published online at OurWorldIn Data.org. Retrieved from: 'https://ourworldindata.org/human-height' [Online Resource]Millar SR, Perry IJ, Van den Broeck J, Phillips CM. Optimal central obesity measurement site for assessing cardiometabolic and type 2 diabetes risk in middle-aged adults. PLoS One. 2015;10(6):e0129088.

Misra A, Pandey RM, Rama Devi J, Sharma R, Vikram NK and Khanna N. High prevalence of diabetes, obesity and dyslipidaemia in urban slum population in northern India. Int J Obes. 2001;

Mohan V,Deepa R, Somannavar S, Dutta M. A Simplified Indian Diabetes Risk Score for screening for undiagnosed diabetes subjects. J Asso Physicians Ind. 2005;53: 759-63.

Ramaiya KL, Kodali VRR and Alberti KGMM. Epidemiology of Diabetes in Asians of the Indian sub-continent. Intnl. J. Diab. Dev. Countries. 1991;11: 15-16.

Ramachandran A.,Jali M.V.,Mohan V.,Snehalatha C., Viswanathan M., High prevalence of diabetes in an urban population of S. India., BMJ. 1988 297: 587-590

Ramchandran A. Snehlatha C, Kapur A, Vijay V, Mohan V, Das AK, *et al*. (2001)Diabetes Epidemiology Study Group in India (DESI). High prevalence of diabetes and impaired glucose tolerence in India: National Urban Diabetes Survey. Diabetologia, 44, 1094-1101.

Reddy KS, Prabhakaran D, Chaturvedi V, *et al* on behalf of the Sentinel Surveillance System for Indian Industrial Populations Study Group. Methods for establishing a surveillance system For cardiovascular diseases in Indian Industrial Populations. Bull WHO.2006; 84: 461-9.

Schulze MB, *et al*. Comparison of anthropometric characteristics in predicting the incidence of type 2 diabetes in the EPIC-Potsdam study. Diabetes Care. 2006;29(8):1921–1923. [PubMed] [Google Scholar] sites.psu.edu>2015/11/15>weight and self image

Song S., Hardisty C. (2009) Early onset type 2 diabetes mellitus: a harbinger for complications in later years—clinical observation from a secondary care cohort. QJM 102: 799–806 [PubMed] [Google Scholar]

Shome S, Roy P, Pal M and Bharati P. 2014. Variation of Adult Heights and Weights in India: State & Zonewise Analysis . Human Biology Review, 3 (3), 242-257

The InterAct Consortium (2012) Long-Term Risk of Incident Type 2 Diabetes and Measures of Overall and Regional Obesity: The EPIC-InterAct Case-Cohort Study. PLoS Med 9(6): e1001230. https://doi.org/10.1371/journal.pmed.1001230

Tripathy, J.P., Thakur, J.S., Jeet, G.*et al*. Prevalence and risk factors of diabetes in a large community-based study in north India: results from a STEPS survey in Punjab, India. Diabetol Metab Syndr 9,8 (2017). https://doi.org/10.1186/s13098-017-0207-3

Wei GS, Coady SA, Goff DC Jr, Brancati FL, Levy D, Selvin E, Vasan RS, Fox CS. Blood pressure and risk of developing diabetes in African Americans and whites: ARIC, CARDIA, and the Framingham heart study. Diabetes Care 2011; 34: 873-879. [PMC free article] [PubMed] [Google Scholar]

Whitlock, Temple, N, Meet Your Hormones, 2019 https://books.google.co.in/books id=EUt7DwAAQBAJ, ISBN 1788401166, 9781788401166

Zhao Q, Laukkanen JA, Li Q, Li G. Body mass index is associated with type 2 diabetes mellitus in Chinese elderly. Clin Interv Aging. 2017;12:745-752 https://doi.org/10.2147/CIA.S130014

How to cite this article:

Rashmi Rekha and Dr. Usha Kumari (2020) 'Baseline Characteristics and Type-2 Diabetes Mellitus', *International Journal of Current Advanced Research,* 09(05), pp. 22172-22176. DOI: http://dx.doi.org/10.24327/ijcar.2020.22176.4369

****