TO STUDY THE PREVALENCE OF TYPE 2 DIABETIC AND PRE - DIABETIC IN URBAN KARNATAKA

Dissertation submitted by

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Under the Guidance of

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TO
SWAMI VIVEKANANDA YOGA ANUSANDHANA SAMSTHANA (SVYASA)

(Declared as Deemed University under Section 3 of the UGC Act, 1956)

BENGALURU - 560 019
I N D I A

DECLARATION

I, hereby declare that the study was conducted by me under the guidance of PADMA SRI at Swami Vivekananda Yoga Anusandhana Samsthana (S-VYASA) University, Bangalore. I also declare that the subject matter of the study entitled "TO STUDY THE PREVALENCE OF TYPE 2 DIABETIC AND PRE - DIABETIC IN URBAN KARNATAKA (Survey no's 21 and 18 of Jigani, Bangalore)" has not formed previously the basis of the award of any degree, diploma or similar titles.

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Date: Name: CH.NAGAVENI

Place: Bangalore

STANDARD INTERNATIONAL TRANSLITERATION CODE USED TO TRANSLITERATE SANSKRIT WORDS

a	=	अ	ṅa	=	ङ	pa	=	प
ā	=	आ	ca	=	च	pha	=	फ
i	=	इ	cha	=	छ	ba	=	ब
ī	=	ई	ja	=	ज	bha	=	भ
u	=	उ	jha	=	झ	ma	=	म
ū	=	ऊ	ñ	=	ञ	ya	=	य
ṛ	=	ऋ	ṭa	=	ट	ra	=	र
ṝ	=	ॠ	ṭha	=	ठ	la	=	ल
e	=	ए	ḍa	=	ड	va	=	व
ai	=	ऐ	ḍha	=	ढ	śa	=	श
o	=	ओ	ṇa	=	ण	ṣa	=	ष
au	=	औ	ta	=	त	sa	=	स
ṁ	=	अं	tha	=	थ	ha	=	ह
ḥ	=	अः	da	=	द	kṣa	=	क्ष
ka	=	क	dha	=	ध	tra	=	त्र
kha	=	ख	na	=	न	jña	=	ज्ञ
ga	=	ग	gha	=	घ			

ABSTRACT

Background and Introduction: To estimate the prevalence of Diabetes and Pre- Diabetes. With fast modernization, and the stress caused due to modernization, made the urban population to get into high risk for many psychosomatic diseases. IDRS score that is used in this study has helped to identify pre-diabetics.

Methods: The present study is among individuals of either sex, aged 20 years and above. Study variables included, socio-demographic characteristics, physical activity, and anthropometric parameters. Starting from the first house onwards all the houses within the lane were covered continuously, keeping towards the left. This procedure was continued until the whole locality was covered. Written informed consent was obtained from all the subjects. During house visits, data was collected by personal face to face interview using a pre-designed questionnaire. The questionnaire included details on socio-demographic variables, anthropometric measurements and physical activity status.

Results: There were 502 men and 521 women. Among them 49.09% men and 50.93% women participants. Among them 25.22% are of the age group of 20-25years, 50.04% are of the age group 26-40 years, 19.55% are under the age group 41-60 years and 4.69% are under the age group of 61-90 years. From total population Diabetics are 5.77% and by using Indian Diabetes Risk Score (IDRS) diabetes risk score has been calculated. Among them 21.37% are under high risk, 40.46% of them are under moderate risk and 38.17% of them are under low risk.

Conclusion: Results indicate that the Family History of a person highly influenced the diabetic status of a person (49.15% of diabetics have Family history) Also results indicate that the persons are very highly prone for Diabetes between the age range of 30 to 50Yrs (59.32% of diabetics are in the age range of 30 to 50Yrs). Among the Pre-diabetics with high risk Maximum percentage are from the age group of 30 to 50Yrs. Among the moderate risk 80.25% are in the age group of 21 to 40Yrs. This study created awareness of diabetes and its complication in urban population of this region. The baseline data of the present study regarding the prevalence of T2DM could be useful for implementation of the National Program for control of Diabetes. Therefore, future research in this direction is a need of the time.

Content

1. INTRODUCTION

1.1 DIABETES MELLITUS

Diabetes mellitus is a disorder in the metabolism of sugar. In the diabetes, the primary problem is the defective utilization of sugar by the body. Dietary sugars are broken down to glucose by the processes of digestion, and this glucose is the major fuel for the various processes, organs and cells of the body (Karmananda, 2013).

1.2 CAUSES

The initial Cause of diabetes is long- term revitalization and sluggishness of the digestive processes due to dietary abuse, overeating, obesity, and lack of exercise. The second causative factor is that stress and frustration of modern sedentary life style (Karmananda, 2013).

1.3 SIGN AND SYMPTOMS

Symptoms include increased thirst (Polydipsia), frequent urination (Polyuria), hunger (Polyplegia), fatigue and blurred vision (Karmananda, 2013).

1.4 PREVALENCE

1.4.1 WORLD WIDE

According to a survey by WHO, estimated diabetic population in 2007 is 60%. This will develop in Asian countries by 2025. It is estimated that an individual increase of diabetes from 240 million in 2007 to 380 million in 2025 will occur. Due to growing globalization, the continent Asia has undergone a great transition in economy and lifestyle accompanied by increased population, changes in food supply and dietary patterns, transfer in technology, and cultural admixtures. In developing countries burden of diabetes is increased in aging population and urbanization (Dixit et al., 2011).

1.4.2 INDIA

65.1 million People were suffering from diabetes in India at the end of 2013 estimation by the year of 2035 is 109 million. Approximately 34.5 million males and 30.6 million females have been

diagnosed with diabetes till the end of 2013 in India in the age group of 20-79 years. 34.5 million of the diagnosed, reside in the rural areas and 30.5 million reside in urban areas in India. 13 million people diagnosed with diabetes are in the age group of 20-39 years, 36.7 million are in the age of 40-59 years and 15.4 million are in the age group of 60-79 years. Approximately 32 million people in India are not yet diagnosed with diabetes (Edition, 2013).

1.4.3 KARNATAKA

A high prevalence of diabetes was noted in the coastal population. Urban areas showed that 70.1% of diabetic population belonged to the middle class, 27.6% to the lower class, and 2.3% to the upper class. A sedentary lifestyle was observed in 11.1% of the subjects, while 41.8% were engaged in moderate physical activity. Positive family history of diabetes was present in 26% of the individuals (Chythra, Veena, Avinash, & Asha, 2010) .

1.5 RURAL POPULATION IN INDIA

More and more studies are needed to find out the prevalence of Diabetes mellitus in rural area which in turn will reflect the true overall picture of the prevalence of diabetes mellitus in Indian population. Increase in diabetes prevalence among rural population at a rate of 2.02 per 1000 population per year. The rate of increase was higher in males (3.33 per 1000 per year) as compared to females (0.88 per 1000 per year) (Himanshu et al., 2014).

1.6 URBAN POPULATION IN INDIA

In a study conducted in Chennai, a total of 6,920 individuals aged ≥ 20 were screened for participation, of which 6,906 (99%) provided questionnaire data and 876 (13%) reported a previous diabetes diagnosis. (Himanshu et al., 2014).

2. LITERATURE REVIEW

2.1 INTRODUCTION

In the scriptures, we see many important concepts being discussed. One such concept is that of the PRATYAHARA. The importance of pratyahara is obvious from the fact that almost in all important scriptures it has been mentioned – *Upanishads, Bhagavad-Gita, Sankhya, Yoga* – to name a few, the scriptures talk of Pratyahara as the essential components in the model of human being (Vasudeva, 2016).

Pratyahara*:** PratyaharaMeans to gather inwards. The practice is concerned with checking and curbing the outgoing tendencies of the mind so that awareness can be directed inward. It is impossible to explore the inner realms of the ***mind if one is addicted to, disturbed and distracted by external sense experience. Therefore, the ***sense experiences***, such as sound and smell, are cut. All meditative techniques such as *antarmouna, ajapajapa and trataka*, are initially concerned with inducing this stage of *pratyahara. Pratyahara*, in a higher sense, also includes the cutting of inner psychic and mental sensations (Satyananda Saraswati, 2013).

2.2 SOURCES OF STUDY

Scripture	Translation Reference
Bhagavad-Gita	Swami Prabhupada, 1999
Patanjali Yoga Sutras	Swami Vivekananda, 1923
Chandogya Upanishad	Shankaracharya
Gherandasamhita	James Mallinson 1970

2.3 BHAGAVAD - GITA

यदा संहरते चायंकूर्मोऽङ्गानीव सर्वशः।

इन्द्रियाणीन्द्रियार्थेभ्यस्तस्त प्रज्ञा प्रतिष्ठिता ॥भगी २-५८ ॥

yadäsaàharatecäyaàkürmo'ìgänévasarvaçaù|
indriyäëéndriyärthebhyastastaprajïäpratiñöhitä||bhagé 2-58||

When, like a tortoise, that draws in its limbs from all directions, he withdras all his senses from the sense-objects, his mind becomes steady.

विषयाविनिवर्तन्तेनिराहारस्यदेहिनः

रसवर्जं रसोऽप्यस्यपरंदृष्ट्वानिवर्तते ॥ भ गी २-५९ ॥

viñayävinivartantenirähärasyadehinaù|
rasavarjaàraso'pyasyaparaàdåñövänivartate|| bhagé 2-59||

Sense-objects turn away from him, who does not enjoy them with his senses; but the taste for them persists. This relish also disappears in the case of the man of stable mind when he realized the Supreme.

यततोह्यपिकौन्तेयपुरुषस्यविपश्चितः ।

इन्द्रियाणिप्रमाथीनिहरन्तिप्रसभंमनः ॥ भ गी २-६० ॥

yatatohyapikaunteyapuruñasyavipaçciataù|
indriyäëipramäthéniharantiprasabhaàmanaù|| bhagé 2-60||

Turbulent by nature, the senses (not free from attachment) even of a wise man, who is practicing self -control, forcibly carry away his mind, Arjuna.

तानिसर्वाणि संयम्ययुक्त असीतमत्परः ।

वशेहियस्येन्द्रियाणितस्य प्रज्ञाप्रतिष्ठता ॥ भ गी २-६१ ॥

tānisarvaṇisaṁyamyayuktaasītamatparaḥ|
vaśe hi yasyendriyāṇitasyaprajïäpratiṣṭhatā|| bhagī 2-61||

Therefore, having controlled all the senses and concentrating his mind, he should sit for meditation, devoting himself heart and soul to me. For, he whose senses are under his control, is known to have a stable mind.

रगद्वेषवियुक्तैस्तुविषयानिन्द्रियैश्चरन् ।

आत्मवश्यैर्विधेयात्माप्रसादमधिगच्छति ॥भगी २-६४ ॥

ragadveñaviyuktaistuviñayänindriyaiçcaran|
ätmavaçyairvidheyätmäprasädamadhigacchati||bhagé 2-64||

But the Self-controlled Sadhaka, while enjoying the various sense-objects through his senses, dislikes, attains placidity of mind.

नास्तिबुद्दिरयुक्तस्य न चायुक्तस्यभावना ।

नचाभावयतःशान्तिरशान्तिस्य कुतःसुखम् ॥ भ गी २-६६ ॥

nästibuddirayuktasyanacäyuktasyabhävanä|
nacäbhävayataùçäntiraçäantisyakutaùsukham|| bhagé 2-66||

He who has not controlled his mind and senses, can have no determinate intellect, nor contemplation. Without contemplation, he can have no peace; and how can there be happiness for one lacking peace of mind?

6th chapter

तत्रैकाग्रंमनःकृत्वा यतचित्तेन्द्रियक्रियः ।

उपविश्यासनेयुञ्ज्याद्योगमात्मविशुद्धये ॥ भ गी ६-१२ ॥

tatraikägraàmanaùkåtväyatacittendriyakriyaù|
upaviçyäsaneyuïjyädyogamätmaviçuddhaye|| bhagé 6-12||

And, occupying that seat, concentrating the mind and controlling the function of the mind and senses, he should practice Yoga for Self-purification.

सुखमात्यन्तिकंयत्तद्बुद्दिग्राह्यमतीन्द्रियम् ।

वेत्तियत्र न चैवायंस्थितश्चलतितत्वतः ॥ भ गि ६-२१ ॥

sukhamätyantikaàyattadbuddigrähyamaténdriyam|
vettiyatranacaiväyaàsthitaçcalatitatvataù|| bhagi 6-21||

Nay, in which the soul experiences the eternal and super-sensuous joy which can be intuited only through the subtle and purified intellect, and wherein establishes the said Yogi moves not from Truth on any account;

सङ्कल्पप्रभवान्कामांस्त्यक्त्वासर्वानशेषतः ।

मनसैवेन्द्रितग्रामंविनियम्यसमन्ततः ॥ भ गी ६-२४ ॥

saìkalpaprabhavänkämäästyaktväsarvänaçeñataù|
manasaivendritagrämaaviniyamyasamantataù|| bhagé 6-24||

Completely renouncing all desires arising from Sankalpas and restraining all the senses from all sides by the mind;

श्रीभगवनुवाच

असंशयंमहाबाहोमनोदुर्निग्रहंचलम् ।

अभ्यासेनतुकौन्तेयवैरग्येणचगृह्यते ॥ भ गी ६-३५ ॥

çrébhagavanuväca
asaàçayaàmahäbähomanodurnigrahaàcalam|
abhyäsenatukaunteyavairagyeëacagåhyate|| bhagé 6-35||

Sri Bhagavan said: The mind is restless no doubt, and difficult to curb, Arjuna; but it can be brought under control by repeated practice (of meditation) and by the exercise of dispassion, O son of Kunti.

2.4 PATANJALI YOGA SUTRAS

यमनियमसनप्रणायमप्रत्यहरधारणाध्यानसमाधयोऽष्टावङ्गानि ॥ प योसु १-२९ ॥

The limbs of the eight fold path are as follows: respect for others(*yama*) and yourself(*niyama*); harmony with your body (*asana*), and your energy (*pranayama*), and your emotions (*pratyahara*); your thoughts (*dharana)*; contemplation*(dhyana)*; ecstasy *(samadhi)*

स्वविषयासम्प्रयोगेचित्तस्वरुपानुकार इवेन्द्रियणांप्रत्याहरः ॥२-५४ ॥

Harmony with the emotions (*pratyahara),* is achieved when the senses cease to be engaged with external objects and thus that which is mutable in human beings (*chitta*) becomes similar to true nature.

ततःपरमावश्यतेन्द्रियाणाम् ॥पयोसु २-५५ ॥

The successful practices of *pratyahara* as we have seen in the previous sutra gives complete control over the *Indriyas* in the senses that we no longer remain their slaves but become their master; switching them off and on as we switch off and on the electric light in our room.

2.5 CHANDOGYA UPANISHAD

अथयदूर्ध्वंमध्यन्दिनात्प्रागपराह्णात्सप्रतिहरस्तदस्यगर्भाअन्वायत्तास्तस्मात्तेप्रतिहृतानावपद्यन्तेप्रतिहारभाजिनोहू येतस्यसाम्नः॥६॥
athayaduurdhvaMmadhyandinaatpraagaparaahNaatsapratiharastadasyagarbhaaanvaayattaastasmaattepratihR^itaanaavapadyantepratihaarabhaajinohyetasya saamnaH..6..

Next, the form of the sun appears just after midday and before (the latter part of) afternoon, that is pratihara. On this, the foetuses are dependent. As they participate in the pratihara part of this saman, so are they held up (in the womb) and they do not fall down.

प्राणेषुपञ्चविधंपरोवरीयःसामोपासीतप्राणोहिङ्कारोवाक्प्रस्तावश्चक्षुरुद्गीथःश्रोत्रंप्रतिहारोमनोनिधनंपरोवरीया

सिवाएतानि॥१॥

praaNeShupa~nchavidhaMparovariiyaHsaamopaasiitapraaNohi~NkaarovaakprastaavashchaxurudgiithaHshrotraMpratihaaromanonidhanaMparovariiyaa{\m+}sivaa etaani..1..

One should meditate on the progressively higher and better fivefold saman as the senses; The organ of the smell is the syllable him, the organ of speech is prastava, the eye is udgitha, the ear is pratihara, and the mind is Nidhana. Verily, these are progressively higher and better.

सर्वास्वप्सुपञ्चविध

सामोपासीतमेघोयत्संप्लवतेसहिङ्कारोयद्वर्षतिसप्रस्तावोयाःप्राच्यःस्यन्दन्तेसउद्गीथोयाःप्रतीच्यःसप्रतिहारःसमुद्

रोनिधनम्॥१॥

sarvaaswapsupa~nchavidha{\m+}

saamopaasiitameghoyatsaMplavatesahi~NkaaroyadvarSatisaprastaavoyaaHpraachyaHsyandante saudgiithoyaaHpratiichyaHsapratihaaraHsamudro nidhanam..1..

One should meditate on the fivefold Saman in the waters: when a cloud gathers, it is the syllable him. When it rains, it is prastava. Those (waters) that flow to the east, are udgitha. Those that flow to the west are pratihara. The ocean is Nidhana.

2.6 GHERANDA SAMHITA (4th Chapter)

यतोयतोनिश्चरतिमनश्चलमस्थिरम्।
ततस्ततोनियम्यैतदात्मन्येववशंनयेत्॥ग स ४-२॥
yatoyatoniścaratiñcalamasthiram।
tatastātoniyamyaitadātmanyevaśaṁnayet||ghesa 4-2||

Let one bring (the Citta thinking principle) under his control by withdrawing it, whereever it wanders away drawn by the various objects of sight.

पुरस्कारंतिरस्कारंसुश्राव्यंवाभयानकम्।

मनस्तस्भान्नियम्यैतदात्मन्येववशंनयेत् ॥घे स ४-३॥

puraskāraṁtiraskāraṁsuśrāvyaṁvābhayānakam।
manastasbhānniyamyaitadātmanyevavaśaṁnayet||ghesa 4-3||

Praise or censure; good speech or bad speech; let one withdra his min from all these and bring the Chitta under the control of the Self.

सुगन्धेवापिदुर्गन्धेघ्रणेषुजायतेमनः ।

तस्मात् प्रत्याहरेदेतदात्मन्येववशंनयेत् ॥घे स ४-४ ॥

sugandhevāpidurgandheghraëeñujāyatemanaḥ।
tasmātpratyāharedetadātmanyevavaśaṁnayet||ghesa 4-4||

From sweet smells or bad smell, by whatever odour the mind may be distracted or attracted, let one withdraw the mind from that, and bring the thinking principle under the control of his Self.

मधुराम्लकतित्तकादिरसं गतं यदा मनः

तस्मात् प्रत्याहरेदेतदात्मन्येववशंःनयेत् ॥ घे स ४-५॥

madhurāmlakatittkādirasaṁ gataṁ yadā manaḥ ।
tasmātpratyāharedetadātmanyevavaśaṁḥnayet|| ghesa 4-5||

From sweet or acid tastes, from bitter or astringent tastes, by whatever taste the mind may be attracted, led one withdraw it from that, and bring it within the control of his Self.

3. REVIEW OF SCIENTIFIC LITERATURE

3.1 DIABETES AND SURVEY

3.1.1 KARNATAKA

SN	Author	Methods	Results	Conclusion
1	(Mentock et al., 2017)	This cross-sectional study was carried out in the main city and surrounding periurban villages within a 2-h Drive of Mangaluru, India. The City population of over 600,000 People as recorded in the 2011 Census The Surrounding communities are comprised of more rural and low income areas.	Out of 204 participants, predictors of at target status included age and rural living area. Participants were commonly diagnosed with symptoms of diabetes (44.6%).	Screening of at risk populations, targeted SMS campaigns, or diabetes specific training for healthcare providers may improve clinical outcomes.
2	(Srinivasan et al., 2015)	A case–control study of 76 patients with type 2 diabetes mellitus who were on treatment for more than 10 years duration and undergoing a coronary angiogram for the evaluation of clinically	The difference in lipid profile, HbA1C, fasting blood sugar, BMI, waist hip ratio, waist and hip circumference was not	The absence of comparable lipid and glycemic parameters in type 2 diabetes mellitus in patients on treatment for a

		suspected CAD at a tertiary care hospital were recruited for the study.	significant. The adjusted odds ratio for insulin resistance less than 2.	duration of more than 10 years.
3	(Shidam, Roy, Sahu, Kumar, & Ananthanarayanan, 2015)	Patient information was collected using a pretested interview schedule. DM status was assessed after reviewing the available records with the patients and/ or their self-reported history regarding DM status. Patients with known DM status were not investigated further for DM. Patients with unknown DM status were encouraged to undergo oral glucose tolerance testing (OGTT)	A total of 650 patients aged 30 years were recruited for DM screening during the study period. DM status could be assessed for 570 patients history of DM or estimating blood glucose levels.	One fifth of the presumed TB patients had diabetes, and nearly half of these patients were newly diagnosed.
4	(Bhalerao et al., 2014)	Community based cross sectional study was carried out at three Primary Health Canters of Handignur, Vantamoori and Kinnaye under administrative control of	Age, occupation, Body Mass Index, diet, smoking, alcohol, truncal obesity and family history of DM were	The prevalence of T2DM was influenced by predictors such as age, occupation, BMI, diet, Smoking, alcohol

		Jawaharlal Nehru Medical College, Belgaum, and Karnataka, India.	significantly associated with prevalence of T2DM whereas gender and literacy were not.	consumption, truncal obesity and family history of diabetes.
5	(Anantlaxmi Ananthram & Nitin Suhas, 2015)	A cross sectional survey of 1099 households (5340 individuals) was conducted using a structured questionnaire. The prevalence and health-seeking pattern for chronic conditions in general and for hypertension and diabetes.	The overall self-reported prevalence of chronic conditions was 12 %, with hypertension (7 %) and diabetes (5.8 %) being the common conditions.	There is need to strengthen health services with a preferential focus on government services to assure affordable care for chronic conditions to urban poor.

3.1.2 INDIA

S N	Author	Methods	Results	Conclusion
1	(Chythra et al., 2010)	The study was carried out on 1,239 respondents, using a two stage, stratified, random sampling technique. Data was	In the high socioeconomic strata, 32% of the subjects had diabetes (P = 0.018	The high prevalence of diabetes in this coastal population

		collected by a personal, face-to-face interview followed by blood sugar estimation using a glucometer.	unadjusted odds ratio 3.29, 95% CI = 1.40 – 7.74)	needs further evaluation.
2	(Dixit et al., 2011)	A cross sectional study design was used to perform a multicenter, national level survey from August, 2011 to February, 2012 in various parts of India. Descriptive analysis was done using Statistical Package for Social Sciences (SPSS)	A total of 323 peoples were screened. 8.7% of men were diabetes, where as 8.3% of women were prone for ulcers in 1620 years of diabetes, 56.4% of the population in urban area	There is a need to bridge the disparity in awareness regarding diabetic foot management in Indian masses.
3	(Chandwani et al., 2010)	Cross-sectional study of 3,299 adult men and women from the 2005–2008 National Health and Nutrition Examination Survey (NHANES). The presence of diabetes, pre-diabetes, the metabolic syndrome and its individual components and biomarkers of glucose metabolisms were based on standardized questionnaire and physical exam data and laboratory tests. The history	Patients with 5 or more years of diabetes duration hadan OR for glaucoma of 3.90 (95% CI: 1.63, 9.32) compared with patients with, 5 years of diabetes duration. We also found a hockey-stick shapedassociations between biomarkers of glucose	Diabetes was associated with higher risk of glaucoma. Participants without diabetes but at the higher levels of fasting glucose, fasting insulin, HbA1c and HOMA-IR spectrum may also be at greater risk of glaucoma.

		of glaucoma was assessed through questionnaire during the home interview.	metabolisms and the prevalence of glaucoma.	
4	(Hulman, Daniel, Dorte, & Kristine, 2017)	We studied a population-based sample of 3,666 Asian Indians without diabetes from the CARRS-Chennai Study, India. Participants underwent a three-point (fasting, 30-minute, and 2hour) OGTT at baseline. Patterns of glycemic response during OGTT were identified using latent class mixed-effects models.	Approximately 22% of participants were categorized as Class 3, and had a 10-fold risk of diabetes compared to the group with the most favorable glucose response	Assessing 30minPG may identify a subgroup of high-risk individuals who remained unidentified by traditional measures.
5	(Sandipana & Schellevis, 2017)	This cross sectional survey was carried out on 912 type 2 diabetes patients attending different urban primary health care facilities at Bhubaneswar. Data regarding existence of co morbidity and demographical details were elicited by predesigned, pretested questionnaire "Diabetes Co morbidity Evaluation Tool in Primary Care (DCET- PC)".	Overall 84% had one or more than one co-morbid condition. The number of co morbidities was highest in the age group>= 60 across both sexes. Most of the male patients below 40 years of age had either single [53%] or three co morbidities [11%] whereas among	Our study findings indicate a high prevalence of co morbidities among type 2 diabetes patients. Health care providers caring for T2DM patients should take co morbid conditions into account.

		Statistical analyses were done using STATA.	female patients of the same age group single [40%] or two co morbidities [22%] were more predominantly present.	
6	(Mohan, Deepa, Anjana, Lanthorn, & Deepa, 2008)	564 The Chennai Urban Population Study [CUPS], an ongoing epidemiological study in two residential colonies in Chennai [the largest city in southern India, formerly called Madras] was launched in 1996; the baseline study was completed in 1997. Follow-up examination was performed after a mean period of 8 years.	Epidemiological study in Chennai. Among subjects with normal glucose tolerance (NGT) at baseline [n=476], 64 (13.4%) developed diabetes and 48 (10.1%) developed pre-diabetes (IGT or IFG). The incidence rate of diabetes was 20.2 per 1000 person years and that of pre-diabetes was 13.1 per 1000 person years among subjects with NGT. Of the 37 individuals who were pre-diabetic at baseline.	Shows that the incidence of DM is very high among south Indians while obesity.

3.1.3 WORLD WIDE

S N	Author	Methods	Results	Conclusion
1	(Kamadjeu et al., 2006)	Body mass index, waist circumference and waist-to-hip ratio were measured using standardized methods. Overall, 10,011 individuals, 6,004 women and 4,007 men, from 4,189 households, aged 15 years and above participated.	Based on body mass index, more than 25% of urban men and almost half of urban women were either overweight or obese with 6.5% of men and 19.5% of women being obese. Using body mass index provided the highest prevalence of obesity in men (6.5%) and waist-to-hip ratio the lowest prevalence (3.2%).	Findings highlight the need to carry out further studies in Cameroonian and other Sub-Saharan African populations to provide appropriate cut-off points for the identification of people at risk of obesity-related disorders, and indicate the need to implement interventions to reverse increasing levels of obesity.
2	(Marrett, Radican, Davies, & Zhang, 2011)	Data were collected on the severity and frequency of hypoglycemic episodes in the 6 months prior to	A follow-up survey (HFS) score was significantly higher (17.5 versus 6.2, $p < 0.0001$) compared to patients not reporting hypoglycemia.	Self-reported hypoglycemia is independently associated with lower HRQoL, and the magnitude of this reduction increases

		the survey, with severity defined as mild (no interruption of activities), moderate (some interruption of activities), severe (needed assistance of others), or very severe (needed medical attention).		with both severity and frequency of episodes in patients with type 2 diabetes treated with oral anti hyperglycemic agents.
3	(Ford, Giles, & Dietz, 2014)	An interview in the home, participants were invited to attend 1 0f 3 examination sessions: morning, afternoon, or evening and abdominal obesity,	Overall, the unadjusted and age adjusted prevalence of the metabolic syndrome were 21.8%, and 23.7%, respectively.	These results from a representative sample of US adults that the metabolic syndrome is highly prevalent
4	(Himanshu et al., 2014)	4523-male-2757, female-1766. The study was planned to estimate the prevalence of diabetes mellitus	Survey-Hospital record based data in Sonepat. Gender specific prevalence for diabetes was 19.36% and 16.98% for male and female respectively. Maximum	Maximum prevalence was found in the age group of 46-60yrs. Rural population remains exposed to high level

		in various age groups by analyzing the hospital record based data. Blood for glucose estimation was collected in a fluoride vacationer and glucose was estimated by kit based GOD – POD method	prevalence of diabetes 41.96% was found in the age group of 46-60 yrs.	of blood sugar for a long time due to lack of screening facility of diabetes at PHC level and this increases the chance of developing various complication of DM.
5	(Sudore et al., 2012)	13,171 adults with type 2 diabetes , aged 30–75 years, from Kaiser Permanente, Northern California.	Survey in Northern California. Mean age was 60 years; 48 % were women, and 43 % were non-white. Acute pain was prevalent (41.8 %) and 39.7 % reported chronic pain, 24.6 % fatigue, 23.7 % neuropathy, 23.5 % depression, 24.2 % insomnia, and 15.6 % physical/emotional disability.	Pain and non-pain symptoms were common among all patients, not only among those near the end of life. . Older adults reported more physical symptoms, whereas younger adults reported more psychosocial symptoms.
6	(Ford et al., 2014)	An interview in the home, participants were invited to attend 1 0f 3 examination	Overall, the unadjusted and age adjusted prevalence of the metabolic syndrome were 21.8%, and 23.7%, respectively.	These results from a representative sample of US adults that the metabolic syndrome is highly prevalent

		sessions: morning, afternoon, or evening and abdominal obesity,		
7	(Zhao, Cho, Kim, Friedman, & Guallar, 2014)	The search retrieved a total of 2168 articles reporting diabetes risk assessment tools which, after culling, produced 41 tools developed in 22 countries, with the majority (n=26) developed in North America and Europe. All are short questionnaires of 2–16 questions incorporating common variables including age, gender, waist circumference, BMI, family history of diabetes, history of hypertension or antihypertensive medications. While scoring format and cut-offs point are	Overall accuracy value range of 40-97%, 24-86% and 62-87% were reported for sensitivity, specificity and receiver operating characteristic curve respectively.	In summary, there is a trend of increasing availability of diabetes prediction tools with the existing risk assessment tools being generally a short questionnaire aiming for ease of use in clinical practice. The overall performance of existing tools showed moderate to high accuracy in their predictive performance. However, further detailed comparison of existing questionnaires is needed to evaluate whether they can serve adequately as diabetes risk

		diverse between questionnaires,		assessment tool in clinical practice.
8	(Leung, Carlsson, Colditz, & Chang, 2017)	Data from the Medical Expenditure Panel Survey, 2008 to 2012, were used to analyze 1) probabilities of developing diabetes and 2) annual total health care expenditures for diabetics. The age-, sex-, race-, and body mass index (BMI)-specific risks of developing diabetes were estimated by fitting an exponential survival function to age at first diabetes diagnosis.	The study observed a more than6timesincreaseindiabetes risks for class III obese (BMI Z 40kg/m2) individuals compared with normal-weight individuals. Using age 50 years as an example, we found a more than 3 times increase in annual health care expenditures for those with diabetes ($13,581) compared with those without diabetes ($3,954). Compared with normal-weight (18.5 r BMI o 25 kg/m2) individuals, class II obese (35rBMIo40 kg/m2) and class III obese (BMI Z 40 kg/m2) individuals incurred an annual marginal cost of $628 and $756, respectively.	This article highlights the importance of obesity on diabetes burden. Our results suggested that obesity, in particular, class II and class III (i.e., BMI Z 35 kg/m2) obesity, is associated with a substantial increase in the risk of developing diabetes and imposes a large economic burden.
9	(Unwin et al., 2017)	Standard methods with appropriate quality control were used to collect data on height, weight, blood pressure, fasting lipids and history of diagnosed diabetes, and to	Diabetes was defined as: FPG ≥7.0 mmol/L or HbA1c ≥6.5%; pre-diabetes as: FPG ≥5.6 to <7mmol/L or HbA1c ≥5.7 to <6.5%.RESULTSComplete data were available on 939 participants without	The routine use of HbA1c for screening and diagnosis in this population would have major implications for clinical and public health policies and resources. Given the

		measure fasting glucose and HbA1c. Those with previously diagnosed diabetes (n = 192) were excluded from the analyses.	previously diagnosed diabetes.	lack of robust evidence, particularly for pre-diabetes, on whether intervention in the individuals identified would improve outcomes, this approach to screening and diagnosis cannot be currently recommended for this population.

4. MATERIALS AND METHODS

4.1 SUBJECTS

4.1.1 SCREENING PROCEDURE

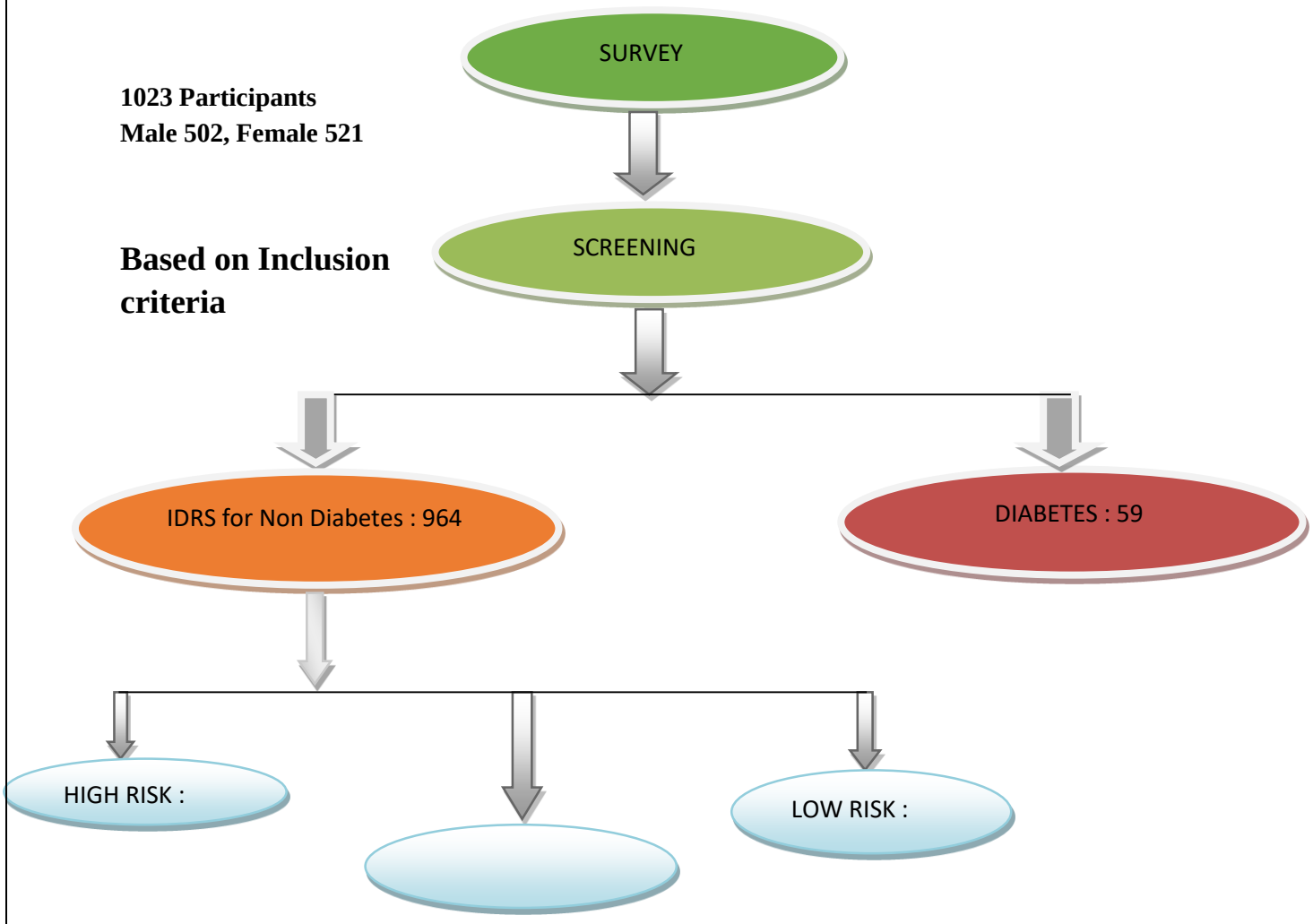
Institutional ethical committee clearance was obtained prior to the initiation of the study. Among the individuals of either sex, aged 20 years and above. The study was carried out in the area of Jigani, which is situated in Urban Karnataka, India. The population of Jigani is 17,036. The population in this town is homogeneous in terms of occupation, socio-economic status, food habits. Study population included all men and women aged 20 years and above. Study variables included, socio-demographic characteristics, physical activity, and anthropometric measurements. Pregnant or lactating women up to 12 weeks post-delivery were excluded from the study. The identification of the localities and the households was done with the help of the local Town Municipal Council (TMC). Starting from the first house onwards all the houses within the lane were covered continuously, keeping towards the left. This procedure was continued until the whole locality was covered. Written informed consent was obtained from all the subjects. During house visits, data was collected by personal face to face interview using a pre-designed questionnaire. The questionnaire included details on socio-demographic variables, anthropometric measurements and physical activity status. A pre-tested scale was used to grade physical activity into sedentary, moderate and heavy work based on their daily activities. Socio-economic status scale was also used to know their socio-economic status. Weight was recorded using a standard weighing scale that was kept on a firm horizontal surface. Height was recorded using a non-stretchable measuring tape to the nearest 1 cm. Subjects were requested to stand straight in bare feet, with heels together, back against the wall, arms loosely at their side and looking forward. Body mass index (BMI) was calculated using the formula, weight (kg) / height^2 (in meters). Waist circumference was measured to the nearest 0.1 cm at the mid-point between costal margin (lower edge of the chest) and iliac crest (super lateral margin of the greater pelvis) using a non-stretchable measuring tape. Hip circumference was measured at the level of the greater trochanters

(widest portion of the hip) to the nearest 0.1 cm by a measuring tape, while the subject was standing with the arms by the side and feet together. Waist-hip ratio was calculated as the ratio of waist circumference over hip circumference. Waist and hip circumference measurements were taken with the clothes on.

4.1.2 INCLUSION CRITERIA

In inclusion criteria we have taken age group above 20years either sex. Included diabetic, pre diabetes which are under high risk according to IDRS score.

4.1.3 FLOW CHAT OF THE STUDY



4.1.4 SOURCE

The study was done in Jigni, urban area of Anekal Taluk, Bengaluru.

4.1.5 ETHICAL CLEARANCE AND CONSENT

The Institute Ethics Committee Approval (SVYASA) was obtained before the start of the study. The heads of the urban areas were explained the details of the study and their oral consent was sought to conduct the survey.

4.2 METHODS

Among the Jigani age above 20 were surveyed. In that diabetic, low, medium, high risk separated by IDRS Score. Weight, waist circumference, Blood pressure were assessed in survey

4.2.1 PRIMARY OUTCOME MEASURES

IDRS

The IDRS, based on age, abdominal obesity, family history of diabetes, and physical activity, was calculated for each patient. Details are given in appendix.

BLOOD PRESSURE

Blood pressure was checked with Sphygmomanometer in survey.

4.2.2 SECONDARY OUTCOME MEASURES

BODY WEIGHT

The body weight was measured by using weighing machine. Subjects are asked to remove their footwear while wearing minimum clothing to stand on the scale.

BODY HEIGHT

The height (in centimeters) was measured using a scale graduated in millimeters. This scale was placed against the wall with their head neither lifted nor depressed but facing straight ahead.

BMI

BMI is calculated from the equation- dividing a person's weight in kilograms by square of height in meters.

WAIST CIRCUMFRENCE

This was measured with a non-stretchable centimeter scale, along the horizontal girth at the midpoint between the costal margin and the iliac crest.

5. RESULTS

Survey was done on Feb 2016. Participants in Jigani, Anekal Taluk were surveyed.

5.2 DEMORAPHIC DATA OF POPUTATON

Jigani Urban area: Jigani urban area total population is 17,036. In that 1023 people from shivanagar-21st lane and kuntlureddy layout-18th lane were surveyed by using inclusion and exclusion criteria with agreed to participate in the study from Jigani area Karnataka. There were 49.09% of men and 50.93% women participants under the age group of 20-25 years (25.22%) participants, under the age group of 26-40 years (50.04%) participants, under the age group 41-60 years (19.55%) participants, under the age group of 61-90 years (4.69%) participants participated. By using Indian Diabetes Risk Score (IDRS), risk score was high risk with 21.37%, under moderate risk 40.46% and under low risk 38.17%.

Table: Jigani population

	Surveyed population	**Present population**	**Percentage (%)**
Total population	1023	17,036	86.1
Male	502	9,990	49.09
Female	521	7,046	50.93

In jigani total population is 17,036 among them total surveyed population is 1023, male are 502 and female are 521.

Demographic data of surveyed population-Jigani

Table 1

Variable		**Number of people**	**Percentage%**
Gender	**Total**	**1023**	**100**
	Male	**502**	**49.09**

	Female	**521**	**50.93**

Among total 1023 surveyed population male are 49.05% and female are 50.93%.

Figure 1: Gender percentage Jigani town

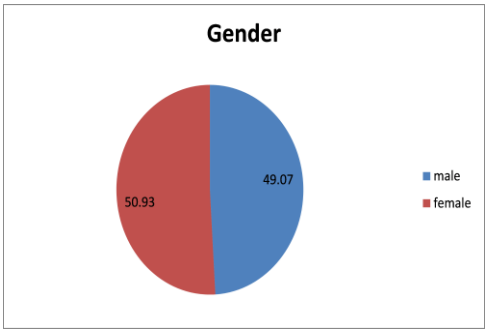


Table 2

Variable		**Number of people**	**Percentage%**
Age	**20-25**	**258**	**25.22**
	26-40	**514**	**50.24**
	41-60	**200**	**19.55**
	61-90	**48**	**4.69**
	90 and above	**1**	**0.10**
	Blank	**2**	**0.20**

Among 1023 population, 20-25 aged people are 25.22%, 26-40 aged people are 50.24%, 41-60 aged people are 19.55%, 61-90 aged people are 4.69%, >90 aged people are 0.10%.

Figure 2: Age percentage of Jigani population

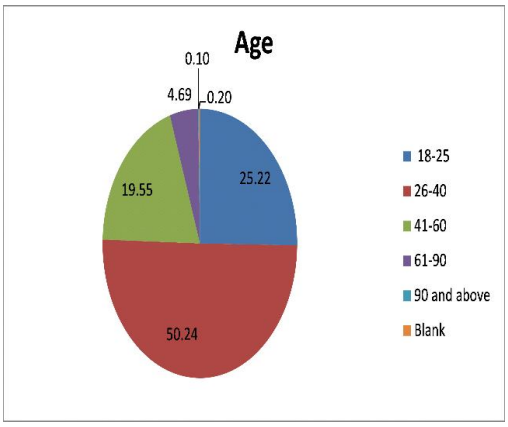


Table 3

Variable		Number of people	Percentage%
IDRS Score	High risk	206	21.37
	Medium risk	390	40.46
	Low risk	368	38.17

Among 1023 surveyed population according to IDRS score 21.37% are under high risk, 40.46% are under medium risk and 38.17% are under low risk.

Figure 3: IDRS Score of Jigani population

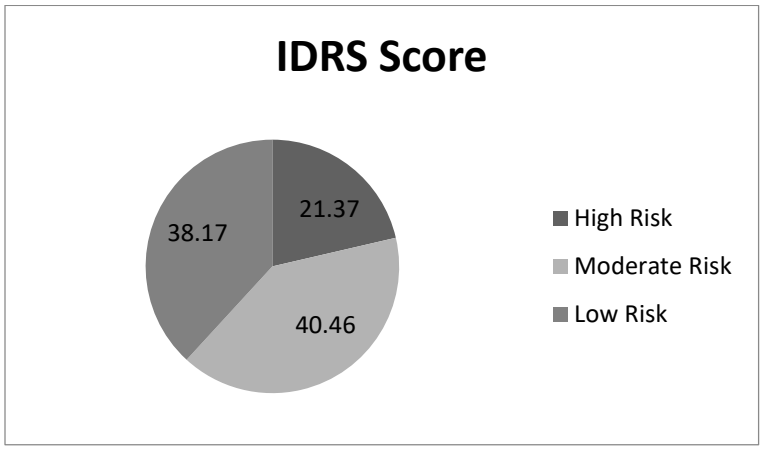


Table 4

Variable		Number of people	Percentage%
Marital status	Married	845	82.40
	Un Married	169	16.52
	Single	1	0.10
	NA	8	0.68

Among 1023 surveyed population married people are 82.40%, unmarried people are 16.52%.

Figure 4: Marital status of Jigani population

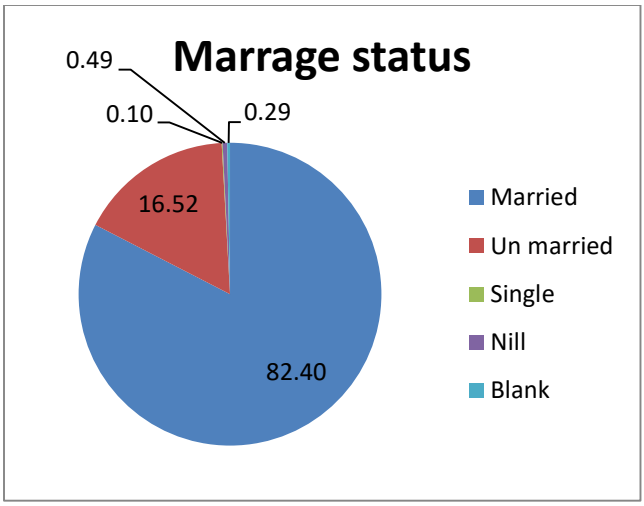


Table 5

Variable		Number of people	Percentage%
Educational qualification	Illiterate	156	12.32
	Primary	189	13
	Secondary	195	16.72
	Higher	267	25.12
	Graduation	3	0.29
	Under Graduate	198	16.81
	NA	2	0.20

Among 1023 surveyed population 12.32% are illiterate, 13% have taken primary education, 16.72% have taken secondary education, 25.12% are taken high school education,17.01% are graduated.

Figure 5: Educational qualification of Jigani population

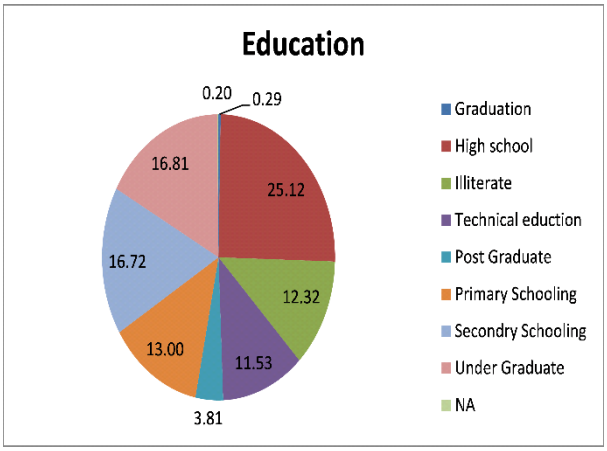


Table: 5

Variable		Number of people	Percentage%
Occupation	Business	16	1.86
	Farmer	26	4.01
	Professional	70	7.23
	Clerical	109	10.65
	Unemployed	220	22.19
	House hold	236	23.85
	Professional	62	7.23
	Driver	5	0.49
	Other	36	4.89
	NA	5	0.49
	Self Employed	8	0.88
	Sale	40	4.20
	Service	54	5.38
	Skilled Manual	73	7.53
	Unskilled manual	63	6.35

Among 1023 surveyed population 1.86% are having their own business, 4.01% people are farmers, 7.23% are under professional, 10.65% does clerical work, 22.19% are unemployed, 23.85% are house holders, 7.23% are under professional work, 0.49% are drivers, 4.89% does other works, 0.88 are self-employed, 4.20% does sales work, 5.38% people does service, 7.53% are skilled workers and 6.35% are unskilled workers.

Figure 6: Occupation of Jigani population

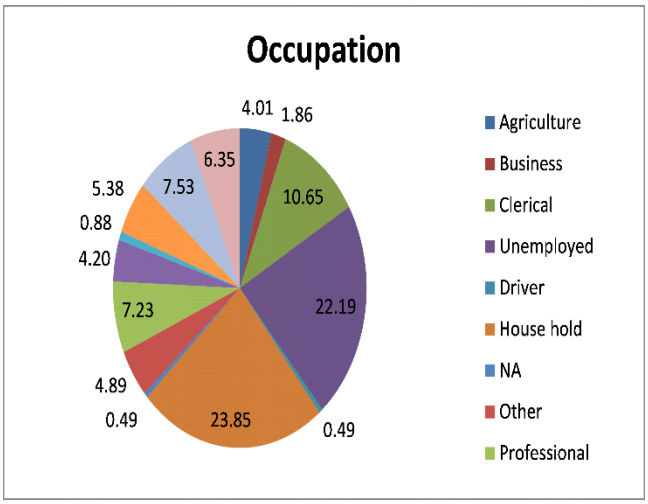


Table 7

Variable		Number of people	Percentage%
BMI	**Under weight (<18)**	**77**	**7.53**
	Normal (18 to 24.9)	**505**	**49.17**
	Over weight (25-29.9)	**287**	**26.98**
	Obese (>30)	**105**	**10.26**

Among 1023 surveyed population 7.53% are under weight, 49.17% are having normal weight, 26.98% are overweight and 10.26% are obese.

Figure 7: BMI percentage Jigani town

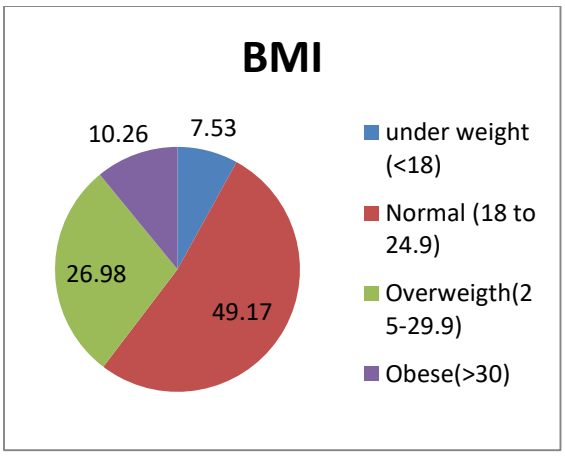


Table 8

Variable		Number of people	Percentage%
Physical activity	Vigorous	97	9.48
	Moderate	505	49.36
	Low	299	29.23
	No exercise	50	4.89
	Blank	10	0.98

Among 1023 surveyed population 9.48% does vigorous physical activity, 49.36% does moderately, 29.23% does low activity, and 4.89% does not participate in any physical activity.

Figure 8: Physical activity of Jigani population

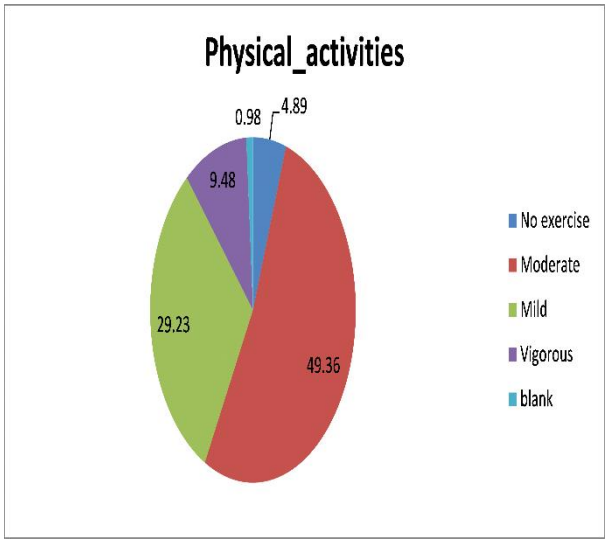


Table 9

Variable		Number of people	Percentage%
Bp SYS	Low (<99)	24	1.08
	Normal(100-120)	304	29.81
	High(>120)	693	61.68
	NA	2	6.06

Among 1023 surveyed population systolic blood pressure is low in 1.08%, normal in 29.81% and high in 61.68%.

Figure 9: Bp Sys percentage of Jigni population

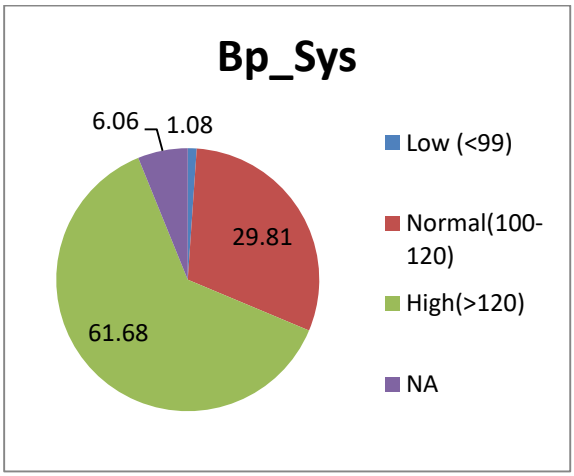


Table 10

Variable		**Number of people**	**Percentage%**
BpDia	**Low(<60)**	**2**	**0.29**
	Normal(60-80)	**358**	**35.58**
	High(>80)	**656**	**57.97**
	Blank	**7**	**6.06**

Among 1023 surveyed population diastolic blood pressure is low in 0.29%, normal in 35.58% and high in 57.97%.

Figure 10: BpDia percentage-Jigani town

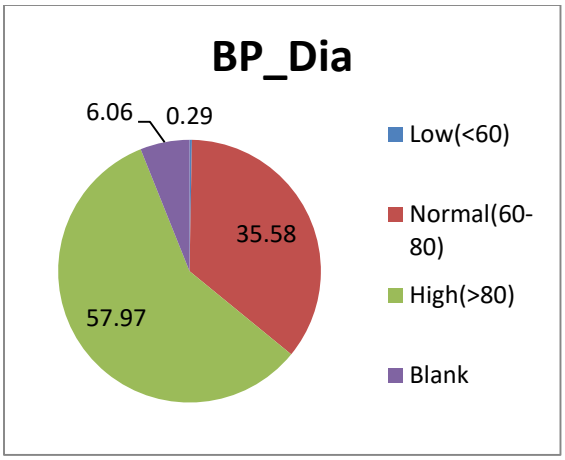


Table 11

Variable		Number of people	Percentage%
OIL FOOD	Daily	5	0.49
	Monthly Once	160	15.64
	Monthly Twice	30	3.88
	Thrice	11	1.08
	Rarely	62	6.06
	No	270	26.39
	Blank	482	47.12

Among 1023 surveyed population 0.49% take oil food daily, 15.64% take monthly once, 3.88% take monthly twice, 1.08% take monthly thrice, 6.06% take rarely and 26.39% doesn't take oil food.

Figure 11: Diet of Jigani population

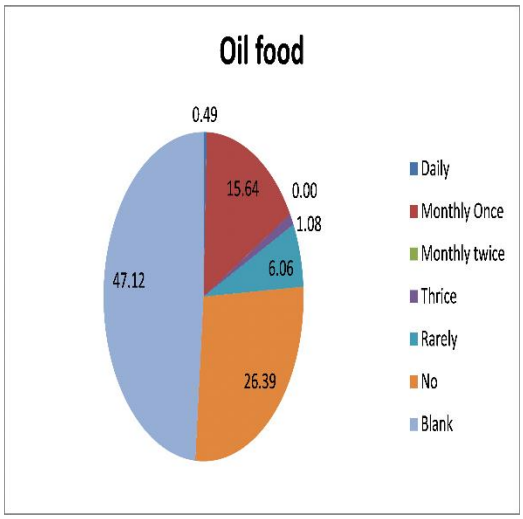


Table 12

	Age	No of People	Percentage
Age- Diabetic	**30-40**	**19**	**32.20**
	41-50	**16**	**27.12**
	51-60	**16**	**27.12**
	61-70	**7**	**11.86**
	>70	**1**	**1.69**

Among the Diabetics in Jigini 32.20% of them are within the age range from 30 to 40Yrs. Among the Diabetics in Jigini 27.12% of them are within the age range from 41 to 50Yrs. Among the Diabetics in Jigini 27.12 % of them are within the age range from 51to 60Yrs.

Among the Diabetics in Jigini 11.86 % of them are within the age range from 61to 70Yrs.

Among the Diabetics in Jigini 1.69 % of them are above the age range of >70.

Figure 12: Age- Diabetic of Jigani population

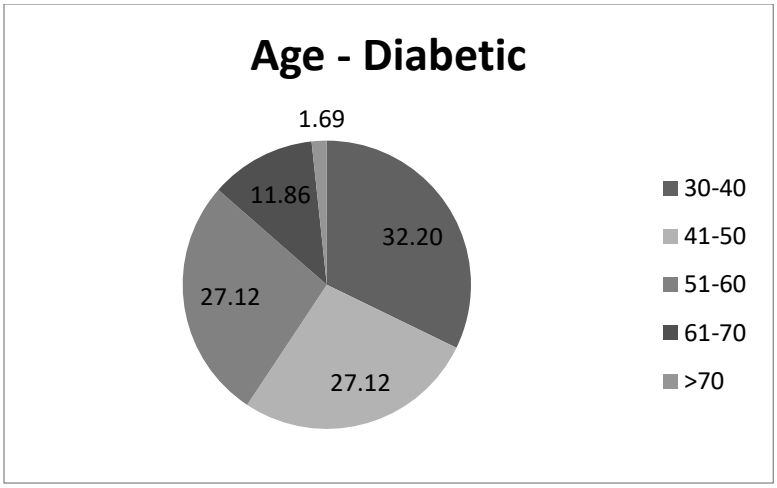


Table 13

Diabetic – Gender	**Gender**	**No of People**	**Percentage**
	Male	**28**	**47.46**
	Female	**31**	**52.54**

Among the diabetics in Jigani 52.54% are female and 47.46% are Male.

Figure 13: Diabetic - Gender of Jigani population

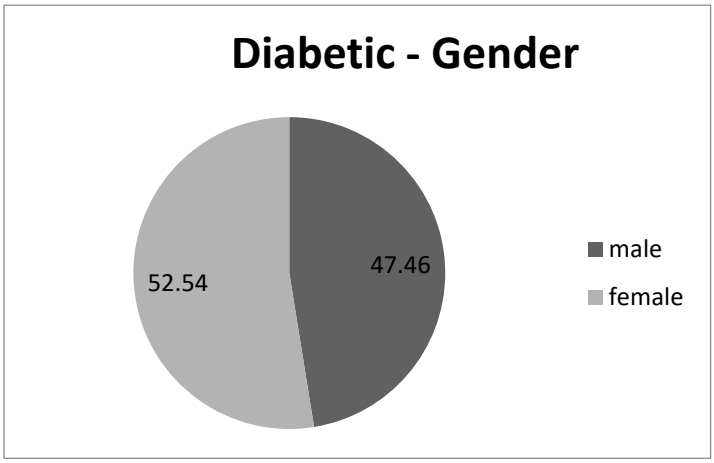


Table 14

		No of People	Percentage
Diabetic – Male	**30-40**	**4**	**23.5**
	41-60	**9**	**52.94**
	>60	**4**	**23.5**

Among the Male Diabetics in Jigini 23.5% of them are within the age range from 30 to 40Yrs. Among the Male Diabetics in Jigini 52.94% of them are within the age range from 41 to 60Yrs. Among the Male Diabetics in Jigini 23.5% of them are above the age of 60Yrs.

Figure 14: Diabetic- Male of Jigani population

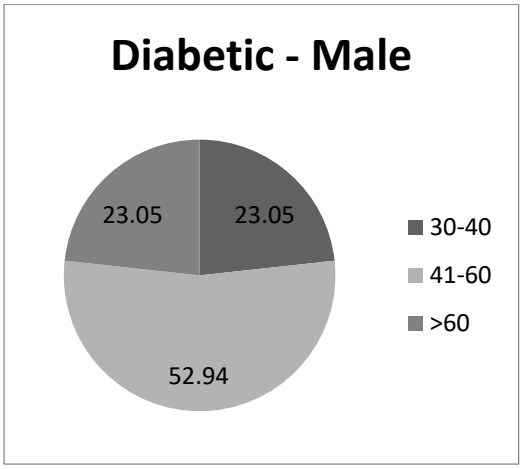


Table 15

		No of People	Percentage
Diabetic – Female	**30-40**	**6**	**30**
	41-60	**11**	**55**
	>60	**3**	**15**

Among the Female Diabetics in Jigini 30% of them are within the age range from 30 to 40Yrs. Among the Female Diabetics in Jigini 55% of them are within the age range from 41 to 60Yrs. Among the Female Diabetics in Jigini 15% of them are above the age of 60Yrs.

Figure 15: Diabetic - Female of Jigani population

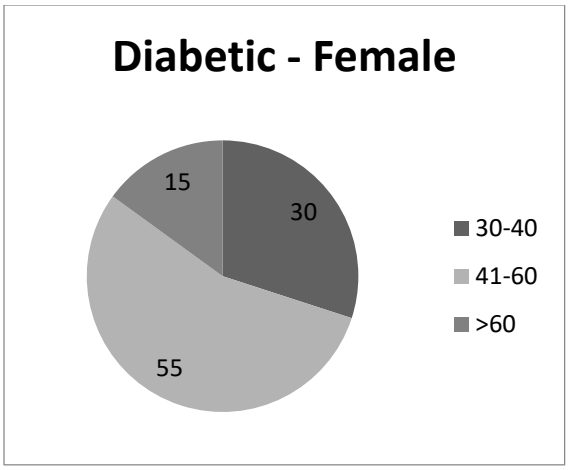


Table 16

		No of People	Percentage
Diabetic- Family history	Both parent	9	15.25
	Single parent	20	33.90

Among the diabetics in Jigani 49.15% have family history of Diabetes (Either one parent or both parents). 33.90% of Diabetics have the Family History of Single parents being Diabetic where as 15.25% diabetics have Family History with Both parents as Diabetics.

Figure 16: Diabetic – Family history of Jigani population

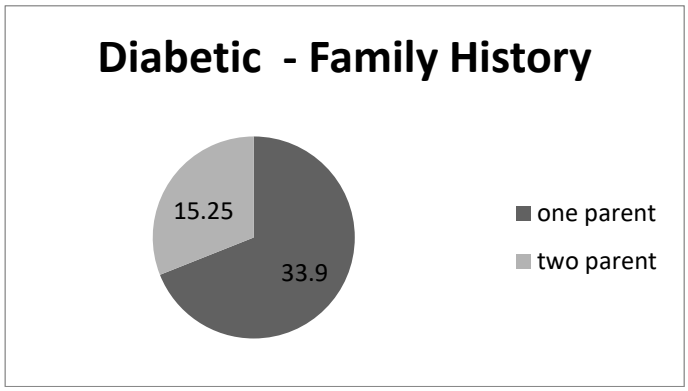


Table 17

Diabetic – Physical activity	Physical activity	No Of People	Percentage
	vigorous	8	13.56
	moderate	31	52.54
	mild	15	25.42
	no exrecise	5	8.47

Among the diabetics in Jigani 13.56% of Diabetics does vigorous physical activity, 52.54% of Diabetics does moderate activity, 25.42% of Diabetics does mild activity and 8.47% Diabetics does not do any exercise.

Figure 17 – Diabetic Physical activity in Jigani population

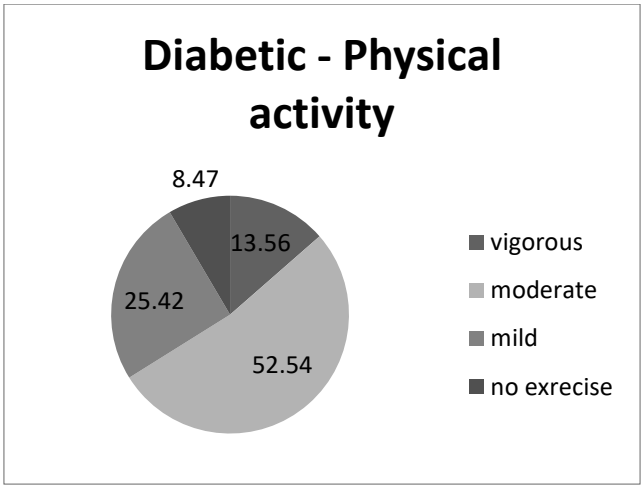


Table 18

High Risk Age	Age	No Of People	Percentage
	21-30	15	7.28
	31-40	68	33.01
	41-50	66	32.04
	51-60	29	14.08
	61-70	25	12.14
	71-80	3	1.46

Among 1023 surveyed population high risk people are 7.28% are 21-30 aged people , 33.01% are 31-40 aged people, 32.04% are 41-50 aged people, 14.08% are 51-60, 12.14% are 61-70 aged people and 1.46% are 71-80 aged people.

Figure 18: High risk - Age of Jigani population

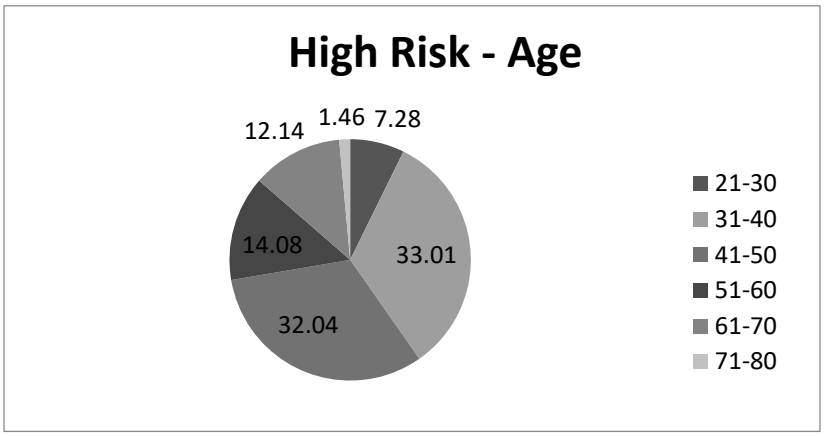


Table 19

High Risk- Family History	Family history	No Of People	Percentage
	Both Parents	10	2.79
	One parent	9	2.51

Among 1023 surveyed population in high risk 2.79% have both parents diabetes and 2.51% have one parent diabetes.

Figure 19: High risk _ Family history of Jigani population

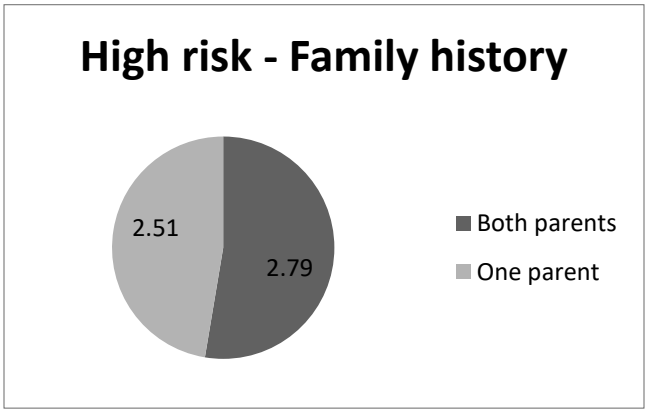


Table 20

High Risk – Physical activity	Physical activity	No Of People	Percentage
	vigorous	4	1.94
	moderate	87	42.23
	mild	87	42.23
	no exrecise	28	13.59

Among 1023 surveyed population under High risk 1.94% does vigorous physical activity, 42.23% does moderate activity, 42.23% does mild activity and 13.59 does not do any exercise.

Figure 20: High Risk – Physical activity in Jigani population

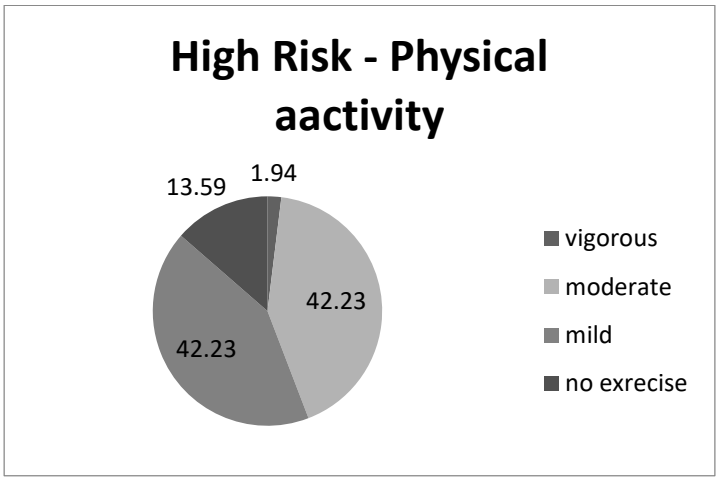


Table 21

	Age	No Of People	Percentage
Moderate Risk Age	21-30	183	46.92
	31-40	130	33.33
	41-50	49	12.56
	51-60	15	3.85
	61-70	11	2.82
	71-80	2	0.51

Among 1023 surveyed population moderate risk people are 46.92% are 21-30 aged people , 33.33% are 31-40 aged people, 12.56% are 41-50 aged people, 3.85% are 51-60 aged people, 2.82% are 61-70 aged people and 0.51% are 71-80 aged people.

Figure 21: Moderate risk - Age of Jigani population

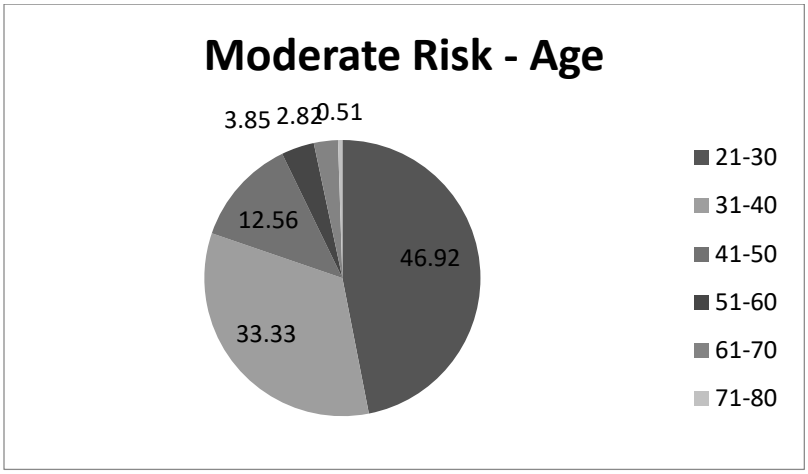


Table 22

Moderate Risk – Family history	Family history	No Of People	Percentage
	Both Parents	19	4.68
	One parent	51	12.56

Among 1023 surveyed population in moderate risk 4.68% have both parents diabetes and 12.56% have one parent diabetes.

Figure 22: Moderate risk – Family history of Jigani population

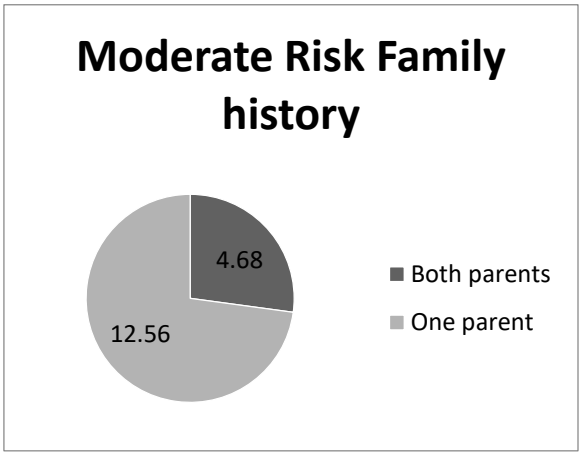


Table : 23

Moderate Risk – Physical activity	Physical activity	No. of People	Percentage
	vigorous	37	9.49
	moderate	229	58.72
	mild	103	26.41
	no exrecise	21	5.38

Among 1023 surveyed population under moderate risk 9.49% does vigorous physical activity, 58.72% does moderate activity, 26.41% does mild activity and 5.38% does not do any exercise.

It was found that the overall prevalence of diabetes was 5.77%, high risk 21.37%, medium risk 40.46% and low risk 38.17%.Studies show that the incidence of diabetes mellitus is very high among south India. Among the diabetics in Jigini 52.54% are female and 47.46 are Male. Among the Male Diabetics in Jigini 23.5% of them are within the age range from 30 to 40Yrs. Among the male Diabetics in Jigini 52.94% of them are within the age range from 41 to 60Yrs. Among the male Diabetics in Jigini 23.5% of them are above the age of 60Yrs. Among the Female Diabetics in Jigini 30% of them are within the age range from 30 to 40Yrs. Among the Female Diabetics in Jigini 55% of them are within the age range from 41 to 60Yrs. Among the Female Diabetics in Jigini 15% of them are above the age of 60Yrs. Among the diabetics in Jigani 49.15% have family history of Diabetes (Either one parent or both parents). 33.90% of Diabetics have the Family History of Single parents being Diabetic where as 15.25% diabetics have Family History with Both parents as Diabetics.

Among 1023 surveyed population high risk people are 7.28% are 21-30 aged people , 33.01% are 31-40 aged people, 32.04% are 41-50 aged people, 14.08% are 51-60, 12.14% are 61-70 and 1.46% are 71-80 aged people.

Among 1023 surveyed population in high risk 2.79% have both parents diabetes and 2.51% have one parent diabetes.

Among 1023 surveyed population moderate risk people are 46.92% are 21-30 aged people , 33.33% are 31-40 aged people, 12.56% are 41-50 aged people, 3.85% are 51-60 and 2.82% are 61-70 aged people, 0.51% are 71-80 aged people.

Among 1023 surveyed population in moderate risk 4.68% have both parents diabetes and 12.56% have one parent diabetes.

6. DISCUSSION

There was a significant IDRS, waist, BMI, BP (systolic & diastolic), and hip circumference. A survey study was done for the prevalence of type 2 diabetes in Jigani area, Anekal Taluk, urban Bangalore. In this survey 1023 participants with the age group of above 20 were included. It was found that the overall prevalence of diabetes was 5.77%, high risk 21.37%, medium risk 40.46% and low risk 38.17%.Studies show that the incidence of diabetes mellitus is very high among south India. The incidence rate of diabetes was 20.2 per 1000 person years among subjects 37 individual who were pre-diabetic at baseline(Mohan et al., 2008). Also, it was seen that high prevalence of type 2 diabetes among the adults in Guwahati, Assam, in north eastern part of India. The prevalence was similar to that reported from this study in southern India (8.2% age > 20 yrs.) and Northern India (6.7% age > 30) (Rachna, Manish, Balwinder, ShekharKumar, & Girish, 2009). The overall self- reported prevalence of chronic conditions was 12, with hypertension (7%) and diabetes (5.8%) being the common conditions (Krishnaveni & Gowda, 2015).

Comparison with the earlier study

Global prevalence of type 2 diabetes was 6.4% in 2010. (Shaw, j., esicree.r a,.&Zimmet, 2010).

In India prevalence has been studied in four states on type 2 diabetes, 10.4% in Tamilnadu, 8.2% in Maharashtra, 5.3% in Jharkhand, 13.6% in Chandigarh in 2011 (Ramachandran, Murugesan, Mary, Snehalatha, & Yamuna, 2008). Urban village in Tamilnadu has showed lower prevalence rate (9.2%) of type 2 diabetic in 2008. In Karnataka, the prevalence rate of type 2 diabetic was 10% in Tamaka village, kolar district (Muninarayana, Balachandra, Hiremath, Iyengar, & Anil, 2010). In Karnataka prevalence of diabetes rate of type 2 diabetes was 10% in Tamaka village, kolar district in 2010 (Muninarayana et al., 2010). The present finding showed the prevalence rate of 17.72% in urban Bengaluru. Present finding supports the earlier study done by Ramachandra in 2004 on urban southern India, in that study; there was increasing trend in prevalence rate. They showed that the prevalence of diabetes increased by 3 folds compared that was seen in 2003 when compared with miller study that was done 14 years before. (From 2.2% to 6.36%) (Ramachandran et al., 2008). Mexican Americans (MAs) in Texas, USA and South Indians (SIs) in Tamil Nadu, India—have an increasing prevalence of DM. We aimed to understand the metabolic correlates of DM in these populations to improve risk stratification and DM prevention (Watt et al., 2018).

Table 13.Earlier studies:

Earlier studies	Percentage (%) of diabetes	Year
Asian population the prevalence of type 2 diabetes.	• In urban-18.6%. • In rural-9.2%.	2006
In India prevalence has been studied in four states on type 2 diabetes. Tamilnadu, Maharashtra, Jharkhand, Chandigarh.	• Tamilnadu-10.4% • Maharastra-8.2% • Jharkhand-5.3% • Chandighar-13.6	2011
Urban village in Tamilnadu has showed lower prevalence rate of diabetes.	Tamaka village-10%.	2008
Finding showed the prevalence rate of diabetes in Channenahalli.	Channenahalli-17.2%.	2003
South Indians (SIs)—have an increasing prevalence of DM.	Tamil Nadu-27.6%	2018
Present study	Urban Karnataka: Diabetics-5.77% & Pre Diabetics-21.37%	2017

7. CONCLUSION

In the present study it was found that the overall prevalence of diabetes is found to be close to earlier findings. (Diabetes 5.77%, high risk 21.37%, medium risk 40.46%). Moderate risk for diabetes is starting from 20yrs onwards(in the age group from 21 to 30yrs is 46.92% and in the age group from 31 to 40 is 33.33%).High risk for diabetes is starting from 30yrs onwards (in the age group 31 to 40yrs is 33.01% and in the age group 41 to 50yrs is 32.04%). 42.23% are under high risk who does mild physical activity. Results indicate that the Family History of a person highly influenced the diabetic status of a person (49.15 % of diabetics have Family history). Also results indicate that the persons are very highly prone for Diabetes between the age range of 30 to 50Yrs (59.32% of diabetics are in the age range of 30 to 50Yrs). This study created awareness of diabetes and its complication in urban population of this region. The baseline data of the present study regarding the prevalence of T2DM could be useful for implementation of the National Program for control of Diabetes. Therefore, future research in this direction is a need of the time.

8. APPRAISAL

8.1 STRENGTHS OF THE STUDY

This study shows the prevalence of diabetes in urban population. Also it correlates the causes and need of prevention. This type of study is useful to create awareness in people on diabetes. For researchers of prevalence studies, the results of this study would provide a substantial base for conducting future trials to know the prevalence of diabetes in other places in Bangalore.

8.2 RECOMMENDATIONS

Regular yoga classes should be arranged in each urban area. More awareness needs to be given to young people in town as well as in villages about yoga. And long term follow-up studies on type 2 diabetes prevalence will help to know the prevalence rates and the future action for the prevention, treatment and control of the disease.

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10. APPENDICS

10.1 INFORMED CONSENT

Consent form Information to the participants:

We understand that you are a resident of SWAMI VIVEKANANDA YOGA ANUSANDANA SAMSTHANA village, jigni, Bangalore. In this study we are evaluating prevalence of type2 diabetes in South Bangalore. Studies show that the how much awareness is in urban areas overall quality of life in type2 diabetics.

Thus this study conduct as a part of the MSC Yoga Therapy Degree program, examines the prevalence of type2 diabetes in _____JIGANI_____ AREA. Your consent is sought to take part in the study. If you consent to take part in this study, the invigilator will interview you. In this interview, the interviewer will ask you questions related to family health and diabetes. The information collected from you would be helpful in understanding the prevalence of diabetes in _____JIGANI_____AREA. The interview may take half an hour. A part from this interview, if you are observed to have symptoms of pre diabetes. Please note that you have a right to refuse to take part in the study any time. Your refusal will not adversely affect your daily routine. Please also note that the information you are going to divulge to us will be kept in utmost confidentially

Undertaking by the investigator:

If you have any doubts about study please feel free to clarify. Even during the study you are free to contact the investigator for clarifications if you so desire. The phone number of the investigator is given below.

CH.NAGAVENI +918331917259

Consent: I have been informed about the procedures of the study. The possible risks too have been explained to me as stated in the information. I have understood that I have the right to refuse my consent of withdraw it any time during the study without adversely affecting me. I am aware that by subjecting to the investigation. I will have to give more time to assessments by the investigator and that these assessments do not interfere with the benefits.

Signature of the participant Signature of the investigator

10.2 IDRS (Indian diabetic risk score)

	Score
Age	
<35years	0
35-49years	20
>50years	30
Waist circumference:	
Waist<80cm(female),<90cm(male)	0
Waist>80-89cm(female),>90-99cm(male)	10
Waist>90cm(female),>100(male)	20
Physical activity:	
Regular vigorous exercise or stannous manual activity at home/work	0
Regular moderate exercise or moderate physical activity at home/work	10
Regular mild exercise or mild physical activity at home/work	20
No exercise or sedentary activities at home/work	30
Family history of diabetes	
No diabetes in parents	0
One parent is diabetic	10
Both parents are diabetic	20

11. RAW DATA

S.No	Reg_code	Age	Gender	Marital status	Education	Occupation	Diabeties info	Physical_activities	IDRS_score	Bp_Sys_first	BP_Dia_first	Oil	Height	Weight
2	KA/BEN/JIGI/01/02	40	male	Married	Secondary School	skilled	No	Mild	70	225	145	Sunflower		58
3	KA/BEN/JIGI/01/03	21	Female	Married	Under Graduate	Unemploved	No	No exercise	60	118	65	Sunflower	162	65
6	KA/BEN/JIGI/01/06	31	Female	Married	Technical education	Unemploved	No	No exercise	80	131	92	Sunflower	165	67
7	KA/BEN/JIGI/01/07	25	Female	Married	Secondary school	Unskilled manual	No	No Excercise	40	111	83	Sunflower	163	49
8	KA/BEN/JIGI/01/08	21	Female	Married	Under Graduate	Unemploved	No	No exercise	30	120	87	Sunflower	158	43
9	KA/BEN/JIGI/01/09	28	male	Married	Technical education	skilled	No	No exercise	30	139	92	Sunflower	172	66
10	KA/BEN/JIGI/01/10	37	Female	Married	No formal schooling	unskilled	No	Mild	60	111	75	Sunflower	165	55
12	KA/BEN/JIGI/01/12	30	Female	Married	Secondary school	Do not work	No	Mild	50	118	75	Sunflower	155	57
13	KA/BEN/JIGI/01/13	33	Female	Married	Under graduate	Do not work	No	Moderate	50	133	80	Sunflower	146	65
14	KA/BEN/JIGI/01/14	37	Female	Married	Under Graduate	Professional	No	Mild	90	130	82	Sunflower	172	102
15	KA/BEN/JIGI/01/15	42	Female	Married	Secondary School	Unemploved	No	Mild	70	135	89	Sunflower	157	69
16	KA/BEN/JIGI/01/16	21	male	Unmarried	Technical education	skilled	No	Moderate	30	146	79	Sunflower	167	61
17	KA/BEN/JIGI/01/17	25	male	Unmarried	Technical education	Clerical	No	Moderate	10	135	83	Sunflower	168	53

18	KA/BEN/JIGI/01/18	21	Female	Married	High school	Unemployed	No	Mild	20	118	77	Sunflower	147	49
19	KA/BEN/JIGI/01/19	22	Female	Married	High school	Unemployed	No	Mild	20	124	82	Sunflower	156	41
20	KA/BEN/JIGI/01/20	41	Male	Married	High school	Skilled manual	No	Moderate	50	124	84	Sunflower	171	74
21	KA/BEN/JIGI/01/21	24	Female	Married	Secondary school	Do not work	No	Mild	50	104	75	Sunflower	159	62
22	KA/BEN/JIGI/01/22	21	Female	Married	Secondary school	Do not work	No	Mild	50	114	85	Sunflower	158	56
23	KA/BEN/JIGI/01/23	53	Female	Married	Secondary School	Unemployed	No	Mild	90	172	110	Sunflower	143	56
24	KA/BEN/JIGI/01/24	19	Female	unmarried	Technical education	Unemployed	No	Mild	20	96	73	Sunflower	156	45
25	KA/BEN/JIGI/01/25	46	Female	Married	primary school	skilled	No	Mild	70	137	96	Sunflower	174	74