STUDY ON DEPRESSION IN THE ELDERLY WITH DIABETES IN AN URBAN GOVERNMENT HOSPITAL OUTPATIENT SETTING

Dissertation submitted to

THE TAMIL NADU DR. M. G. R. MEDICAL UNIVERSITY

In partial fulfillment of the regulations

For the award of the degree of

M.D. BRANCH - XVIII

M.D. (PSYCHIATRY)

INSTITUTE OF MENTAL HEALTH

MADRAS MEDICAL COLLEGE,

THE TAMIL NADU DR. M. G. R. MEDICAL UNIVERSITY,

CHENNAI, INDIA

APRIL - 2016

CERTIFICATE

This is to certify that this dissertation titled, "**STUDY ON DEPRESSION IN THE ELDERLY WITH DIABETES IN AN URBAN GOVERNMENT HOSPITAL OUTPATIENT SETTING**" submitted by **Dr. N. Nisha**, is an original bonafide record of work done in part fulfilment of the requirements for the M.D. Branch – XVIII (Psychiatry) examination of The Tamil Nadu Dr. M.G.R. Medical University, to be held in April 2016. I forward this to the Tamil Nadu Dr. M.G.R. Medical University, Chennai, Tamil Nadu, India.

Dr. JEYAPRAKASH R
Director
Institute of Mental Health
Madras Medical College
Chennai.

THE DEAN
Madras Medical College
Chennai

CERTIFICATE OF GUIDE

This is to certify that this dissertation titled, "**STUDY ON DEPRESSION IN THE ELDERLY WITH DIABETES IN AN URBAN GOVERNMENT HOSPITAL OUTPATIENT SETTING**" is the original work of **Dr. N. NISHA**, appearing for M.D. (Psychiatry) degree examination in April 2016, is an original bonafide record of work done from May 2015 to September 2015 by her under my guidance and supervision in partial fulfilment of requirements of the Tamil Nadu Dr. M.G.R. Medical University, Chennai. I forward this to the Tamil Nadu Dr. M.G.R. Medical University, Chennai, Tamil Nadu, India.

Dr. SABITHA V

Associate Professor of Psychiatry
Institute of Mental Health
Madras Medical College
Chennai.

DECLARATION

I, Dr. N. Nisha, solemnly declare that this dissertation, "**STUDY ON DEPRESSION IN THE ELDERLY WITH DIABETES IN AN URBAN GOVERNMENT HOSPITAL OUTPATIENT SETTING**", was done by me in the Department of Geriatric Medicine, Rajiv Gandhi Government General Hospital / Madras Medical College, under the guidance of Associate Professor of Psychiatry, Institute of Mental Health, and under the supervision of the Director of Institute of Mental Health, Chennai. This dissertation is submitted to the Tamil Nadu Dr. M.G.R. Medical University, Chennai-32, in partial fulfilment of the University requirements for the award of the degree of M.D. Psychiatry.

Place: Chennai **Dr. N. Nisha**

Date: 23-09-2015

Acknowledgement with Gratitude

I wish to place on record my heartfelt gratitude to the Director, Insitute of Mental Health Chennai, Prof. R.Jeyaprakash, for permitting me to do this dissertation.

Also on record is my thankful acknowledgement for the permission given to conduct the study in Rajiv Gandhi Government General Hospital by the Dean Dr. R.Vimala M.D.

Prof.Sivakumar, Head of Department for Geriatrics in RGGH, needs special thankful mention for his kind permission to use his out-patient population for the study. His very first reaction was a smiling encouragement when approached for the study.

My guide, Prof.Sabitha,IMH, was very supportive during the period of study and its final drafting process.

To the statistician who understood the clinical aspects and helped me to analyse the data will I will remain indebted.

The elderly, who were the essence of this study, will be forever etched in memory, for their kind and co-operative responses to all my questions. I hope that they will live the rest of their lives better.

To the divinity that made this possible, my prayerful thanks.

INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE, CHENNAI-3

EC Reg No.ECR/270/Inst./TN/2013
Telephone No. 044 25305301
Fax : 044 25363970

CERTIFICATE OF APPROVAL

To
Dr.N.Nisha
Postgraduate M.D.(Psychiatry)
Madras Medical College
Chennai 600 003

Dear Dr.N.Nisha,

The Institutional Ethics Committee has considered your request and approved your study titled **"Study on depression in the elderly with diabetes in an urban Government Hospital outpatient setting" No.33042015.**

The following members of Ethics Committee were present in the meeting held on 07.04.2015 conducted at Madras Medical College, Chennai-3.

1. Prof.C.Rajendran, M.D.,	: Chairperson
2. Prof.R.Vimala, M.D., Dean, MMC, Ch-3	: Deputy Chairperson
3. Prof.B.Kalaiselvi, M.D., Vice-Principal, MMC, Ch-3	: Member Secretary
4. Prof.B.Vasanthi, M.D., Prof. of Pharmacology, MMC	: Member
5. Prof.P.Ragumani, M.S., Professor of Surgery, MMC	: Member
6. Prof.S.Baby Vasumathi, Director, Inst. Of O&G, MMC	: Member
7. Prof.K.Ramadevi, Director, Inst.of Biochemistry, MMC	: Member
8. Prof.Saraswathy, M.D., Director, Pathology, MMC, Ch-3	: Member
9. Prof.K.Srinivasagalu, M.D.,Director, I.I.M. MMC, Ch-3	: Member
10. Thiru S.Rameshkumar, B.Com., MBA	: Lay Person
11. Thiru S.Govindasamy, B.A., B.L.,	: Lawyer
12. Tmt.Arnold Saulina, M.A., MSW.,	: Social Scientist

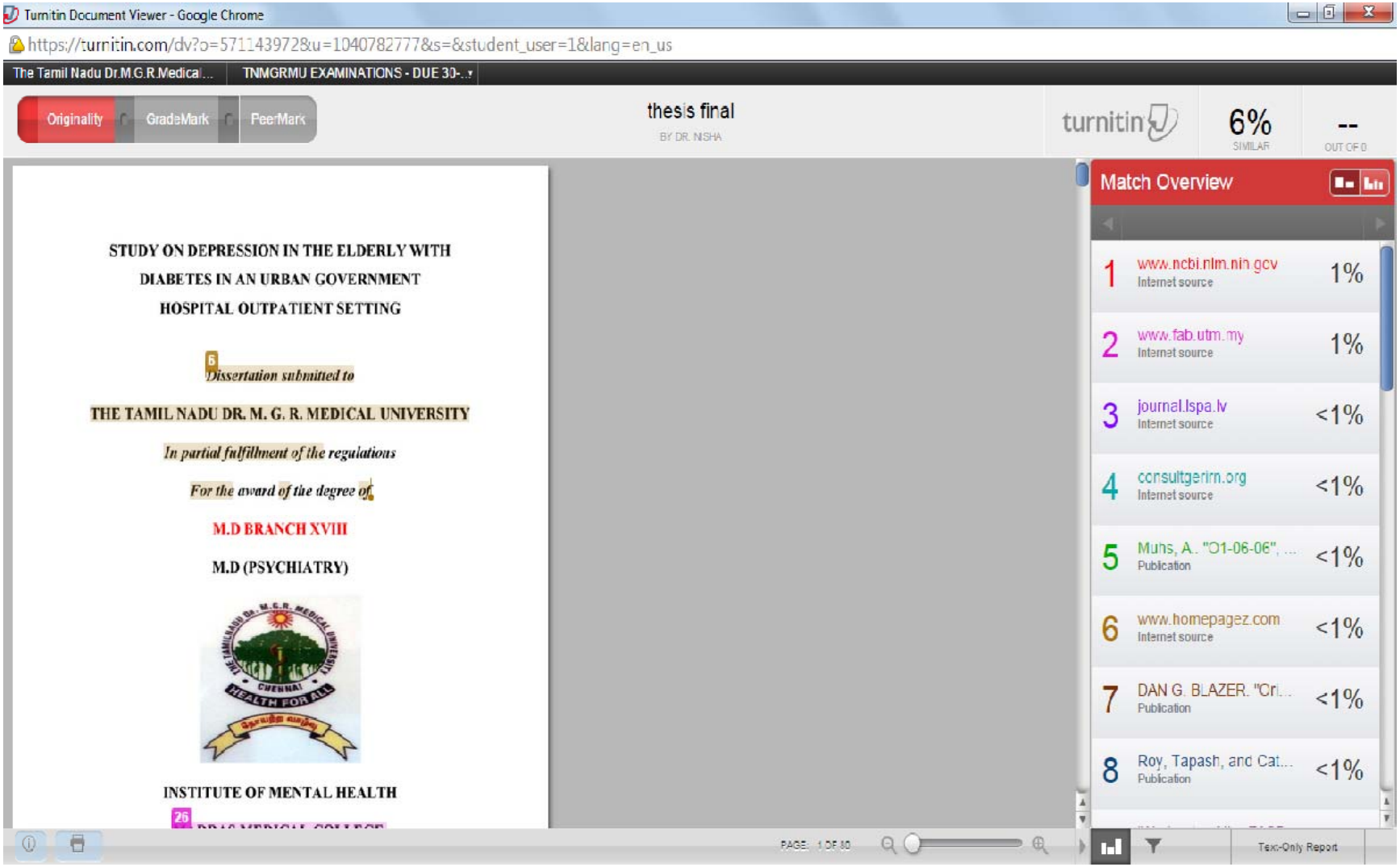
We approve the proposal to be conducted in its presented form.

The Institutional Ethics Committee expects to be informed about the progress of the study and SAE occurring in the course of the study, any changes in the protocol and patients information/informed consent and asks to be provided a copy of the final report.

25/4/15

Member Secretary, Ethics Committee

MEMBER SECRETARY
INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE
CHENNAI-600 003

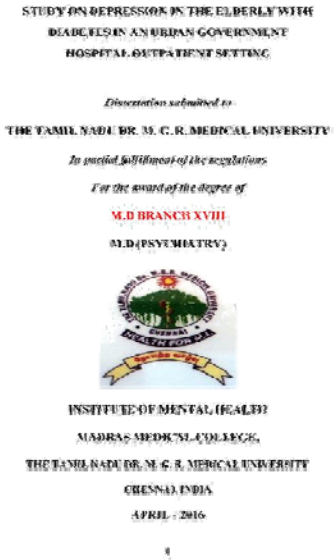

Turnitin Document Viewer - Google Chrome
https://turnitin.com/dv?o=571143972&u=1040782777&s=&student_user=1&lang=en_us
The Tamil Nadu Dr.M.G.R.Medical...
TNMGRMU EXAMINATIONS - DUE 30-...
Originality
GradeMark
PeerMark
thesis final
BY DR. NISHA
turnitin
6%
SIMILAR
--
OUT OF 0
STUDY ON DEPRESSION IN THE ELDERLY WITH
DIABETES IN AN URBAN GOVERNMENT
HOSPITAL OUTPATIENT SETTING
Dissertation submitted to
THE TAMIL NADU DR. M. G. R. MEDICAL UNIVERSITY
In partial fulfillment of the regulations
For the award of the degree of
M.D BRANCH XVIII
M.D (PSYCHIATRY)
INSTITUTE OF MENTAL HEALTH
Match Overview
1 www.ncbi.nlm.nih.gov Internet source 1%
2 www.fab.utm.my Internet source 1%
3 journal.lspa.lv Internet source <1%
4 consultgerim.org Internet source <1%
5 Muhs, A.. "01-06-06", ... Publication <1%
6 www.homepagez.com Internet source <1%
7 DAN G. BLAZER. "Cri... Publication <1%
8 Roy, Tapash, and Cat... Publication <1%
PAGE: 1 OF 80
Text-Only Report

Digital Receipt

This receipt acknowledges that Turnitin received your paper. Below you will f ind the receipt inf ormation regarding your submission.

The first page of your submissions is displayed below.

Submission author:	Dr. Nisha
Assignment title:	TNMGRMU EXAMINATIONS
Submission title:	thesis f inal
File name:	document_6_FOR_PLAGIARISM.do…
File size:	349.81K
Page count:	80
Word count:	13,779
Character count:	73,216
Submission date:	23-Sep-2015 07:28PM
Submission ID:	571143972



STUDY ON DEPRESSION IN THE ELDERLY WITH DIABETES IN AN URBAN GOVERNMENT HOSPITAL OUTPATIENT SETTING

Dissertation submitted to

THE TAMIL NADU DR. M. G. R. MEDICAL UNIVERSITY

In partial fulfillment of the regulations

For the award of the degree of

M.D BRANCH XVIII

M.D.(PSYCHIATRY)

INSTITUTE OF MENTAL HEALTH

MADRAS MEDICAL COLLEGE,

THE TAMIL NADU DR. M. G. R. MEDICAL UNIVERSITY

CHENNAI, INDIA

APRIL : 2016

INDEX

INTRODUCTION

"Depression is the inability to construct a future."- declared Rollo May in his book Love and Will.

When age advances and the end of life is not just an idle mind's speculation but a reality zooming in, the aged mind caged in an ageing body, would tend to get depressed- not out of an inability to construct a future but out of a realization that the future does not really mean much.

The ageing Indian is not left with many choices in the current period of time. Unlike in the West where a new occupation or an interest can be discovered and pursued, the elderly Indian is often left with stitching memories on a fragmented fabric of time. The traditional safe haven called home and family is not the same as it was sixty years ago, when he would have seen his grandfather still having a say in household activities. The present elderly Indian would often feel unwanted and neglected if he were to still live with his children's family.

The swift changes in the cultural expression and life style of the new generation would be anathema for his, though unnecessary value system. He would be lost inside his house. Even if he were to have adequate monetary independence too, he would not venture out to live alone and explore what the world can offer to him at this age. He is a

creature that was culturally domesticated for thousands of years and led to believe that he is an inseparable part of the family system. He was designed to dream of a caring good-bye and loving tears when he would have to depart this world. In this changed scenario, we see the elderly frustrated, exhausted and depressed- frustrated that they had not lived life fully in its enjoyable way but had spent their active life time in making the family that they created or bequeathed, more comfortable economically if not emotionally; exhausted because it was never part of his routine to take his physical health seriously and keep himself fit, and depressed because he cannot create a new future- for want of time and energy and resources. It is therefore not uncommon to see the elderly Indian depressed.

Depression can strike anyone and have the same consequences on the mind and the body, but when it strikes the elderly, it manifests in a slightly different manner, with somatic preoccupations as a defence against the reality of indifferent immediate social circle, as a vain attempt to regain the lost attention from the family. The elderly Indian may not cry and lament, may not immediately search for a noose, but would sulk, withdraw and communicate less to an uncommunicating world.

Ageing though inevitable can be agonizing if the process of completion is prolonged. Awaiting death to deliver self from suffering-

physical or emotional or social, is not a pleasant experience and it only raises questions like ‘why me?’, ‘what went wrong?’, even when his life is not in pain, though his life may be fairly fine when compared to peers.

“Ageing is the fertile ground for questioning existence” said a famous Greek philosopher, what he probably meant was that ageing brings about a period of uncertainty confounded by growing physical and emotional incapacity to deal with life; perhaps this may be construed as the primary cause of a saddened angst. Though this may qualify under modern psychiatric purview as depression, what we propose to study is not the environmental and social and emotional entanglements of depression. This study is not about an assessment of an association between the metabolic and biochemical factors inducing depression and their variable manifestations. In this study we are focussing on diabetes.

Diabetes is prevalent in India. The age of the population is also on the rise. Therefore there would be more diabetics who are depressed and aged.

With this surmise we are preparing a preliminary study to unravel, if possible any association, if present, between diabetes and ageing (particularly in the defined aged/geriatric population) and depression.

The association between ageing and depression has been rather extensively studied and documented across many cultures in the world. However the examination of the relationship between diabetes and depression in geriatric population has not had much coverage in Indian mental health research. This was one of the reasons for undertaking this study.

As the life expectancy is increasing all over the world, late life depression is more commonly encountered. Since the prevalence of diabetes is also on the rise, depression and diabetes in the elderly is more commonly encountered in our times.

The question whether diabetes causes depression is not the subject matter of this study, though that hypothesis has been investigated all over the world. *Our study is mainly to see if glycaemic levels and severity of depression have a correlation.* A chronic illness like diabetes does take its toll on the physical and mental well-being of an individual, and with the socio-economic factors and internally perceived or real insecurity being a common aspect of ageing, diabetes does appear in many elderly.

There are not many studies in India studying diabetes and depression in the elderly. This study was undertaken to see if there is an association between depression and diabetes in the elderly population who receive medical care in an urban Government hospital.

The socio-economic profile of any patient who seeks free medical care from the state run, government hospital generally is that of a weaker economic background. In an urban setting where nuclear family structure is on the rise, the elderly do tend to feel neglected and isolated, making them feel sad and insecure. While sad thoughts are quite common in the otherwise healthy elderly, when coupled with a chronic illness like diabetes, for which they have to regularly check their blood levels and visit the hospital for medical checks and medication, their mood is understandably depressed.

Depression is a common psychiatric illness.

"No light; but rather darkness visible
Served only to discover sights of woe,
Regions of sorrow, doleful shades, where peace
And rest can never dwell, hope never comes
That comes to all, but torture without end" - Milton in Paradise Lost

To age with sorrow, and to be further burdened by a life-time illness like depression is a matter that would become a growing concern in the future when the elderly live longer. This study is to examine the possibility of relating depression and diabetes in the elderly so that a simpler way of handling these comorbid conditions can be envisaged in the future.

REVIEW OF LITERATURE

➢ Ageing, diabetes and depression

The population is growing older, and WHO fact sheet declares that the geriatric population in India, is on the increase. This is due to the increase in life expectancy seen in the Indian population. A Study showed that in 2011, the point prevalence for depression in the elderly was between 10-25%.

From 30 million diabetics worldwide in 1985, it is now expected to rise to 380 million worldwide by 2025(IDF). In India, the prevalence of diabetes which was 6.2% in 2007 is set to become 7.6% by 2025 according to an epidemiological study conducted in India by Ramachandran et al.

Diabetes in the elderly population of India too is on the rise. In a study by Jain and Paranjapee, to see the prevalence of Type 2 Diabetes Mellitus in elderly, from total 585 elderly people, 178 had T2DM (30.42%- Prevalence).The sex ratio of Diabetic males to females was 1:0.97.

Gupta and Suri in 2002, found that the prevalence of diabetes is 11% in the geriatric population, aged above 65.

In India, in 1961 life expectancy at birth was 36.7 years and in 2012, it is reported to be about 67 years. The proportion of the elderly population in India increased from 5.6% in 1961 to 8.5% in 2011, and is estimated to rise to 9% by 2016. (Kandpal 2012). This shows that the elderly with diabetes and depression too would increase. Studies on Indian population show this.

- **Diabetes and depression**

Psychosocial factors do play a role in depression, and with diabetes the concern about physical health only compounds the depressive state. As described in the paper by Edge et al, in a 2003 paper in Diabetic Care, perceptions and myths about diabetes and general health seem to play a major role in causing or compounding depression. 2003 study by Egede et al., of 1,810 individuals with diabetes from the 1999, looked at the factors associated with depression individuals with diabetes which included BMI, smoking, duration of diabetes, presence or absence of major complications, and type of treatment for diabetes concluded that misconceptions and fears about the effect of diabetes on health was a major factor associated with depression in the elderly diabetics.

In geriatric population as described by Alexopoulos in his article-Depression in the elderly besides ageing and age related illnesses (Lancet 2005) depression affects those with chronic medical illnesses, which

makes their suffering more intense causing various psychosocial difficulties in interpersonal relationships and in family interactions. In his paper he postulates that psychosocial dysfunction, physical disability combined with economic stress increases the susceptibility to depression and in some this combination can be the prime trigger for disrupting the mood.

A neuro-endocrine perspective of the possible link between diabetes and depression too has been studied by quite a few authors. Fronto-striatal pathways, the amygdala, and the hippocampus do get compromised by ageing, its associated immune changes and diseases of the endocrine. As discussed in a study by Golden et al in 2007, activation of the hypothalamic-pituitary-adrenal (HPA) axis and sympathetic nervous system (SNS), induced by stressors and associated neuro endocrine changes, might provide a unifying explanation in the association between diabetes and depression. However the research in linking diabetes and depression with neuroendocrinology is still in progress and yet to produce definitive support for this theory.

There have been some postulates that increased serum cortisol levels found in some diabetics could be the causative factor for diabetes in the elderly. (Lee et al 1999).

Sherita Hill Golden et al, in their study on the biological mechanisms between depression and type 2 diabetes, having reviewed the body of growing literature on the subject conclude that though the exact mechanism is not clear yet, indicate that the bi-directional link between these two chronic and debilitating illnesses is gaining more scientific scrutiny and thus far the thinking is leaning towards concluding that the link is definitely there though the exact mechanism is unclear. (JAMA. 2008).

Does diabetes increase the risk of depression, or does depression indicate oncoming diabetes? This is the question that has been studied by many researchers. While some like Palinkas (2011) feel depression can be the forerunner for diabetes, others like Brown (2006) feel diabetes when coupled with other illnesses does induce depression.

Palinkas et al, emphatically conclude that depressed mood is a definite risk factor for type II diabetes in the elderly, based on blood glucose levels done as baseline and in follow-up over years in the elderly.

Brown et al, equally emphatically declare that diabetes does not increase the risk of depression in the elderly. They however stress the fact that those with diabetes who develop other chronic illnesses like arthritis will be more prone for depression. The study by Brown et al, was done on 31 635 people with diabetes and 57 141 without diabetes. In this

population male sex and older age associated significantly with diabetes and the incidence of new onset depression did not vary between the groups, which made the researchers conclude that depression is not the risk factor for diabetes but it could be the other way when coupled with other disabling age related illnesses.

One major study conducted in Chennai, the locale of our current study, discusses many aspects of diabetes. From that study done by Poongkothai et al, in 2009, (Prevalence of Depression in a Large Urban South Indian Population - The Chennai Urban Rural Epidemiology Study (Cures – 70).), prevalence of depression in Chennai population was noted to be 15.1%. The study also noted that prevalence of depression was higher in the lower socio-economic group which is the population that comes to the Chennai Rajiv Gandhi General Hospital, the place where our study was conducted.

Taking these two factors into account, with the reported increase in life expectancy, being 67.3 years for males and 69.6 years for females, the number of geriatric diabetics with depression would assume a significant population. The projected figures of population increase and the expected increase in the prevalence of diabetes, indicate that geriatric diabetic population is bound to increase.

The prevalence of depression in diabetics was studied by Katon (2008), and the prevalence of depression in patients with diabetes was significantly higher in women than men (28% and 18%). The same paper also notes that 11% of patients with diabetes met the criteria for comorbid major depressive disorder (MDD) and 31% experienced significant depressive symptoms.

A metanalysis done by Anderson et al (2001) showed that Depression is associated with hyperglycemia, and depression in the diabetic group was two times more than the nondiabetic comparison group and that prevalence of comorbid depression was significantly higher in diabetic women (28%) than in diabetic men (18%). In an earlier meta study, by Gavard et al, (1993) the same view that diabetes and depression were co-morbid and influencing each other was surmised.

A study by Roy et al, (2012) affirms that depression and diabetes do present together in a high number of cases though it does not give any indication as to the causative direction of these comorbid illnesses. In another study an attempt was made to see if diabetics did suffer from depression or were just feeling low and sad (Fisher 2007). The findings of Fisher et al, suggests patients with diabetes and high levels of depressive symptoms are not clinically depressed. However the study does not differentiate clinical depression and distressed state.

That patients with diabetics do suffer from depression is fairly well documented in many papers over many years as in the study Am J Med. 2008 Nov; 121(11 Suppl 2): S8–15. The Comorbidity of Diabetes Mellitus and Depression Wayne J. Katon.).

Cultural variations in the co-morbidity of diabetes and depression too have been studied. Studying the epidemiology of depression in diabetes, the 2012 paper by Lloyd et al does not come to any conclusion as they were not able to get data from non-English speaking population. However when the literature on depression and diabetes is perused, we can find many studies from the East-Japan and China in particular. Though there are not many studies in India, the major study conducted on urban population in Chennai does affirm the co-existence of diabetes and depression.

There have been studies that also dispute the direct correlation between diabetes and depression. Engum et al (2005) find that diabetes without other chronic illnesses does not correlate with depression suggesting that the onset and intensity of depression could be triggered by other comorbid conditions and not just diabetes alone. This finding is not in consistence with many other international studies which find depression to be comorbid with diabetics who do not have any other chronic debilitating comorbid illnesses.

In the Middle East, there have been studies to see the relationship between depression and diabetes, and they too concur on the correlation between the two. In a study on Iranian patients Khamseh (2007) found the prevalence of depression in 71 % of diabetics. But this study did not try to differentiate the differences in type I and II diabetes and therefore does not give much light on the type II diabetes with co morbid depression. But, a Saudi Arabian study by Mahalli (2015) found that 49.6% patients with diabetes were having depression. These studies however have been on diabetes and depression in a general population and not specifically on the elderly population.

In an African study by Agbir (2010) it was noted that there was a 19.4% prevalence of depression in diabetics over one year. This study says that age was not correlated significantly in this so morbidity. This study was done on 160 cases and after ascertaining the presence of depression, Hamilton Depression Rating Scale was used to determine the severity of depression. However the study does not elaborate on the severity of depression but focusses primarily on the comorbidity of the two illnesses.

From Bangladesh there are studies on depression and diabetes. In a 2007 study by Asghar, 29% males and 30.5% of females with diabetes were found to have depression. Montgomery-Asberg Depression Rating

Scale (MADRS) was used to assess depressive symptoms. But the paper does not elaborate on the choice of scale and the factors considered and controlled. However with its locational and ethnic closeness to our country and culture these numbers do assume a significance.

A recent study from the same country, Bangladesh, Natasha studying 2291 cases found the prevalence of depression to be 15.3% in diabetics.

In a Pakistan study by Zahid and others, (2008) depressed patients with diabetes were found to be 15% prevalent in the community compared to the 5% prevalence of non-diabetic depressed.

The study by Das (2013) while concurring with the factual relationship between diabetes and depression, focusses on the quality of life. This Indian study concludes that quality of life is indeed compromised in diabetics who are also depressed, but does not clearly indicate which of these two debilitating illnesses reduce the quality of life in individuals.

In another study from Karnataka, (2012) Guruprasad et al, found that in the study of 210 subjects 25% of diabetics were depressed and in those fifty odd cases, 25.9% had co-morbid cardiac ailments. This comorbidity with cardiac disease in some ways clouds the picture. There

are studies in other countries too which indicate that diabetes with a co-morbid cardiac ailment is more commonly associated with depression than diabetes without co-morbid major physical illnesses.

Golden (2008) while examining the bidirectional association between diabetes and depression, found a modest association of depressive symptoms and type II diabetes, and this association was not affected by other commonly considered socio-economic and psycho-social variables.

A population based study by Palinkas (1991) shows that patients who had been diagnosed with diabetes were 3.7 times more prone for depression than those who were newly diagnosed as diabetic. This however does not help us to determine whether long term diabetes can be the triggering cause for depression.

The prevalence of depression in type II DM patients was 41 per cent in an Indian study, by Raval et al. This study was done in tertiary care hospitals in north India. South Indian studies on the same lines are not available.

This study was critically analysed (Indian J Med Res 133, May 2011, pp 555-556) by Datta, who felt that there was a problem of generalization in the study. He questions the additive or synergistic effect

between diabetes and depression and further he states that since the study did not find any difference between glycaemic control and depression, it would not be proper to conclude a causal relation as indicated in the paper.

Tabak, (2014) concludes from his meta-analysis of cohort studies that depression can predict diabetes onset and diabetes can predict future depression. He notes that pathophysiological changes preceding the onset of diabetes might not cause depression, and depression will not directly increase the risk of developing type 2 diabetes. Earlier, Knol (2006) in his study found that depressed patients have a 37 % risk of developing diabetes.

This view is corroborated by Mezuk (2008) who claims that depression is associated with 60% risk of developing diabetes, and type II diabetes has only a moderate risk for depression. The debate and inquiry as to whether one causes the other is still unsettled.

An American study by Li et al, (2008), prevalence of depression in diabetics varied from State to State – Alaska 28.8 to Connecticut 2.0 and Asian American population had a prevalence of 1.1%. Variations on similar lines may occur in India too and there could be a north south difference in the prevalence of depression in diabetics, however such differences were not the focus of this study though this factor ought to be

kept in mind in future research. Therefore studies from India have to be seen with diabetic epidemiological milieu of the particular State, as it has been noticed that south Indians are more prone for diabetes than the north Indians.

One South Indian study (2013) done in Mangalore, by Joseph et al, showed that 30.9% had moderate depression, 14.3% severe depression, while 54.8% had no clinically significant depression. This study was done in a tertiary hospital too, but the population visiting a private tertiary care hospital and a Government tertiary care hospital are different. If this were to be taken into account then we may have to surmise that socio-economic and psycho-social factors do play a role in the prevalence of depression in diabetics, which has been shown to be absent in other studies quoted earlier.

2010 Chennai study by Poongothai et al, shows that in newly diagnosed diabetics, impaired fasting glucose and depression correlate. They have kept more than 125 as the base line for fasting blood sugar lever. This was done in nearly 25,000 cases and the result shows a prevalence of 14.3% of depressed patients in this diabetic population.

The study also notes that as the blood sugar level increases depression becomes more prevalent. Taking this finding alongside other studies which do not differentiate new or chronic diabetics, depression is

certainly associated with diabetes. Though this had been indicated and adequately demonstrated in studies all over the world, the question which this dissertation wishes to answer, that is, whether *glycaemic levels and severity of depression* ***in the elderly*** *correlate* has not been adequately addressed in the literature covering diabetes and depression.

In a paper even titled as the comorbidity in a nutshell, Anisha 2012, begins the article with Thomas Willis, the man who first noticed the connection between diabetes and depression. Though that thought and the resultant queries and searches, in the elusive field of psychiatric research has been a regular contemplation for researchers, for more than 450 years, till date no one has conclusively declared the mechanism of their bi-directional relationship. Though the neuro-endocrine link has been explored in the paper, the conclusion on this angle is rather inconclusive. This remains the state in many articles that broach on the subject.

In the same paper, the author addresses the effect of stressors on the comorbidity. But again this rather unravelled area does not contain much information in the growing literature on the topic.

- **Diabetes and depression in the elderly**

Demakakos (2014), in a study finding that there is a definitive bidirectional association between depression and diabetes in people in those aged above 50, does also find that depression is more common in those diabetics aged 52 to 64 years, but strangely not those aged more than 65 years.

Taking this study into consideration, we may surmise that diabetes begins before 65 years of age. The CDC study shows that the age of onset for type II diabetes is between 45 and 64. Taking these two into consideration we may concur with their surmise that diabetes appears earlier in adults, and depression comes later. This would make studying the severity of depression and the glycaemic status of diabetes more useful especially in the elderly.

Chau et al (2011) in their study say that older diabetic patients have 1.3% more risk to become depressed, than the elderly without diabetes.

Trief et al (2006) in their study of depression and glycaemic control, conclude that HbA1c that measures glycaemic control, and depression are not significantly correlated. In their study they do mention that depression can predict poor glycaemic control. Here we have to consider the symptoms of depression which may include binge eating or sweet craving at times. Their study emphatically says that there is a very

weak connection between depression and glycaemic control. This large study of 1578 subjects indicates that though glycaemic control can be affected at times by depression, depression just by itself, is not a factor in glycaemic control. They however, do mention that at the baseline there is correlation between glycaemic levels and depression, when the study becomes prospective this correlation becomes weak.

Shehatah in a 2010 study, and later Palta (2014) have emphatically said that depression and glycaemic control are not associated. Palta study was a two year follow-up, of 36% of 613 subjects and it did not find any impact by depression in glycaemic control in the elderly.

Nouwen et al (2010) in their metanalysis find that there is a 24% increased risk for diabetics to be affected by depression. This indicated that diabetes is the more potent precursor of depression than vice versa.

In a study by Mika Kivimaki, (2009) it is seen that those with good glycaemic control, and those with normoglycemia had lower risk of getting a depressive illness.

Lustman (2000) concluded in his study the possibility of reciprocal interaction between diabetes and depression. Here there are many studies which assert that depression makes a diabetic less compliant. The neglect of self-care component of depression comes into effect in this angle. This

interactive and reactive association between diabetes and depression leads to the question whether treating depression would make treating comorbid diabetes easy, as mortality in diabetics with depression is also fairly well documented. (Kimbro et al 2014).

Depression also is known to cause poor medication compliance in diabetics with poor glycaemic control that is more than 7.25 HbA1c levels (Lin et al 2014). Strandberg (2014) found that there was no relationship between glycaemic changes noted in HbA1c levels and depression.

Individuals with type 2 diabetes and depressive symptoms were seen to exhibit poor compliance which correlated with less self-care (Park 2000). This neglect of self-care as a depressive manifestation exhibits in disinterest to take diabetic medication seriously properly and regularly.

Impact of depression on diabetes has been reported as resulting in poor self-care which is often manifested as poor compliance. This has been studied by Ciechanowski (2004), McKellar (2005), Kilbourne (2005), and many others.

- **Depression in the elderly**

As early as in 1983, Venkoba Rao (Indian J. Psychiatry. (1983), 25(4), 251-259) found the occurrence of mood disorders in the elderly to vary from 21% to 39% in Madurai. This was done when the elderly defined as aged above 65 years were constituting 7% of Indian population which meant 42 million people. With increased life expectancy this number would increase.

The prevalence of depression in people older than 65 years of age doubled from 3% to 6% between 1992 and 2005 in the USA. A similar scenario can be envisaged in India too.

In an early study on Depression in later age, V. Ramachandran (1977) among the aged population, physical ailments accompanying depression was found in more than 50% of cases'; however he does not elaborate on the percentage of diabetics in his study. This was one of the early studies done from the Institute of Mental Health, Chennai. This study was more to see the presentation of depression as known nearly fifty years ago.

Venkoba Rao who had done work on depressed old patients found the occurrence of depression to vary between 21 to 39.9% in a 1972 study. A random sampling survey conducted by Ramachandran and

Sarada Menon in 1980, found a prevalence of 241 per 1000 geriatric patients in Chennai.

In a 1982 study by Rao and Madhavan, depression was found to be prevalent in 50 per 1000 in the age group 60 to 70, while in the age group of 70 to 80 it was 80 per thousand.

Anamika et al, in 2014, found the prevalence of depression among the elderly to be 14.1% in Assam.

Grover in a 2010 study, found a very strong correlation between depression and diabetes. In 2015, Grover, studying depression in the elderly notes that depression is prevalent in the elderly. In his meta-analysis of studies involving samples ranging from 70 to 7,150 elderly subjects, finds that these studies report prevalence rate varying from 8.9% to 62.16%. Studies have reported depression to be more common among females.

Sathyanarayana Rao et al in a 2014 study, find a prevalence of 14.8% depression in a south Indian village, whose socio economic profile matches the population studied for this thesis.

In 2013, Radhakrishnan S, Nayeem A. found that in the aged population in rural Tamilnadu, 37.8% were having mild depression and 21% were severely depressed.

Seby et al, (2011) find that in north Indian urban aged, depression and dementia were the most common psychiatric illnesses while the physical illnesses most common were vision defects and hypertension with cardiac problems. This was in consistence with studies done abroad. However, there are quite some studies that just correlate depression and diabetes in the aged in India.

Archana et al, (2013) find in a study of 585 elderly, 178 had diabetes indicating a prevalence of 30.42%. While a comparison with US elderly shows 22 to 33% Americans aged above 65 years have diabetes. Similar findings are seen in the study by Mohan et al in 2007.

Older adults appear to be at greater risk for major depression as depression resulting from vascular changes common in ageing, is seen in them, yet the frequency of depression is lower compared to younger adults. (Blazer 2005). In another article Blazer (2003), states that Depression is the most frequent cause of emotional suffering in later life resulting in significantly decreased quality of life in the aged.

The prevalence of depression diagnosed as per DSM IV, in American adults older than 65 years of age doubled (from 3% to 6%) between 1992 and 2005. This study however does not take into account comorbid conditions. (Mojtabai 2014).

Comorbid prevalence of depression and diabetic adults was studied in 2001 by Anderson et al. This metanalysis showed that depression in diabetes was twice as much as that in the non-diabetic group. The study also goes to prove what has been the observation in many other studies that women with diabetes were more prone for depression than men.

In a metanalysis of studies that looked at glycaemic control and depression, Lustman (2000) selected 24 studies that satisfied the inclusion and exclusion criteria for the meta- analysis and found that depression was significantly associated with hyperglycemia. Papelbaum (2011) did a study on similar lines to see the relationship between glycaemic control and depression. And found that HbA1c levels of more than 8.6 were significantly associated with depression. In 2001, deGroot et al in their metanalysis of depression in those with diabetic complications found a significant correlation between depression and retinopathy, neuropathy, and sexual dysfunction.

Djernes JK, in a 2006 study of literature from 1996, found depression in 0.9% to 42 % of the elderly. Further analysis showed 9.4% in their own home, 14% to 42% in institutional setting. The study was to see not just the prevalence of depression in the elderly but to see if the predictors can be identified. The predictors were female, somatic illness,

cognitive deficit, functional difficulties, lack or loss of close social interactions, and history of depression.

This finding is seen in most of the metanalysis done on this topic. Institutional living has its own implications of isolation and reduced social circles and can be a predictor easily, but female gender was the more important aspect noticed by many authors. When viewed in an Indian context, the elderly female of even the current times is prone for depression in a culturally imbibed manner.

The prevalence of depression in elderly and the prevalence of depression in the elderly diabetics have been well studied and documented,, in many studies all over the world, but studies from Chennai or an urban Tamilnadu / South Indian elderly population with diabetes and depression are not found. The study by Poongothai et al, did study depression and diabetes and their inter-relationship, but did not focus on the elderly. The elderly have their own social reasons for depression and whether diabetes confounds this predicament is an area that needs exploration.

Another study by Beekman (1999) reported that the prevalence rates varied widely in the various studies on depression in the elderly (0.4-35%). The authors arrived at an average prevalence of 13.5%.again in this study female gender and depression was highly correlated.

There have been studies to see if there are other causes than diabetes that can trigger a depression in the elderly, and when this angle was pursued most of the studies point to a vascular aetiology. The study by Baldwin and others in 1995 emphatically state that depression in elderly is a biological disorder. This study did not find any difference between early and late onset of diabetes and depression.

Age of onset of depression was not shown to be significant in many studies, and in the one, by Conwell and others (1989), it was very definitively analysed and shown. However recovery was slower or difficult in late onset depression. This study did not attempt to correlate diabetes with late onset depression.

In the book, Depression and Diabetes edited by Katon, Maj and Sartorius (2010 Wiley-Blackwell), though the part on diabetes and depression in late life is given a brief mention, the impact of diabetes on depression is clearly documented.

Barua et al (2011) participating in a study that spanned almost the whole globe, found that Indian and the rest of the world did differ with rest of the world, when the prevalence of depression in elderly was studied. The Indian prevalence was 18.2% compared to the rest of the

world prevalence of 5.4%. However even in this study that we are quoting there is a word of caution that the number of studies done in India was very small in this group when compared to the rest of the world.

Poverty, social and economic deprivation associating with depression in the elderly was also studied in a south Indian population by Kuruvilla and Jacob (2007). But the study does not document details of assessment and verities of soci0-economic stressors that could have contributed to depression in the elderly.

In another study done in Tirupati a place close to our area of study, Naveen Kumar and T.P.Sudhakar (2013) come to the conclusion of the co-existence whether causal or not between depression and diabetes. In their study, age, sex, economic comfort, spouse status, chronic ailments and smoking showed significant correlation with depression. In their study they showed that 37.8% of the elderly were having mild depression while 21% of the elderly suffered with severe depression.

As it has been well studied and documented in literature, that diabetes and depression have a bi-directional association, and as there is paucity of literature on this inter-relation in an urban Tamilnadu population, the study proposes to find if the elderly depressed who also have diabetes in an urban centre, Chennai to be more specific, have any difference in the severity of depression and the glycaemic levels.

AIMS AND OBJECTIVES

Primary objective:

1. To study the severity of depression in elderly diabetic out patients and to see the variation in presentation and severity between diabetic and non-diabetic geriatric out-patients.

2. To see if there is a correlation between glycaemic levels and severity of depression in the elderly diabetic out-patients.

Secondary objective:

1. To compare the socio-demographic characteristics between diabetic and non-diabetic elderly affected by depression.

This study proposes to find not just the occurrence of either depression or diabetes in the elderly, but the correlation between the two debilitating illnesses. More specifically the aim of the study is to see if glycaemic control in the elderly depressed diabetics, has any correlation with the severity of depression.

METHODOLOGY

The study was designed and conducted in the following manner-

1. Approval was sought and obtained from the Institutional Human Ethical Committee, stating that it was a cross-sectional study on patients attending out-patient clinic in Rajiv Gandhi Govt. General Hospital, Geriatric department.
2. Permission was obtained for the same from the Director, Institute of Mental Health, and Chennai and from the Head of Department of Geriatrics, RGGGH.
3. Case selection was done by screening out-patients in the Geriatric department, OPD for depression and diabetes.
4. Informed consent was obtained from the participants for the study.
5. Further screening was done to use cases that fit in the criteria for the study. Rating and diagnostic scales were used for assessment to include and exclude subjects.

(Stressors were assessed using the appropriate scale. (Holmes Rage),)

6. Blood glycaemia levels were taken from case records (fasting and post-prandial blood sugar levels), and for those who were willing for HbA1c estimation, blood samples were drawn and analysed for HbA1c levels, without causing any expense for the patients.

Permission was obtained from the ethical committee for this procedure.

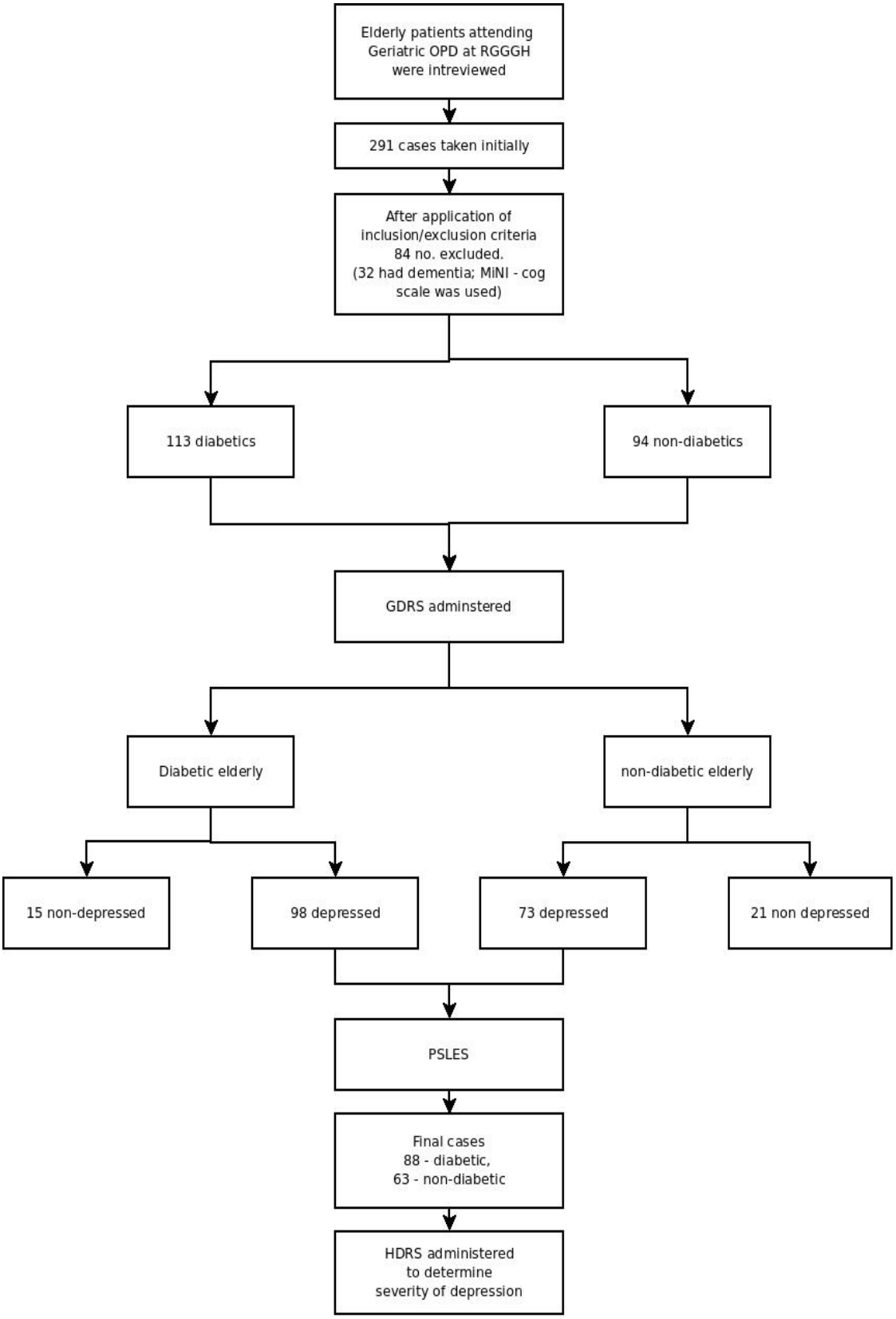
7. The results were tabulated and statistically analysed.
8. The study was conducted over a duration of ninety days.
9. Cases were defined as elderly diabetic individuals affected with depression and the controls were defined as elderly individuals affected with depression and without diabetes or any other major illness. Both groups were taken from the out-patient clinic of Geriatric Dept.

Inclusion Criteria:

1. Elderly (65+) attending RGGGH Geriatric OP
2. Male and female
3. Known diabetics (and non-diabetics as control)

Exclusion Criteria:

1. Chronic /serious comorbid illnesses like hypothyroidism, systemic hypertension, tuberculosis, cancer, cardiovascular, cerebro vascular disease etc.
2. History of head injury / physical trauma.
3. Drug / substance abuse.
4. Previous history of psychiatric illness.
5. Dementia was screened with Mini-Cog, and excluded.


Elderly patients attending Geriatric OPD at RGGGH were intreviewed
291 cases taken initially
After application of inclusion/exclusion criteria 84 no. excluded. (32 had dementia; MiNI - cog scale was used)
113 diabetics
94 non-diabetics
GDRS adminstered
Diabetic elderly
non-diabetic elderly
15 non-depressed
98 depressed
73 depressed
21 non depressed
PSLES
Final cases 88 - diabetic, 63 - non-diabetic
HDRS administered to determine severity of depression

Selection of sample:

291 elderly patients attending the Geriatric OP in RGGGH were included in the study period. After applying inclusion and exclusion criteria, 84 patients (of which 32 were found to have dementia) were excluded. The remaining sample consisted of 113 diabetic patients and 94 non-diabetic patients.

All the remaining 207 patients were administered GDRS-15 (Geriatric Depression Rating Scale- 15 items), to screen for depression.

Among the 113 diabetic elderly patients, 98 were found to have depression.

Among the 94 non-diabetic elderly, 73 patients were found to have depression.

All patients, diabetic and non-diabetic, who had depression (171 in number) were administered Presumptive Life Events Scale (Gurmeet), to control the stress level as common in both groups. 84 patients had scored for three main stressors: son or daughter leaving home, (Rank 16, Score 55), family conflict (Rank 29, Score 47), retirement (Rank 42, Score 35).

20 patients had scored in stressors: Death of close family member (Rank 7, Score 66), Property or crop damaged (Rank 9, Score 61), Conflict with in-laws (Rank 13, Score 57), Financial loss (Rank 17, Score

54), Illness of family member (Rank 18, Score 52). For these 20 patients there was significant correlation between stress scores and HDRS scores. Hence these cases were eliminated.

The final sample after these filters came to 88 diabetic and 63 non-diabetic depressed elderly patients.

Their blood parameters were then noted from the case records, and for 30 diabetic depressed elderly who were willing to undergo HbA1c, the test was done without charge.

All the diabetic and non-diabetic cases, 151 in total were administered Hamilton Depression Rating Scale -24 items, to assess depression severity.

MATERIALS USED FOR THE STUDY

Subjects as defined and described in the criteria of selection, were then administered the appropriate available scales and instruments to get the findings.

1. Semi structured profoma.
2. Geriatric Depression Rating Scale.
3. MINI-Cog test.
4. Presumptive Stressful Life Events Scale-PSLES.
5. HDRS-24 Hamilton Depression rating scale 24 version.
6. Kuppusamy socio-economic status scale (for 2015).

Assessment Tools

1. GDRS Geriatric Depression Rating Scale- 15 item rating scale, with a simple yes no answer that has been validated and found reliable and sensitive. Of the 15 items, 10 indicated the presence of depression when answered yes, while the other five indicated depression when answered negatively. Scores of 0 to 15 can be obtained and the results would be as follows: 0-4 not depressed 5-8 mild depression, 9-11 moderate depression, 12-15 severe depression.

The scale was first created by in J.A. Yesavage and others in 1982, as a 30 item scale. It was later modified as a short form in 1986. The short form (15 items), was found to have 92% sensitivity and 89% specificity when evaluated against diagnostic criteria. This scale is being used in studies that evaluate depression in the elderly and is also used as a screening instrument in clinical setting.

2. MINI-COG test which has sensitivity ranging from 76-99%, and specificity ranging from 89-93% with 95% confidence interval, is a simple to administer cognitive screening test for dementia. it helps the clinician to quickly assess numerous cognitive domains including cognitive function, memory, language comprehension, visual-motor skills, and executive function and its clock drawing test provides a visual record of both normal and impaired performance, to assess the progression of the illness.

3. Presumptive Stressful Life Events Scale-PSLES. This is a 51 item scale in which various life events ranging from death of spouse to going for a pleasure trip are given validated numerical values, much like the Holmes- Rahe Life Stress inventory. PSLES is the Indian version of life stress inventory, and was published in 1984. This scale of 51 items were classified according to personal or impersonal events, desirable or undesirable events, and ambiguous or clear-cut events. The inclusion of eustress and distress make it a complete inventory.

4. HDRS-24 Hamilton Depression rating scale 24 items is one of the most used rating scales to assess the severity of depression. The 24 item scale was originally published in 1960 by Max Hamilton, and revised over the years until 1980. Though there are some critics who feel some of the items do not assess depressive illness when under pharmacotherapy, it has stood the test of time to remain as the most widely used and accepted scale to rate the severity of depression.

5. Kuppuswami's SES 2015. Kuppuswami who was one of the pioneers in Indian Social Psychology, had devised an instrument to ascertain the socio-economic status of individuals. This valid and reliable instrument has been regularly updated taking into consideration the economic status of the country, GDP, and other factors. The version used for this study is the 2015 version, updated to make the assessment more meaningful for this year.

STATISTICAL ANALYSIS

All statistical procedures were performed using statistical package namely IBM SPSS Statistics -20.

The categorical variables, i.e., socio-demographic data were compared between both groups (elderly diabetic and non-diabetic depressives) by Chi-square test.

The continuous variables were correlated and compared between them by student's T test.

The P-values when < 0.05 were considered to be statistically significant in two tailed test.

Description of the data:

The final sample taken for statistical analysis consisted of 151 elderly depressed patients divided into two groups: diabetic (88) and non-diabetic (63)

Among the diabetic group of individuals, 73 of them were of age 60-75years and 15 of them were of age greater than 75years.

While, among the non-diabetic group of individuals, 56 of them were of age 60-75 years and 7 of them were of age greater than 75 years.

There were 44 males and 44 females in diabetic group and 24 males and 39 females in non-diabetic group.

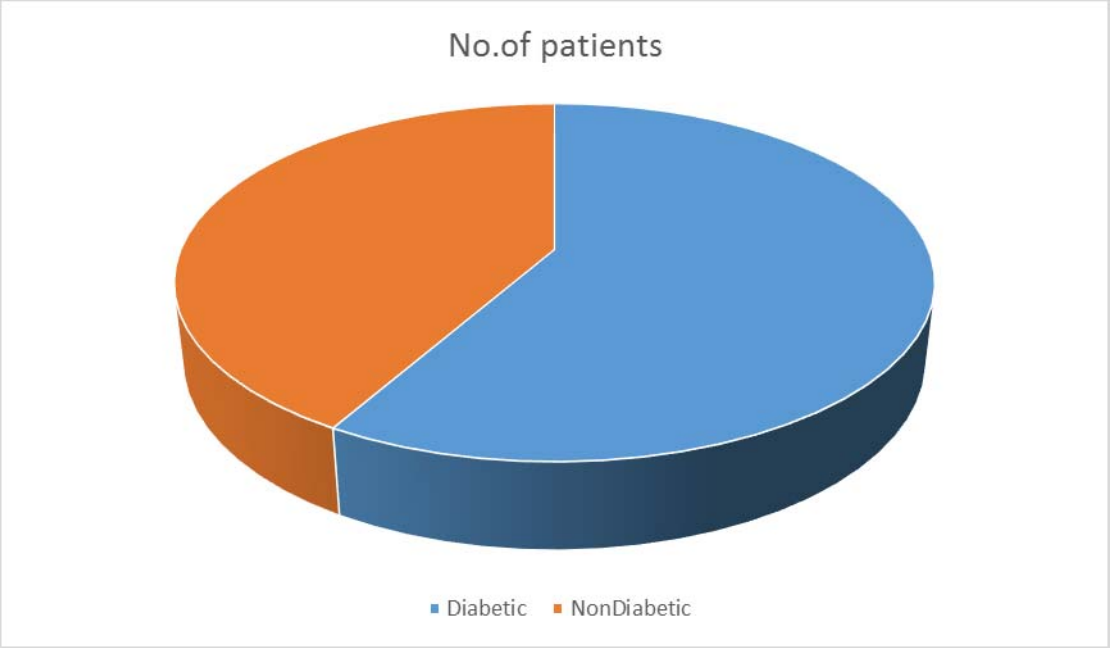
In the diabetic group of individuals, 44 were married and living with spouse and 44 were widow/widower.
73 of them were dependent on their children/relatives and 15 of them were living alone.

In the non-diabetic group of individuals, 31 were married and living with spouse and 32 were widow/widower.
51 of them were dependent on their children/relatives and 12 of them were living alone.

In both groups majority of individuals (125 out of 151) belonged to lower socioeconomic status (71 diabetic, 54 non-diabetic). While in upper lower SES there were 18 individuals (12 in diabetics and 6 in non-diabetics) and in lower middle there were 8 individuals (5 in diabetics and 3 in non-diabetics).

None, in both groups, belonged to upper middle or upper SES. {based on Kuppusamy socio-economic scale for 2015}

In the diabetic group of patients, 61 received treatment with oral hypoglycaemic agents only and 27 were treated with oral hypoglycemic drugs in combination with insulin.



RESULTS

The results are discussed henceforth as given below:

1. Comparison of both groups (namely, elderly diabetic depressives and elderly non-diabetic depressives) based on:

- Socio-demographic data (Age, gender, marital status, mode of living, socio-economic status)
- Duration of depression
- Severity of depression

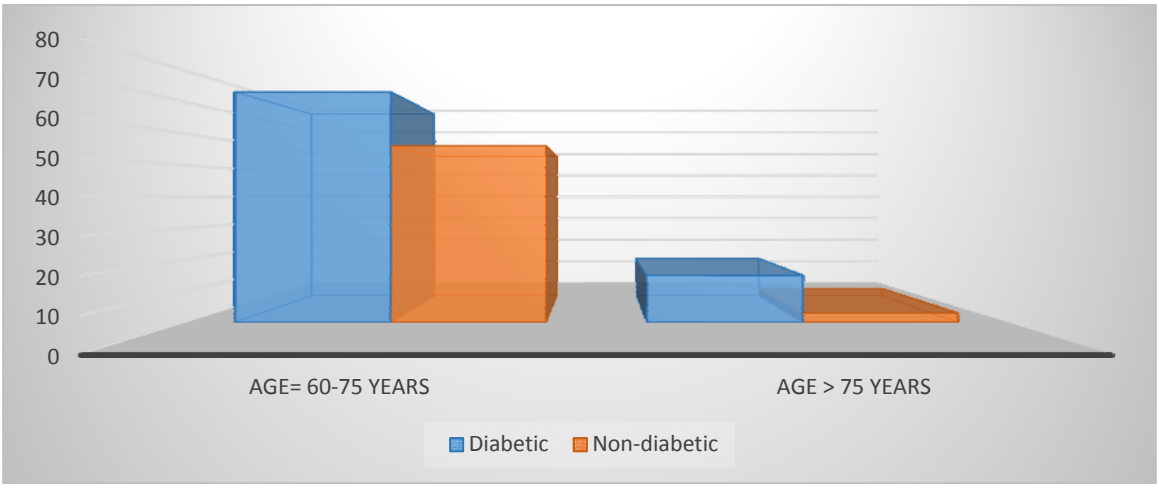
2. Analysis of elderly depressed diabetic patients, in the following manner:

- Comparison between gender and severity of depression.
- Comparison between duration of diabetes and severity of depression.
- Comparison of depression between patients takin treatment with oral hypoglycaemic agents alone and those in combination with insulin.
- Comparison and Correlation between variables (Blood glycaemia-FBS, PPBS, HbA1c, Diabetes duration, Treatment) in elderly diabetic depressed patients.

Table – I : (Comparison of both groups according to their age)

Age Range		Depressives	
	N	Diabetic	Non-diabetic
60 – 75 years	129	73	56
>75 years	22	15	7
Total	151	88	63

This chart shows both the groups according to their ages.



Independent samples t-test for comparison of age (continuous variable) between both the groups shows:

Depressives	N	Mean Age	Standard deviation	Mean Difference	t-statistic	P-value
Diabetic	88	70.3514	5.65792	2.31289	1.400	0.168
Non-diabetic	63	68.0385	6.95977	2.31289		

Both groups did not show any significant difference with respect to age. ($P > 0.05$).

Table – II: (Comparison of both groups according to their gender)

Sex	N	Depressives		χ 2	Df	Significance
		Diabetic	Non-diabetic			
Male	68	44	24	2.1021	1	0.147096
Female	83	44	39			
Total	151	88	63			

This table shows the comparison of the groups between the genders. No significant difference noted between the groups with respect to gender. (P > 0.05).

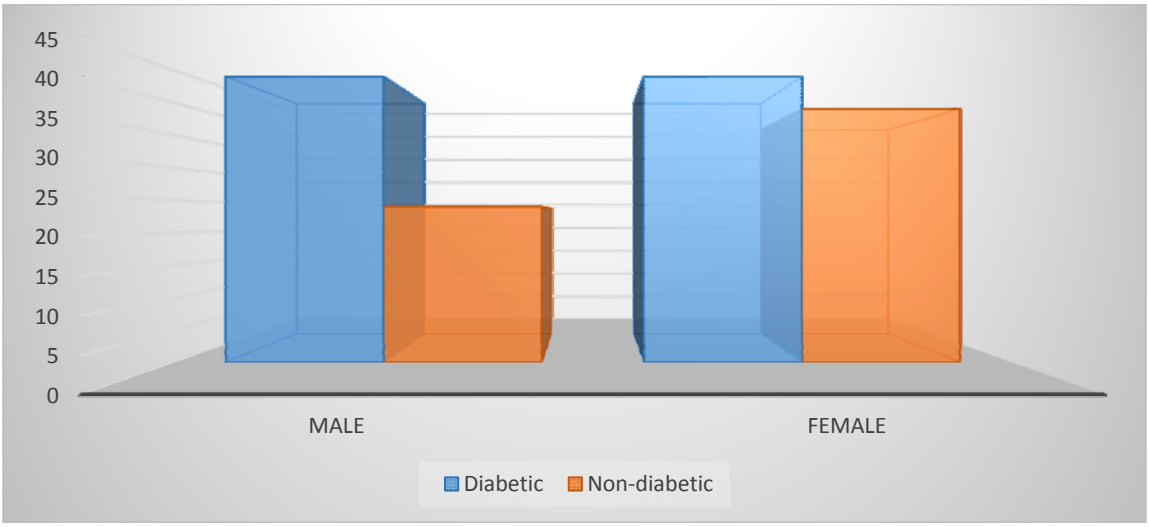


Table – III: (Comparison of marital status between the groups)

Marital Status	N	Depressives		χ 2	Df	Significance
		Diabetic	Non-diabetic			
Married – spouse alive	75	44	31	0.0093	1	0.923376
Widow / widower	76	44	32			
Total	151	88	63			

This table compares the marital status of individual of both the groups. There was no significant difference between the groups in respect of their marital status (P > 0.05).

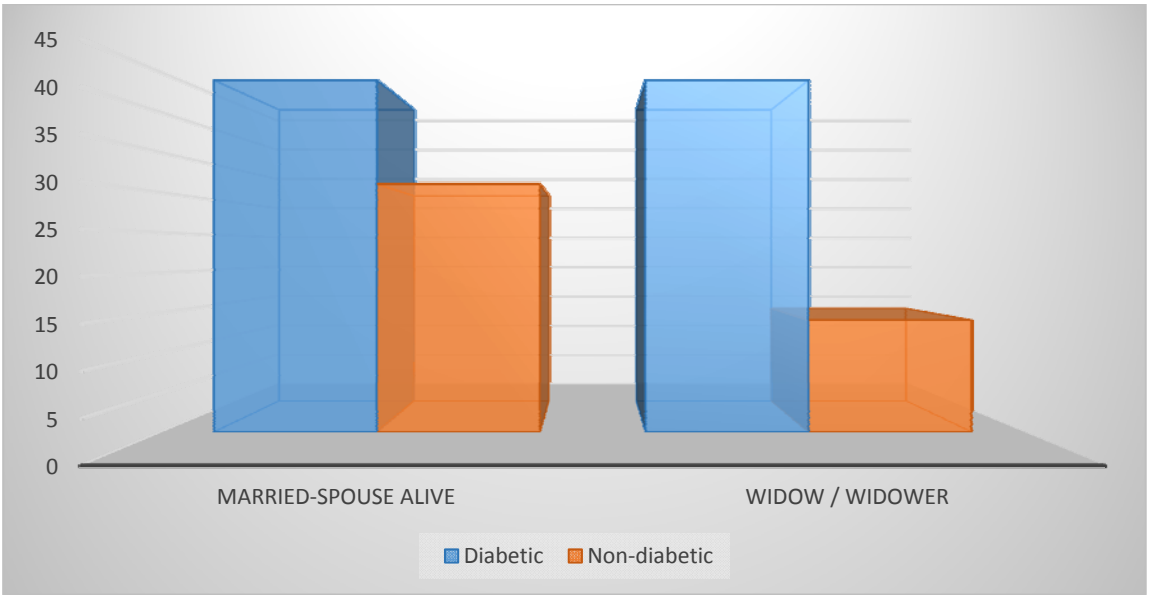


Table – IV:

(Comparison of both the groups with respect social support)

Living with	N	Depressives		χ 2	Df	Significance
		Diabetic	Non-diabetic			
Children/Other relatives	124	73	51	0.0533	1	0.8174
Alone /Old Age Home	27	15	12			
Total	151	88	63			

This table compares the extent of social support for individuals in both groups. Results show no significant difference between the groups with respect to social support received. (P > 0.05).

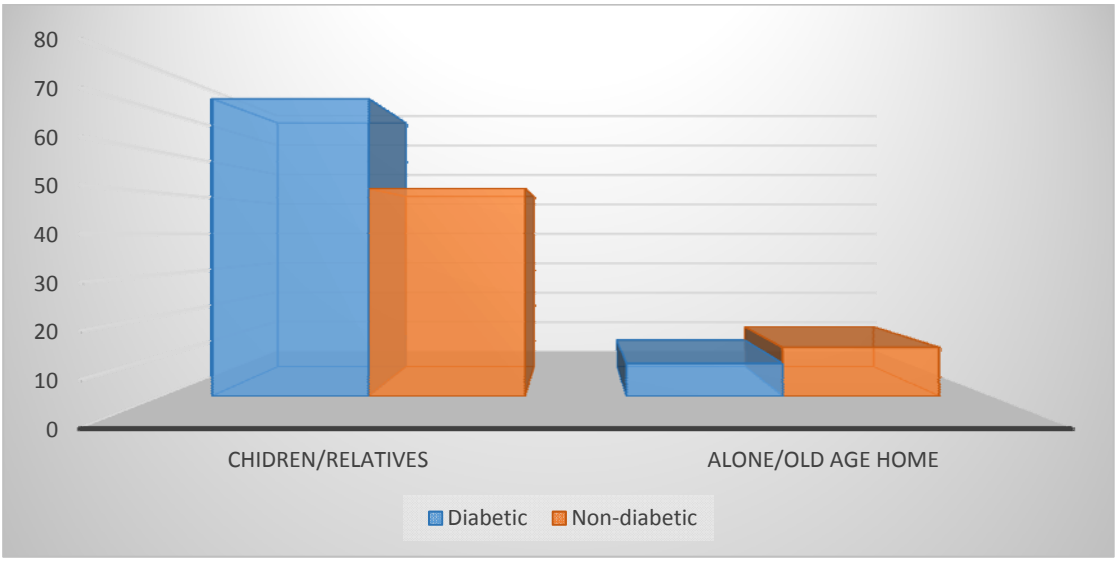


Table – V:

(Comparison of both the groups with respect socio economic status)

Socio economic group	N	Depressives		χ 2	Df	Significance
		Diabetic	Non-diabetic			
Lower Middle/Upper Lower	26	17	9	0.6229	1	0.4300
Lower	125	71	54			
Total	151	88	63			

This table compares the socio economic status for individuals in both groups. Results show no significant difference between the groups with respect to socio economic status. (P > 0.05).

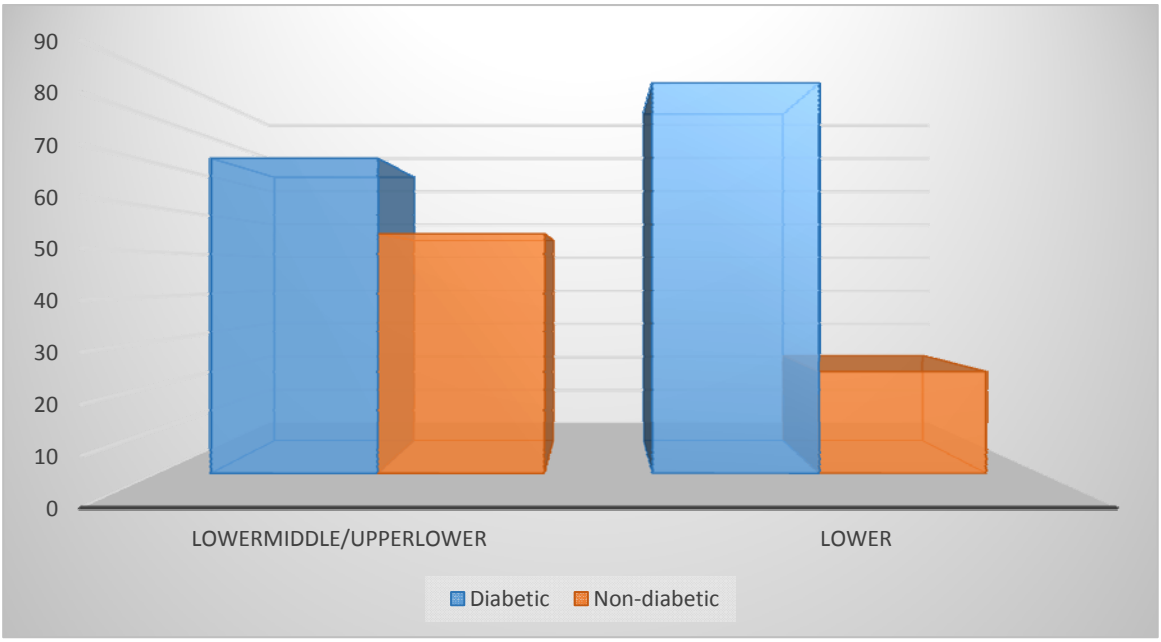


Table – VI: (Comparison of both the groups for stressors)

Stressor	N	Depressives		χ 2	Df	Significance
		Diabetic	Non-diabetic			
Present	84	48	36	0.0819	1	0.7748
Absent	67	41	26			
Total	151	89	62			

Those with stressors were matched using presumptive stressful life events scale. The main stressors were son or daughter leaving home, (Rank 16, Score 55), family conflict (Rank 29, Score 47), retirement (Rank 42, Score 35).

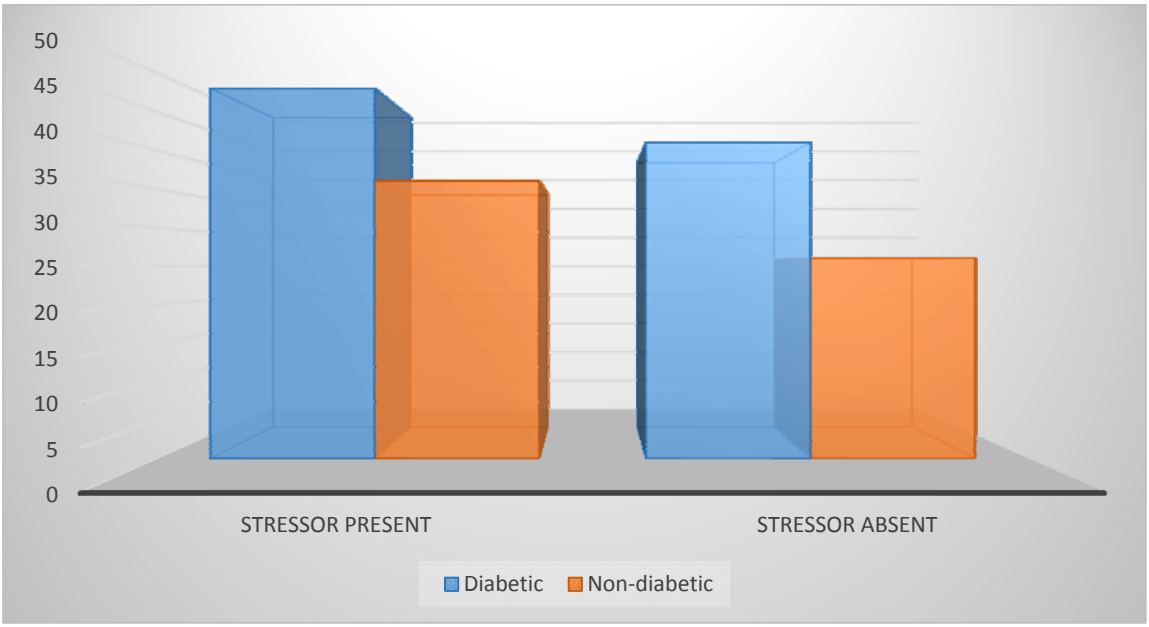
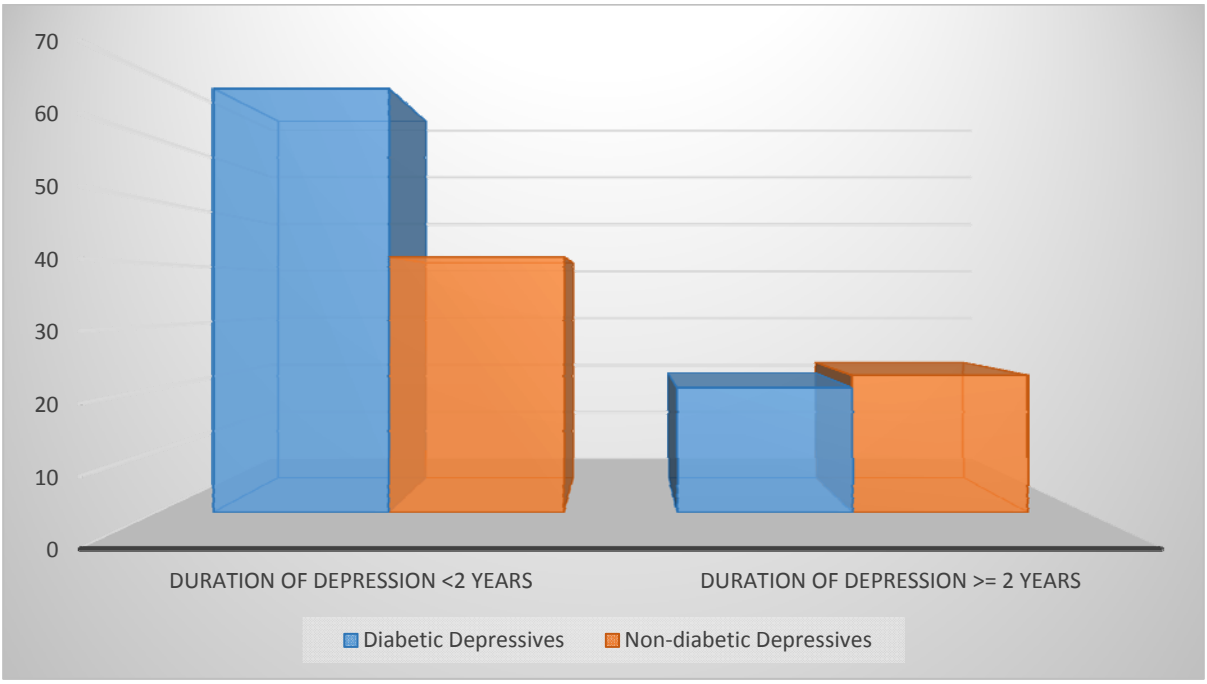


TABLE – VII

(Comparison in the depression duration between groups)

Duration of Depression	N	Diabetic Depressives	Non-diabetic Depressives
< 2 Year	109	68	41
>= 2 Years	42	20	22
Total	151	88	63



Independent sample t-test

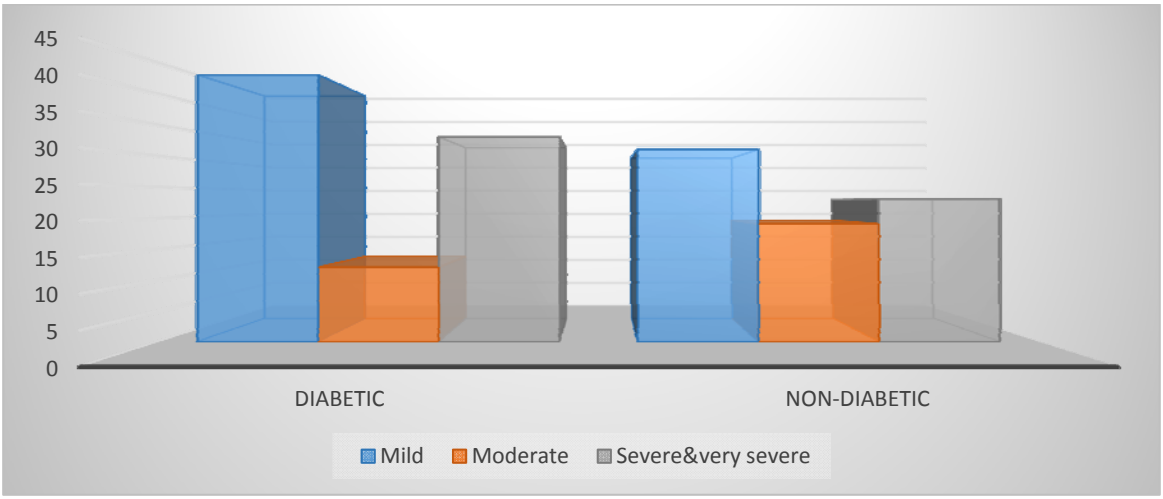
Depressives	N	Mean Depression Duration	Standard deviation	Mean Difference	t-statistic	P-value
Diabetic	88	2.7803	4.39482	0.99181	1.112	0.271
Non-diabetic	63	1.7885	1.35774			

No significant mean difference in duration of depression between the two groups. (P>0.05)

COMPARISON OF DEPRESSION BETWEEN DIABETIC AND NON-DIABETIC GROUP

TABLE – VIII : Sample: overall

Depressed elderly	N	HAM-D		
		MILD	MODERATE	SEVERE & VERY SEVERE
Diabetic	88	43	12	33
Non-diabetic	63	31	19	23
Total	151	74	31	56



Depressives	N	Mean GDRS score	Standard deviation	Mean Difference	t-statistic	P-value
Diabetic	88	8.5676	2.60918	-0.43243	-0.608	0.545
Non-diabetic	63	9.0000	3.00666			

Depressives	N	Mean HDRS score	Standard deviation	Mean Difference	t-statistic	P-value
Diabetic	88	16.3243	6.62510	4.32432	2.996	0.004
Non-diabetic	63	12.0000	3.79473			

There was significant difference of mean HDRS value between diabetic and non-diabetic individuals (P<0.05). Mean HDRS score was higher in diabetic group than that of non-diabetic group, indicating more severe depression in the elderly diabetic depressed individuals.

Odds RATIO:

HDRS	Diabetic	Non-diabetic
>= 18	33	23
<18	55	50

Odds Ratio is calculated as (33*50)/ (23*55) which gives 1.304. The implication being diabetic depressives are 1.3 odds of having severe depression (HDRS>= 18) than non-diabetic depressive elderly.

SAMPLE : AGE (60-75)

Age (60-75)	N	Mean GDRS score	Standard deviation	Mean Difference	t-statistic	P-value
Diabetic	73	8.7097	2.51917	-0.07293	-0.095	0.925
Non-Diabetic	56	8.7826	2.98415			

Age (60-75)	N	Mean HDRS score	Standard deviation	Mean Difference	t-statistic	P-value
Diabetic	73	16.0645	6.89896	3.80365	2.382	0.021
Non-Diabetic	56	12.2609	3.82833			

This result reveals significantly higher HDRS score in diabetic group than the non-diabetic group, for age less than or equal to 75 years. (by a value of about 4).

SAMPLE : GENDER (FEMALE)

Gender = Female	N	Mean GDRS score	Standard deviation	Mean Difference	t-statistic	P-value
Diabetic	44	8.7368	2.64243	-0.07566	-0.086	0.932
Non-Diabetic	39	8.8125	2.53558			

Gender = Female	N	Mean HDRS score	Standard deviation	Mean Difference	t-statistic	P-value
Diabetic	44	17.3684	7.37270	5.24342	2.473	0.019
Non-diabetic	39	12.1250	4.54423			

This result reveals significantly higher HDRS score in diabetic group than the non-diabetic group, with respect to female gender.

SAMPLE : GENDER (MALE)

Gender = Male	N	Mean GDRS score	Standard deviation	Mean Difference	t-statistic	P-value
Diabetic	44	8.3889	2.63771	-0.91111	-0.750	0.460
Non-Diabetic	24	8.8125	2.53558			

Gender = Male	N	Mean HDRS score	Standard deviation	Mean Difference	t-statistic	P-value
Diabetic	44	15.2222	5.73488	3.42222	1.793	0.085
Non-diabetic	24	12.1250	4.54423			

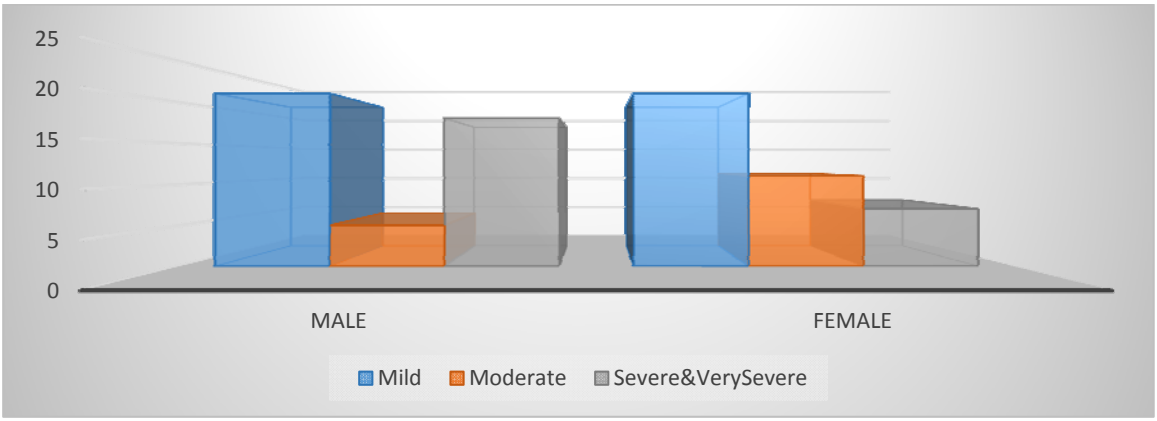
No significant difference observed between both the groups with respect to male gender.

ANALYSIS WITHIN THE DIABETIC GROUP

COMPARISON OF GENDER WITH DEPRESSION

TABLE IX

Depressed Diabetic elderly (GENDER)	N	HAM-D		
		MILD	MODERATE	SEVERE & VERY SEVERE
MALE	44	21	5	18
FEMALE	44	21	11	12
Total	88	42	16	30



Diabetic Patients Gender	N	Mean GDRS score	Standard deviation	Mean Difference	t-statistic	P-value
Male	44	8.3889	2.63771	0.34795	-0.401	0.691
Female	44	8.7368	2.64243			

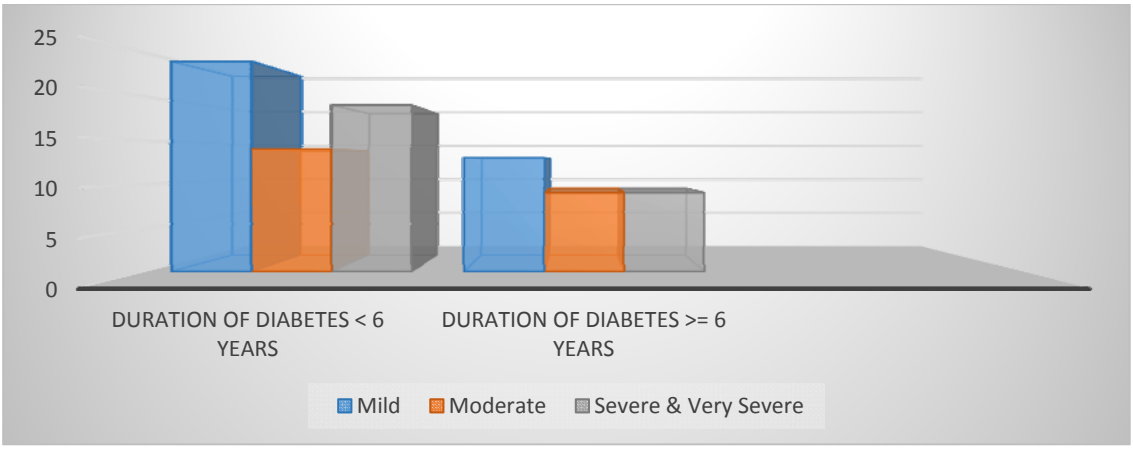
Diabetic Patients Gender	N	Mean HDRS score	Standard deviation	Mean Difference	t-statistic	P-value
Male	44	15.2222	2.63771	-2.14620	-0.991	0.329
Female	44	17.3684	7.37270			

No significant difference in depression severity between males and females in diabetic elderly.

COMPARISON BETWEEN DIABETES DURATION AND DEPRESSION

TABLE - X

Duration of Diabetes	N	HAM-D		
		MILD	MODERATE	SEVERE & VERY SEVERE
<6 years	57	24	14	19
>=6 years	31	13	9	9
Total	88	37	23	28



Diabetic Patients Duration of diabetes	N	Mean GDRS score	Standard deviation	Mean Difference	t-statistic	P-value
< 6 years	57	7.7083	2.64541	2.44551	3.011	0.005
>= 6 years	31	10.1538	1.67562			

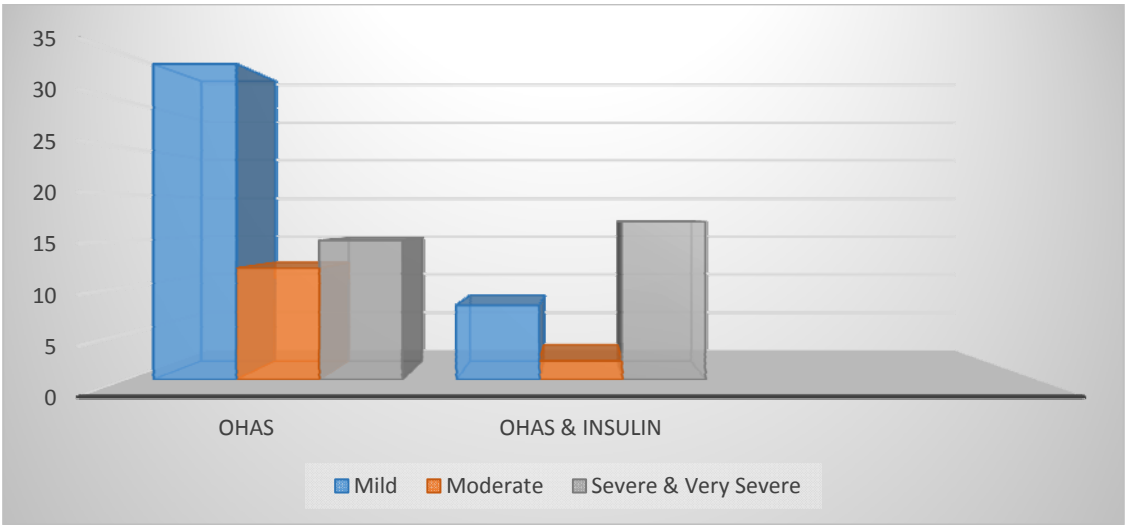
Diabetic Patients Duration of diabetes	N	Mean HDRS score	Standard deviation	Mean Difference	t-statistic	P-value
< 6 years	57	15.4167	5.77036	2.58333	1.034	0.314
>= 6 years	31	18.0000	7.94775			

No significant association seen between diabetic duration and depression severity (HDRS scale). However there is an association seen in GDRS score.

VARIATION IN DEPRESSION BETWEEN PATIENTS WITH OHA'S AND THOSE IN COMBINATION WITH INSULIN

TABLE – XI

Diabetes Treatment	N	HAM-D		
		MILD	MODERATE	SEVERE & VERY SEVERE
OHAs	61	34	12	15
OHAs & Insulin	27	8	2	17
Total	88	42	14	32



Diabetes Treatment	N	Mean GDRS score	Standard deviation	Mean Difference	t-statistic	P-value
OHAs	22	8.5714	2.60240	-0.01587	-0.015	0.988
OHAs & Insulin	66	8.5556	2.78887			

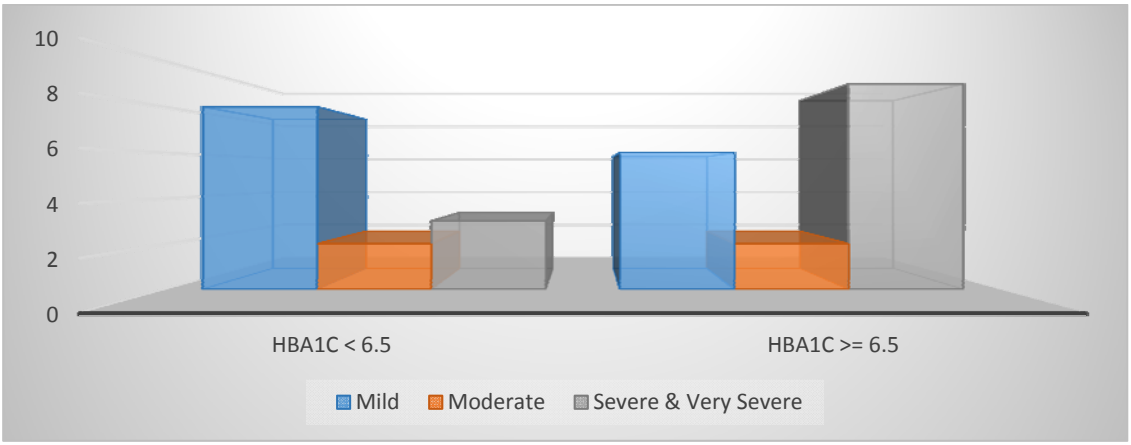
Diabetes Treatments	N	Mean HDRS score	Standard deviation	Mean Difference	t-statistic	P-value
OHAs	22	15.1071	6.14238	5.00397	2.058	0.047
OHAs & Insulin	66	20.1111				

Significant difference in mean HDRS scores, between patients on OHA's alone and with those on both OHA and insulin, was seen. The HDRS score is significantly high in the group under OHAs & Insulin.

SAMPLE "30 DIABETIC PATIENTS"

TABLE XII

HbA1c (mmol/mol)	N	HAM-D		
		MILD	MODERATE	SEVERE & VERY SEVERE
<6.5	13	8	2	3
>=6.5	17	6	2	9
Total	30	14	4	12



HbA1c (mmol/mol)	N	Mean HDRS score	Standard deviation	Mean Difference	t-statistic	P-value
< 6.5	13	14.4615	5.89654	4.12670	1.791	0.084
>= 6.5	17	18.5882	6.69009			

HbA1c (mmol/mol)	N	Mean GDRS score	Standard deviation	Mean Difference	t-statistic	P-value
< 6.5	13	8.5385	2.22169	0.52036	0.589	0.561
>= 6.5	17	9.0588	2.60937			

No significant association seen between HbA1c values and HDRS scores.

CORRELATION BETWEEN BLOOD GLYCEMIA AND DEPRESSION

SAMPLE ALL

Correlations

		FBS	PPBS	GDRS	HDRS
FBS	Pearson Correlation	1	.766**	.123	.123
	Sig. (2-tailed)		.000	.469	.467
	N	88	88	88	88
PPBS	Pearson Correlation	.766**	1	.205	.407*
	Sig. (2-tailed)	.000		.223	.013
	N	88	88	88	88
GDRS	Pearson Correlation	.123	.205	1	.268*
	Sig. (2-tailed)	.469	.223		.033
	N	88	88	88	88
HDRS	Pearson Correlation	.123	.407*	.268*	1
	Sig. (2-tailed)	.467	.013	.033	
	N	88	88	88	88

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

The above result indicates statistically significant correlation between PPBS levels and HDRS scores, in the elderly depressed diabetic patients.

SAMPLE

AGE <=75

Correlations

		FBS	PPBS	GDRS	HDRS
FBS	Pearson Correlation	1	.762**	.059	.134
	Sig. (2-tailed)		.000	.751	.472
	N	73	73	73	73
PPBS	Pearson Correlation	.762**	1	.111	.418*
	Sig. (2-tailed)	.000		.551	.019
	N	73	73	73	73
GDRS	Pearson Correlation	.059	.111	1	.329*
	Sig. (2-tailed)	.751	.551		.015
	N	73	73	73	73
HDRS	Pearson Correlation	.134	.418*	.329*	1
	Sig. (2-tailed)	.472	.019	.015	
	N	73	73	73	73

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

The above result indicates statistically significant correlation between PPBS levels and HDRS scores, in the elderly depressed diabetic patients of AGE <= 75.

SAMPLE

MALE GENDER

Correlations

		FBS	PPBS	GDRS	HDRS
FBS	Pearson Correlation	1	.758**	.378	.358
	Sig. (2-tailed)		.000	.122	.145
	N	44	44	44	44
PPBS	Pearson Correlation	.758**	1	.281	.536*
	Sig. (2-tailed)	.000		.259	.022
	N	44	44	44	44
GDRS	Pearson Correlation	.378	.281	1	.157
	Sig. (2-tailed)	.122	.259		.426
	N	44	44	44	44
HDRS	Pearson Correlation	.358	.536*	.157	1
	Sig. (2-tailed)	.145	.022	.426	
	N	44	44	44	44

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Significant correlation seen between PPBS and HDRS scores in elderly depressed male patients.

SAMPLE

FEMALE GENDER

Correlations

		FBS	PPBS	GDRS	HDRS
FBS	Pearson Correlation	1	.772**	-.029	.005
	Sig. (2-tailed)		.000	.905	.985
	N	44	44	44	44
PPBS	Pearson Correlation	.772**	1	.150	.330
	Sig. (2-tailed)	.000		.540	.168
	N	44	44	44	44
GDRS	Pearson Correlation	-.029	.150	1	.360*
	Sig. (2-tailed)	.905	.540		.034
	N	44	44	44	44
HDRS	Pearson Correlation	.005	.330	.360*	1
	Sig. (2-tailed)	.985	.168	.034	
	N	44	44	44	44

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

There is no significant correlation seen between PPBS and HDRS scores in female elderly diabetic patients.

SUMMARY OF RESULTS:

1. **Comparison of depression between diabetes and non-diabetes**:

Parameters	Mean HDRS score		Mean difference	significance
	Diabetes	Non-diabetes		
Whole sample	16.3243	12.0000	4.32432	0.004
Age< 75	16.0645	12.2609	3.80365	0.021
Male	15.2222	12.1250	3.42222	0.085
Female	17.3684	12.1250	5.24342	0.019

Mean HDRS score was higher in diabetic group than that of non-diabetic group, indicating more severe depression in the elderly diabetic depressed individuals compared to non-diabetic depressed elderly , in the whole sample as well as in the age group<75 and in female gender.

2. Comparison of male and female in the diabetic group for depression :

Diabetic Patients Gender	N	Mean HDRS score	Standard deviation	Mean Difference	t-statistic	P-value
Male	44	15.2222	2.63771	-2.14620	-0.991	0.329
Female	44	17.3684	7.37270			

No significant difference in depression severity between males and females in diabetic elderly.

3. Comparison of treatment groups for depression in the diabetic group:

Diabetes Treatments	N	Mean HDRS score	Standard deviation	Mean Difference	t-statistic	P-value
OHAs	22	15.1071	6.14238	5.00397	2.058	0.047
OHAs & Insulin	66	20.1111				

Significant difference in mean HDRS scores, between patients on OHA's alone and with those on both OHA and insulin, was seen. The HDRS score is significantly high in the group under OHAs & Insulin

4. Comparison of duration of diabetes with depression severity

Diabetic Patients Duration of diabetes	N	Mean GDRS score	Standard deviation	Mean Difference	t-statistic	P-value
< 6 years	57	7.7083	2.64541	2.44551	3.011	0.005
>= 6 years	31	10.1538	1.67562			

No significant association seen between diabetic duration and depression severity (HDRS scale). However there is an association seen in GDRS score.

5. Correlation between PPBS (Post prandial blood sugar) and HDRS

Parameters	CORRELATION	SIGNIFICANCE
Whole sample	0.407	0.013
Age <75	0.418	0.019
Male	0.536	0.022
Female	0.330	0.168

Statistically significant correlation observed between PPBS levels and HDRS scores, in the whole sample of elderly depressed diabetic patients as well as in the age group < 75 and in male gender

6. Comparison of HbA1c with HDRS (sample of 30 patients)

HbA1c (mmol/mol)	N	Mean HDRS score	Standard deviation	Mean Difference	t-statistic	P-value
< 6.5	13	14.4615	5.89654	4.12670	1.791	0.084
>= 6.5	17	18.5882	6.69009			

No significant correlation seen between HbA1c values and HDRS scores.

DISCUSSION

It was in the seventeenth century that Thomas Willis (1621-1675) said that diabetes is caused by “sadness or long sorrow and other depressions.” However, in recent times it has been noted that it is a bidirectional association between diabetes and depression. Diabetes, even if it had started earlier in life, continues well into old age. In the USA, 8–20% elderly people were found to be depressed, with an aging-associated increase in symptoms, and the prevalence of depression in a Chennai population was 15.1%. Those who are depressed and diabetic constitute a major population in the geriatric community. An Indian study showed that the elderly diabetic depressed were twice the number of the elderly non-diabetic depressed. With the association between diabetes, depression and old age established in literature, this study was undertaken to primarily see if glycaemic levels had an impact on the severity of depression.

The sample taken from out-patient department of Geriatrics in RGGGH, as mentioned earlier in this dissertation, was, after strict screening for inclusion and exclusion criteria comprised of 88 depressed elderly who also had diabetes. This group was compared with 63 non-diabetic elderly depressed. To effectively eliminate as much contamination as possible they were matched for socio-economic status,

living condition (married/widowed, dependent or not on their family). The socio economic status was as expected in those who would attend a free Government medical facility, from the lower income group. Applying the standards of Kuppuswamy's Socio-Economic status Scale 2015, this group was further divided into upper, upper middle, lower middle, upper lower and lower according to their economic strata. Looking at this sample in which 125 out of 151 came under the 'lower 'category '(71 were elderly depressed diabetics and 54 were non-diabetic depressed.) while Upper lower comprised of 18 subjects and lower middle comprised of 8 subjects it can be seen that there were no upper middle income group in the sample, which again was an expected finding as the population and settings indicate the population utilizing Government services.

Social factors like living with children/ other relatives/ single in an institution did not vary significantly between the two groups, nor did marital status and gender vary much between the two groups i.e., depressed diabetic elderly and depressed non-diabetic elderly . The subjects and the controls were evenly matched in these areas. Therefore the study could focus on the diabetic status and depression,

One of the major findings in this study is that, the elderly depressed diabetics had a strong correlation with severe depression when compared with the elderly non-diabetic depressed individuals.

This significant (0.004) correlation obtained in our study is found in studies conducted all over the world. On why the diabetic elderly have a more severe depression than the non-diabetic elderly, there have been many postulates by many authors. The elderly who have high prevalence of depression, would only naturally be burdened by the physical and economic stress added by diabetes and its medical management. Burden of diabetes had been studied and reported in many studies, taking into account the cost of treatment for the same, but these were done in Western countries whose welfare schemes and state- designed health care are different from what we have in India. This makes the Indian diabetic elderly feel the burden of travelling to a hospital with a companion, to get the free medication itself, an act involving asking for financial help from those on whom they are dependent at home, and the population in the sample we have taken, this is strenuous as their income group is low and most of them are not treated with the care and concern a sick elderly would need and expect.

In this study, when the elderly group with diabetes cum depressed, was further divided into those treated with oral hypoglycaemic agents

alone and those who additionally needed insulin supplement. It was found that those who needed additional insulin support were more depressed than those treated with solely oral medication for diabetes. To take oral medication is comparatively easier than to take insulin in order to keep diabetic status under control. This could be a reason for another stressor for the patient. Also, insulin requirement itself indicates poor control of blood glycaemic levels, so per say underlying high blood glycaemia can be biochemically related to increase depression. Additionally in the elderly depressed diabetics, forgetfulness (owing to pseudo dementia) to both injecting insulin and to swallow drugs may be another reason.

The elderly in our hospital RGGGH come to hospital everyday morning to receive insulin which might be missed due to forgetfulness or other psychosocial reasons while oral drugs are given for two weeks minimum raising the treatment compliance of latter .In this study the sample was from an urban lower income group (comprising of middle lower, lower upper and lower economic strata), and the time, effort and money needed to go to a hospital and obtain drugs by the patient is by itself a strain on these elderly individuals.

To further get help for their insulin supplement, would make them a little more dependent on others, and with the current social scenario in which the elderly are not given that much attention, care and comfort,

these patients would tend to get depressed about their diabetic status also. And, diabetes by itself has been postulated to cause a depressive mood state.

When the duration of diabetes was studied for an association with severity of depression, it was found that the longer the duration of diabetic burden, was not a factor to contribute to the severity of depression. In the 88 subjects, 31 had diabetes for more than 6 years, and 57 were diabetic for less than six years.

In this group, the results show an interesting point. Those with more years of diabetes do not show any correlation with severity of depression in HDRS. But, these cases were found to score significantly when the GDRS scores were analysed. Perhaps the years of diabetic stress just confounds their mood state further. Though with each passing year seeking and getting medical assistance for diabetes would be an added emotional burden to their socially burdened existence, this seems to become a depressed state of mind and the years do not make it more severe. It can be taken to mean that depression does occur with diabetes in the elderly but does not become more severe with more years of diabetes

Not just taking the years of diabetic status into account, HbA1c assessment was done on 30 willing individuals. This showed that 13 of

the 30 had good diabetic control (<6.5) while 17of the 30 had poor glycaemic control (>=6.5). However, when these sets of patients were assessed for severity of depression, there was no significant association. This again has been the finding in many other studies.

Diabetic control as seen from the HbA1c results, does not seem to have an effect on the severity of depression, but less than half the sample population was not willing to take this test. Though HbA1c estimate does not significantly correlate with severity of depression, blood sugar levels were found to have a significant impact on the severity of depression, thereby reaffirming the established bi-directional association between the two illnesses

The fact that only 30 of the 88 subjects who were filtered through strict inclusion and exclusion criteria were willing to go for an additional test shows that many of the elderly are just content enough to carry on with their illness and do not care for further evaluation or better management.

This can be construed as their lack of self-care, as reported by some authors who believed that this was the reason for poor compliance. In our sample these patients were fairly regular in their visits and were regularly taking the medication given. In this population, the frustration level could be the reason why they might have felt that there would be no

great purpose in undergoing another test as they might have concluded that life and illness cannot become better and mere existence and control of symptoms cannot change in their life time.

The study design was planned by primarily screening out-patient population attending the Geriatric OPD, by screening them with Geriatric Depression Rating Scale. GDRS the most widely used screening for depression in the elderly did give the sample of elderly who were depressed (diabetic as well as non-diabetic).

When the scores of GDRS were tabulated for diabetic and non-diabetic group, the difference in the score mean did not differ much, (8.6 for diabetic depressed and 9.0 for non-diabetic depressed). This again shows that GDRS screening matched the diabetic depressed with non-diabetic depressed, as to the presence of depression. Depression being thus confirmed as present in both groups the study further probed into the severity of depression between the two groups using HDRS-24 scale.

Hamilton Depression Rating Scale-24 (HDRS-24) version when given to both the diabetic and non-diabetic group showed a significant variation between the groups. This again is consistent with what the literature on depression and diabetes contains. The mean HDRS score for diabetic depressed was higher than the mean score of the non-diabetic

depressed, indicating that depression though equally present in both groups, was more significantly severe in the diabetic-depressed patients.

Whether age matters in the severity of depression experienced by the diabetic elderly was an angle that needed to be probed. 73 out of total 88 subjects, (diabetic depressed) were less than 75 years old, and the non-diabetic group comprised of 56 patients in the same age group. HDRS scores for both, again indicate that the diabetic group scores more on the severity of depression than the non-diabetic for less than age 75yrs.

This finding shows that though depression is present in this age group taken in the sample, irrespective of diabetic status, when the severity of depression is ascertained, it clearly indicates that those elderly with diabetes have a more severe depression compared to the non-diabetic controls.

The gender difference in diabetic and non-diabetic elderly depressed has been studied by many, and in this study this angle was explored to see if our findings concur with what is seen in many other studies. When the HDRS scores were analysed for male and females who are diabetic and non-diabetic, it showed that there was no significant difference seen in the male population between the diabetic and non-diabetic group. Males in both the groups had a mean score that was not

significantly different from each other. But the female population of the two groups showed a significant difference.

There are many reports in literature that say female gender is more prone for depression than male in the elderly (Katon). In our study when the female group comprising of 44 elderly diabetic depressed, and 39 non-diabetic female elderly depressed were given HDRS, the difference in their mean scores was slightly above 5.7 which was significant. That the female elderly diabetics have a more severe depression than the non-diabetic female elderly, is consistent with the literature as seen in the 2005 study by Engum and in the 2009 Chennai based study by Poongkothai, Mohan et al. The studies done on this subject have almost all concurred on the presence of depression in the female elderly diabetics, and this study goes on to indicate that the female elderly with diabetes suffer from depression with a greater severity.

As there has been a demonstrable difference in the scores of diabetic and non-diabetic depressed elderly depressed population ,indicating that diabetes does have an impact on depression, it became imperative in the study to see the impact of diabetic status on depression in this study group. Earlier we had mentioned that HbA1c did not significantly correlate with depression severity, while Post Prandial Blood Sugar levels corresponded to depressive severity.

In all the 88 (both male and female) subjects, fasting blood sugar and post prandial blood sugar levels were seen in the light of HDRS scores. Though the fasting glucose level did not significantly correlate with depressive severity, post prandial blood sugar levels correlated significantly. Post prandial blood sugar levels cannot be taken as a predictor of depression but as an indicator of the severity of depression in this study. Our study results show that HDRS and PPBS have a correlation of 0.407, which only indicates some of the studies found in the literature.

On the question of age and gender playing a part in the association between blood sugar levels and severity of depression, the study probed into the groups above and below 75 years of age,(young-old) and also the gender difference. Among the patients aged less than seventy five, when fasting glucose and post prandial blood sugar levels were studied alongside HDRS, there was significant correlation to say blood sugar levels and severity of depression have a relation. In this age group of less than seventy five years, there was a significant correlation between PPBS and HDRS (0.019).

While, considering age group > 75 yrs. (old-old)which had meagre sample size and hence its results being an artefact was not taken into consideration(though there was significant correlation between PPBS and

HDRS).. It may perhaps indicate that diabetes per say individually influences the severity level of depression irrespective of age. This again shows how diabetes per se can be an economical and emotional problem in the elderly who hail from a lower income group.

When the odds parameter was seen for this study group, it showed that elderly diabetic depressed were 1.3 times more severely depressed than the non-diabetic group. This just shows the chance of getting depressed is more when the elderly is also a diabetic. Again coinciding and concurring with studies done all over the world.

Studying the blood parameters measuring diabetes and its impact on depression in both genders showed a variation between male and female in the study population. Of the 44 males in the study group, when fasting and post prandial blood sugar levels were seen alongside HDRS scores, it emerged that higher post prandial blood sugar levels correlated with severity of depression (.023). For the 44 females in the group, when similar parameters were studied it emerged that there was no significant correlation between blood sugar levels and severity of depression.

When compared within males and females in the diabetic elderly depressed group. Based on HDRS, though there was no difference between the two with regard to severity of depression, even when parameters measuring diabetes like HbA1c was estimated, no significant

association seen with depression. Poor glycaemic control relates with severe depression when the blood levels, especially the post prandial blood sugar levels, are correlated. Again, the burden of a life-long illness can be the trigger for the depressed state in the elderly. Since this study had matched the diabetic and non-diabetic groups for their stressor levels and socio-economic states, diabetes is the differentiating factor between the two groups. What it also shows is that depression is more severe in those with diabetes than those without diabetes.

Would the duration of diabetes have an impact on the severity of depression in the diabetic elderly depressed? This question was addressed in this study. The 88 subjects were divided into those with less than six years duration of diabetes, and those who were suffering with diabetes for more than six years. Neither of the groups associated with depression severity (HDRS score). But, GDRS scores showed a significant difference between the two. What this indicates perhaps is irrespective of being more used to having medication for an illness, they have accepted as a life-time accompaniment are not severely depressed about it.

Though this may not concur with the general idea that diabetes increases the severity of depression in the elderly, in a different context if one were to view the scenario from a socio-psychological perspective, we may infer that diabetes and its burden are accepted as an inevitable

discomforting part of life by the aged. Having got used to various psychological pains in life, they perhaps do not give weightage to one more discomfort in life even if it were a serious physical illness. Even in this group, it is seen that there is a correlation for the presence of depression in the elderly diabetic, but age and duration of diabetes does not contribute to the severity of depression.

In a study quoted earlier, by Poongothai et al, amidst the elderly population in Chennai, (which is our area of study) who are depressed, newly diagnosed diabetics score high on depression. Whether the term 'new' means less than six years is not clearly mentioned in the study, but with the prolonged duration of diabetes in any individual this has to be seen for this population. For an individual who has lived for 65 years, six may definitely be a short period, and for those who are already facing life with despondency and dejection- as is common in the social milieu of our sample, any new stressor would be magnified to become another insurmountable unpleasantness.

At this juncture we have to revisit the life stressors. In the Holmes-Rahe inventory and in the Indian Gurmeet version, (Presumptive Stressful Life Events Scale) death of spouse features predominantly with a score of 95. In our study half the population had lost their spouse. This stressor was not significant because both the study sample and the control did not

vary in their marital status. And, bereavement and grief, even if extended would not matter as all the widowed subjects in the study had lost their partner three and more years ago.

In which case, we may have to wonder if diabetes does impact the depressive state in the elderly. It does. As even in this study the scores of depression between diabetic and non- diabetic depressed elderly clearly shows that those with diabetes are more depressed in old age. The study also indicates that those with a diabetic duration of less than 6 years of their life are more depressed.

This may indicate that they are yet to reach the stage wherein diabetes cases to be a cause for depression, but rather just another add on to the depressive elements in life. However, as seen in other findings from this study, diabetes does increase the severity of depression in the elderly. The association between diabetes and depression, irrespective of the age of the subject and duration of diabetes is seen in the results, but, what the mechanism is, which causes this impact and whether it is bi-directional as some believe was not the matter of study in this dissertation.

This study was done to primarily ascertain whether diabetes increases the severity of depression in the elderly. For this question, the answer is yes. It does show that the elderly diabetic when depressed

suffers with more severity than his non-diabetic counterpart. This also indicates that diabetes is an important variable to consider in the management of depression, as some blood parameters indicate.

STRENGTHS OF THE STUDY

This is case control study which is well matched for socio-demographic characteristics - age, gender, marital status, social support, and socio-economic status, in both diabetic and non-diabetic elderly depressed groups.

Stressors have been matched in the two groups too in order to avoid any contribution by stressful life event's contribution to depression.

When the stressors were compared there was no significant difference found between the groups. So the confounding factors are eliminated leading to the notion to attribute difference in depression characteristics between both groups to diabetes.

The study was undertaken to see if there is an association between diabetes and depression in the elderly, and if diabetes made the depression more severe.

In the results, among the diabetic depressive, diabetes is found to be significantly associated with severity of depression. Rather, those persons with both depressive disorder and diabetes have significant association with severe depressive disorder as seen with high mean HDRS scores.

Poor glycaemic control associated with severe depression is further established in our study with significant higher HDRS score observed in patients treated with both oral hypoglycaemic drugs & insulin compared to those taking only oral hypoglycaemic drugs. Therefore, the study shows that diabetes has a stronger association with severe depression, and thus fulfils its purported aim.

LIMITATIONS OF THE STUDY

As with all studies, there are limitations in this study that were unavoidable. To overcome these limiting obstacles and conduct to conclude a scientific fact regarding the impact of diabetes on the severity of depression, the study has to be done on a larger sample.

The main limitation of the study is its narrowing of the population. We have studied a phenomenon only in the lower income group coming to a Government Hospital out-patient setting, and therefore cannot generalize the findings as to their applicability and relevance for the lower income group in the population. For this an extensive field study would have to be undertaken.

Also in this study more probing into the pattern of diabetic-depressive association in those of more than 75 years of age could not be done as there were not enough number of subjects to statistically ascertain any significance. A larger study would be needed over a longer period of time for this. Apart from excluding cardio-vascular and hypertensive patients other subjects who may have had some other form of vascular problems were not identified and removed from the sample as the case records did not mention such problems and the patients were unable to say that there were other problems when enquired.

As many of the subjects were reluctant to undergo another blood test, HbA1c was done only for the willing 30. This investigation needs to be done on more subjects.

The long going debate on HDRS may indicate another limitation, but as it is one of the best scales to see the severity of depression, and also there is a local language version of the same, this was used though not with regret, as our objective was to see if diabetes increases the severity of depression. This is shown to indicate severity of depression more clearly than HADS or Zeng scales.

Another area of concern in this study is that we could use only the Presumptive Stressful Life Events scale to control any confounding stressors in the study group. This was inevitable as there are no other validated scales to measure this in Indian population. Perhaps this calls for forming, and scientifically creating a valid scale of stressors for the elderly population in India, who may face various other forms of stressors than those enlisted in the scale.

When analysed, there was significant association observed between poor control of diabetes and severe depression. This is evident with heightened levels of post prandial blood sugar having significant association with HDRS scores. In addition, this is true for male gender and age less than & equal to 75 years and, this finding requires further exploration to find explanation between the two.

CONCLUSION

This study done on patients attending the Geriatrics out-patient department in Rajiv Gandhi Government General Hospital, to see if those elderly who are depressed also suffering from diabetes, with a control/comparison group of elderly depressed who are non-diabetic, to see if diabetes increases the severity of depression in these individuals.

Screening with scales relevant for geriatric population with depression, and using the instrument to assess the severity of depression, with case record documented blood parameters, the study yields findings that suggest a strong correlation between diabetes and depression in the elderly.

Concurring with other studies found in the literature, female gender appeared to be more affected with depression when there was a co-morbid diabetic status.

As seen in some studies done in other countries, HbA1c, a very useful parameter to assess diabetic control was not found to significantly correlate with depressive severity.

Post prandial blood sugar levels significantly correlated with diabetic severity.

This finding that diabetes does impact the severity of depression in the elderly was found with no age, gender, socio-economic class difference. Life stressors too were not found to confound this finding.

This is a study on an urban low-income group of elderly who suffer with depression and have a comorbidity of diabetes, and it shows in its results that diabetes makes the depressive state more severe in these elderly.

These findings are concurring with what have been reported in the literature.

This study differs from others, as this subject has not been studied with this population sample in Chennai, Tamilnadu.

BIBLIOGRAPHY

➢ Journals

1. Agbir TM1, Audu MD, Adebowale TO, Goar SG.. Depression among medical outpatients with diabetes: a cross-sectional study at Jos University Teaching Hospital, Jos, Nigeria. Ann Afr Med, 2010 Jan-Mar;9(1):5-10.

2. Akhtar Hussain, A, K Azad Khan, Bishwajit Bhowmik. Prevalence of Depression and Glucose Abnormality in an Urbanizing Rural Population of Bangladesh Khurshid Natasha, Diabetes Metab J, 2015 Jun; 39(3): 218–229.

3. Amit Raval et al. Prevalence & determinants of depression in type 2 diabetes patients in a tertiary care centre. Indian J Med Res 132, August 2010, pp 195-200.

4. Anamika et al. Prevalence of depression among the elderly in Rani Block; Kamrup (rural) district; Assam, Indian Journal of Basic and Applied Medical Research; September 2014: Vol. -3, Issue- 4, P. 72-79.

5. Anderson RJ1, Freedland KE, Clouse RE, Lustman PJ. The prevalence of comorbid depression in adults with diabetes: a meta-analysis, Diabetes Care; 2001 Jun;24(6):1069-78.

6. Anisha Heeramun-Aubeeluck1, Zheng Lu1, 2*, Yanli Luo1. Comorbidity of Depression and Diabetes; In a Nutshell, Psychology 2012, Vol. 3, Special Issue, 787-794.

7. Ankur Barua**, M. K. Ghosh*, N Kar*, M A Basilio*. Depressive Disorders in Elderly: An Estimation of this Public Health Problem, JIMSA October - December 2011 Vol, 24 No,4193.

8. Archana Jain, Shilpa Paranjape. Prevalence of type 2 diabetes mellitus in elderly in a primary care facility: An ideal facility, Indian J Endocrinol Metab, 2013 Oct; 17(Suppl1): S318–S322.

9. Asghar S1, Hussain A, Ali SM, Khan AK, Magnusson A. Prevalence of depression and diabetes: a population-based study from rural Bangladesh, Diabet Med, 2007 Aug;24(8):872-7.

10. Asghar,S, Hussain A, et al. Depression diabetes and glycaemic control in Primary Indians. Diabetes Care 27, 2004, 618-619.

11. Ashraf Shehatah et al. Prevalence and correlates of depressive disorders in elderly with type 2 diabetes in primary health care settings. Journal of Affective disorders June 2010Volume 123, Issues 1-3, Pages 197–201.

12. Baldwin R C , B Tomenson. Depression in later life; A comparison of symptoms and risk factors in early and late onset cases, bjp,167,5, 649 Published 1 November 1995.

13. Beekman AT1, Copeland JR, Prince MJ. Review of community prevalence of depression in later life, Br J Psychiatry, 1999 Apr;174:30711.

14. Briana Mezuk, PHD, William W Eaton, PHD, Sandra Albrecht, MPH, Sherita Hill Golden, MD, MHS. Depression and Type 2 Diabetes Over the Lifespan A meta-analysis, Diabetes Care, 2008 Dec; 31(12): 2383–2390.

15. Brown LC, Majumdar SR, Newman SC, Johnson JA. Type 2 diabetes does not increase risk of depression, CMAJ 2006;175(1):42–46.

16. Chau PH1, Woo J, Lee CH, Cheung WL, Chen J, Chan WM, Hui L, McGhee SM.. Older people with diabetes have higher risk of depression, cognitive and functional impairments: implications for diabetes services. J Nutr Health Aging, 2011 Nov;15(9):751-5.

17. Ciechanowski PS1, Katon WJ, Russo.. Depression and diabetes: impact of depressive symptoms on adherence, function, and costs. J Diabetes Educ, 2004 May-Jun;30(3):485-92.

18. Dan G Blazer, Depression in Late Life: Review and Commentary. Journal of Gerontology: MEDICAL SCIENCES Copyright 2003 by The Gerontological Society of America 2003, Vol.. 58A, No.. 3, 249–265.

19. DAN G BLAZER II*, CELIA F HYBELS. Origins of depression in later life. Psychological Medicine, 2005, 35, 1–12.

20. de Groot M1, Anderson R, Freedland KE, Clouse RE, Lustman PJ. Association of depression and diabetes complications: a meta-analysis, Psychosom Med, 2001 Jul-Aug;63(4):619-30.

21. Djernes JK1, Prevalence and predictors of depression in populations of elderly: a review, Acta Psychiatr Scand, 2006 May;113(5):372-87.

22. Dr Adam G Tabák, et al. Depression and type 2 diabetes: a causal association?. Lancet Volume 2, No.. 3, p236–245, March 2014.

23. El Mahalli A A. Prevalence and Predictors of Depression among Type 2 Diabetes Mellitus Outpatients in Eastern Province, Saudi Arabia. Int J Health Sci (Qassim), 2015 Apr; 9(2): 119–126.

24. Engum A1, Mykletun A, Midthjell K, Holen A, Dahl AA.. Depression and diabetes: a large population-based study of sociodemographic, lifestyle, and clinical factors associated with

depression in type 1 and type 2 diabetes. Diabetes Care, 2005 Aug;28(8):1904-9.

25. Fisher L1, Skaff MM, Mullan JT, Arean P, Mohr D, Masharani U, Glasgow R, Laurencin G. Clinical depression versus distress among patients with type 2 diabetes: not just a question of semantics, Diabetes Care, 2007 Mar;30(3):542-8.

26. Gavard JA1, Lustman PJ, Clouse RE. Prevalence of depression in adults with diabetes; An epidemiological evaluation, Diabetes Care; 1993 Aug;16(8):1167-78.

27. George S Alexopoulos, Depression in the elderly, Lancet2005; 365: 1961–70.

28. Golden SH. A review of the evidence for a neuroendocrine link between stress, depression and diabetes mellitus. Curr Diabetes Rev 2007;3(4):252–259.

29. Golden SH1, Lazo M, Carnethon M, Bertoni AG, Schreiner PJ, Diez Roux AV, Lee HB, Lyketsos C. Examining a bidirectional association between depressive symptoms and diabetes, JAMA, 2008 Jun 18;299(23):2751-9.

30. Grover S, Dutt A, Avasthi A. An overview of Indian research in depression, Indian J Psychiatry 2010;52 (Suppl 1):S17.

31. Grover S, Malhotra N. Depression in elderly: A review of Indian research, J Geriatr Ment Health 2015;2:4-15.

32. Gurmeet Singh, MBBS, MRCPsych, DPM(Lond), Dip Psych (McGill), Diplomate Am Board of Psychiatry and Neurology,1 Dalbir Kaur, MA, DM & SP,2 and Harsharan Kaur, MA. PRESUMPTIVE STRESSFUL LIFE EVENTS SCALE (PSLES) — A NEW STRESSFUL LIFE EVENTS SCALE FOR USE IN INDIA. Indian J Psychiatry, v. 26(2); Apr-Jun 1984.

33. Guruprasad K G, M R Niranjan, and S Ashwin. A Study of Association of Depressive Symptoms Among the Type 2 Diabetic Outpatients Presenting to a Tertiary Care Hospital, Indian J Psychol Med, 2012 Jan-Mar; 34(1): 30–33.

34. IHDI- Life Expectancy at Birth by Gender, 1992 – 2004 Table 5A.. 10, India Human Development Index Report, page 287.

35. Jain A, Paranjape S. Prevalence of type 2 diabetes mellitus in elderly in a primary care facility: An ideal facility. Indian J Endocr Metab 2013;17, Suppl S1:318-22.

36. Kandpal SD, Kakkar R, Aggarwal P. Mental and social dimensions in geriatric population: Need of the hour, Indian J Community Health 2012;24:71-2.

37. Khamseh ME1, Baradaran HR, Rajabali H. Depression and diabetes in Iranian patients: a comparative study, Int J Psychiatry Med, 2007;37(1):81-6.

38. Kimbro LB, Mangione CM, Steers WN, Duru OK, McEwen L, Karter A, Ettner SL. Depression and all-cause mortality in persons with diabetes mellitus: are older adults at higher risk? Results from the Translating Research Into Action for Diabetes Study, J Am Geriatr Soc, 2014 Jun;62(6):1017-22.

39. Kivimaki Mika 1 2 *, Tabak Adam G, 1 3 , Batty G David 4 5 6 , Singh Manoux.. Hyperglycemia, type 2 diabetes, and depressive symptoms: the British Whitehall II study. Diabetes Care, 2009 Oct; 32(10): 1867–1869.

40. Knol, MJ, Twisk, JW, Beekman, AT, Heine, RJ, Snoek, FJ, and Pouwer, F. Depression as a risk factor for the onset of type 2 diabetes mellitus: a meta-analysis, Diabetologia, 2006; 49: 837–845.

41. LEONARD E, EGEDE, DEYI ZHENG. Independent Factors Associated With Major Depressive Disorder in a National Sample of Individuals With Diabetes. Diabetes Care 26:104–111, 2003.

42. Linda G Marc, ScD, MPH, MS, Patrick J Raue, PhD, and Martha L Bruce. Screening Performance of the Geriatric Depression Scale (GDS-15) in a Diverse Elderly Home Care Population, Am J Geriatr Psychiatry, 2008 Nov; 16(11): 914–921.

43. Lee ZS, Chan JC, Yeng VT et al.. Plasma insulin, growth hormone, cortisol, and central obesity among chineese type 2 diabetic patients.. Diabetic Care, 1999, 22, 145-1457.

44. LEONARD E, EGEDE, MD, MS1 DEYI ZHENG, MB, PHD2. Independent Factors Associated With Major Depressive Disorder in a National Sample of Individuals With Diabetes. Diabetes Care 26:104–111, 2003.

45. Li Ci, Ford ES, Strine TW, Mokdad. Prevalence of depression among U S adults with diabetes: findings from the 2006 behavioral risk factor surveillance system, Diabetes Care, 2008 Jan;31(1):105-7.

46. Lloyd CE, Roy T, Nouwen A, Chauhan AM. Epidemiology of depression in diabetes: international and cross-cultural issues. Affect Disord J 2012 Oct;142 Suppl:S22-9. doi: 10, 1016/S0165-0327(12)70005-8.

47. Lustman et al. Depression and Poor Glycemic Control A meta-analytic review of the literature. DIABETES CARE, VOLUME 23, NUMBER 7, JULY 2000.

48. MAX HAMILTON, A RATING SCALE FOR DEPRESSION BY, J, Neurol, Neurosurg, Psychiat. , 1960, 23, 56.

49. McKellar JD1, Humphreys K, Piette JD. Depression increases diabetes symptoms by complicating patients' self-care adherence, Am J Geriatr Psychiatry, 2005 Mar;13(3):202-10.

50. Mohan V, et al. Epidemiology of type 2 diabetes: Indian scenario. Indian J Med Res 125, March 2007, pp 217-230.

51. Nitin Joseph, Bhaskaran Unnikrishnan, Y P Raghavendra Babu, M Shashidhar Kotian, Maria Nelliyanil. Proportion of depression and its determinants among type 2 diabetes mellitus patients in various tertiary care hospitals in Mangalore city of South India, Indian J Endocrinol Metab, 2013 Jul-Aug; 17(4): 681–688.

52. Nouwen A, K Winkley. Type 2 diabetes mellitus as a risk factor for the onset of depression: a systematic review and meta-analysis, Diabetologia, 2010 Dec; 53(12): 2480–2486.

53. Papelbaum et al. Depression; glycemic control and type 2 diabetes, Diabetology & Metabolic Syndrome 2011 3:26.

54. Panayotes Demakakos, Is the association between depressive symptoms and glucose metabolism bidirectional? Evidence from the English Longitudinal Study of Ageing (ELSA), Psychosom Med, 2014 Sep; 76(7): 555–561.

55. Palinkas LA, Lee PP, Barrett-Connor E. A prospective study of type 2 diabetes and depressive symptoms in the elderly: the Rancho Bernardo Study, Diabet Med 2004;21(11):1185–1191.

56. Park et al. Arch Intern Med, 2000 Nov 27;160(21):3278-85.

57. PATRICK J, LUSTMAN, PHD RYAN J.. ANDERSON, BA KENNETH E FREEDLAND, PHD. Depression and Poor Glycemic Control A meta-analytic review of the literature. Diabetes Care 23:934–942, 2000.

58. Paula M Trief PhD, Depression in Elderly Diabetes Patients, Diabetes Spectrum April 2007 vol, 20 no, 2 71-75.

59. Poongothai S, Prevalence of depression in relation to glucose intolerance in urban south Indians--the Chennai Urban Rural Epidemiology Study (CURES-76), Diabetes Technol Ther, 2010 Dec;12(12):989-94.

60. Poongothai, Poongothai S ,Pradeepa R, Ganesan A ,Mohan V . Prevalence of depression in a large urban South Indian population--

the Chennai Urban Rural Epidemiology Study (CURES-70). PloS one, 4 (9). e7185.

61. Priya Palta, Sherita Hill Golden, Jeanne A Teresi, Walter Palmas, Paula Trief, Ruth S Weinstock, Steven Shea, Jennifer J Manly, Jose A Luchsinger. Depression is not associated with diabetes control in minority elderly, J Diabetes Complications, 2014 Nov-Dec; 28(6): 798–804.

62. Radhakrishnan S, Nayeem A. Prevalence of depression among geriatric population in a rural area in Tamilnadu, Int J Nutr Pharmacol Neurol Dis 2013;3:309-12.

63. Ramachandran A, International Diabetes Federation report; 2005 Epidemiology of diabetes in India- three decades of research, J, Assoc. Physicians India 53, 34-38.

64. Ramachandran, Menon. Depressive disorder in late life. , p59 of the book Depression edited by Rao and devi 1980.

65. Ramachandran V (1977) MD Psychiatry dissertation.

66. Ramin Mojtabai, Diagnosing Depression in Older Adults in Primary Care, n engl j med 370;13.

67. Ramin Mojtabai, MD, PhD, MPH. Diagnosing Depression in Older Adults in Primary Care, n engl j med 370;13 nejm. org march 27, 20141180.

68. Ranjan Das, Omprakash Singh, Rajarshi Guha Thakurta, M R Khandakar, S N Ali,1 Asim Kumar Mallick,1 Paromita Roy, Amit K Bhattacharrya. Prevalence of Depression in Patients with Type II Diabetes Mellitus and its Impact on Quality of Life, Indian J Psychol Med, 2013 Jul-Sep; 35(3): 284–289.

69. Rao, Madhavan. Agero psychiatric morbidity survey in a semi urban area near Madurai. IJP 24,258.

70. Roy T, Lloyd CE. Epidemiology of depression and diabetes: a systematic review. Affect Disord J 2012 Oct;142 Suppl:S8-21, doi: 10, 1016/S0165-0327(12)70004-6.

71. RYAN J ANDERSON, BA1 KENNETH E FREEDLAND, PHD1 RAY E CLOUSE, MD1,2 PATRICK J LUSTMAN. The Prevalence of Comorbid Depression in Adults With Diabetes A meta-analysis. PHD1,3 Diabetes Care 24:1069–1078, 2001.

72. Seby K, Suprakash Chaudhury, Rudraprosad Chakraborty. Prevalence of psychiatric and physical morbidity in an urban

geriatric population, IJP 2011 | Volume : 53 | Issue : 2 | Page : 121-127.

73. Sherita Hill Golden, MD, MHS, Mariana Lazo, MD, MSc, Mercedes Carnethon, PhD, Alain G Bertoni, MD, MPH,Pamela J Schreiner, PhD, Ana V Diez Roux, PhD, Hochang Benjamin Lee, MD, and Constantine Lyketsos, MD, MHS. Examining a Bidirectional Association Between Depressive Symptoms and Diabetes, JAMA, 2008 Jun 18; 299(23): 2751–2759.

74. Sheikh JI, Yesavage JA. Geriatric Depression Scale (GDS) Recent evidence and development of a shorter version. In: Brink TL, editor. Clinical Gerontology: A Guide to Assessment and Intervention, New York: The Haworth Press; 1986, pp, 165–173.

75. Siddiqui S1, Jha S2, Waghdhare S2, Agarwal NB3, Singh K1 Postgrad Med J. 2014 Oct;90(1068):552-6, doi: 10, 1136/postgradmedj-2014-132593, Epub 2014 Aug 4.

76. Soo Borson, James Scanlan, Michaels Brush, Peter Vitaliano et al. The Mini-Cog: a cognitive ‘vital signs’ measure for dementia screening in multilingual elderly. International Journal of Geriatric Psychiatry, volume 15, issue 11.. , pp 1021-1027.

77. Strandberg RB, Graue M, Wentzel-Larsen T, Peyrot M, Rokne B.. Relationships of diabetes-specific emotional distress, depression, anxiety, and overall well-being with HbA1c in adult persons with type 1 diabetes. J Psychosom Res, 2014 Sep;77(3):174-9.

78. Suttur study: An epidemiological study of psychiatric disorders in south Indian rural population Indian J Psychiatry, 2014 Jul-Sep; 56(3): 238–245.

79. Trief PM1, Morin PC, Izquierdo R, Teresi J, Eimicke JP, Goland R, Starren J, Shea S, Weinstock RS. Depression and glycemic control in elderly ethnically diverse patients with diabetes: the IDEATel project, Diabetes Care, 2006 Apr;29(4):830-5.

80. Venkoba Rao et al. Mental illness in persons aged fifty and over. IJP 14,319.1972.

81. Vijay Gupta MD. , DM.. , MNAMS Pawan Suri MBBS. DIABETES IN ELDERLY PATIENTS, JK Practitioner 2002:91(4): 258-259.

82. World Health Organization, Non-communicable diseases, WHO Factsheet. Accessed Nov 19, 2012.

83. Wayne J Katon, The Comorbidity of Diabetes Mellitus and Depression, Am J Med, 2008 Nov; 121(11 Suppl 2): S8–15.

84. Yeates Conwell, 1,J Craig Nelson2, Kathleen M Kim3, Carolyn M Mazure2. Depression in late life: age of onset as marker of a subtype, Journal of Affective Disorders. Volume 17, Issue 2, September–October 1989, Pages 189–195.

85. Zahid N, Asghar S, Claussen B, and Hussain A. 2008 Depression and diabetes in a rural community in Pakistan, Diabetes Res, Clin, Pract. 2008, 79, 124-127.

- **Books**

86. Depressive disorders: Mario Maj, Norman Sartorius,2002, Wiley

87. Depression and Diabetes: Ed: Wayne Katon , Mario Maj , Norman Sartorius,:August 2010, Wiley-Blackwell.

88. Guidelines on depression in older people ,practising the evidence: Robert C Baldwin,Edmond Chiu, Cornelius Katona, Nori Graham,2002, Martin Dunitz.

89. Kaplan & Sadock's Comprehensive Textbook of Psychiatry, 10th Edition: Ed: Benjamin J. Sadock, Virjinis A. Sadock, Lippincott Williams & Wilkins.

90. Psychiatric Clinics of North America , Late Life Depression : W.Vaughn Mccall , December 2013, vol.36, number 4

91. Psychiatry Of Old Age In India , A. Venkoba Rao ,1989,self publisher.

92. Stress, the Brain and Depression : Herman M. Van Praag, Ron de Kloet , Jim van Os , 2006, Cambridge.

93. The American Psychiatric Publishing Textbook of Geriatric Psychiatry : Dan g. Blazer, David C. Steffens2010, American Psychiatric Publishing.

ANNEXURES

STUDY OF CORRELATION BETWEEN DIABETES AND DEPRESSION

~~IN GERIATRIC POPULATION IN URBAN OUT-PATIENT SETTING~~

IN GOVERNMENT HOSPITAL

CONSENT TO PARTICIPATE IN THE STUDY

NAME OF INVESTIGATOR:

NAME OF PARTICIPANT: **HOSPITAL NO:**

AGE, SEX

SERIAL NUMBER IN THE INVESTIGATION:

- I agree to participate in the study that proposes to see the correlation and impact of diabetes and depression in a geriatric population.
- I have been fully explained and clearly informed about the nature of the study and its details.
- I have understood the nature of the study and give my wholehearted consent, consciously to participate in the same.
- I accept the researcher's explanation that there would be no harmful effects when I choose to answer the questionnaires in the study.
- If for any reason I am not satisfied with the way in which the study is conducted I have the right to withdraw from the study at any time.

SIGNATURE:

DATE:

ஆராய்ச்சி ஒப்புதல் கடிதம்

முதியோர் மத்தியில் மனசோர்வும் நீரிழிவு நோயும் குறித்த ஆய்வு

பெயர்: தேதி:

வயது: மருத்துவமனை எண்:

பாலினம்: ஆய்வு அடையாள எண்:

- முதியோரிடையே மனச்சோர்வு நோய், நீரிழிவு நோய் ஆகியவை கொண்டுள்ள தொடர்பு, தாக்கம் குறித்த இந்த ஆய்வில் பங்கேற்க சம்மதிக்கிறேன்.
- ஆய்வின் விவரம் தெரியப்படுத்தி, தெளிவாய் எனக்கு விளக்கப்பட்டுள்ளது.
- தெரிந்து, புரிந்து, முழு மனத்துடனும், சுயநினைவுடனும் சம்மதிக்கிறேன்.
- ஆய்வின் கேள்விகளால் எனக்கு பாதிப்பு வராது எனும் விளக்கத்தை ஏற்றுக்கொள்கிறேன்.
- எக்காரணத்தாலும் ஆய்வின் இடையே அதிருப்தி ஏற்பட்டால் விலகிக்கொள்ளும் அனுமதி உண்டென்பதையும் ஏற்று ஒப்புதல் தருகிறேன்.

ஒப்பம்:

தேதி

PATIENT INFORMATION FORM

Date:

ID No:

Name: Age/Sex:

Locale:

Education: Occupation:

SE status: LIG?MIG?HIG? Income:

Marital status:

Unmarried/Married/Widowed/Separated If s/w for the past

Type of Housing: Flat/Individual house/Hut

Living with : Children / Other relatives / Alone / Old age home

Duration of Diabetes: Years Months

Diabetic related complications:

Blood Sugar: F PP HbA1c

Treatment: OHAs Insulin:

Mode of Injection:

Other AYUSH Rx:

On other drugs:

Alcohol/drug abuse:

Prior Psychiatric Illness From To	**Psychiatric medication details & duration**

Present depressive illness duration (according to patient/informant):

Stressors in family/social life (PSLES)

HDRS score:

GDRS score:

GERIATRIC DEPRESSION SCALE: SHORT FORM

Choose the best answer for how you have felt over the past week:

1. Are you basically satisfied with your life? YES / NO

2. Have you dropped many of your activities and interests? YES / NO

3. Do you feel that your life is empty? YES / NO

4. Do you often get bored? YES / NO

5. Are you in good spirits most of the time? YES / NO

6. Are you afraid that something bad is going to happen to you? YES / NO

7. Do you feel happy most of the time? YES / NO

8. Do you often feel helpless? YES / NO

9. Do you prefer to stay at home, rather than going out and doing new things? YES / NO

10. Do you feel you have more problems with memory than most? YES / NO

11. Do you think it is wonderful to be alive now? YES / NO

12. Do you feel pretty worthless the way you are now? YES / NO

13. Do you feel full of energy? YES / NO

14. Do you feel that your situation is hopeless? YES / NO

15. Do you think that most people are better off than you are? YES / NO

Answers in bold indicate depression. Score 1 point for each bolded answer.

A score > 5 points is suggestive of depression.

A score ≥ 10 points is almost always indicative of depression.

A score > 5 points should warrant a follow-up comprehensive assessment.

Source: http://www.stanford.edu/~yesavage/GDS.html

THE HAMILTON RATING SCALE FOR DEPRESSION

(to be administered by a health care professional)

Patient's Name _____

Date of Assessment _____

To rate the severity of depression in patients who are already diagnosed as depressed, administer this questionnaire. The higher the score, the more severe the depression.

For each item, write the correct number on the line next to the item. (Only one response per item)

1. **DEPRESSED MOOD** (Sadness, hopeless, helpless, worthless)

_____
- **0**= Absent
- **1**= These feeling states indicated only on questioning
- **2**= These feeling states spontaneously reported verbally
- **3**= Communicates feeling states non-verbally—i.e., through facial expression, posture, voice, and tendency to weep
- **4**= Patient reports VIRTUALLY ONLY these feeling states in his spontaneous verbal and non-verbal communication

2. **FEELINGS OF GUILT**

_____
- **0**= Absent
- **1**= Self reproach, feels he has let people down
- **2**= Ideas of guilt or rumination over past errors or sinful deeds
- **3**= Present illness is a punishment. Delusions of guilt
- **4**= Hears accusatory or denunciatory voices and/or experiences threatening visual hallucinations

3. **SUICIDE**

_____
- **0**= Absent
- **1**= Feels life is not worth living
- **2**= Wishes he were dead or any thoughts of possible death to self
- **3**= Suicidal ideas or gesture
- **4**= Attempts at suicide (any serious attempt rates 4)

4. **INSOMNIA EARLY**

_____
- **0**= No difficulty falling asleep
- **1**= Complains of occasional difficulty falling asleep—i.e., more than 1/2 hour
- **2**= Complains of nightly difficulty falling asleep

5. **INSOMNIA MIDDLE**

_____
- **0**= No difficulty
- **1**= Patient complains of being restless and disturbed during the night
- **2**= Waking during the night—any getting out of bed rates 2 (except for purposes of voiding)

Adapted from Hedlung and Vieweg, The Hamilton rating scale for depression, *Journal of Operational Psychiatry*, 1979;10(2):149-165.

6. **INSOMNIA LATE**

_____
0= No difficulty
1= Waking in early hours of the morning but goes back to sleep
2= Unable to fall asleep again if he gets out of bed

7. **WORK AND ACTIVITIES**

_____
0= No difficulty
1= Thoughts and feelings of incapacity, fatigue or weakness related to activities; work or hobbies
2= Loss of interest in activity; hobbies or work—either directly reported by patient, or indirect in listlessness, indecision and vacillation (feels he has to push self to work or activities)
3= Decrease in actual time spent in activities or decrease in productivity
4= Stopped working because of present illness

8. **RETARDATION: PSYCHOMOTOR** (Slowness of thought and speech; impaired ability to concentrate; decreased motor activity)

_____
0= Normal speech and thought
1= Slight retardation at interview
2= Obvious retardation at interview
3= Interview difficult
4= Complete stupor

9. **AGITATION**

_____
0= None
1= Fidgetiness
2= Playing with hands, hair, etc.
3= Moving about, can't sit still
4= Hand wringing, nail biting, hair-pulling, biting of lips

10. **ANXIETY (PSYCHOLOGICAL)**

_____
0= No difficulty
1= Subjective tension and irritability
2= Worrying about minor matters
3= Apprehensive attitude apparent in face or speech
4= Fears expressed without questioning

11. **ANXIETY SOMATIC:** Physiological concomitants of anxiety, (i.e., effects of autonomic overactivity, "butterflies," indigestion, stomach cramps, belching, diarrhea, palpitations, hyperventilation, paresthesia, sweating, flushing, tremor, headache, urinary frequency). Avoid asking about possible medication side effects (i.e., dry mouth, constipation)

_____
0= Absent
1= Mild
2= Moderate
3= Severe
4= Incapacitating

12. SOMATIC SYMPTOMS (GASTROINTESTINAL)

_____ **0=** None
1= Loss of appetite but eating without encouragement from others. Food intake about normal
2= Difficulty eating without urging from others. Marked reduction of appetite and food intake

13. SOMATIC SYMPTOMS GENERAL

_____ **0=** None
1= Heaviness in limbs, back or head. Backaches, headache, muscle aches. Loss of energy and fatigability
2= Any clear-cut symptom rates 2

14. GENITAL SYMPTOMS (Symptoms such as: loss of libido; impaired sexual performance; menstrual disturbances)

_____ **0=** Absent
1= Mild
2= Severe

15. HYPOCHONDRIASIS

_____ **0=** Not present
1= Self-absorption (bodily)
2= Preoccupation with health
3= Frequent complaints, requests for help, etc.
4= Hypochondriacal delusions

16. LOSS OF WEIGHT

_____ **A.** When rating by history:
0= No weight loss
1= Probably weight loss associated with present illness
2= Definite (according to patient) weight loss
3= Not assessed

17. INSIGHT

_____ **0=** Acknowledges being depressed and ill
1= Acknowledges illness but attributes cause to bad food, climate, overwork, virus, need for rest, etc.
2= Denies being ill at all

18. DIURNAL VARIATION

_____ **A.** Note whether symptoms are worse in morning or evening. If NO diurnal variation, mark none
0= No variation
1= Worse in A.M.
2= Worse in P.M.

_____ **B.** When present, mark the severity of the variation. Mark "None" if NO variation
0= None
1= Mild
2= Severe

19. DEPERSONALIZATION AND DEREALIZATION (Such as: Feelings of unreality; Nihilistic ideas)

_____
0= Absent
1= Mild
2= Moderate
3= Severe
4= Incapacitating

20. PARANOID SYMPTOMS

_____
0= None
1= Suspicious
2= Ideas of reference
3= Delusions of reference and persecution

21. OBSESSIONAL AND COMPULSIVE SYMPTOMS

_____
0= Absent
1= Mild
2= Severe

22 Helplessness

Total Score _____

0 = Not present
1 = Subjective feelings which are elicited only by inquiry
2 = Patient volunteers his/her helpless feelings
3 = Requires urging, guidance and reassurance to accomplish chores, personal hygiene
4 = Requires physical assistance for dress, grooming, eating or, personal hygine.

23. HOPELESSNESS

0 = Not present
1 = Intermittently doubts that "things will improve" but can be re-assured.
2 = Consistently feels "hopelessness" but accepts reassurances
3 = Expresses feelings of discouragement, despair, pessimism about failure, which cannot be dispelled
4 = Spontaneously and inappropriately perseverates "I will never get well" or equivalent

24. WORTHLESSNESS

0 = Not present
1 = Indicates feelings of worthlessness (loss of self esteem) only on questioning
2 = Spontaneously indicates feelings of worthlessness
3 = Different ~~from~~ 2 by degree; patient volunteers that ~~after~~ he/she is "no good", "inferior", etc.
4 = Delusional notions of worthlessness i.e. "I am a heap of garbage" or equivalent.

Kuppuswamy's SES Scale for 2015

Online Tool

Real-time update for the Kuppuswamy's Socioeconomic Status Scale

Check:

Is you study going to have people from **rural** areas OR **both** urban and rural areas?

If yes, please use instead the **Real-time update of the BG Prasad Scale (http://prasadscaleupdate.weebly.com)** for socioeconomic status assessment

Check this webpage first for the current CPI(IW):

www.labourbureau.nic.in/indnum.htm (http://www.labourbureau.nic.in/indnum.htm)

Then, please enter the CPI(IW) value in the green cell in the tool below.

CPI(IW) means Consumer Price Index for Industrial Workers. It will be some number between 200 to 300. For example, the CPI(IW) for February 2015 was 253.

Do note that the latest available value of CPI(IW) will usually be for 2 or 3 months prior to the current month.

Real-time update for the Kuppuswamy's Socioeconomic Status Scale

ENTER THE CURRENT CPI(IW) HERE :

253 Type and then press 'Enter'.

(A)	Education of Head	Score
1.	Profession or Honours	7
2.	Graduate or post graduate	6
3.	Intermediate or post high school d	5
4.	High school certificate	4
5.	Middle school certificate	3
6.	Primary school certificate	2
7.	Illiterate	1

(B)	Occupation of Head	Score
1.	Profession	10
2.	Semi-Profession	6
3.	Clerical, Shop-owner, Farmer	5
4.	Skilled worker	4
5.	Semi-skilled worker	3
6.	Unskilled worker	2
7.	Unemployed	1

(C)	Family income per month Latest revision (in Rs./month)			Score
1.		≥	39,020	12
2.	19,510	-	39,019	10
3.	14,633	-	19,509	6
4.	9,755	-	14,632	4
5.	5,853	-	9,754	3
6.	1,971	-	5,852	2
7.		≤	1,970	1

SCORING

Total score	Socioeconomic Class
26-29	Upper
16-25	Upper middle
11-15	Lower middle
5-10	Upper lower
< 5	Lower

This is a realtime update for the Kuppuswamy's Socioeconomic Status Scale for the year 2015.
The scale is as reproduced by Kumar (2007) & Ghosh (2009). The income categories are revised as given by Sharma (2011).

HOW TO USE:

Note that the interactivity in the tool is limited only to updating the income component. The scoring is passive i.e. will have to be done manually.

Use the online tool as a one-time reference to get the real-time update of the scale. Then do calculations of the socioeconomic class in your own excel-sheet/masterchart.

For further details of the scale and revision, please see the following article:

Kuppuswamy's Socioeconomic Status Scale – Revision for 2011 and Formula for Real-Time Updating. Indian Journal of Pediatrics; July 2012.
Available here: Springerlink (http://www.springerlink.com/content/w5661k2087744102/)

You can request a copy of the article by emailing at **scaleupdate@gmail.com** OR by using the feedback form below

MINI-COG™

Instructions

ADMINISTRATION	SPECIAL INSTRUCTIONS
1. Get patient's attention and ask him or her to remember three unrelated words. Ask patient to repeat the words to ensure the learning was correct.	• Allow patient three tries, then go to next item. • The following word lists have been validated in a clinical study:[1–3] **Version 1** • Banana • Sunrise • Chair **Version 3** • Village • Kitchen • Baby **Version 5** • Captain • Garden • Picture **Version 2** • Daughter • Heaven • Mountain **Version 4** • River • Nation • Finger **Version 6** • Leader • Season • Table
2. Ask patient to draw the face of a clock. After numbers are on the face, ask patient to draw hands to read 10 minutes after 11:00 (or 20 minutes after 8:00).	• Either a blank piece of paper or a preprinted circle (other side) may be used. • A correct response is all numbers placed in approximately the correct positions AND the hands pointing to the 11 and 2 (or the 4 and 8). • These two specific times are more sensitive than others. • A clock should not be visible to the patient during this task. • Refusal to draw a clock is scored abnormal. • Move to next step if clock not complete within three minutes.
3. Ask the patient to recall the three words from Step 1.	Ask the patient to recall the three words you stated in Step 1.

Scoring

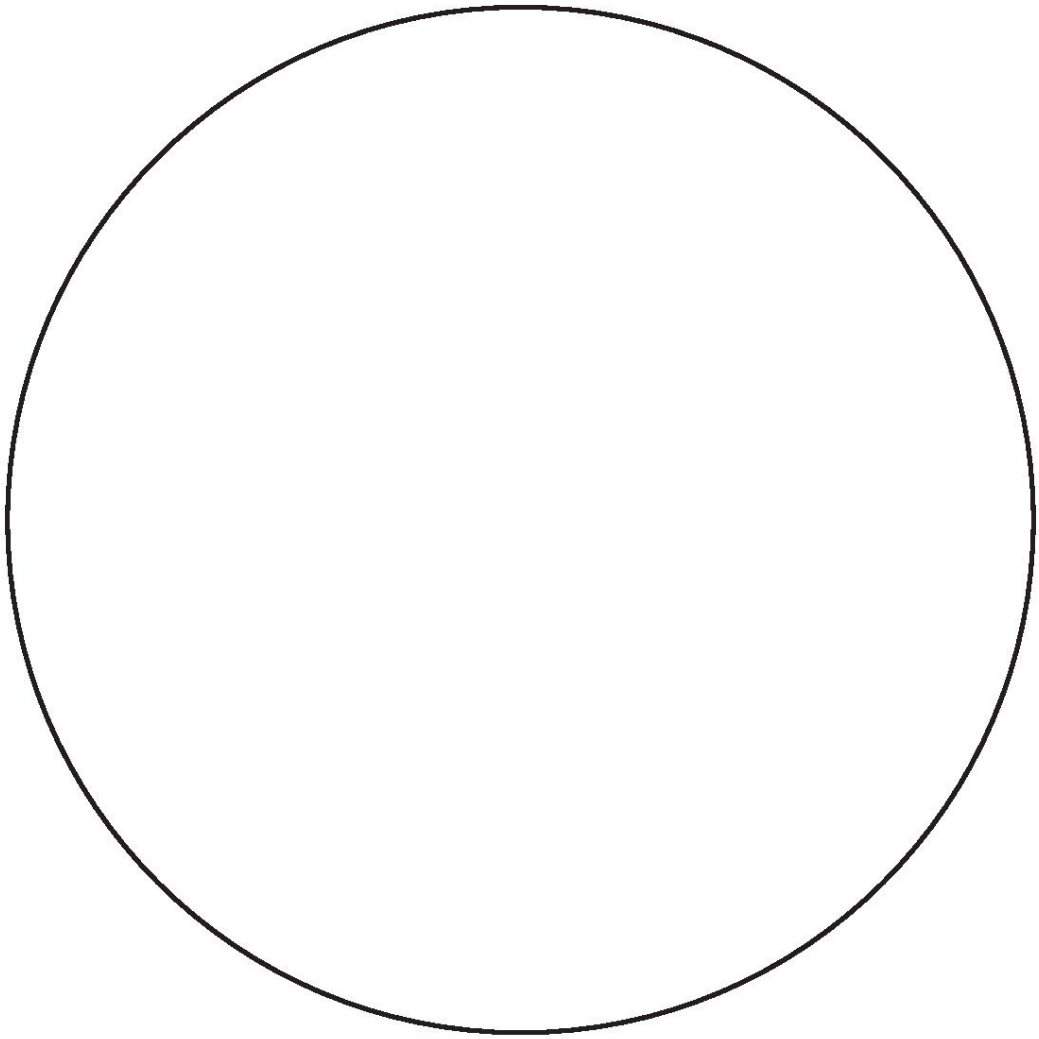
3 recalled words	Negative for cognitive impairment
1-2 recalled words + normal CDT	Negative for cognitive impairment
1-2 recalled words + abnormal CDT	Positive for cognitive impairment
0 recalled words	Positive for cognitive impairment

References

1. Borson S, Scanlan J, Brush M, Vitaliano P, Dokmak A. The mini-cog: a cognitive "vital signs" measure for dementia screening in multi-lingual elderly. Int J Geriatr Psychiatry. 2000;15(11):1021-1027.
2. Borson S, Scanlan JM, Chen P, Ganguli M. The Mini-Cog as a screen for dementia: validation in a population-based sample. J Am Geriatr Soc. 2003;51(10):1451-1454.
3. McCarten JR, Anderson P Kuskowski MA et al. Finding dementia in primary care: the results of a clinical demonstration project. J Am Geritr Soc. 2012;60(2):210-217.

CLOCK DRAWING TEST

Patient Name: _____ **Date:** _____



PRESUMPTIVE STRESSFUL LIFE EVENTS SCALE (PSLES)

Mean ranked stress score of each item

S. No.	Life events	Mean stress score
1	Death of spouse	95
2	Extramarital relations of spouse	` 80
3	Marital separation/divorce	77
4	Suspension or dismissal from job	76
5	Detention in jail of self or close family member	72
6	Lack of child	67
7	Death of close family member	66
8	Marital conflict	64
9	Property or crops damaged	61
10	Death of friend	60
11	Robbery or theft	59
12	Excessive alcohol or drug use by family member	58
13	Conflict with in-laws (other than over dowry)	57
14	Broken engagement or love affair	57
15	Major personal illness or injury	56
16	Son or daughter leaving home	55
17	Financial loss or problems	54
18	Illness of family member	52
19	Trouble at work with colleagues, superiors or subordinates	52
20	Prophecy of astrologer or palmist etc	52
21	Pregnancy of wife (wanted or unwanted)	52
22	Conflict over dowry (self or spouse)	51
23	Sexual problems	51
24	Self or family member unemployed	51

25	Lack of son	51
26	Large loan	49
27	Marriage of daughter or dependent sister	49
28	Minor violation of law	48
29	Family conflict	47
30	Break-up with friend	47
31	Major purchase or construction of house	46
32	Death of pet	44
33	Failure in examination	43
34	Appearing for examination or interview	43
35	Getting married or engaged	43
36	Trouble with neighbour	40
37	Unfulfilled commitments	40
38	Change in residence	39
39	Change or expansion of business	37
40	Outstanding personal achievement	37
41	Begin or end schooling	36
42	Retirement	35
43	Change in working conditions or transfer	33
44	Change in sleeping habits	33
45	Birth of daughter	30
46	Gain of new family member	30
47	Reduction in number of family functions	29
48	Change in social activities	28
49	Change in eating habits	27
50	Wife begins or stops work	25
51	Going on pleasure trip or pilgrimage	20

Data of Non Diabetic Patients

Sl. No.	Age	Gender	Marital Status	Living With	SE Status	Stressors	Depression Duration	GDRS socre	HDRS score
1	78	F	W	C	L	N	0.5	13	6
2	72	F	W	C	L	Y	2	10	14
3	75	F	M	A	L	N	1	7	11
4	66	F	W	A	L	Y	2.5	4	16
5	60	F	M	S	L	Y	5	9	13
6	75	M	W	A	L	N	1	13	9
7	65	M	W	A	L	N	3	7	11
8	63	M	U	E	M	Y	5	14	15
9	76	M	M	C	L	N	2	7	12
10	62	M	M	C	M	Y	0.5	6	10
11	85	F	W	C	L	Y	0.5	12	12
12	65	M	W	C	L	Y	0.5	12	9
13	65	M	M	S	L	N	2	9	16
14	61	M	W	C	L	N	3	11	12
15	73	M	M	S	L	N	1.5	12	11
16	60	F	W	C	L	Y	1	7	15
17	75	F	W	C	L	Y	1	11	16
18	75	F	W	C	L	Y	2	4	8
19	70	F	M(s)	E	L	Y	0.5	9	16
20	61	F	M	C	L	Y	0.5	11	20
21	71	M	M	C	M	Y	0.5	2	13
22	61	F	M	S	L	Y	1	8	18
23	65	F	W	E	L	Y	1	10	7
24	60	F	M	S	L	N	3	10	7
25	70	F	W	A	L	N	2	8	6
26	60	F	W	E	L	N	4	8	9
27	60	F	M	S	L	Y	5	9	13
28	61	M	W	C	L	N	3	11	12

Data of Non Diabetic Patients

Sl. No.	Age	Gender	Marital Status	Living With	SE Status	Stressors	Depression Duration	GDRS socre	HDRS score
29	75	F	M	A	L	N	1	7	11
30	85	F	W	C	L	Y	0.5	12	12
31	75	M	W	A	L	N	1	13	9
32	76	M	M	C	L	N	2	7	12
33	62	M	M	C	M	Y	0.5	6	10
34	75	F	W	C	L	Y	2	4	8
35	72	F	W	C	L	Y	2	10	14
36	71	M	M	C	M	Y	0.5	2	13
37	72	F	M(s)	E	L	Y	2	10	18
38	75	F	W	C	L	Y	1	11	16
39	65	M	W	A	L	N	3	7	11
40	60	F	W	C	L	Y	1	7	15
41	61	F	M	S	L	Y	1	8	18
42	65	M	M	S	L	N	2	9	16
43	60	F	M	S	L	N	3	10	7
44	78	F	W	C	L	N	0.5	13	6
45	61	F	M	C	L	Y	0.5	11	20
46	65	F	W	E	L	Y	1	10	7
47	65	M	W	C	L	Y	0.5	12	9
48	70	F	W	A	L	N	2	8	6
49	73	M	M	S	L	N	1.5	12	11
50	66	F	W	A	L	Y	2.5	4	16
51	63	M	U	E	M	Y	5	14	15
52	60	F	M	S	L	Y	5	9	13
53	76	M	M	C	L	N	2	7	12
54	61	M	W	C	L	N	3	11	12
55	70	F	M(s)	E	L	Y	0.5	9	16
56	61	F	M	S	L	Y	1	8	18
57	85	F	W	C	L	Y	0.5	12	12

Data of Non Diabetic Patients

Sl. No.	Age	Gender	Marital Status	Living With	SE Status	Stressors	Depression Duration	GDRS socre	HDRS score
58	65	F	W	E	L	Y	1	10	7
59	61	F	M	S	L	Y	1	8	18
60	75	F	W	C	L	Y	2	4	8
61	65	M	W	A	L	N	3	7	11
62	62	M	M	C	M	Y	0.5	6	10
63	73	M	M	S	L	N	1.5	12	11

Abbreviations:

Gender: M-Male; F-Female

Marital Status: M-Married; U-Unmarried; W-Widdow/widdower; M(s)-Married and seperated

Living with: S-Spouse alone; A-Alone; C-Children; E-Near Relative

SE Status: L-Lower; M-Lower Middle/Middle

Stressor: Y-Yes; N-No

Data of Diabetic Patients

Sl. No.	Age (years)	Gender	Marital Status	Living With	SE Status	Stressor	Duation of Depression (years)	Duration of diabetes (years)	Blood Sugar (F) mg/dcl	Blood Sugar (PP) mg/dcl	Diabetic Complications	OHAs	Insulin	GDRS score	HDRS score	HbA1c
1	85	M	M	C	L	Y	2.5	25	168	315	y	y	y	12	19	
2	65	M	M	E	L	Y	0.12	3	120	185	y	y	y	7	17	
3	80	M	W	C	L	N	2	1	161	328	n	y	n	7	12	8
4	67	F	W	C	L	N	0.5	0.5	188	409	n	y	n	5	11	
5	78	M	M	C	M	N	24	5	94	166	n	y	y	4	19	
6	73	M	M	S	L	Y	10	8	249	372	n	y	n	12	22	
7	65	F	W	A	L	Y	0.5	2	50	168	y	y	n	12	23	9
8	66	M	M	C	M	N	1	4	121	220	n	y	y	5	10	
9	80	F	W	C	L	N	8	2	157	341	y	y	n	11	25	
10	70	M	M	S	L	N	0.5	4	100	180	n	y	n	10	12	8
11	65	M	W	E	L	N	0.25	5	120	180	n	y	n	6	5	
12	72	F	W	A	L	Y	2	3	150	280	n	y	n	10	17	9.5
13	65	M	M	A	L	N	2.5	3	110	190	y	y	n	12	17	
14	70	M	M	A	L	N	1	8	122	282	y	y	n	8	11	10
15	71	M	M	C	L	N	0.5	8	111	198	y	y	n	11	10	
16	70	F	M	C	L	N	2.5	5	127	220	y	y	n	6	11	
17	69	F	W	C	L	Y	0.5	8	160	350	y	y	y	10	26	8.5
18	67	F	W	C	L	Y	3	3	125	220	n	y	n	6	13	
19	74	F	W	C	M	Y	6	4	115	159	y	y	n	6	13	
20	65	F	M	C	L	Y	1	2	107	156	n	y	n	4	10	
21	65	F	W	C	L	Y	1	1	114	360	n	y	n	9	22	11
22	65	M	M	S	L	Y	0.5	7	143	240	y	y	n	9	11	
23	86	M	M(s)	A	L	Y	0.5	2	115	255	n	y	n	8	20	
24	66	F	M	S	L	Y	0.5	4	112	213	n	y	n	11	9	
25	70	F	W	C	L	Y	3	9	191	345	y	y	n	11	30	9
26	72	F	W	C	L	Y	0.5	8	83	194	n	y	n	10	13	
27	72	F	W	C	L	Y	4	7	79	145	y	y	n	12	17	
28	66	F	W	C	L	Y	1	1	132	177	y	y	n	8	16	10

Data of Diabetic Patients

Sl. No.	Age (years)	Gender	Marital Status	Living With	SE Status	Stressor	Duation of Depression (years)	Duration of diabetes (years)	Blood Sugar (F) mg/dcl	Blood Sugar (PP) mg/dcl	Diabetic Complications	OHAs	Insulin	GDRS score	HDRS score	HbA1c
29	72	M	W	A	L	Y	5	5	124	332	y	y	y	9	24	
30	65	M	M(s)	A	L	N	2	6	95	202	y	y	n	7	9	10
31	72	M	M	C	L	N	1	1	152	362	y	y	n	7	23	
32	65	F	W	C	L	N	2	20	320	415	n	y	y	9	10	
33	72	F	W	C	L	N	1	4	110	170	n	y	n	5	8	8.5
34	70	F	W	C	L	Y	0.5	20	165	290	y	y	y	12	28	
35	65	F	W	C	L	Y	1	15	120	260	Y	Y	y	9	28	11
36	67	M	M	S	M	N	10	0.5	134	235	n	y	n	12	22	
37	76	M	M	A	L	N	1	3	135	210	n	y	n	5	11	
38	70	F	M	C	M	N	24	5	127	220	y	y	n	6	11	9
39	72	F	W	C	L	N	8	8	83	194	n	y	n	10	13	
40	74	F	W	A	L	Y	2	4	115	159	y	y	n	6	13	
41	67	M	W	A	L	Y	0.5	0.5	134	235	n	y	n	12	22	
42	65	M	W	C	L	Y	3	3	120	185	y	y	y	7	17	13
43	67	F	W	C	L	N	2	3	125	220	n	y	n	6	13	
44	65	F	W	A	L	N	5	2	50	168	y	y	n	12	23	
45	65	F	W	C	L	Y	4	2	107	156	n	y	n	4	10	10
46	65	M	M	S	L	Y	0.5	3	110	190	y	y	n	12	17	
47	69	F	W	C	L	N	0.5	8	160	350	y	y	y	10	26	12
48	86	M	M	C	L	Y	2.5	2	115	255	n	y	n	8	20	9.5
49	72	M	M	C	L	N	1	5	124	332	y	y	y	9	24	
50	72	F	M	S	L	Y	0.5	3	150	280	n	y	n	10	17	11
51	65	F	M	C	M	N	1	15	120	260	Y	Y	y	9	28	
52	80	M	W	C	L	N	3	1	161	328	n	y	n	7	12	
53	65	M	M	E	L	N	0.12	7	143	240	y	y	n	9	11	
54	80	F	M	C	L	Y	2.5	2	157	341	y	y	n	11	25	

Data of Diabetic Patients

Sl. No.	Age (years)	Gender	Marital Status	Living With	SE Status	Stressor	Duation of Depression (years)	Duration of diabetes (years)	Blood Sugar (F) mg/dcl	Blood Sugar (PP) mg/dcl	Diabetic Complications	OHAs	Insulin	GDRS score	HDRS score	HbA1c
55	70	F	W	E	L	N	0.25	9	191	345	y	y	n	11	30	11
56	73	M	M	A	L	N	2.5	8	249	372	n	y	n	12	22	
57	66	F	W	C	L	N	2	4	112	213	n	y	n	11	9	
58	66	M	M	S	L	N	10	4	121	220	n	y	y	5	10	8
59	65	F	M	C	L	Y	1	20	320	415	n	y	y	9	10	
60	70	M	W	C	L	N	1	4	100	180	n	y	n	10	12	10
61	72	M	W	C	L	Y	1	1	152	362	y	y	n	7	23	
62	67	F	M	S	L	Y	0.5	0.5	188	409	n	y	n	5	11	
63	67	F	M	C	L	N	0.5	3	125	220	n	y	n	6	13	10
64	72	F	M(s)	A	L	Y	2	7	79	145	y	y	n	12	17	
65	70	M	M	A	L	Y	1	8	122	282	y	y	n	8	11	8
66	71	M	W	C	L	Y	1	8	111	198	y	y	n	11	10	
67	76	M	W	C	L	N	0.5	3	135	210	n	y	n	5	11	
68	78	M	W	C	L	Y	0.5	5	94	166	n	y	y	4	19	
69	72	F	W	C	L	N	0.5	4	110	170	n	y	n	5	8	13
70	65	M	M	S	M	N	10	6	95	202	y	y	n	7	9	
71	66	F	W	C	L	Y	3	1	132	177	y	y	n	8	16	
72	85	M	M	A	L	Y	1	25	168	315	y	y	y	12	19	
73	65	M	W	C	L	Y	3	5	120	180	n	y	n	6	5	11
74	76	M	W	C	L	N	1	3	135	210	n	y	n	5	11	
75	65	F	M(s)	A	L	N	0.5	1	114	360	n	y	n	9	22	
76	70	F	W	C	M	Y	6	20	165	290	y	y	y	12	28	8
77	78	M	W	C	L	Y	0.5	5	94	166	n	y	y	4	19	
78	72	M	W	C	L	N	1	1	152	362	y	y	n	7	23	
79	69	F	W	A	L	N	5	8	160	350	y	y	y	10	26	
80	76	M	M	S	L	Y	0.5	3	135	210	n	y	n	5	11	9

Data of Diabetic Patients

Sl. No.	Age (years)	Gender	Marital Status	Living With	SE Status	Stressor	Duation of Depression (years)	Duration of diabetes (years)	Blood Sugar (F) mg/dcl	Blood Sugar (PP) mg/dcl	Diabetic Complications	OHAs	Insulin	GDRS score	HDRS score	HbA1c
81	71	M	M	C	M	Y	1	3	149	342	y	y	n	8	22	
82	65	M	M	C	L	Y	0.5	5	120	180	n	y	n	6	5	8.5
83	80	M	W	E	L	N	0.25	1	161	328	n	y	n	7	12	
84	74	F	M	S	L	Y	10	4	115	159	y	y	n	6	13	
85	65	F	M	C	M	N	1	2	50	168	y	y	n	12	23	11
86	72	F	W	C	L	Y	3	4	110	170	n	y	n	5	8	
87	65	F	W	A	L	N	0.5	1	112	358	n	y	n	9	22	
88	72	F	M	S	L	Y	0.5	3	150	280	n	y	n	10	17	10.5

Abbreviations:

Gender: M-Male; F-Female

Marital Status: M-Married; U-Unmarried; W-Widdow/widdower; M(s)-Married and seperated

Living with: S-Spouse alone; A-Alone; C-Children; E-Near Relative

SE Status: L-Lower; M-Lower Middle/Middle

Stressor, OHAs, Insulin, Diabetic Complications: Y-Yes; N-No